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Pantawid Pamilyang Pilipino Program (4Ps) Beneficiaries: An Analysis of Their Satisfaction Levels

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ABSTRACT: This study examined the difference in the satisfaction level of 4Ps beneficiaries in Barangay VI, Victorias City, Negros Occidental, Philippines between the year 2015 and year 2020. The design of the study used a descriptive comparative method of research. The participants were 216 from 2015, 250 from 2020, and were official 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental in the specified years. Results were analyzed with frequency, percentage, mean, and T-test. The findings revealed that the majority of them were above 30 years old with 349 (74.89%), female with 425 (91.20%), married with 359 (77.04%), laborers with 268 (57.51%), with 1-3 number of children with 261 (56%), and high school level of educational attainment with 284 (60.95%). Further, it indicated that there was an increasing trend in the 4Ps parent-beneficiaries in 2020 with the following: above 30 years old (41.2%) widow (7.1%), single parent (9.9%), no work (17.4%), laborers (8.8%), college-level (4.8%) and college graduates (0.1%). It revealed the decreasing trend in the year 2020 with the following 4Ps parent-beneficiaries: 30 years old and above (46.8%) and married (13.5%). The satisfaction level of 4Ps beneficiaries to CCT has significantly increased to a high level of satisfaction by 2020. There was a significant difference in the satisfaction level of 4Ps parent- beneficiaries to the CCT program which revealed that the satisfaction level survey was higher in 2020 than in 2015 especially in terms of health grants and education grants. Lastly, it was recommended to provide sustainable programs that would enhance the living conditions and nutrition grants of locals.

KEYWORDS: Include at least 5 to 6 keywords or phrases

1. INTRODUCTION

Pantawid Pamilyang Pilipino is a Philippine government assistance program for extremely poor families. This program provides health care, nutrition, family development, and education to low-income families with children aged 0 to 14. It has two objectives: 1) to provide economic assistance to satisfy their immediate needs, and 2) to promote social development by investing in human capital to break the cycle of poverty (Agbon, Nolasco-Amadora, Aguilar, Abellanosa, & Ligaton, 2013). It aspires to end severe poverty in the Philippines by investing in health and education, especially for children aged 0 to 18. It is modeled after similar projects in other developing countries, such as Bolsa Familia in Brazil, Familias en Accion in Columbia, and Oportunidades in Mexico (Defensor). At this time, the 4Ps program serves 4,326,208 households in 17 regions, 79 provinces, 143 cities, and 1,484 municipalities (4Ps).

This government program is still affecting the lives of poor people across the country, especially the 463 Indigenous Peoples (IT) of the Ata tribe/family in Mabinay, Negros Oriental. In 2015, it covered IPs who received modified conditional cash transfers for indigenous peoples (MCCT-IP), notably those who lived in geographically isolated and disadvantaged areas (GIDAs). It also strives to give families with a holistic change through family development Sessions (FDS), which have a higher rate of developing parent leaders in the community, according to Newman (2020).

Along this line, several studies have been conducted showing that, while life satisfaction is not always high in countries with higher earnings, income has a greater impact on the well-being of impoverished people than it does on the well-being of rich people (Bayram, Aytac, Aytac, Sam, & Bilgel, 2012).

Pantawid Pamilyang Pilipino Program (4Ps) Beneficiaries: An Analysis of Their Satisfaction Level

Most research on the Pantawid Pamilyang Pilipino Program concentrated on its sociological and economic components. As a result, the researchers chose this time to pursue a psychological approach. The focus of this study will be on a satisfaction survey of 4Ps recipients with the following objectives: (1) determine the demographic profiles of the 4Ps beneficiaries in terms of age, sex, civil status, occupation, number of children, and educational qualification; (2) determine the satisfaction levels of the 4Ps beneficiaries in health grant, nutrition grant, education grant, and living condition.

2. METHODOLOGY

Research Design

This study aimed to determine the satisfaction levels of the 4Ps beneficiaries of Brgy VI, Victorias City, Philippines; hence the descriptive method of research was used. According to Latin and Berg (2004), descriptive research is typified by observations or descriptions of the status of a condition or situation. Investigators using this method do not manipulate variables or make things happen.

Participants of the Study

The participants of the study were the 4Ps beneficiaries of Brgy VI, Victorias City, Philippines. These participants were grouped according to their demographic profile such as their age, sex, civil status, occupation, number of children, and educational qualification.

Research Instrument

The research instrument used in this study consisted of two main parts namely:

Part I. Demographic Profile

Part I of the research instrument determined the demographic profile of the 4Ps participants. This includes participants' name which is optional, age, sex, civil status, occupation, number of children, and educational qualification.

Part II. Level of Satisfaction Survey

This study made use of self-made questionnaire which was used in the 2015 satisfaction survey. Such questionnaires used a Likert scaling system to measure the level of satisfaction on a 4Ps program or CCT. The second part of the research instrument determined the satisfaction levels of 4ps beneficiaries in health grants, nutrition grants, education grants, and living condition. Since the instrument was adapted in 2015, it has undergone validity and reliability.

Statistical Analysis of the Data

To answer the proposed problems, the researcher utilized the descriptive statistics. For problem 1 which determined the demographic profile of the participant, frequency and percentage was used. For problem 2, which determined the satisfaction levels of the 4Ps participants, mean was used. To interpret the satisfaction levels of the 4Ps participants, the following scale was used: 4.21-5.00 (Very highly satisfied); 3.41-4.2 (Highly satisfied); 2.61-3.40 (Satisfied), 1.81-2.60 (Fairly satisfied); 1.00-1.80 (Not satisfied).

Ethical Considerations

The researchers included statements that consider the following: Republic Act 10173 – Data Privacy Act of 2012, informed consent, the anonymity of respondents, the confidentiality of data; and disposal of survey materials. It was also emphasized that their participation was voluntary and all the data taken from them were treated with high confidentiality.

Pantawid Pamilyang Pilipino Program (4Ps) Beneficiaries: An Analysis of Their Satisfaction Level

3. RESULTS AND DISCUSSION

Table 1: Demographic Profile of the 4Ps Beneficiaries

	2015		2020	Difference	
Age					
30 and above	114 (52.8%)	235 (94%)	349 (74.89%)	41.2%	Increase
Below 30	102 (47.2%)	15 (6%)	117 (25.11%)	41.2%	Decrease
Total	216 (100%)	250 (100%)	466 (100%)		
Sex					
Female	200 (92.6%)	225 (90%)	425 (91.20%)	2.6%	Decrease
Male	16 (7.4%)	25 (10%)	41 (8.80%)	2.6%	Increase
Total	216 (100%)	250 (100%)	466 (100%)		
Civil Status					
Married	182 (84.3%)	177 (70.8%)	359 (77.04%)	13.5%	Decrease
Separated	12 (5.6%)	11 (4.4%)	23 (4.94%)	1.2%	Decrease
Widow	14 (6.5%)	34 (13.6%)	48 (10.30%)	7.1%	Increase
Single Parent	8 (3.7%)	28 (13.6%)	36 (7.73%)	9.9%	Increase
Total	216 (100%)	250 (100%)	466 (100%)		
Occupation					
Laborer	114 (52.8%)	154 (61.6%)	268 (57.51%)	8.8%	Increase
Driver	57 (26.4%)	25 (10.0%)	82 (17.60%)	16.4%	Decrease
Vendor	35 (16.2%)	16 (6.4%)	51 (10.94%)	9.8%	Decrease
No Work	10 (4.6%)	55 (22%)	65 (13.95)	17.4%	Increase
Total	216 (100%)	250 (100%)	466 (100%)		
Number of Children					
1 – 3	124 (57.4%)	137 (54.8%)	261 (56%)	2.6%	Decrease
4 and above	92 (42.6%)	113 (45.2%)	205 (44%)	2.6%	Increase
Total	216 (100%)	250 (100%)	466 (100%)		
Educational Qualification					
Elementary	66 (30.6%)	67 (26.8%)	133 (28.54%)	3.8%	Decrease
High School	133 (61.1%)	151 (60.4%)	284 (60.95%)	0.7%	Decrease
College Level	13 (6 %)	27 (10.8%)	40 (8.58%)	4.8%	Increase
College Graduate	4 (1.9%)	5 (2%)	9 (1.93%)	0.1%	Increase
Total	216 (100%)	250 (100%)	466 (100%)		

Table 1 shows the demographic profile of the 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during 2015 and 2020. When grouped according to age, there were114 (52.8%) ages 30 and above and 102 (47.2%) for below 30 in 2015. In the year 2020, it shows that there were 235 (94%) ages 30 and above and 15 (6%) ages below 30 years old. It signifies that some of 30 years old and above 4Ps beneficiaries have increased in 2020. Below 30 years old significantly decreased in 2020. When grouped according to sex, there were 200 (92.6%) females in 2015 and 225 (90%) in 2020. For male beneficiaries, there were 16 (7.4%) in 2015 and 25 (10%) in 2020. When grouped according to civil status, married with 182 (84.3%), separated with 12 (5.6%), a widow with 14 (6.5%), single parent with 8 (3.7%), and total sample size with 216 (100%) in 2015. In the year 2020, it showed that 4Ps beneficiaries who were married were 177 (70.8%), separated with 11 (4.4%), widows with 34 (13.6%), and single parents with 28 (13.6%). When it comes to occupation, in the year 2015 there were 114 (52.8%) for laborers, drivers with 57 (26.4%), vendors with 35 (16.2%), no work 10 (4.6%). However, in the year 2020, there were 154 (61.6%) for laborers, drivers with 25 (10.0%), vendors with 16 (6.4%), and no work with 55 (22%). When grouped according to the number of children, it shows that in 2015, 4Ps beneficiaries with 1-3 children were 124 (57.4%) and those with beneficiaries with 4 children and above were 92 (42.6%).

However, in the year 2020, it showed that beneficiaries with 1-3 children were 137 (54.8%) and 4 children and above with 113 (45.2%). When grouped according to educational qualification, it shows that in 2015, 4Ps beneficiaries with educational qualification of elementary were 66 (30.6%), high school with 133 (61.1%), college-level with 13 (6 %), and graduated college with 4 (1.9%). However, in the year 2020, it showed that 4Ps beneficiaries with educational qualification of elementary were 67 (26.8%), high school with 151(60.4%), college-level with 27 (10.8%), and graduated college with 5 (2%). Overall, the majority of 4Ps beneficiaries from 2015 to 2020 were those who were below 30 with 337 (72.3%), female with 425 (91.20%), married with 359 (77.04%), a laborer with 268 (57.51%), 1-3 number of children with 261 (56%) and those who have high school educational attainment with 284 (60.95%).

Pantawid Pamilyang Pilipino Program (4Ps) Beneficiaries: An Analysis of Their Satisfaction Level

Table 2. Satisfaction Level of the 4Ps beneficiaries During the Year 2015 and Year 2020

Areas	Year 2015		Year 2020	
	Mean	Interpretation	Mean	Interpretation
Health	3.38	Satisfied	3.44	Highly Satisfied
Nutrition	3.31	Satisfied	3.40	Satisfied
Education	3.35	Satisfied	3.49	Highly Satisfied
Living condition	3.00	Satisfied	3.37	Satisfied
When Taken as a Whole	3.26	Satisfied	3.43	Highly Satisfied

Table 2 shows the satisfaction level of 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during 2015 and 2020. Overall, in 2015 it shows that the satisfaction level of 4Ps beneficiaries was M=3.26 interpreted as satisfied. In terms of health grant, it was M=3.38, nutrition grant with M=3.31, education grant with M=3.35, and living condition with 3.00. This indicated that in terms of health grant, nutrition grant, education grant, living condition and overall level of satisfaction to CCT by 4Ps parent-beneficiaries were all satisfied. However, in the year 2020, it shows that the overall satisfaction level to CCT was 3.43. In terms of health grant, it was M=3.44, nutrition grant with M=3.40, education grant with M=3.49, and living condition with 3.37. It further indicated that the overall satisfaction level of 4Ps beneficiaries to CCT was highly satisfied. In terms of nutrition grant and living condition were satisfied but highly satisfied in terms of health and living condition grants.

Table 3. Satisfaction Level of the 4Ps beneficiaries During the Year 2015 and Year 2020 when Grouped According to Age

Areas and Variables	2015		2020	
	Mean	Verbal Interpretation	Mean	Verbal Interpretation
Health				
Below 30	3.45	Highly Satisfied	3.40	Satisfied
30 and Above	3.31	Satisfied	3.44	Satisfied
As A Whole	*3.31*	*Satisfied*	*3.44*	*Satisfied*
Nutrition				
Below 30	3.39	Satisfied	3.46	Highly Satisfied
30 and Above	3.23	Satisfied	3.39	Satisfied
As A Whole	*3.31*	*Satisfied*	*3.43*	*Satisfied*
Education				
Below 30	3.37	Satisfied	3.46	Highly Satisfied
30 and Above	3.32	Satisfied	3.49	Highly Satisfied
As A Whole	*3.35*	*Satisfied*	*3.48*	*Highly Satisfied*
Living Condition				
Below 30	3.00	Satisfied	3.33	Satisfied
30 and Above	2.99	Satisfied	3.37	Satisfied
As A Whole	*3.00*	*Satisfied*	*3.35*	*Satisfied*

Table 3 shows the satisfaction level of the 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during 2015 and 2020 according to age. Overall, the satisfaction level of 4Ps beneficiaries in 2015 with below 30 was satisfied in terms of nutrition grant with M=3.39, education grant with M=3.37, and living condition with M=3.00 except that health grant with M=3.45 were indicated as highly satisfied. In 2015, it also indicated those respondents' ages below 30 rated health grant as the highest with M=3.45, followed by nutrition grant with M=3.39, education grant with M=3.37, and the least was living conditions with M=3.00. On the other hand, respondents with ages 30 and above rated education grant as the highest with M=3.32, followed by health grant with M=3.31, then nutrition grant with M=3.23, and the least was the living condition with M=2.99.

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However, in 2020, it showed that health grant with M=3.40 and living condition with M=3.33 were interpreted as highly satisfied while nutrition grant with M=3.46 and education grant with M=3.46 were interpreted as highly satisfied. When grouped according to 30 and above, it showed that in 2015 the satisfaction level of the CCT program was highly satisfied in terms of health grant, education grant, nutrition grant, and living condition. The 2020 survey indicated that nutrition grant with M=3.39 and living condition with M=3.37 remained as satisfied. However, health grant with 3.44 and education grant at 3.49 indicated as highly satisfied. Further 2020 survey indicated that those respondents' ages above 30 rated education grant as the highest with M=3.32, followed by health grant with M=3.31, nutrition grant M=3.23, and the least was living condition with M=2.99. On the other hand, respondents with ages below 30 in 2020 revealed that respondents rated nutrition grant and education grant as the highest with M=3.46, followed by health grant with M=3.40, and the least was living condition with M=3.33. It was revealed that respondents' satisfaction level to 4Ps program according to age was higher in 2020 than in 2015, scored the highest at education grant which increased to a highly satisfied level in 2020.

Table 4. Satisfaction level of the 4Ps beneficiaries During the Year 2015 and Year 2020 when Grouped According to Sex

Areas and Variables	2015		2020	
	Mean	Verbal Interpretation	Mean	Verbal Interpretation
Health				
Female	3.56	Highly Satisfied	3.43	Highly Satisfied
Male	3.37	Satisfied	3.56	Highly Satisfied
As A Whole	*3.47*	*Highly Satisfied*	*3.50*	*Highly Satisfied*
Nutrition				
Female	3.19	Satisfied	3.37	Satisfied
Male	3.32	Satisfied	3.60	Highly Satisfied
As A Whole	*3.26*	*Satisfied*	*3.49*	*Highly Satisfied*
Education				
Female	3.19	Satisfied	3.48	Satisfied
Male	3.36	Satisfied	3.60	Highly Satisfied
As A Whole	*3.28*	*Satisfied*	*3.54*	*Highly Satisfied*
Living Condition				
Female	2.88	Satisfied	3.36	Satisfied
Male	3.01	Satisfied	3.52	Highly Satisfied
As A Whole	*2.95*	*Satisfied*	*3.44*	*Highly Satisfied*

Table 4 shows the satisfaction level of the 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during the year 2015 and year 2020 according to sex. Overall, the satisfaction level of 4Ps beneficiaries in 2015 with females was satisfied in terms of nutrition grant with M=3.19, education grant with M=3.19, and living condition with M=2.878 except that health grant with M=3.43 were indicated as satisfied. The 2015 survey also indicated that female respondents rated health grant as the highest with M=3.56, followed by nutrition grant and education grant with M=3.19, and the least was living conditions with M=2.88. On the other hand, male respondents rated health grants as the highest with M=3.37, followed by education grant with M=3.36, then nutrition grant with M=3.32, and the least was the living condition with M=3.01.

However, in 2020, it showed that health grant with M=3.43 and education grant with M=3.48 were interpreted as satisfied. However, nutrition grant with M=3.37 and living condition with M=3.36 were interpreted as satisfied. When grouped according to males, in the year 2015 it showed that the satisfaction level to CCT program was satisfied in terms of health grant M=3.37, education grant with M=3.32, nutrition grant with M=3.36, and living condition with M=3.01. However, in 2020, it indicated that the satisfaction was satisfied in terms of health grant with M=3.56, nutrition grant with M=3.60, education grant with 3.60, and living condition with M=3.52.

Further, the 2020 survey indicated that female respondents rated education grant as the highest with M=3.48, followed by

health grant with M=3.43, nutrition grant with M=3.37, and the least was living condition with M=3.36. On the other hand, male respondents rated nutrition grant and education grant as the highest with M=3.60, followed by health grant with M=3.56, and the   least was living condition with M=3.52.

It revealed that respondents' satisfaction level to 4Ps program according to sex was higher in 2020 than in 2015. It scored the highest at education grant and health grant and lowest at living condition. Further, nutrition grant, education grant, and living condition increased to a highly satisfying level in 2020.

Table 5. Satisfaction level of the 4Ps Beneficiaries During the Year 2015 and Year 2020 when Grouped According to Civil Status

Areas and Variables	2015 Mean	2015 Verbal Interpretation	2020 Mean	2020 Verbal Interpretation
Health				
Married	3.43	Highly Satisfied	3.46	Highly Satisfied
Separated	3.25	Satisfied	3.45	Highly Satisfied
Widow	3.07	Satisfied	3.44	Highly Satisfied
Single Parent	3.00	Satisfied	3.44	Highly Satisfied
As A Whole	*3.19*	*Satisfied*	*3.45*	*Highly Satisfied*
Nutrition				
Married	3.36	Satisfied	3.46	Highly Satisfied
Separated	3.25	Satisfied	3.45	Highly Satisfied
Widow	2.79	Satisfied	3.26	Satisfied
Single	3.25	Satisfied	3.39	Satisfied
As A Whole	*3.16*	*Satisfied*	*3.39*	*Satisfied*
Education				
Married	3.35	Satisfied	3.52	Satisfied
Separated	3.67	Satisfied	3.54	Highly Satisfied
Widow	3.07	Satisfied	3.35	Satisfied
Single Parent	3.25	Satisfied	3.49	Highly Satisfied
As A Whole	*3.34*	*Satisfied*	*3.48*	*Highly Satisfied*
Living Condition				
Married	3.03	Satisfied	3.37	Satisfied
Separated	3.08	Satisfied	3.45	Highly Satisfied
Widow	2.92	Satisfied	3.44	Highly Satisfied
Single Parent	2.25	Fairly Satisfied	3.37	Satisfied
As A Whole	*2.82*	*Satisfied*	*3.41*	*Highly Satisfied*

Table 5 shows the satisfaction level of the 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during 2015 and 2020 according to civil status. Overall, the satisfaction of married 4Ps beneficiaries in 2015   was satisfied in terms of nutrition grant with M=3.36, education grant with   M=3.35, and living condition with M=3.03. Only that health grant with M=3.43 were highly satisfied. However, in 2020, it showed that education grant with M=3.52 and living condition with M=3.37 remained satisfied. However, nutrition   grant with M=3.46 and health grant with M=3.46 were highly satisfied. When grouped according to separated parent-beneficiaries, it showed that in the year   2015 the satisfaction to CCT program was satisfied in terms of health grant M=3.25, nutrition grant with M=3.25, education grant with M=3.67, and living condition with M=3.08. The 2015 survey also indicated that married respondents rated health grant as the highest with M=3.43, followed by nutrition grant with M=3.36, then education grant with M=3.35 and the least were living condition with M=3.03. Separated respondents rated education grant as the highest with M=3.67, followed by health and nutrition grants with M=3.25, and the least was the living condition with M=3.08. Widow respondents rated health grant and education grant as the highest with M=3.07, followed by living condition with M=2.92, and the least was nutrition grant with M=2.79. Single parent respondents rated nutrition grant and education grant as the highest with M=3.25, followed by health grant with M=3.00, and the least was living condition   with M=2.25.

However, in 2020, it indicated that the satisfaction level was satisfied in terms of health grant with M=3.45, nutrition grant with M=3.45, education grant with M=3.54, and living condition with M=3.45. When grouped according to widow parent-beneficiaries, it showed that in 2015 the satisfaction to CCT program was satisfied in terms of health grant M=3.07, nutrition grant with M=2.79, education grant with M=3.07, and living condition with M=2.92. Even if nutrition grant and living condition have lower mean scores, still widow parent-beneficiaries were satisfied. However, in 2020, it indicated that the level of satisfaction remained satisfied in terms of nutrition grant with M=3.26 and   education grant with M=3.35. However, health grant with M=3.44 and living   condition with M=3.44 have significantly indicated as highly satisfied. When grouped according to single parent beneficiaries, it showed that in the year 2015   the satisfaction was satisfied in terms of health grant with M=3.00, nutrition grant M=3.25, and education grant with M=3.25 except for living condition with M=2.25 which indicated fairly satisfied.

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However, the 2020 survey, showed that nutrition grant with M=3.39 and living condition with M=3.37 remained satisfied while health grant with M=3.44 and education grant with M=3.49 were satisfied. Further, the 2020 survey indicated that married respondents rated education grant as the highest with M=3.52, followed by health grant and nutrition grant with M=3.46, and the least was living condition with M=3.37. Separated respondents rated education grant as the highest with M=3.54, and the least were health grant, nutrition grant, and living condition with M=3.45. Widow respondents rated health grant and living condition as the highest with M=3.44, followed by education grant with M=3.35, and the least was nutrition grant with M=3.26. Single parent respondents rated education grant as the highest with M=3.49, followed by health grant with M=3.44, then nutrition grant with M=3.39 and the least were living condition with M=3.37. It revealed that respondents' satisfaction level to 4Ps program according to civil status was higher in 2020 than in 2015. It scored the highest at education grant and lowest at living condition. Further, health grant, education grant, and living condition increased to a highly satisfying level in 2020.

Table 6. Satisfaction level of the 4Ps beneficiaries During year 2015 and year 2020

Areas and Variables	2015		2020	
	Mean	Verbal Interpretation	Mean	Verbal Interpretation
Health				
Laborer	3.43	Highly Satisfied	3.43	Highly Satisfied
Driver	3.25	Satisfied	3.20	Satisfied
Vendor	3.46	Highly Satisfied	3.45	Highly Satisfied
No Work	3.30	Satisfied	3.54	Highly Satisfied
As A Whole	*3.36*	*Satisfied*	*3.41*	*Highly Satisfied*
Nutrition				
Laborer	3.32	Satisfied	3.40	Satisfied
Driver	3.25	Satisfied	3.28	Satisfied
Vendor	3.37	Satisfied	3.39	Satisfied
No Work	3.40	Satisfied	3.42	Highly Satisfied
As A Whole	*3.34*	*Satisfied*	*3.37*	*Satisfied*
Education				
Laborer	3.35	Satisfied	3.46	Highly Satisfied
Driver	3.26	Satisfied	3.52	Highly Satisfied
Vendor	3.46	Highly Satisfied	3.45	Highly Satisfied
No Work	3.50	Highly Satisfied	3.54	Highly Satisfied
As A Whole	*3.39*	*Satisfied*	*3.49*	*Highly Satisfied*
Living Condition				
Laborer	2.95	Satisfied	3.38	Satisfied
Driver	3.01	Satisfied	3.36	Satisfied
Vendor	3.14	Satisfied	3.37	Satisfied
No Work	3.00	Satisfied	3.35	Satisfied
As A Whole	*3.03*	*Satisfied*	*3.37*	*Satisfied*
As a Whole				

Table 6 shows the satisfaction level of the 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during 2015 and 2020 according to occupation. The satisfaction level of laborer 4Ps parent-beneficiaries in 2015 was satisfied in terms of nutrition grant with M=3.32, education grant with M=3.35, and living condition with M=2.95 with the exception that health grant with M=3.43 indicated as highly satisfied. However, in 2020, it showed that nutrition grant with M=3.40 and living condition with M=3.38 remained satisfied. However, health grant with M=3.43 and education grant with M=3.46 were interpreted as highly satisfied. When grouped according to driver parent-beneficiaries, it showed that in 2015 the satisfaction to CCT program was satisfied in terms of health grant M=3.25, nutrition grant with M=3.25, education grant with M=3.26, and living condition with M=3.01. The 2015 survey also indicated that laborer respondents rated health grant as the highest with M=3.43, followed by education grant with M=3.35, then nutrition grant with M=3.32 and the least were living condition with M=2.95. Driver respondent rated education grant as the highest with M=3.26, followed by education grant with M=3.26, then health grant with M=3.25, and the least was the living condition with M=3.01. Vendor respondents rated health grant and education grant as the highest with M=3.46, followed by nutrition grant with M=3.37, and the least was living condition with M=3.14. Respondents with no work rated education grant as the highest with M=3.50, followed by nutrition grant with M=3.40, then health grant with M=3.30 and the least were living condition with M=3.00.

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However, the 2020 survey, showed that health grant with M=3.54, nutrition grant with M=3.42, and education grant with M=3.54 were highly satisfied except that living condition with M=3.35 remained satisfied. Overall, it indicated that the satisfaction level to the CCT program in 2015 and 2020 according to civil status remained satisfied except that health grant and education grant increased their level remained highly satisfied in 2020. It revealed that 4Ps parent-beneficiaries when grouped according to civil status were more satisfied in terms of health and education grants in 2020 than in 2015. Further, the 2020 survey indicated that laborer respondents rated education grant as the highest with M=3.46, followed by health grant with M=3.43, then nutrition grant with M=3.40 and the least were living condition with M=3.38. Driver respondents rated education grant as the highest with M=3.52, followed by living condition with M=3.36, then nutrition grant with M=3.28 and the least were health and nutrition grants with M=3.20. Vendor respondents rated health grant and education grant as the highest with M=3.45, followed by nutrition grant with M=3.39, and the least was living condition with M=3.37. Respondents with no work rated education grant and health grant as the highest with M=3.54, followed by nutrition grant with M=3.42, and the least was living condition with M=3.35. It revealed that respondents' satisfaction level to 4Ps program according to occupation was higher in 2020 than in 2015. It scored the highest at education grant and lowest at living condition. Further, health grant and education grant increased to a highly satisfying level in 2020.

Table 7. Satisfaction level of the 4Ps beneficiaries During the Year 2015 and Year 2020 According to Number of Children

Areas and Variables	2015		2020	
	Mean	Verbal Interpretation	Mean	Verbal Interpretation
Health				
1 - 3	3.36	Satisfied	3.56	Highly Satisfied
4 and above	3.40	Highly Satisfied	3.33	Satisfied
As A Whole	*3.38*	*Satisfied*	*3.45*	*Highly Satisfied*
Nutrition				
1 - 3	3.26	Satisfied	3.53	Highly Satisfied
4 and above	3.38	Satisfied	3.28	Satisfied
As A Whole	*3.32*	*Satisfied*	*3.41*	*Highly Satisfied*
Education				
1 - 3	3.33	Satisfied	3.58	Highly Satisfied
4 and above	3.37	Satisfied	3.42	Highly Satisfied
As A Whole	*3.37*	*Satisfied*	*3.50*	*Highly Satisfied*
Living Condition				
1 - 3	2.94	Satisfied	3.52	Satisfied
4 and above	3.07	Satisfied	3.24	Satisfied
As A Whole	*3.01*	*Satisfied*	*3.38*	*Satisfied*

Table 7 shows the satisfaction level of the 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during the year 2015 and year 2020 according to the number of children. The satisfaction level of 4Ps parent- beneficiaries in 2015 with 1-3 number of children indicated satisfied in terms of health grant with M=3.36, nutrition grant with M=3.26, education grant with M=3.33, and living condition with M=2.94. However, in 2020, it showed that health grant with M=3.56, nutrition grant with M=3.53, education grant with M=3.58, and living conditions with M=3.52 were highly satisfied. When grouped according to parent-beneficiaries with 4 and above several children, it showed that in 2015 the satisfaction level to CCT program was satisfied in terms of health grants M=3.40, nutrition grants with M=3.38, education grants with M=3.37, and living condition with M=3.07. The 2015 survey also indicated that respondents with 1-3 children, rated health grants as the highest with M=3.36, followed by education grants with M=3.33, then nutrition grants with M=3.26 and the least were living condition with M=2.94. On the other hand, respondents with 4 and more children, rated health grants as the highest with M=3.40, followed by nutrition grants with M=3.38, then education grants with M=3.37, and the least was the living condition with M=3.07.

However, in 2020, it indicated that the satisfaction level remained satisfied in terms of health grant with M=3.33, nutrition grant with M=3.28, and living condition with M=3.24 except that education grant with M=3.52 were highly satisfied. Further, the 2020 survey indicated that respondents with 1-3 children, rated education grants as the highest with M=3.58, followed by health

grants with M=3.56, then nutrition grants with M=3.53, and the least was living condition with M=3.52. On the other hand, respondents with 4 and more children, rated education grants as the highest with M=3.42, followed by health grants with M=3.33, then nutrition grants with M=3.28, and the least was the living condition with M=3.24.

It revealed that respondents' satisfaction level with the 4Ps program according to the number of children was higher in 2020 than in 2015. It scored the highest at education grants and health grants and lowest at living conditions. Further, health grants, nutrition grants, and education grants increased to a highly satisfying level in 2020.

Table 8. Satisfaction level of the 4Ps Beneficiaries During the Year 2015 and Year 2020 when Grouped According to Educational Qualification

Areas and Variables	2015		2020	
	Mean	Verbal Interpretation	Mean	Verbal Interpretation
Health				
Elementary	3.35	Satisfied	3.39	Satisfied
High School	3.44	Highly Satisfied	3.44	Highly Satisfied
College Level	3.00	Satisfied	3.44	Highly Satisfied
College Graduate	3.00	Satisfied	4.00	Highly Satisfied
As A Whole	*3.20*	*Satisfied*	*3.57*	*Highly Satisfied*
Nutrition				
Elementary	3.26	Satisfied	3.43	Highly Satisfied
High School	3.38	Satisfied	3.36	Satisfied
College Level	2.92	Satisfied	3.40	Satisfied
College Graduate	3.25	Satisfied	4.00	Highly Satisfied
As A Whole	*3.20*	*Satisfied*	*3.55*	*Highly Satisfied*
Education				
Elementary	3.30	Satisfied	3.54	Highly Satisfied
High School	3.40	Satisfied	3.45	Highly Satisfied
College Level	3.07	Satisfied	3.52	Highly Satisfied
College Graduate	3.25	Satisfied	4.00	Highly Satisfied
As A Whole	*3.26*	*Satisfied*	*3.63*	*Highly Satisfied*
Living Condition				
Elementary	3.06	Satisfied	3.43	Satisfied
High School	3.02	Satisfied	3.34	Satisfied
College Level	2.61	Satisfied	3.30	Satisfied
College Graduate	2.50	Satisfied	3.80	Satisfied
As A Whole	*2.80*	*Satisfied*	*3.47*	*Highly Satisfied*

Table 8 shows the satisfaction level of the 4Ps beneficiaries of Barangay VI, Victorias City, Negros Occidental during 2015 and 2020 according to educational qualification. The satisfaction level of elementary graduate 4Ps parent-beneficiaries in 2015 was satisfied in terms of health grant with M=3.35, nutrition grant with M=3.26, education grant with M=3.30, and living condition with M=3.06. However, in 2020, it showed that the satisfaction level of the CCT program remained satisfied in terms of health grant with M=3.39 and living   condition with M=3.43. When grouped according to high school parent-beneficiaries, it showed that in 2015 the satisfaction level to CCT program was satisfied in terms of nutrition grant M=3.38, education grant with M=3.40, and living condition with M=3.02 except that health grant with M=3.44 were highly satisfied. However, in 2020, it indicated that the satisfaction level was satisfied in terms of nutrition grant with M=3.36 and living condition with M=3.34 except that health grant with M=3.44 and education grant with M=3.45 were highly satisfied. When grouped according to college-level 4Ps parent-beneficiaries, it showed that in 2015 the satisfaction level to CCT program was satisfied in terms of health grant with M=3.00, nutrition grant M=2.92, education grant with M=3.07, and living condition with M=2.61. However, in 2020, it indicated that the satisfaction level remained satisfied in terms of nutrition grant with M=3.40 and living condition with M=3.30. However, health grant with M=3.44 and education grant with M=3.52 have significantly increased to a highly satisfied. When grouped according to college graduate 4Ps parent-beneficiaries, it showed that in 2015 the satisfaction level was satisfied in terms of health grant with M=3.00, nutrition grant M=3.25, education grant with M=3.25, and living condition with M=2.50. The 2015 survey also indicated that elementary graduate respondents rated health grant as the highest with M=3.35, followed by education grant with M=3.30, then nutrition grant with M=3.26 and the least were living condition with M=3.06. The high school graduate respondents rated health grant as the highest with M=3.44, followed by education grant with

M=3.40, then nutrition grant with M=3.38, and the least was the living condition with M=3.02. The college-level respondents rated education grant as the highest with M=3.07, followed by health grant with M=3.00, then nutrition grant with M=2.92 and the least were living conditions with M=2.61. College graduate respondents rated education grant and nutrition grant as the highest with M=3.25, followed by health grant with M=3.00, and the least was living condition with M=2.50.

However, the 2020 survey, showed that health grant with M=4.00, nutrition grant with M=4.00, and education grant with M=4.00 were highly satisfied except that living condition with M=3.80 remained satisfied. Overall, it indicated that the satisfaction level to the CCT program in 2015 and 2020 according to civil status remained satisfied except that health grant and education grant were highly satisfied in 2020. Further, the 2020 survey indicated that elementary graduate respondents rated education grant as the highest with M=3.54, followed by nutrition grant and living condition with M=3.43, and the least was health grant with M=3.39.

The high school graduate respondents rated education grant as the highest with M=3.45, followed by health grant with M=3.44, then nutrition grant with M=3.36, and the least was the living condition with M=3.34. The college-level respondents rated education grant as the highest with M=3.52, followed by health grant with M=3.44, then nutrition grant with M=3.40 and the least were living condition with M=3.30. College graduate respondents rated education grant, nutrition grant, and health grant as the highest with M=4.00, and the least was living condition with M=3.80. Finally, it revealed that there was a significant difference in the satisfaction level of the 4Ps parent-beneficiaries of Barangay VI, Victorias City, Negros Occidental during the year 2015 and year 2020. That the satisfaction level was higher in 2020 with M=3.43 indicated highly satisfied and lower in 2015 with M=3.26 indicated as satisfied. It revealed that respondents' satisfaction level to 4Ps program according to educational qualification was higher in 2020 than in 2015. It scored the highest at education grant and lowest at living condition. Further, health grant, nutrition grant, education grant, and living condition increased to a highly satisfying level in 2020.

4. FINDINGS

The demographic profile of 4Ps parent-beneficiaries in 2015 and 2020 revealed approximately 41.2% of 30 years old and above new 4Ps beneficiaries were added to the program in Barangay VI by 2020. When grouped according to sex, it revealed that the number of female 4Ps parent-beneficiaries significantly decreased by 2.6% and males increased by 2.6% in 2020. Overall, the majority of 4Ps beneficiaries were female with 425 (91.20%). Overall, the percentages of female parent-beneficiaries were higher than that of males. When grouped according to the civil status it shows a significant decrease in 2020 with married beneficiaries by 13.5% and those who were separated by 1.2%. However, a significant increase was obvious with widowed parent-beneficiaries by 7.1% and the single parent by 9.9%.

Overall, the majority of 4Ps beneficiaries by age are married with 359 (77.04%). When it comes to occupation there was a significant decrease in the following 4 Ps beneficiaries in the year 2020: drivers with 16.4%, and vendors with 9.8%. However, those beneficiaries who have no work have significantly increased by 17.4% and laborers by 8.8% in 2020. The rise of people who have no work and laborers was probably because of the effect of the Covid 19 pandemic. Due to the Covid-19 outbreak and the lockdown shuttering thousands of businesses, Filipinos have lost their jobs this year, with the unemployment rate reaching 10.4%, the highest in 15 years, according to the government. Overall, the majority of the educational background of 4Ps beneficiaries of Barangay VI was high school followed by elementary level and graduates. When grouped according to the number of children, there was a significant decrease by 2.6% with parent-beneficiaries with 1-3 numbers of children and 2.6% increase to 4Ps beneficiaries with 4 and above several children. Overall, the majority of the 4Ps beneficiaries have 1-3 children per household. In terms of family size, most of them belong to small families with one to three children..

When grouped according to educational qualification, there was a significant decrease in 4Ps beneficiaries with high school educational level by 3.8% and high school educational level by 0.7% in 2021. On the other hand, there was an increase to college-level parent-beneficiaries by 4.8% and college graduates by 0.1%. The majority of 4Ps beneficiaries by educational qualification was at high school with 284 (60.95%) which found out that most parent respondents parents were high school graduates and engaged in non-professional occupations. Further, college-level parent-beneficiaries have had increased by 4.8% but with no work increased by 69%. It indicated that 4Ps beneficiaries were able to finish their basic education and have reached higher education levels. However, there was also an obvious decrease of 4ps beneficiaries from 2015 to 2020 with the following: 30 and above decreased (46.8%), females (2.6%), drivers (16.4%) and vendors (9.8%), elementary educational qualification (3.8%) and high school (0.7%). The satisfaction level of 4Ps parent-beneficiaries to CCT remained at a satisfying level from 2015 to 2020 in terms of nutrition grants and living conditions only. On the other hand, health grants and education grants have significantly indicated as highly satisfied by the year 2020. It revealed that the 4Ps beneficiaries were highly satisfied with the program than they used to be in 2015.

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Further from 2010 to 2016, the program consistently registered above 88% compliance with the health conditions of the program, such as deworming, immunization, and preventive check-ups, and according to the Impact Evaluation Wave 2, "more 4Ps mothers delivered in health facilities. Generally, it has brought satisfaction even in times of global pandemic. It further indicated that the following 4Ps beneficiaries: male, female, below 30, above 30, separated, widow, single parent, no work/job, with 1-3 children, college-level and graduate were more satisfied in the program in 2020 satisfaction survey than in 2015 in terms of health grants and living conditions. Significantly, residents of Barangay VI, Victorias City were more satisfied in the satisfaction survey in the year 2020 than in 2015 in terms of health grants and education grants. Overall, the year 2020 survey revealed that 4Ps parents-beneficiaries were highly satisfied with the program than that of the 2015 satisfaction survey significantly on health and education grants were statistically noted.

There was a significant difference in the satisfaction level of 4Ps parent-beneficiaries to the CCT program between the years 2015 and 2020. It was revealed that the satisfaction level was higher in 2020 than in 2015 in terms of health and education grants.

5. CONCLUSIONS

The demographic profile of 4Ps parent-beneficiaries of Barangay VI, Victorias City, Negros Occidental during 2015 and 2020 shows that majority of them were above 30 with 349 (74.89%), female with 425 (91.20%), married with 359 (77.04%), a laborer with 268 (57.51%), with 1-3 number of children with 261 (56%), and high school level of educational attainment with 284 (60.95%). Further, it indicated that there was an increasing trend in the 4Ps parent-beneficiaries in 2020 with the following: above 30 years old (41.2%) widow (7.1%), single parent (9.9%), no work (17.4%), laborers (8.8%), college-level (4.8%) and college graduates (0.1%). The increasing number of 4Ps parent-beneficiaries with college-level or graduate indicated that the new members' 4Ps parent-beneficiaries have finished basic education and even tertiary level. It implies that the education system in the Philippines has positively impacted the educational attainment of the CCT program. Also, the rise of 4Ps parent-beneficiaries who have no work or laborers was probably because of the effect of the Covid 19 pandemic. Moreover, it revealed the decreasing trend in the year 2020 with the following 4Ps parent-beneficiaries: below 30 years old (41.2%) married (13.5%), separated (1.2%), with 1-3 children (2.6%), with the elementary educational level (3.8%), and those with high school educational level (0.7%). The decrease of beneficiaries who's 30 and above indicated that old members were no longer a part of the government program in the year 2020. Further, the decrease of members whose educational background was either elementary or high school indicated that basic education has mostly been met by Filipinos living in poverty.

The satisfaction level of 4Ps beneficiaries to CCT has significantly increased to a high level of satisfaction by 2020 in terms of health grants and education grants. In education, the CCT program has helped increase the low performance of learners into better performance. The retention rate of elementary schools dramatically decreased. The overall satisfaction increased in the year 2020 which revealed that 4Ps parents-beneficiaries were highly satisfied with the program in 2020 than that of the 2015 satisfaction survey, significantly on health and education grants were statistically noted.

There was a significant difference in the satisfaction level of 4Ps parent- beneficiaries to the CCT program. It was revealed in the survey that the satisfaction level was higher in 2020 than in 2015 especially in terms of health and education grants. It implies enhanced health practices, improved uptake of barangay health care services, and increased awareness of health issues. In education, it changed the behavior of learners and their attitude towards learning. The program has helped increase the low performance of learners into better performance.

6. Recommendations

1. Conduct a seminar on sustainable programs that would enhance the living conditions and nutrition of the locals.
2. Find out the factors why nutrition grants and living conditions of 4Ps student and parent-beneficiaries have not increased.
3. Conduct a study that would find out the significant impact of the CCT program on the lives of previous 4Ps beneficiaries who graduated from the program.
4. Conduct a tracer study of 4Ps student beneficiaries about their current employability status.
5. Examine the level of academic performance and health status of 4Ps student beneficiaries since these two areas have significantly increased in 2020 than 2015.
6. Find out the underlying causes of low satisfaction levels on nutrition grants and living conditions as a basis for improving the program.

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The Borrowing Processes of Thai Language in Patani Malay Dialect in Thailand

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ABSTRACT: This study concerns with the processes borrowing Thai language (TL) words in Patani Malay Dialect (PMD) from the perspective of Sociolinguistics. The main objective of this study is to see how the processes happen from TL to PMD. The research data for TL loanwords in PMD are obtained from written and spoken language while the data from TL itself are obtained from written materials. Attention towards the processes of TL loanwords in PMD is in regard with the study about similarities between TL and Malay language (ML) through two important processes; importation and substitution. Indirectly this study also touched on the influence of TL which has an important role to the lexical elements of PMD. In addition to the elaboration of the borrowing process, an analysis was also carried out on the process of changing TL loanwords in PMD in terms of phonology involving vocal and consonant changes using descriptive approaches. Finally, the findings showed that apart from direct borrowing from TL, PMD also adapts the loanwords according to the existing system in PMD. Even from the borrowing elements themselves, it is found that there are words considered to come from the same family while some are borrowed from other languages.

KEYWORD: Patani Malay Dialect, Thai Language, Borrowing, Loanwords, Importation, Substitution.

INTRODUCTION

Language is part of the cultural elements which is a common property of a group of people descended through its descendants, and should be transformed towards progress (Asmah Haji Omar, 1985: 3). For the purpose of language enrichment, a society must be open to new inclusions without compromising existing values in society. The inclusion of these new values is known as borrowing or loaning (Nik Safiah Karim, 1996: 72).

Language borrowing is resulted from language collision that has caused the entry of foreign elements into a certain language (Zaharani Ahmad, et.al, 2011: 14). According to Asmah Haji Omar (1995: 5-7), Malay language (ML) has received has received an influence from Sanskrit, followed by Arabic in the 10th century, and in the present, widely influenced by English due to the development of science and technology. Besides that, there are also other languages that have given an impact to ML like Javanese, Tamil, Chinese, Portuguese, Dutch and Persian (Zaharani Ahmad, et.al, 2011: 14).

In Thailand, standard Thai language (TL) has also contributed to the development of ML vocabulary treasures especially the Patani Malay dialect (PMD) spoken in Southern Thailand which covers the regions of Pattani, Yala and Narathiwat (Faiz Awae, 2015: 104). This is also inclusive of certain districts in Songkhla province such as Chana, Thepa, Nathawi, Sabayoi and Sadao (Ruslan Uthai, 2011: 20). The condition of the Malay community due to the pressures of the assimilation policy from the Thai government shows the development of PMD in facing changes in accordance with the era (Hara Shintaro, 2001: 175). Hence, the discussions in this study focused on the identification of TL loanwords in PMD as well as about the borrowing processes by explaining the appropriateness of language in the loanwords.

RESEARCH OBJECTIVE

This study is aimed at reviewing the process of TL loanwords in PMD. Indirectly, it will also identify some TL loanwords in PMD. Besides that, it will touch on the types and categories of TL loanwords in ML that are able to show the development of PMD spoken at the present. Further aspects to be studied include research and analysis of loanword changes in PMD from TL, such as phonological changes and changes in meaning. However, the change in meaning will only be mentioned at a glance.

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THEORETICAL FRAMEWORK

The study belongs to Sociolinguistics that examined TL loanwords in PMD spoken in the region of Southern Thai border. In fact, if two or more languages are used in the same society, then there is a clash of languages (Amran Halim, 1980: 22). As such, frequent relationships or influences are symptoms of borrowing.(Abdullah Hassan, 1974: 216-217).

In terminology, one way to form a new word or term is through the borrowing process, either from a cognate language or a non-cognate language (Haugen, 1953: 363). Thus, word borrowing is a process that involves re-earning the original pattern or model of the borrower's language. This study is undergone based on a theory proposed by Haugen (1950) who said that there are two important processes in language borrowing which are the process of importation and the process of substitution. The former process happens when the results of the loanwords are similar to the native language once the speaker receives the words. Meanwhile, the latter process simply means new words are invented. This process happens only if the results of the loanwords are derived from imperfect source language. Consequently, the speakers would substitute those words by matching and appropriating from the source language with the existing pattern in their native language.

In addition, Haugen (1950) has also divided borrowing words into three main types which are loanwords, loan blends and loan translations. Loanwords are words that have undergone a full morphemic importation while loan blends are words that are modified a bit on its phonemic in which some part are imported from a foreign language and some are original morphemes. Loan translations are words that are borrowed from other languages and translated into the recipient's language. These loan processes and forms will be applied to TL loanwords in PMD according to the appropriateness of the language.

RESEARCH FINDINGS

The results of a study conducted in Pattani province has found that the processes of TL loanwords in PMD existed, and can be categorized into several types. There are also several factors contributed to the occurrence of these processes which are the needs to use new concepts and the efforts to achieve language modernisation.

Based on the study, there are two types of loaning process which are the process of importation and the process of substitution. The first process has resulted in the creation of two loaning processes: loanwords and loan blends. Loanwords occurred in PMD are caused by the lack of certain terms in particular fields in PMD. Hence, it is found that loanwords used in PMD have similar features or near similar with the original pronunciation in TL as listed in the examples:

		TL	PMD		ML
1.	ดัง	/ daŋ /	/ daŋ /	=	famous
2.	แก้	/ kɛ /	/ kɛ̈ /	=	correct
3.	ลา	/ la: /	/ la /	=	holiday
4.	ป้าย	/ pa:y /	/ pay /	=	label
5.	ติ	/ tiʔ /	/ tɨʔ /	=	criticize
6.	โต๊ะ	/ toʔ /	/ töʔ /	=	table

Besides that, there are also loanwords from TL that have been assimilated with the features of PMD phonology. Yet, they still have the TL features in them as shown in the examples below:

	TL	PMD	ML		
1.	ปลอม	/ plɔ:m /	/ pəlɔ̈ŋ /	=	fake
2.	จำเป็น	/ campen /	/ capë̈ŋ /	=	have to
3.	เจ้า	/ ca:w /	/ ca /	=	Buddhist monk
4.	กำนัน	/ kamnan /	/ kəmənɛ̃̈ /	=	village head
5.	พอ	/ pʰɔ: /	/ bɔ̈ /	=	sufficient
6.	รอด	/ rɔ:d /	/ ɣɔ:ʔ /	=	capable of

Loan blends occurred due to the processes of importation and substitution, and a combination between PMD and TL. Words in TL that are brought in and combined with PMD consist of one-layer word + one-layer word and one-layer word + complex word. As a result, the words are complex that might consist of compound words or phrases. Some examples of loan blends are illustrated below:

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No.	Language / Dialect	PMD words	TL words	ML
1.	TL	/ sɯːa /	/ kiːlaː /	
	PMD	/ bajʉ /	/ kɨla /	shirt + sports = sports shirt
2.	TL	/ yib /	/ tʰahaːn /	
	PMD	/ jəpʉʔ /	/ tahaŋ /	invite + army = choosing army
3	TL	/ pʰɔː /	/ diː /	
	PMD	/ bɔ̈ /	/ mɔ̈lɛ̈ʔ /	enough + just nice = sufficient
4.	TL	/ yɔ̈ːm /	/ pʰɛ̈ː /	
	PMD	/ jɔ̈ŋ /	/ alɔ̈h /	willing + lose = admit to losing
5.	TL	/ fay /	/ faː /	fire + sky = electric
	PMD	/ apɨ /	/ pɛ̈fa /	fire + electric = electric
6.	TL	/ biːa /	/ liːaŋ /	money + spend = allowance
	PMD	/ dʉwɨʔ /	/ bɨyalɨyaŋ /	money + allowance = allowance

In the process of substitution for loan translations, a certain word or phrase in TL is substituted with the existing form in PMD in which it means that only the structure or the meaning is borrowed. Loan translations from TL are a combination of new morphemes in PMD, and the examples are illustrated below:

No.	Language / Dialect	Source words	Source words	ML
1.	TL	/ dɔːk /	/ biːa /	flower + money = interest (finance)
	PMD	/ dʉwɨʔ /	/ bʉŋɔ̈ /	money + flower = interest (finance)
2.	TL	/ loŋ /	/ tʰun /	
	PMD	/ tʉɣɔ̈ŋ	/ mɔ̈da /	give away + capital = invest
3.	TL	/ sɔːb /	/ pʰaːn /	examination + passed =
	PMD	/ pɛ̈ʔsɔ̈ /	/ ləpah /	passed in examination
4.	TL	/ ok /	/ hak /	chest + break = heartbroken
	PMD	/ patɔ̈h /	/ dadɔ̈ /	break + chest = heartbroken
5.	TL	/ haː /	/ siːaŋ /	
	PMD	/ caɣɨ /	/ sɔ̈ɣɔ̈ /	search for + voice = campaigning
6.	TL	/ riːan /	/ tɔː /	study + connect = further study
	PMD	/ ŋajɨ /	/ hʉbӧŋ /	study + connect = futher study

Based on the processes resulted from TL loanwords in PMD, this study also examines the phonological changes from the loanwords that involve vocal sounds and consonants. However, a vivid change can bee seen in the plosive sound. In this case, all plosive consonants appeared at the end range of the TL loanwords in PMD will be substituted with the sound of a glottis halt / ʔ /. This is likewise apparent in the plosive sound that occurred in consonant stanzas that will experience the same occurrence. Generally, the symptom of glottis appeared in PMD as well including the East Coast dialects of Kelantan and Terengganu in Malaysia (Asmah Haji Omar, 1995: 266). However, the changes in the middle range of the words only happen at the closure of the first syllables. Look at the examples illustrated below:

	TL		PMD		ML	
1.	จบ	/ coːb /	/ cɔ̈ʔ /	=	finish	
2.	ชุด	/ cʰud /	/ cʉʔ /	=	uniform	
3.	บุก	/ buk /	/ bʉʔ /	=	raid	
4.	เหตุ	/ heːt /	/ hɛ̈ʔ /	=	about	

In addition, another change that is interesting about TL loanwords in PMD is the elimination of aspiration. This process happens when TL loanwords have aspiration features that become consonants without aspiration in PMD. The elimination of aspiration plosive consonants consists of / pʰ /, / tʰ / and / kʰ /in which each of them will produce two new consonants whereby / pʰ / will

produce new consonants / p / and / b /. As for / tʰ /, it will produce new consonants / t / and / d /; and / kʰ / will produce new consonants / k / dan / g /. Besides that, there is also elimination of aspiration fricative consonant / cʰ / that will produce two new consonants / c / and / j /. Below are the examples related to this explanation :

		TL	PMD	ML		
1.	ผู้แทน	/ pʰuːtʰɛːn /	/ pʉtɤ̈ŋ /	=	MP (member of Parliament)	
2.	พอดี	/ pʰɔːdiː /	/ bɔmɔ̈lɤ̈ʔ /	=	medium	
3.	โทรศัพท์	/ tʰoːrasap /	/ tɤrɔsaʔ /	=	telephone	
4.	ทหาร	/ tʰahaːn /	/ tahaŋ /	=	army	
5.	ทัน	/ tʰan /	/ dɤ̈̃ /	=	in time	
6.	ค่อย	/ kʰɔy /	/ kɔ̈hɔ̈ /	=	slow	
7.	คอย	/ kʰɔːy /	/ kɔ̈ /	=	wait	
8.	คุก	/ kʰuk /	/ gö̈ʔ /	=	prison	
9.	ชะแลง	/ cʰaʔlɛŋ /	/ cɤ̈lɤ̈ŋ /	=	lever	
10.	ชาย	/ cʰaːy /	/ cɤ̈ /	=	grandfather	

Another process that frequently happens in TL loanwords in PMD is the process of co-articulation. However, based on the collected data it is found that there are several TL loanwords in PMD that do not conform to this process. This issue might happen due to the words being newly borrowed and used in PMD. Look at the examples below:

a) Articulation process

TL			PMD	ML		
1.	สยาม	/ sayam /	/ sɨyɤ̈̃ /	=	Siam	
2.	ศาล	/ saːn /	/ sɤ̈̃ /	=	court	
3.	สตางค์	/ sataːŋ /	/ sətɤ̈̃ /	=	Thai currency	

b) Nasal retention

BT			DMP	BMS		
1.	ต้มยำ	/ tomyam /	/ tö̈ŋyam /	=	tom yam	
2.	การบ้าน	/ kaːnbaːn /	/ kanban /	=	homework	
3.	นายช่าง	/ naːycʰaŋ /	/ nɤ̈caŋ /	=	handyman	

Another process that frequently happens in TL loanwords in PMD is the process of monophthongization which means that the diphthong elements are changed into monophthong. In this case, the process of monophthongization can be divided into two types, which are:

1. Dropping one of the diphthongs, and
2. Dissolving diphthong elements and producing another sound.

The examples are as below:

TL			PMD	ML		
1.	เจ้า	/ caːw /	/ tö̈ʔca /	=	Buddhist head monk	
2.	ทนาย	/ thanaːy /	/ tö̈ʔna /	=	advocates	
3.	ค่อย	/ khɔy /	/ kɔ̈hɔ̈ /	=	slow	
4.	คาย	/ khaːy /	/ kɤ̈hɤ̈ʔ /	=	to express	
5.	ใบเสร็จ	/ bayset /	/ bɤ̈sɤ̈ʔ /	=	receipt	
6.	นายบ้าน	/ naːybaːn /	/ tö̈ʔnɤ̈bɤ̈̃ /	=	village head	

Apart from borrowing elements, it is found that there are words between TL and PMD in which the forms and meanings are similar with each other. Basic words like / ta: / "mata" (eyes), / kha: / "kaki" (feet), / phet / "pedas" (spicy), / mot / "semut"

The Borrowing Processes of Thai Language in Patani Malay Dialect in Thailand

(ant) and so on are believed to derived from the same source which is Malay language (Hara Shintaro, 1998: 445). Based on the study made, and the data collected, the similarities occur because both TL and ML are located under the same phylum; the Austric phylum (C.A.Mees, 1967: 12). Hence, it is assumed that those words that have similarities among each other belong to the same parent of language because they are also apparent in ML and Malay dialects. Some of the words are illustrated below:

	TL	PMD	ML		
1.	แปลก	/ plɛːk /	/ pəlĕʔ/	=	absurd
2.	ตวง	/ tuaːŋ /	/ tɨwɛ̃ /	=	pour
3.	จิ้งจก	/ ciŋcok /	/ cɨcɔ̈ʔ /	=	lizard
4.	จูบ	/ cuːp /	/ kɨcɐʔ /	=	kiss
5.	สกัด	/ sakad /	/ səkaʔ /	=	ban
6.	รัง	/ raŋ /	/ saɤɛ̃ /	=	nest

Indeed, there are many words in TL that are equal in meanings and pronunciation like ML to an extent that it is impossible to say that those similarities are resulted from language borrowing. However, problems might arise when the direction of the borrowing is uncertain as there is no clear differentiation feature. Therefore, it is likely that these features show kindred characteristics between ML and TL. Nonetheless, a more detailed study needs to be carried out regarding this issue.

CONCLUSION

From the study conducted at Pattani province, TL that exists today is regarded as the dominant language that has a wide influence and roles on PMD. This is due to the urgent need for the use of new concepts and the efforts of language modernization in accordance with the eras. In addition, due to the increasingly absorbing TL into speech and the use of PMD, especially among the younger generation, TL is widely used alternately with PMD. Even though there are many TL loanwords in PMD, most of the words are made appropriate to be used so that the speakers of PMD will find it easy to pronounce.

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Theses and Dissertations Abstract E-Archiving System with SMS Support

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ABSTRACT: The NIPSC Library is currently using manual-based in keeping the theses and dissertation in order to save more time and easy way of finding related literature, an alternative solution to solve the current problem was developed. The "Theses and Dissertations Abstract E-Archiving System with SMS Support", a system provides borrowers with real-time information in finding related literature. The architectural design used in this system is N-tier architecture. Since it is connected to the Local Area Network inside the library, the researchers can easily access the resources in wired and wireless network to help the Librarians and the researchers inside and outside the library to access the electronic archiving, the collections of abstract theses and dissertations in wired and wireless network to view, download in jpeg format for the protection of copyright and IPR law which can be printed in real-time. The developed Theses and Dissertations Abstract E-Archiving System with SMS Support was based on the result and findings of surveys, electronic archiving of theses and dissertations were accessible just in time, the developed system can perform its required functions efficiently while sharing a common environment and resources without detrimental the impact on any other product.

KEYWORDS: Theses, Dissertations, Abstract, E-Archiving System, SMS Support

I. INTRODUCTION

The increased sophistication and availability of technology in daily life have changed the expectations of library users which demand remote access to full-text resources including theses and dissertations. The convergence of technology, open source initiatives, and emerging new paradigm on intellectual property rights have encouraged Electronic Theses and Dissertations (ETDs) projects. NIPSC Library is currently using manual-based in keeping the theses and dissertations. In order to save more time and easy way of finding related literature, an alternative solution to solve the current problem. The system provides borrowers with real-time information in finding related literature. The architectural design used in this system is N-tier architecture, a Short Message Service (SMS) Support, will also be used, as the additional feature which will play a vital role as a communicating tool, to accommodate and provide researchers from external campuses that needs assistance from NIPSC Library Main Campus Estancia, Iloilo in finding related literature of their researches. This application can further be enhanced by adding various features to it like we can send and receive various information regarding students on a cell over the air (OTA). Even students can view their assignments on the mobile phone by just using certain services that can be availed from the server. The scope of Project is limited to the use of GSM protocol while sending and receiving the message from the application (Singh and Kumar, 2011). The purpose of this paper is to conduct a literature review looking at the evolution of bibliographic control and access to theses and dissertations including (ETDs) initiatives and the identification of persistent issues and concerns on the implementations of ETDs projects. This feature makes SMS message scheduling possible across all SMS gateways including those that do not internally support scheduling. Moreover, users can also cancel any scheduled message if it is needed (Olaleye1, Olaniyan, Eboda1 and Awolere, 2013).

OBJECTIVES

▸ Develop a system wherein all the compilation of abstract of Theses and Dissertations can be easily viewed, downloaded in wired and wireless network with two-way interactive text messaging from inquiries via mobile phone that will provide and respond to a specified text format.

Theses and Dissertations Abstract E-Archiving System with SMS Support

▸ Determine the level of usability of the proposed Theses and Dissertations Abstract E-Archiving System with SMS Support among the identified users group.

▸ Evaluate the performance of the proposed Theses and Dissertations Abstract E-Archiving System with SMS support in terms of functionality, reliability and efficiency.

Automatic Response System Using SMS

The paper presents a novel method to send SMS through mobile at the remote host on a mobile service as well for internet host. The method was based on the reliability of the software e-corporate. The system used a specified code, which was being used to access a database system. The data residing the code will be immediately sent to the user regarding which the request had been sent. The utility of the work enhances the educational system to the various business unit.

The reasons for the enormous popularity of SMS have been the fact that this mechanism of sending and receiving messages not only saves time but costs less as well. The advantage for network operators has been the ease of deploying equipment from any vendors that implement the standard. Like other cellular standards. The above developed and developed application is a mobile application for adding values to an institution. This application can only run on the cell phone having GPRS enabled services with them. This application can further be enhanced by adding various features to it like we can send and receive various information regarding students on a cell over the air (OTA). Even a student can view their assignments on the mobile phone by just using certain services that can be availed from the server. The scope of Project is limited to the use of GSM protocol while sending and receiving the message from the application (Singh and Kumar, 2011).

SMS-Based Event Notification System

Existing mass Short Message Service (SMS) mailing systems are designed to work with a specific SMS gatewayhence resulting in user lock-in to an SMS vendor. Also, some SMS gateways support scheduling of SMS message to be sent at a later time and date, others do not support it. Moreover, those gateways that support scheduling don't mostly allow users to cancel scheduled SMS message. This study has successfully designed and developed an enterprise-class mass SMS mailing system that supports multiple users as well as multiple SMS gateways, providing a unified interface and common set of features across many SMS gateways which prevent vendor lock-in as users can choose among multiple SMS vendor gateways. Another major feature provided by the new system is the introduction of SMS message scheduling. This feature makes SMS message scheduling possible across all SMS gateways including those that do not internally support scheduling. Moreover, users can also cancel any scheduled message if it is needed (Olaleye1, Olaniyan, Eboda1 and Awolere, 2013).

E-Diss.Ch: collecting and archiving online theses at the Swiss National Library

"e-Diss.ch" is a project undertaken in collaboration with the Swiss university libraries as part of the e-Helvetica project at the Swiss National Library. The mission of the Swiss National Library is to collect and archive all Swiss publications, both printed and electronic. The objective of the e-Helvetica project is to fulfill this mission for electronic publications. The goal of the e-Diss.ch project is to set up a collection of all Swiss online theses and to preserve them in the Digital Archive of the Swiss National Library. In collaboration with several Swiss university libraries, we have designed and tested a shared workflow for the collection, cataloging, archiving and dissemination of online theses. Standards are used to ingest the publications into the Digital Archive of the Swiss National Library, to describe the publications in the catalog, and to identify the publications within the Digital Archive (URN on the basis of NBN). Furthermore, a policy is being developed for the assignment of URN-NBN in the entire Swiss academic domain. This paper gives some general information on the e-Helvetica project and how the Digital Archive is being built at the Swiss National Library. The approach was chosen for the collection, cataloging and dissemination of the online theses will be highlighted as well as the creation of a social infrastructure of the Swiss university libraries and other partners (Barbara Signori, 2014).

Electronic Theses & Dissertations (ETDS) A Literature Review

The increased sophistication and availability of technology in daily life have changed the expectations of library users which demand remote access to full-text resources including theses and dissertations. The convergence of technology, open source initiatives, and emerging new paradigm on intellectual property rights have encouraged Electronic Theses and Dissertations (ETDs) projects. The purpose of this paper is to conduct a literature review looking at the evolution of bibliographic control and access to theses and dissertations including (ETDs) initiatives and the identification of persistent issues and concerns on the implementations of ETDs projects. The management and access to thesis literatureat the University of Puerto Rico, Rio Piedras Campus is also covered (Rodriguez, 2016).

In the present study, the system provides the capability to analyze problems related to the day to day operations of the school library particularly in the office of the librarian.

Theses and Dissertations Abstract E-Archiving System with SMS Support

Copyright and Intellectual Property Rights

Copyright and Intellectual Property Rights (IPR) are concerns for those institutions establishing e-theses repositories and the authors who are providing the content. ETDs and paper theses and dissertations are afforded equal copyright protection under the law, regardless of the author's nationality or domicile, and whether or not the copyright is registered (Fineman, 2003). Students, professors and administrators at the English and History Departments opposed Ohio State University plan to put dissertations online. While the University claimed the policy conforms to the University's mission, students and administrators objecting the policy say that posting the documents online could reduce student's chances of publishing the dissertation in journal or university presses, with the implication of whether that was going to take control of the copyright out of the hands of the students and into the hands of the university (Carlson, 2003). Referring to The United Kingdom (UK) Copeland, lists several developments which offer help in clarifying the route to follow regarding IPR, among these are the increase in the availability of advice and an increased awareness of the need for students to understand the IPR issue (Copeland et al, 2005). Andrew's paper on the intellectual property of e-theses examines ownership of copyright within theses, the rights and responsibilities of authors, institutions, end users, and third parties regardless the medium of publication for theses and dissertations. It includes several useful appendices that state legal requirements for publication of e-theses. This paper, although written from the point of view of the United Kingdom IPR laws, applies in many ways to the United States IPR laws. The UK also has the equivalent of "Fair use" of the US Copyright law which is called "fair dealing" and many uses of e-theses are protected by the "fair dealing"(Andrew, 2014).

This literature review revealed that problems encountered by many libraries such as poor technological support, cost control, copyright and preservation issues, and the need for changes in institutional culture were also reported by other institutions. However, there are "many researchers, universities and libraries [which] view ETDs not only as a wave of the future but a tsunami that we have no choice but to ride" (Beaven, 2014). The implementation of an ETD project is certainly a concern for even larger academic libraries in Puerto Rico but it is also a hope to improve access to thesis literature. If the goal is to improve the access and availability of thesis literature by taking advantage of current technological advances, the University of Puerto Rico-Rio Piedras Campus should consider the usage patterns of thesis literature, material obsolescence level by discipline, and the strong tendency of graduate students to use current research, the increase of the incorporation of multimedia into thesis literature, and the need for preservation of this type of material. Furthermore, it must consider the current administrative structure of the libraries on the campus, and the level of technological support for libraries. Ideally, it must strive to provide a uniform, consistent and predictable way to manage thesis literature providing access to current as well as old literature, accommodating the new multimedia formats and complying with current copyright and intellectual property rights. If an ETD project is initiated at the University of Puerto Rico it is important to keep in mind the following points to facilitate the process:

• The ETD initiative must be a collaborative project involving all the libraries at the University of Puerto Rico, Río Piedras Campus and the Office of the Dean of Graduate Studies and Research.

• Education on academic honesty and intellectual property rights must be provided to the university community.

• The project should be flexible taking into consideration the concerns of students, providing training for students on the use of technology for submission of theses.

• The University of Puerto Rico's libraries must provide access and preserve the product of its collective research

• The only proven reliable format for preservation is still microfilm or paper copies

• ETDs are needed to ease access and dissemination of knowledge yet we should not become too dependent on electronic-only options.

• The project must have full administrative support with an adequate budget

• There are advantages and disadvantages of each one of the four different options in dealing with ETDs available to universities (Beaven, 2014).

The Elusive Quest: Software Product Quality Evaluation

Quality has many definitions and even more models and methods for assurance and evaluation associated with it. After an overview of existing concepts, we provide a comprehensive methodology for evaluating the quality of a software product, complete with methods for model structure and parameter elicitation and a way for mapping the quantitative results obtained from the evaluation to qualitative rankings of product characteristics (e.g. Poor, Good, Excellent). This is complemented with a compendium of quality characteristics and metrics associated with them and a generic quality model combining the works of McCall and Boehm with the international standard for software product quality ISO/IEC 25010. A discussion of the advantages

Theses and Dissertations Abstract E-Archiving System with SMS Support

that the use of Bayesian Belief Networks (BBNs) can provide in this framework is also offered, as well as a method for transforming quality models to a form suited for BBN use. The methodology has been applied to a case study (Grigorova, 2010).

II. METHODOLOGY

A.   Software Development Life Cycle (SDLC)

The researcher used the Rapid Application Development (RAD) model allowing usable systems to be produced in a short time frame.

The RAD model started with understanding and defining the client's business needs, and moves through the four phases namely; requirements planning phase, the user design phase, the rapid construction phase, and the cutover phase. Testing should involve early in the project and throughout the development effort. One of the goals of RAD is to provide an updated "look and feel" of the evolving product and to allow the client to have hands-on contact with the product as soon as possible.

Throughout these phases, the researcher continually review and update the project plan, carefully controlling all changes requests along the way. Must assess the risks of the project during the completion of each cycle, and review the current understanding of the client's business needs throughout the project.

RAD used a prototyping approach in the software development to help users visualize and request changes to the system as it is being built, allowing applications to evolve iteratively. The objective is to build a feature light version of the finished product in a short amount of time as possible, preferably days or three to four months. The initial prototype serves as a proof of concept for the client, but more importantly, serves as a talking point and tool for refining requirements.

The Rapid Application Development Model

B.   System Prototype User Design (UD) Phase
▪   **Process Model**

Theses and Dissertations Abstract E-Archiving System with SMS Support
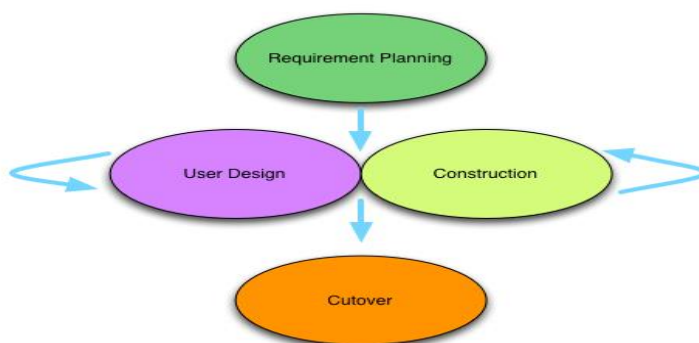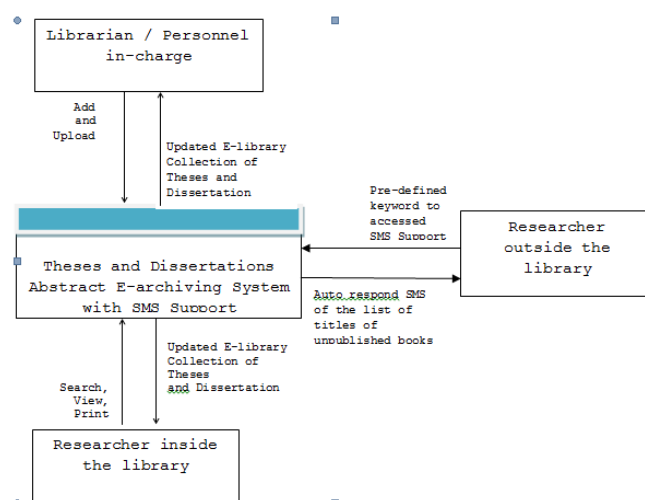
- **Physical Network Topology**
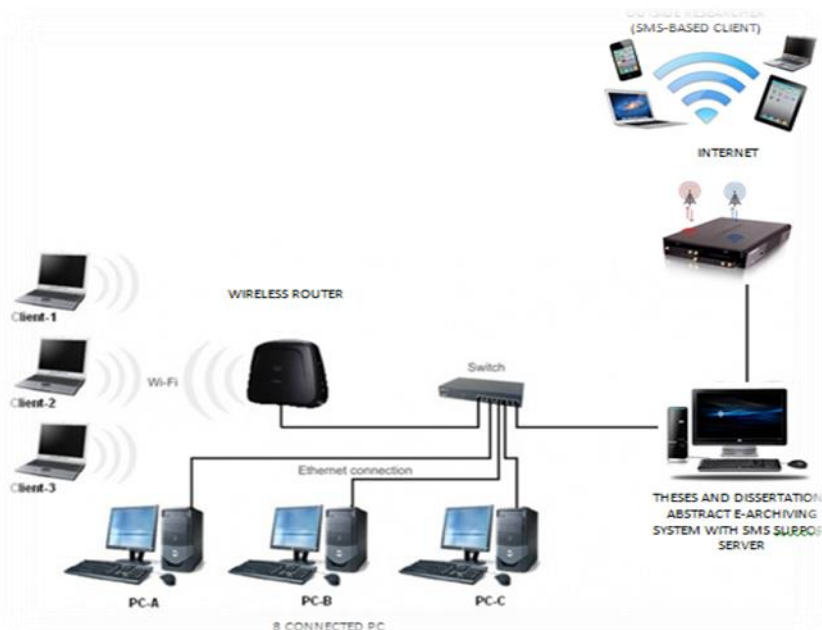
III. RESULTS AND DISCUSSION

The present investigation has the following findings:

1. The results of the developed system are 4.81 which is interpreted as Very Good.The findings implied that the degree in which the functions facilitate had accomplished the specified tasks and objectives of the developed system of the specified users in searching and archiving the abstract of their related study. The SMS Manager as the third party plays a vital role as SMS support which provides and respond to such request, through an auto-responses send back dynamic replies based on specified keywords to the inquiries is operational and accessible to outside researchers.

2. The usability of the developed features of Theses and Dissertations Abstract E-Archiving System with SMS Support have a computed mean of 4.82 which is interpreted as Very Good. The findings implied that the degree in which using the features of Theses and Dissertations Abstract E-Archiving System with SMS Support can be used by specified users to achieve specified goals with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.

   Features are easy to operate and control, reports generated by the system such as collection views and SMS logs can be easily viewed, retrieved and printed in real-time by the Librarian. Also, it reduces hours spent in retrieving archives of theses and dissertations.

3. The performance of the developed system in terms of functionality, reliability and efficiency have the computed mean of 4.82 interpreted as Very Good. This simply implied that the degree in which the response and processing time throughput rates of the system, in performing its functions, meet the requirements by using the developed Theses and Dissertations Abstract E-Archiving System with SMS support is very good.

   It provides borrowers with real-time information for the researchers using wired and wireless network which can be easily archive and select the related literature they need. The developed system is useful in minimizing the time for the researchers and provide better services. Control and security of the developed system indicate secure and safe. Wherein all the abstract of Theses and Dissertations can be viewed and downloaded in jpeg format for the author's protection by copyright and IPR Law.

IV. CONCLUSIONS

Based on the interpretation that was discussed in the preceding chapter, the following conclusions arrived:

1. The developed Theses and Dissertations Abstract E-archiving System with SMS Support based on the result and findings of surveys, electronic archiving of theses and dissertations were accessible in real-time. The two-way SMS provider and auto-response send back dynamic replies based on specified keywords to the inquiries was operational and accessible for outside researchers are users friendly and fully functional.

2. The usability of the feature of the developed system is operational and accessible with effectiveness and efficiency was appropriate for the need of the users. The specified goals are easy to operate and control in which the design interface enables the pleasing and satisfying interaction for the users.

3. The performance of the developed system and the processing time throughout rates meet the end-users requirements. The degree in which a developed system can perform its required functions efficiently while sharing a common environment and resources with the other products, without detrimental impact on any other product.

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The Effect of Capital Adequacy Rasio (CAR) and Liquidity on Profitability of Islamic Comercial Banks in Indonesia for The 2015-2019 Period

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ABSTRACT: This study aims to determine how the Effect of Capital Adequacy Ratio (CAR) and Liquidity on Profitability of Islamic Commercial Banks in Indonesia for the 2015-2019 Period. The results of data processing using the SPSS 17 For Windows program resulted in multiple regression analysis with two independent variables and one dependent variable showing that Y = 1.108 +1.404X1 - 0.240 X2, meaning that profitability is influenced by Capital Adequacy Ratio (CAR) and Liquidity. Furthermore, the results show that the Capital Adequacy Ratio (CAR) and Liquidity variables can explain the Profitability variable 36%, the remaining 64% is explained by other variables. The results of the hypothesis test state that: Hypothesis 1 is accepted, this can be seen from the value of tcount>ttable, then the Capital Adequacy Ratio (CAR) has an effect on profitability. The second hypothesis is rejected, it can be seen from the value of tcount<ttable, it is stated partially that Liquidity has no effect on Profitability. Hypothesis 3 is accepted, it can be seen from the value of Fcount>Ftable, it is stated simultaneously that Capital Adequacy Ratio (CAR) and Liquidity have an effect on Profitability.

KEYWORDS: Capital Adequacy Ratio (CAR) and Liquidity, Profitability

INTRODUCTION

Indonesia is one of the countries with the largest Muslim majority population in the world, indirectly this shows a huge potential for sharia sector economic activities in Indonesia. Public awareness of Islamic law will determine the amount of growth of Islamic economic activity in Indonesia. The Islamic banking sector is the sector that is most positively affected by the increasing public awareness of Islamic law, this is because every community activity is currently not separated from banking, either as a place to store funds that have been obtained or obtain funds as capital to run a business. In general, banks have the function of collecting and distributing public funds, so banks are also referred to as agents of public trust. According to Hasibuan (2015: 4), apart from functioning as an agent of trust, banks also function for national economic development (agent of development) in order to increase income distribution, economic growth, and national stability.

The presence of Islamic banking was initially triggered by the desire of Muslims for financial services based on sharia principles which were expected to avoid the practice of usury, maysir, gharar and other practices that were considered incompatible with Islamic principles. According to Adiwarman (2010: 25) in 1992 the first Islamic banking industry in Indonesia was established, namely Bank Muamalat Indonesia (BMI). Although the development is late when compared to other Muslim countries, in 1992-1998 there was only one Sharia Bank unit, in 2005 the number of Sharia Banks in Indonesia had increased to 20 units, namely 3 Sharia Commercial Banks and 17 Sharia Business Units. In the last few years, Indonesia has experienced very rapid growth in Islamic finance. By the end of 2019, there were 14 sharia commercial banks, 20 sharia business units and 164 sharia people's financing banks with total assets of Rp. 538.32 trillion, while the third party funds that can be collected is Rp. 425.29 trillion and distributed Rp. 365.13 trillion. On October 17, 2019, Indonesia managed to rank first in the Islamic finance market in the Islamic Finance Country Index (IFCI) 2019 from 48 countries. The growth of sharia banking is very rapid, but it is common for every bank to have differences in its management in terms of finances, which can be presented in the following figure:

The Effect of Capital Adequacy Rasio (Car) and Liquidity on Profitability of Islamic Comercial Banks in Indonesia for The 2015-2019 Period
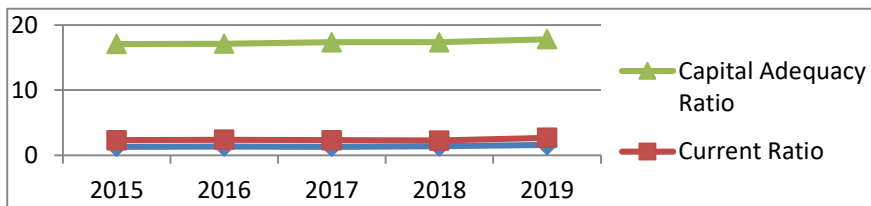

Figure 1. Average Annual Return on Assets, Capital Adequacy Ratio and Current Ratio of Islamic Banking Companies in Indonesia 2015 – 2019

Figure 1 illustrates the profit, ability to pay debts, and the capital adequacy ratio of Islamic banking in Indonesia as seen from the Return On Assets, Current Ratio and Capital Adequacy Ratio. In the data there are differences in theory with facts, where the decline in profitability in the last 1 year on average per year, namely in 2017 experienced by Islamic commercial bank companies, but the Capital Adequacy Ratio in 2017 has increased from the previous year 2016. of 0.31%, as well as the Current Ratio only decreased by 0.02% in the same year. In previous research, there are differences in the results of research conducted by SyifaMutiaulfah (2018) entitled The Effect of Current Ratio (CR) and Capital Adequacy Ratio (CAR) on Return On Assets (ROA) at Bank BNI SyariahTbk, with the results of Current Ratio (CR) and Capital Adequacy Ratio (CAR) has an effect on Return On Assets (ROA). While the research conducted by Herman Supardi (2016) entitled The Effect of Current Ratio, Debt To Asset Ratio, Total Asset Turnover and Inflation on Return On Assets, with the results of the Current Ratio having no effect on Return On Assets, and research conducted by Dwi Indah (2016) entitled The Effect of Non-Performing Loans (NPL) and Capital Adequacy Ratio (CAR) on Profitability in Banking Companies Listed on the IDX with the result that the Capital Adequacy Ratio has no effect on Return On Assets.

Based on the facts and research gaps that were stated previously, it attracted attention to conduct a study entitled **"The Effect of Capital Adequacy Ratio (CAR) and Liquidity on Profitability of Islamic Commercial Banks in Indonesia for the 2015-2019 Period".**

LITERATURE REVIEW

Profitability

According to Kasmir (2011: 196) states that the profitability ratio is a ratio to assess the company's ability to seek profit in providing a measure of the effectiveness of the company's management, this is indicated by the profits earned and investment income. In other words, profitability is the company's ability to generate profits. According to Home and Wachowiz in Satriana (2017:12), profit is also often compared to other financial conditions such as sales, assets and equity. This comparison is called the profitability ratio. According to Kasmir (2011: 196) states that the profitability ratio is a ratio to assess the company's ability to seek profit in providing a measure of the effectiveness of the company's management, this is indicated by the profits earned and investment income. According to Brigham and Houston in Satriana (2017:15) stated that ROA can be calculated as the following formula:

$$Return\ On\ Assets\ =\frac{laba\ bersih}{total\ aset}$$

Capital Adequacy Ratio (CAR)

According to Mia Lasmi (2013: 295) Capital Adequacy Ratio (CAR) is the ratio of the bank's capital adequacy or the ability of the bank in existing capital to cover possible losses in credit or securities trading. Meanwhile, according to Dendawijaya (2012: 120) Capital Adequacy Ratio (CAR) is a ratio that shows how far all bank assets that contain risks (credit, investments, securities, claims on other banks) are also financed from the bank's own capital funds in addition to obtaining funds from sources outside the bank, such as public funds, loans (debt), and others. In other words, the Capital Adequacy Ratio is a bank's performance ratio to measure the adequacy of capital owned by a bank to support assets that contain or generate risks, such as loans. According to Mia Lasmi (2013: 295) the ratio of the Capital Adequacy Ratio can be formulated as follows:

$$CAR = \frac{Bank\ Capital}{Risk\ Weighted\ Assets}\ x\ 100\%$$

The Effect of Capital Adequacy Rasio (Car) and Liquidity on Profitability of Islamic Comercial Banks in Indonesia for The 2015-2019 Period

Liquidity

According to Subramanyam and Wild (2010:241), liquidity refers to the company's ability to meet its short-term obligations. Meanwhile, according to Munawir in Satriana (2017: 18) revealed that liquidity shows the company's ability to meet financial obligations that must be fulfilled immediately or the company's ability to meet financial obligations when billed. According to Fahmi (2013:157-158) if a company experiences problems in liquidity, it is very possible for the company to enter a period of financial difficulty and if not above, it will lead to business bankruptcy. Henry (2015:175) states that the liquidity ratio is a ratio that shows the company's ability to meet obligations or pay short debts. The formula to find the current ratio is as follows:

$$Current\ Rasio = Total\ AktivaLancar\ /\ Total\ Kewajiban$$

Framework of thinking

Based on the gap research found previously, the conceptual framework model can be seen as follows:
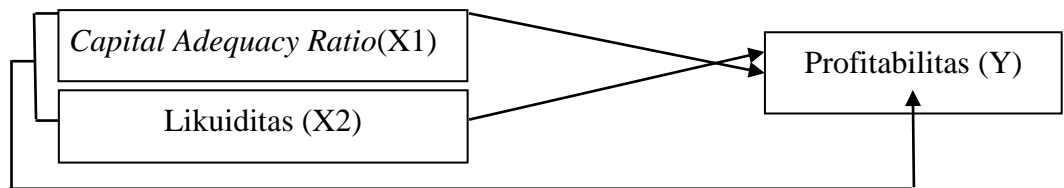
Figure 2. Conceptual Framework

Hypothesis

Based on Figure 2, the research hypothesis can be formulated as follows:

H1 : Capital Adequacy Ratio (CAR) has an effect on Profitability of Islamic Commercial Banks in Indonesia for the 2015-2019 Period

H2: Liquidity (CR) has an effect on Profitability (ROA) at Islamic Commercial Banks in Indonesia for the 2015-2019 period.

H3 : Capital Adequacy Ratio (CAR) and Liquidity have a simultaneous effect on Profitability (ROA) at Islamic Commercial Banks in Indonesia for the 2015-2019 Period.

RESEARCH METHODS

Population and Sample

In this study, the population used were Islamic commercial bank companies registered with the Financial Services Authority as many as 14 companies. The sampling technique is using purposive sampling, where the sample is taken through certain considerations whose criteria are determined by the researcher himself. The criteria set by the researchers are:

1. Sharia banking company registered with the Financial Services Authority in 2015-2019.
2. Islamic banking companies that publish complete financial reports for 2015-2019.
3. Banking companies that consistently generate profits in 2015-2019.

Based on these criteria, the number of samples in the study were 8 companies, with a research year of 5 years starting from 2015-2019. The following is a list of Food and Beverage companies according to the research criteria listed on the Indonesia Stock Exchange.

Table 3.2.Company Sample

No	Company name
1	PT. Bank BCA Syariah
2	PT. BNI Syariah Bank
3	PT. Sharia National Pension Savings Bank
4	PT. Bank MaybankSyariah Indonesia
5	PT. Bank Muamalat Indonesia
6	PT. Pain Bank Dubai Sharia
7	PT. MandiriSyariah Bank
8	PT. Victoria Sharia Bank

Source : www.sahamok.com (Year 2021)

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Data collection technique

Data collection techniques that will be used in this study are:

1. Literature study

This study is conducted by reading books or journals as a basis for analysis and formulation of theories or information related to research,

2. Documentation

This is done by looking at historical data, namely the 2015 to 2019 financial statements.

Data analysis technique

Multiple linear regression testing can be done after the model from this study meets the requirements, namely passing the classical assumptions. The conditions that must be fulfilled are that the data must be normally distributed, not containing multicollinearity, heteroscedasticity and autocorrelation.

Hypothesis testing

1. Significant test of individual parameters (t test)

The t-test is used to test the simultaneous effect of independent variables on the dependent variable. A variable of a variable will have a significant effect if the tcount value of the variable is greater than the ttable value.

The results of the hypothesis t are compared with t with the following test criteria:

a. If t-count > t-table at 5% then Ho is rejected and H1 is accepted (peruhnya).
b. If t-count < t-table at 5% then Ho is accepted and H1 is rejected (no effect).

2. Simultaneous Significant Test (F Test)

The F test is used to see whether the independent variables together (simultaneously) have an influence on the dependent variable. Testing by comparing Fcount with Ftable with the following conditions:

a. If Fcount>Ftable at 5% then Ho is rejected and Ha is accepted (influential).
b. If Fcount<Ftable at 5% then Ho is accepted and Ha is rejected (no effect).

RESEARCH RESULT

Classic assumption test

Normality Test

Normality test aims to test whether in the regression model, the confounding variable or residual has a normal distribution. The test results use SPSS 17 as follows:

Table 1. One Sample Kolmogorov Smirnov Test

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			40
Normal Parameters[a,,b]	Mean		.0000000
	Std. Deviation		.22566614
Most Extreme Differences	Absolute		.089
	Positive		.054
	Negative		-.089
Kolmogorov-Smirnov Z			.563
Asymp. Sig. (2-tailed)			.909
Monte Carlo Sig. (2-tailed)	Sig.		.875[c]
	99% Confidence Interval	Lower Bound	.740
		Upper Bound	1.000

a. Test distribution is Normal.

b. Calculated from data.

c. Based on 40 sampled tables with starting seed 2000000.

Source: Data processed in 2021

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From the output in table 4.1, it can be seen that the significance value (Monte Carlo Sig.) of all variables is 0.875. If the significance is more than 0.05, then the residual value is normal, so it can be concluded that all variables are normally distributed.

Multicollinearity Test

The multicollinearity test aims to determine whether there is a correlation between the independent variables in the regression model. The multicollinearity test in this study is seen from the tolerance value or variance inflation factor (VIF). The calculation of the tolerance value or VIF with the SPSS 17.00 program for windows can be seen in Table 2 below:

Table 2.Multicollinearity Test Results

Coefficients[a]

Model	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
CAR	.609	1.643
CR	.609	1.643

a. Dependent Variable: ROA

Source: Data processed in 2021

Based on table 2, it can be seen that the tolerance value of the Capital Adequacy Ratio (X1) variable is 0.609, Current Ratio (X2) variable is 0.609, all of which are greater than 0.10 while the VIF value of the Capital Adequacy Ratio (X1) variable is 1.643 Current variable. Ratio (X2) is 1.643, all of which are smaller than 10. Based on the results of the above calculations, it can be seen that the tolerance value of all independent variables is greater than 0.10 and the VIF value of all independent variables is also smaller than 10 so that there is no correlation symptom in independent variable. So it can be concluded that there is no symptom of multicollinearity between independent variables in the regression model.

Heteroscedasticity Test

The heteroscedasticity test aims to test whether from the regression model there is an inequality of variance from the residuals of one observation to another observation. A good regression model is one with homoscedasticity or no heteroscedasticity. One way to detect the presence or absence of heteroscedasticity is the Glejser test, in the Glejser test, if the independent variable is statistically significant in influencing the dependent variable, then there is an indication of heteroscedasticity. The results of data processing using SPSS 17.00 show the results in the following table:

Table 3.Glejser Test Results

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.290	.079		3.679	.001
CAR	-.012	.017	-.148	-.726	.472
CR	-.074	.046	-.331	-1.631	.111

a. Dependent Variable: abs_res1

Source: Data processed in 2021

Based on table 3, the Sig Capital Adequacy Ratio is 0.193 and the Current Ratio is 0.802, both of which are greater than 0.050 so it can be concluded that there are no symptoms of heteroscedasticity in this model.

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Autocorrelation Test

The autocorrelation test aims to test whether in the linear regression model there is a correlation between the confounding error in period t and the confounding error in period t-1 (previous). Autocorrelation test using Durbin-Watson test, with criteria du < d < 4-du. The test results using SPSS 17.00 in are shown as follows:

Table 4.Autocorrelation Test

Model Summary[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | | Durbin-Watson |
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.627[a]	.393	.360	.455322	.393	49.482	2	37	.000	1.806

a. Predictors: (Constant), CR, CAR

b. Dependent Variable: ROA

Source: Data processed in 2021

From table 4, it can be seen that the Durbin Watson value is 1.806 while the Durbin Watson table value with n: 40 and k: 3 is 1.658. Because the Durbin Watson score is between 1.658 and 4-1.658 (2.342), it can be concluded that there is no autocorrelation symptom.

Hypothesis testing

t test (Partial)

In this study, partial hypothesis testing was carried out on each independent variable as shown in Table 5 below:

Table 5. Partial Test (t)

Coefficients[a]

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
	B	Std. Error	Beta		
1 (Constant)	1.108	.890		1.245	.221
CAR	1.404	.188	.820	7.460	.000
CR	-.240	.516	-.051	-.466	.644

a. Dependent Variable: ROA

Source: Data processed in 2021

a. Hypothesis Testing the Effect of Capital Adequacy Ratio (X1) Variable on Return On Assets (Y)

From table 5, the tcount value is 7.460. With = 5%, ttable (5%; nk = 38) the ttable value is 2.024. From the description it can be seen that tcount (7.460) >ttable (2.024), as well as the significance value of 0.000 <0.05, it can be concluded that the first hypothesis is accepted, meaning that the Capital Adequacy Ratio (X1) variable affects the Return On Asset (Y) variable. The results of this study are in line with the results of SyifaMutiaulfah's research (2018) with the title "The Effect of Current Ratio (CR) and Capital Adequacy Ratio (CAR) on Return On Assets (ROA) at Bank BNI SyariahTbk Period 2014-2016.

b. Hypothesis Testing the Effect of Variable Current Ratio (X2) on Variable Return On Assets .. (Y)

From table 5, the tcount value is -0.466. With = 5%, ttable (5%; nk = 38) the ttable value is 2.024. From the description it can be seen that tcount (-0.466) <ttable (2.024), and the significance value is 0.644 > 0.05, it can be concluded that the second hypothesis is rejected, meaning that the Current Ratio (X2) variable has no effect on the Return On Asset (Y) variable. The results of this study are in line with the research results of Herman Supardi, H. Suratno, Suyanto (2016) with the title "The Effect of Current Ratio, Debt To Asset Ratio, Total Asset Turnover and Inflation on Return On Assets".

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F Test (Simultaneous)

The results of the F test can be seen in table 6 below:

Table 6. Simultaneous Test Results (F)

ANOVA[b]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	202.088	2	101.044	49.482	.000[a]
Residual	75.555	37	2.042		
Total	277.644	39			

a. Predictors: (Constant), CR, CAR

b. Dependent Variable: ROA

Source: Data processed in 2021

From table 6, the Fcount value is 49.482 With = 5%, dk numerator: 2, dk denominator: nk-1 (5%; 2:37) Ftable value is 3.25. From the description it can be seen that Fcount (49.482) >Ftable (3.25), and a significance value of 0.000 <0.05, it can be concluded that the third hypothesis is accepted, meaning that the Capital Adequacy Ratio (X1) and Current Ratio (X2) variables have a simultaneous (simultaneous) effect on the Return variable. On Assets (Y) .

CONCLUSION

1. From this study shows that the ability of Capital Adequacy Ratio (CAR), Current Assets (CR) can Return on Assets (ROA) of 0.360 or 36%. far close to the number 1, so it can be said that the regression model used is not good.
2. The first hypothesis proposed states that the Capital Adequacy Ratio (CAR) has an effect on Profitability at Islamic Commercial Banks in Indonesia for the 2015-2019 Period. From the results of processing SPSS.17, it shows that the first hypothesis is accepted, meaning that the Capital Adequacy Ratio (CAR) has an effect on Profitability at Islamic Commercial Banks in Indonesia for the 2015-2019 period.
3. The second hypothesis proposed states that Liquidity has an effect on Profitability (ROA) in Islamic Commercial Banks in Indonesia for the 2015-2019 Period. From the results of SPSS.17 processing shows that the second hypothesis is accepted, meaning that Liquidity affects Profitability (ROA) in Islamic Commercial Banks in Indonesia. Indonesia for the 2015-2019 period.
4. The third hypothesis proposed states that the Capital Adequacy Ratio (CAR) and Liquidity have a simultaneous (simultaneous) effect on Profitability (ROA) at Islamic Commercial Banks in Indonesia for the 2015-2019 period. Adequacy Ratio (CAR) and Liquidity have a simultaneous effect on Profitability (ROA) at Islamic Commercial Banks in Indonesia for the 2015-2019 Period.

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Stabiizing The Steady State Solution of Lasser Fever: Problems and Prospect

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ABSTRACT: The study of mathematical modeling of the stability analysis of Lassa fever was examined. A mathematical model for the spread and control of Lassa fever was formulated and analyzed. The model incorporates a control parameter, the use of condom to control human to human transmission through sexual contact with opposite sex. The disease free and endemic equilibrium states were analyzed.

KEYWORDS: Mathematical model, Ordinary differential equations, Stability, Laser Fever.

1. INTRODUCTION

Mathematical representation of disease parameters is a data reliant process and this prediction is often based on the implementation of mathematical models. The important feature is bridging the gap between mathematics (models) and the real world (data). In these models, the important features are theoretically developed but applied to real life scenarios represented by a given data. Such data may contain the signature of social effect, hence a comprehensive understanding of the phenomenon of disease involves a variety of mathematically tools, from model creation to the determination of solution to differential equation and to statistical analysis.

Lassa virus is a member of the Arenaviridae, a family of single-stranded RNA virus. This virus is an old world arenavirus which is enveloped, single-stranded and bi-segmented RNA. The natural reservoir of Lassa virus is multimammate Rat species known as mastomys natalensis which breed frequently and are distributed widely throughout West, Central and East Africa. They are the common rodents in Africa and they are found predominantly in rural areas and dwelling more often than surrounding country side. Member of this genus are infected persistently and shed the virus in their excrete and other bodily fluid throughout life. Sulaiman *et al*. (2018) investigated the transmission dynamics of the Lassa fever infection model with conclusion that the reproduction numbers in the humans are most sensitive to the transmission rates, recovery rates and the natural mortality rates of the humans, while the reproduction number in the rodents is most sensitive to the transmission rate, hunting/predation rate and the natural mortality rate of the rodents. The qualitative analysis of the study revealed that the disease becomes endemic in the rodents population and also do not die out of the human population over time without controlling the growth of the rodents population, preventing animal-humans transmissions and improvement on the recovery rates of humans.

Onuorah *et al*. (2016) studied the basic reproductive number for the spread and control of Lassa fever. In this research work, a mathematical model was developed and analyzed to study the transmission and control of Lassa fever. The model incorporate two control parameters, the use of rodenticide and condom. The disease free equilibrium points of the model were obtained and analyzed. They obtained an important threshold parameter called the basic reproductive number R_0, as it was known that when $R_0 < 1$ the disease dies out and when $R_0 > 1$ the disease persists in the population.

Lanlege *et al*. (2018) studied measuring the spread and control of Lassa fever using the basic reproduction number R_0. In this study, a mathematical model for the spread and control of Lassa fever was presented showing that the most effective strategy to curb the disease is the usage of condom. It was evaluated that as the compliance to the use of condom as a control measure increase, the reproduction number R_0 decreases to less than one ($R_0 < 1$) which means that the disease is under control within the country and when the control measure is at lower rate or moderate rate then R_0, hence the disease is not under control within the country.

Stabiizing The Steady State Solution of Lasser Fever: Problems and Prospect

A mathematical model of the transmission dynamics of Lassa fever with separation of infected individual and treatment as control measures was studied by Nwasuka *et al*. (2019). The model assumes susceptible humans acquired the infection through interaction with the infected rodent populations. It was found that treatment is only given to separate human population. A threshold parameter called the effective reproduction number R_{eff} was obtained. The disease free equilibrium state was obtained and analyzed before the reproduction number was obtained. If $R_{eff} < 1$ the disease-free equilibrium exists and it is locally and globally asymptotically stable, implying that Lassa fever can be controlled and eradicated within the population in a finite time and if the

$R_{eff} > 1$, the disease invade and become endemic in the population.

A study by Eraikhueman *et al*. (2017) considered Lassa fever and its control measures. In their study, a mathematical model was used to investigate the dynamics of spread of Lassa fever in human population. The contributions from regular contact with the species of rodents that carry the virus that cause Lassa fever and infections, contract with persons suffering from the disease was examined to be significant in the spread of the disease. The paper gathered among several intervention measures, control of the rodents carrying the virus, isolation policy for persons infected with the virus and introducing vaccines to the human population are some of the best strategies against the spread of the disease.

Obabiyi *et al*. (2017) discussed a mathematical model for Lassa fever transmission dynamics with variable human and reservoir population. Their study highlighted a compartmental modeling approach for two different populations: human and rodent with rigorous analysis. The analytical results showed the spread of Lassa fever can be effectively controlled in the population if the associated intervention strategies can make R_0 less than 1 $(R_0 < 1)$. But if $R_0 > 1$ the disease will persist in the population. The results of simulations reveal that increase in recovery rate contributes to decrease in the number of exposed and infectious human in the population and increase in the number of recovered human. The study concluded that early diagnostic of infected humans, maintaining hygienic environment, use of new needle when taking injection and interim control of the rodent carrying the virus are the best strategies against the spread of the disease.

Akinwande *et al*. (2018) investigated a mathematical model for Lassa fever and sensitivity analysis. In this study, a mathematical model of five compartments was formulated. The disease free equilibrium point of the model was performed and the local and global stability was obtained and analyzed based on the reproduction number. The sensitivity analysis shows that the most sensitive parameters to the basic reproduction number R_0 are the contact rate β

Faniran (2017) investigated a mathematical modeling of Lassa fever dynamics with non-drug compliance rate. The model incorporate a non-drug compliance rate in the parameters for the human population. The basic reproduction number was derived and so also was the stability of the disease-free and endemic equilibrium points analyzed. It was established that the disease-free equilibrium is globally asymptotically stable when the reproduction, $R_0 < 1$ and the disease always dies out. Also, the disease-free equilibrium point becomes unstable when $R_0 > 1$, hence endemic equilibrium point is globally asymptotically stable.

Sensitivity analysis of Lassa fever model by Onuorah *et al*. (2016), an extension of the proposed model by Onuorah and Akinwande was formulated by incorporating the sensitivity analysis. Sensitivity tells us how important each parameter is to disease transmission. Key to analysis was the reproduction number. Reasonable sets of values for the parameter in the model were compiled and sensitivity analysis around the baseline parameter value were computed, which shows that the most sensitive parameter to R_0 is human birth rate, followed by condom efficacy and compliance. Obasi *et al*. estimated the basic reproduction of Lassa fever epidemics and its relationship with inter-epidemic period. (2019). In this work, a realistic mathematical model that incorporate all the known transmission routes into Lassa fever epidemiology was presented. The basic reproduction number for the model R_0, was derived and the inter-epidemic period of infection disease was examined. From the result, it can be said that the inter-epidemic period is useful to estimate the effect of intervention on Lassa fever incidence quantitatively. The paper highlighted the relationship between the Lassa fever basic reproduction and inter-epidemic period of infection disease. Therefore, any policy or measures taken to reduce the basic reproduction number will definitely make the disease to take a very long time to re-occur.

Akinade *et al*. (2020) studied sensitivity and stability analysis of a Lassa fever disease model with control strategies. The research brought into limelight three control strategies which include; early diagnosis of the the infected human before onset of noticeable symptoms resulting in the treatment of the human-carriers, vaccination of the susceptible humans and the use of rodenticide on the vector populations as effective means of limiting the spread of Lassa fever disease within an endemic population. An increase in the value of these three controls, yields a rapid and continuous decrease in the members of the carrier human, infected human and vector populations and eventually in the eradication of the disease from an endemic population. In this work, the recovered population experiences a continuous increase and no decrease in its size suggesting that these controls are very efficacious in

controlling the disease. The basic reproduction number was obtained, so also was the disease-free equilibrium analyzed for stability. The sensitivity analysis results show the sensitiveness of each model parameter to the transmission of the disease and it was obtained that the rate at which the susceptible human population contracts the infection via contact with human-carrier is the most sensitive parameter to the spread of the disease.

Sensitivity analysis of multiple control intervention measures of Lassa fever disease model by Onah *et al.* (2019) was developed that incorporates the basic and important dynamics of Lassa fever disease transmission under the assumption of a homogeneously mixed population. The study extended the model by introducing various control intervention measures, like external protection, isolation, treatment and rodent control. Sensitivity analysis was carried out to investigate the impact of the control parameters on the persistence or eradication of Lassa fever disease.

2. MODEL FORMULATION

For the sake of clarity in this chapter, we assume a homogeneous mixing of the human and vector population such that there are equal chances of transmitting the virus when there is contact between susceptible human and active vector. Thus the total human population at time t denoted by $N_H(t)$ is sub-divided into four (4) and they are; susceptible male $S_M(t)$, infected male $I_M(t)$, susceptible female $S_F(t)$, infected female $I_F(t)$ Hence:

$$N_H(t) = S_M(t) + I_M(t) + S_F(t) + I_F(t)$$

Similarly, the total vector population at timet, denoted by $N_V(t)$ is sub-divided into dormant vector $D_V(t)$ and active vector $A_V(t)$, such that

$$N_V(t) = D_V(t) + A_V(t)$$

The schematic diagram of the model is shown in fig 3.1.

The dashed line from infected male I_M to susceptible female S_F shows that the infected male infects the susceptible female. This could be as a result of sexual interaction between the infected male and susceptible female.

The line from infected female I_F to susceptible male S_M shows that the infected female infects the susceptible male. This also could be as a result of sexual interaction between the infected female and susceptible male.

The dashed line also from active vector A_V (carrier vector) to the susceptible male population S_M shows the transfer of the virus from infected rodent to susceptible male. When susceptible male is exposed to the droppings of infected mastomy rats, they become infected.

The dashed line from active vector A_V (carrier vector) to the susceptible female population S_F shows the transfer of the virus from infected rodent to susceptible female. That is, susceptible female become infected with Lassa fever virus from exposure to the droppings of infected mastomy rats.

The susceptible male population $S_M(t)$ is generated through male birth at the rate $\beta_H \theta N_H$ where $0 < \theta < 1$.

The dormant vector D_V population is generated through natural birth rate by active vector A_V denoted by $\beta_R N_V$ and is reduced by progression to active vector (A_V) population due to maturity at the rate σ, natural death at the rate μ_2 and death due to application of pesticide at the rate δ_2 Males who recovered from the infection at the rate γ is at the other hand reduced by natural death at the rate μ_1, interaction with infected female I_F and active vector A_V, which results to the force of infection.

$$\text{i. e;} \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H}, \text{ where}$$

C_2 is the average sexual partners acquired by susceptible male S_M

α_1 is the probability of transmission of infection resulting from sexual interaction between infected infected female and susceptible male.

The factor $(1 - \varepsilon\tau)$ is the effect of condom usage by susceptible male S_M.

α_3 is the probability of transmission of infection when there is interaction between Active Vector and Susceptible male.

The infected male population $I_M(t)$ is generated by sexual interaction with infected female $I_F(t)$ and interaction with Active Vector $A_V(t)$ i.e

$$\frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H}.$$

It is decreased by natural death at the rate μ_1, death due to infection at the rate δ_1 and recovery of infected male I_M as a result of treatment at the rate γ. The Susceptible female $S_F(t)$ population is generated through female birth at the rate $\beta_H(1 - \theta)N_H$ where

$0 < \theta < 1$. It is increased by recovered infected female at the rate γ. It is on the other hand reduced by natural death at the rate μ_1 and interaction with infected male I_M and Active Vector A_V which results to the force of infection $\frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H}$ where C_1 is the average sexual partners acquired by susceptible females.

α_2 is the probability of transmission of infection when there is interaction between infected male I_M and Susceptible female.
The factor $(1 - \tau\varepsilon)$ is the effect of condom usage by Susceptible female.

α_4 is the probability of transmission of infection when there is interaction between Active Vector and Susceptible female.

The infected female $I_F(t)$ population is generated by sexual interaction with infected male I_M and interaction with Active Vector A_V i.e

$\frac{(C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V)S_F}{N_H}$. It is decreased by natural death at the rate μ_1, death due to infection at the rate δ_1 and recovery of infected female I_F as a result of treatment at the rate γ.
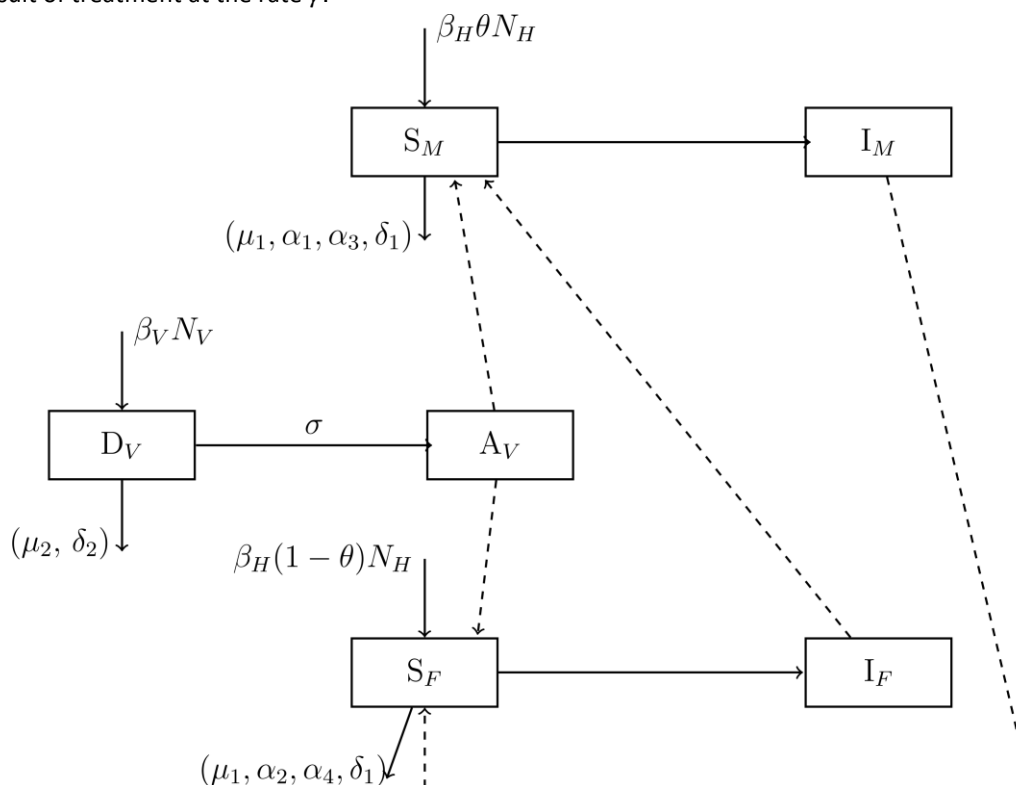
Figure3. 1: Schematic Diagram of the Mathematical model for the Lassa Fever Transmission.

3. MODEL ASSUMPTIONS

We assumed that:

1. New births are Susceptible
2. Virus does not kill the reservoir host. I.e. their death can be natural or accidental.
3. Vector class is divided into two; Active Vector A_V and Dormant Vector D_V

4.MODEL EQUATIONS

Considering the above assumptions, definition of variables and parameters and relationship between the variables and parameters described in the schematic diagram, we developed six (6) ordinary differential equations for the causes, spread and control of Lassa fever in a population. The differential equations are given as the following;

$$\frac{dS_M}{dT} = \beta H\theta N_H + \gamma I_M - \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V)S_M}{N_H} - \mu_1 S_M. \tag{3.1}$$

$$\frac{dI_M}{dT} = \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V)S_M}{N_H} - (\mu_1 + \delta_1 + \gamma)I_M. \tag{3.2}$$

$$\frac{dS_F}{dT} = \beta H(1 - \theta)N_H + \gamma I_F - \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V)S_F}{N_H} - \mu_1 S_F \tag{3.3}$$

$$\frac{dI_F}{dT} = \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V)S_F}{N_H} - (\mu_1 + \delta_1 + \gamma)I_F \tag{3.4}$$

$$\frac{dD_V}{dT} = \beta_V N_V - (\sigma + \mu_2 + \delta_2)D_V \tag{3.5}$$

$$\frac{dA_V}{dT} = \sigma D_V - (\mu_2 + \delta_2)A_V \qquad (3.6)$$

Where

$S_M(t)$	Number of susceptible male at time **t**
$I_M(t)$	Number of Infected male at time **t**
$S_F(t)$	Number of susceptible female at time **t**
$I_F(t)$	Number of Infected female at time **t**
$D_V(t)$	Number of dormant vector at time **t**
$A_V(t)$	Number of active vector at time **t**
β_H	The natural birth rate of Human population
β_V	The natural birth rate of Vectors
θ	The proportion of Human birth that is male $(0 < \theta < 1)$
α_1	The probability of transmission of infection resulting from sexual interaction between infected female and susceptible male
α_2	The probability of transmission of infection resulting from sexual interaction between infected male and susceptible female
α_3	The probability of transmission of infection resulting from interaction between active vectors and susceptible male
α_4	The probability of transmission of infection resulting from interaction between active vectors and susceptible female
c_1	Average number of male partners acquired by a susceptible female
c_2	Average number of male partners acquired by a susceptible male
μ_1	Natural death rate of Human population
μ_2	Natural death rate of vector population
σ	Progression rate from dormant to active vector
δ_1	Death rate of Human population due to infection
δ_2	Death rate of vector population due to application of pesticide
γ	Recovery rate of infected Human
ε	Efficacy of condom
τ	Compliance of condom usage

From the above model equations, by adding equations (1)--(4) we can derive the rate of change of the total Human population. Thus;

$$\beta_H\theta N_H + \gamma I_M - \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - \mu_1 S_M + \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - (\mu_1 + \delta_1 + \gamma)I_M + \beta_H(1-\theta)N_H + \gamma I_F$$

$$- \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} - \mu_1 S_F + \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 AV)S_F}{N_H} - (\mu_1 + \delta_1 + \gamma)I_F$$

$$= \beta_H\theta N_H + \gamma I_M - \mu_1 S_M - (\mu_1 + \delta_1 + \gamma)I_M + \beta_H(1-\theta)N_H + \gamma I_F - \mu_1 S_F - (\mu_1 + \delta_1 + \gamma)I_F$$

$$= \beta H\theta N_H + \gamma I_M - \mu_1 S_M - (\mu_1 + \delta_1)I_M - \gamma I_M + \beta_H(1-\theta)N_H + \gamma I_F - \mu_1 S_F - (\mu_1 + \delta_1)I_F - \gamma I_F$$

$$= \beta_H\theta N_H - \mu_1 S_M - (\mu_1 + \delta_1)I_M + \beta_H(1-\theta)N_H - \mu_1 S_F - (\mu_1 + \delta_1)I_F \qquad = \beta_H\theta N_H - \mu_1 S_M - \mu_1 I_M -$$

$$\delta_1 I_M + \beta_H N_H - \beta_H\theta N_H - \mu_1 S_F - \mu_1 I_F - \delta_1 I_F \qquad = \beta_H N_H - \mu_1 S_M - \mu_1 I_M - \mu_1 S_F - \mu_1 I_F - \delta_1 I_M - \delta_1 I_F$$

$$= \beta_H N_H - \mu_1(S_M + I_M + S_F + I_F) - \delta_1(I_M + I_F)$$

Recall that

$$N_H = S_M + I_M + S_F + I_F$$

Hence;

$$\beta_H N_H - \mu_1 N_H - \delta_1(I_M + I_F)$$

Hence, the rate of change of the total human population is

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$$\frac{dN_H}{dT} = \beta_H N_H - \mu_1 N_H - \delta_1(I_M + I_F) \tag{3.7}$$

Also by adding equations (5)−(6) , we can derive the rate of change of the total vector population. Thus;

$$= \beta_V N_V - (\sigma + \mu_2 + \delta_2)D_V + \sigma D_V - (\mu_2 + \delta_2)A_V$$
$$= \beta_V N_V - \sigma D_V - \mu_2 D_V - \delta_2 D_V + \sigma D_V - \mu_2 A_V - \delta_2 A_V$$
$$= \beta_V N_V - \mu_2 D_V - \delta_2 D_V - \mu_2 A_V - \delta_2 A_V$$
$$= \beta_V N_V - D_V(\mu_2 + \delta_2) - A_V(\mu_2 + \delta_2)$$
$$= \beta_V N_V - (\mu_2 + \delta_2)(D_V + A_V)$$

Recall that $N_V = D_V + A_V$

Hence; $= \beta_V N_V - (\mu_2 + \delta_2)N_V$

Therefore the rate of change of the total vector population is

$$\frac{dN_V}{dT} = \beta_V N_V - (\mu_2 + \delta_2)N_V \tag{3.8}$$

5. EQUILIBRIUM STATE

Using the dictionary definition of equilibrium, we know it to be a state of balance. But with respect to this chapter, we will narrow down the definition as, at equilibrium state, the rate of change must be equal to zero (0). i.e.

$$\frac{dS_M}{dT} = \frac{dI_M}{dT} = \frac{dS_F}{dT} = \frac{dI_F}{dT} = \frac{dD_V}{dT} = \frac{dA_V}{dT} = 0$$

We let;

$$(S_M, I_M, S_F, I_F, D_V, A_V) = (X, Y, Z, U, V, W)$$

6. DISEASE-FREE EQUILIBRIUM STATE

From the name, we derive the definition. It is a state in which a disease does not exist. So from this we have that the classes where the disease does not exist equals zero (0) i.e. at the disease-free equilibrium state;

$$I_M = I_F = D_V = A_V = 0 \tag{3.9}$$

Substitute equation (3.9) into equation (3.1)

$$\beta_H \theta N_H + \gamma I_M - \frac{(C_2 \alpha_1(1 - \varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - \mu_1 S_M = 0$$

$$\beta H \theta N_H + \gamma(0) - \frac{(C_2 \alpha_1(1 - \varepsilon\tau)(0) + \alpha_3(0))S_M}{N_H} - \mu_1 S_M = 0$$

$$\beta_H \theta N_H - \mu_1 S_M = 0 \Rightarrow \mu_1 S_M = \beta_H \theta N_H$$

Making S_M subject formulae

$$S_M = \frac{\beta_H \theta N_H}{\mu_1} \tag{3.10}$$

Also substituting equation (3.9) into equation (3.3)

$$\frac{dS_F}{dT} = \beta_H(1 - \theta)N_H + \gamma I_F - \frac{(C_1 \alpha_2(1 - \varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} - \mu_1 S_F$$

$$\beta_H(1 - \theta)N_H + \gamma I_F - \frac{(C_1 \alpha_2(1 - \varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} - \mu_1 S_F = 0$$

$$\beta H(1 - \theta)N_H + \gamma(0) - \frac{(C_1 \alpha_2(1 - \varepsilon\tau)(0) + \alpha_4(0))S_F}{N_H} - \mu_1 S_F = 0$$

$$\beta H(1 - \theta)N_H - \mu_1 S_F = 0 \Rightarrow \mu_1 S_F = \beta_H(1 - \theta)N_H$$

$$S_F = \frac{\beta_H(1-\theta)N_H}{\mu_1} \tag{3.11}$$

Where

$$(S_M, I_M, S_F, I_F, D_V, A_V) = (X, Y, Z, U, V, W)$$

Hence the disease free equilibrium (DFE) state is

$$E_0 = (X, Y, Z, U, V, W) = \left[\frac{\beta_H \theta N_H}{\mu_1}, 0, \frac{\beta_H H(1-\theta)N_H}{\mu_1}, 0, 0, 0\right] \tag{3.12}$$

7. ENDEMIC EQUILIBRIUM STATE

In the endemic state, the disease exists for every class in the population. That is the endemic equilibrium state is the state where the disease cannot be totally eradicated but remains in the population. Hence;

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$$I_M = I_F = D_V = A_V \neq 0$$

To obtain the number of susceptible male S_M at the endemic equilibrium state, we solve
equation (3.2)

$$\frac{dI_M}{dT} = \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - (\mu_1 + \delta_1 + \gamma)I_M$$

$$0 = \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - (\mu_1 + \delta_1 + \gamma)I_M$$

$$\frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} = (\mu_1 + \delta_1 + \gamma)I_M$$

$$S_M = \frac{N_H(\mu_1+\delta_1+\gamma)I_M}{(C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V)} = \frac{N_H(\mu_1+\delta_1+\gamma)I_M}{C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V} \qquad (3.13)$$

To obtain the number of infected male I_M at the endemic equilibrium state, we solve equation (1)

$$\frac{dS_M}{dT} = \beta H\theta N_H + \gamma I_M - \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - \mu_1 S_M.$$

$$0 = \beta_H\theta N_H + \gamma I_M - \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - \mu_1 S_M.$$

$$S_M\left[\frac{C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V}{N_H} + \mu_1\right] = \beta_H\theta N_H + \gamma I_M$$

$$S_M\left[\frac{C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V + N_H\mu_1}{N_H}\right] = \beta_H\theta N_H + \gamma I_M$$

Multiply both side by $\frac{N_H}{C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V+N_H\mu_1}$

$$S_M = \frac{N_H(\beta_H\theta N_H+\gamma I_M)}{C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V+N_H\mu_1} \qquad (3.14)$$

Substituting equation (3.13) into (3.14)

$$\frac{N_H(\mu_1+\delta_1+\gamma)I_M}{C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V} = \frac{N_H(\beta_H\theta N_H+\gamma I_M)}{C_2\alpha_1(1-\xi j\tau)I_F+\alpha_3 A_V+N_H\mu_1}$$

$$\frac{(\mu_1+\delta_1+\gamma)I_M}{C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V} = \frac{(\beta_H\theta N_H+\gamma I_M)}{C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V+N_H\mu_1}$$

Let $C_2\alpha_1(1-\varepsilon\tau) = P$ and $(\mu_1+\delta_1+\gamma) = A$

Thus;

$$\frac{AI_M}{PI_F+\alpha_3 A_V} = \frac{\beta_H\theta N_H+\gamma I_M}{PI_F+\alpha_3 A_V+N_H+\mu_1}$$

$$AI_M(PI_F+\alpha_3 A_V+N_H\mu_1) = (PI_F+\alpha_3 A_V)(\beta_H\theta N_H+\gamma I_M)$$

$$AI_M PI_F + AI_M\alpha_3 A_V + AI_M N_H\mu_1 = PI_F\beta_H\theta N_H + PI_F\gamma I_M + \alpha_3 A_{VH}\beta_H\theta N_H + \alpha_3 A_V\gamma I_M$$

Collect like terms

$$AI_M PI_F + AI_M\alpha_3 A_V + AI_M N_H\mu_1 - PI_F\gamma I_M - \alpha_3 A_V\gamma I_M = PI_F\beta H\theta N_H + \alpha_3 A_V\beta_H\theta N_H$$

$$I_M(PAI_F + A\alpha_3 A_V + AN_H\mu_1 - PI_F\gamma - \alpha_3 A_V\gamma) = PI_F\beta_H\theta N_H + \alpha_3 A_V\beta_H\theta N_H$$

$$I_M = \frac{PI_F\beta H\theta N_H + \alpha_3 A_V\beta_H\theta N_H}{PAI_F + A\alpha_3 A_V + AN_H\mu_1 - PI_F\gamma - \alpha_3 A_V\gamma}$$

Thus

$$I_M = \frac{\beta_H\theta N_H[C_2\alpha_1(1-\in\tau)I_F+\alpha_3 A_V]}{(\mu_1+\delta_1+\gamma)[C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V+N_H\mu_1]-C_2\alpha_1(1-\varepsilon\tau)I_F\gamma-\alpha_3 A_V\gamma} \qquad (3.15)$$

To solve for the number of susceptible female S_F at the endemic equilibrium state, we solve equation (4)

$$\frac{dI_F}{dT} = \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} - (\mu_1 + \delta_1 + \gamma)I_F$$

$$0 = \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} - (\mu_1 + \delta_1 + \gamma)I_F$$

$$\frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} = (\mu_1 + \delta_1 + \gamma)I_F$$

$$S_F = \frac{N_H(\mu_1+\delta_1+\gamma)I_F}{C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V} \qquad (3.16)$$

To solve for the number of infected female I_F at the endemic equilibrium state, we solve

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Equation (3.3)

$$\frac{dS_F}{dT} = \beta_H(1-\theta)N_H + \gamma I_F - \frac{(C_1\alpha_2(1-\xi j\tau)I_M + \alpha_4 A_V)S_F}{N_H} - \mu_1 S_F$$

$$0 = \beta_H(1-\theta)N_H + \gamma I_F - \frac{(C_1\alpha_2(1-\in \tau)I_M + \alpha_4 A_V)S_F}{N_H} - \mu_1 S_F$$

$$S_F\left[\frac{C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V}{N_H} + \mu_1\right] = \beta_H(1-\theta)N_H + \gamma I_F$$

$$S_F = \frac{N_H[\beta_H(1-\theta)N_H+\gamma I_F]}{C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V+N_H\mu_1} \tag{3.17}$$

Substituting equation (3.16) into (3.17)

$$\frac{N_H(\mu_1+\delta_1+\gamma)I_F}{C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V} = \frac{N_H[\beta_H(1-\theta)N_H+\gamma I_F]}{C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V+N_H\mu_1}$$

$$\frac{(\mu_1+\delta_1+\gamma)I_F}{C_1\alpha_2(1-\xi j\tau)I_M+\alpha_4 A_V} = \frac{[\beta_H(1-\theta)N_H+\gamma I_F]}{C_1\alpha_2(1-\xi j\tau)I_M+\alpha_4 A_V+N_H\mu_1}$$

Let $C_2\alpha_2(1-\varepsilon\tau) = q$ and let $(\mu_1+\delta_1+\gamma) = A$

Thus

$$\frac{AI_F}{qI_M+\alpha_4 A_V} = \frac{\beta_H(1-\theta)N_H+\gamma I_F}{qI_M+\alpha_4 A_V+N_H\mu_1}$$

$$AI_F(qI_M+\alpha_4 A_V+N_H\mu_1) = (qI_M+\alpha_4 A_{VH})(\beta_H(1-\theta)N_H+\gamma I_F)$$

$$AI_F(qI_M+\alpha_4 A_V+N_H\mu_1) = qI_M\beta_H(1-\theta)N_H+qI_M\gamma I_F+\alpha_4 A_V\beta_H(1-\theta)N_H+\alpha_4 A_V\gamma I_F$$

$$AI_F(qI_M+\alpha_4 A_V+N_H\mu_1) = \beta_H(1-\theta)N_H(qI_M+\alpha_4 A_V)+I_F(qI_M\gamma+\alpha_4 A_V\gamma)$$

Collect like terms

$$I_F(qI_M+\alpha_4 A_V+N_H\mu_1)A - I_F(qI_M\gamma+\alpha_4 A_V\gamma) = \beta_H(1-\theta)N_H(qI_M+\alpha_4 A_V)$$

$$I_F[(qI_M+\alpha_4 A_V+N_H\mu_1)A - (qI_M\gamma+\alpha_4 A_V\gamma)] = \beta_H(1-\theta)N_H(qI_M+\alpha_4 A_V)$$

$$I_F = \frac{\beta_H(1-\theta)N_H(qI_M+\alpha_4 A_V)}{(qI_M+\alpha_4 A_V+N_H\mu_1)A - (qI_M\gamma+\alpha_4 A_V\gamma)}$$

Thus

$$I_F = \frac{\beta_H(1-\theta)N_H(C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V)}{[C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V+N_H\mu_1](\mu_1+\delta_1+\gamma)-(C_1\alpha_2(1-\varepsilon\tau)I_M\gamma+\alpha_4 A_V\gamma)} \tag{3.18}$$

Similarly for the vector population, we solve equation (5) and (6)

From equation (5)

$$\frac{dD_V}{dT} = \beta_V N_V - (\sigma+\mu_2+\delta_2)D_V$$

$$0 = \beta_V N_V - (\sigma+\mu_2+\&)D_V$$

$$(\sigma+\mu_2+\&)D_V = \beta_V N_V$$

$$D_V = \frac{\beta_V N_V}{\sigma+\mu_2+\delta_2} \tag{3.19}$$

Also from equation (6)

$$\frac{dA_V}{dT} = \sigma D_V - (\mu_2+\&)A_V$$

$$0 = \sigma D_V - (\mu_2+\delta_2)A_V$$

$$\sigma D_V = (\mu_2+\delta_2)A_V$$

$$A_V = \frac{\sigma D_V}{\mu_2+\delta_2} \tag{3.20}$$

So the endemic equilibrium state is given by

$$E^0 = (X,Y,Z,U,V,W) = \frac{N_H(\mu_1+\delta_1+\gamma)I_M}{C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V}, \tag{3.21}$$

$$\frac{\beta_H\theta N_H[C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V]}{(\mu_1+\delta_1+\gamma)[C_2\alpha_1(1-\varepsilon\tau)I_F+\alpha_3 A_V+N_H\mu_1]-C_2\alpha_1(1-\varepsilon\tau)I_F\gamma-\alpha_3 A_V\gamma}, \tag{3.22}$$

$$\frac{N_H(\mu_1+\delta_1+\gamma)I_F}{C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V}, \tag{3.23}$$

$$\frac{\beta_H(1-\theta)N_H(C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V)}{[C_1\alpha_2(1-\varepsilon\tau)I_M+\alpha_4 A_V+N_H\mu_1](\mu_1+\delta_1+\gamma)-(C_1\alpha_2(1-\varepsilon\tau)I_M\gamma+\alpha_4 A_V\gamma)}, \tag{3.24}$$

$$\frac{\beta_V N_V}{\sigma+\mu_2+\delta_2}, \tag{3.25}$$

$$\frac{\sigma D_V}{\mu_2+\delta_2} \tag{3.26}$$

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STABILITY ANALYSIS FOR THE EQUILIBRIUM STATE

We refer to an equilibrium as being stable if the real parts of the eigenvalues of the Jacobian at the equilibrium are negative. An equilibrium is unstable if at least one of the eigenvalues of the Jacobian at that point is positive. In other to obtain the Eigenvalues to check for the stability of the system, we carryout standard linearization of the system by letting the functions F_1, F_2, F_3, F_4, F_5, F_6 to represent equations (1) $-(6)$ respectively as follows

$$F_1 = \beta_H \theta N_H + \gamma I_M - \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - \mu_1 S_M \qquad (3.27)$$

$$F_2 = \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)S_M}{N_H} - (\mu_1 + \delta_1 + \gamma)I_M \qquad (3.28)$$

$$F_3 = \beta_H(1-\theta)N_H + \gamma I_F - \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} - \mu_1 S_F \qquad (3.29)$$

$$F_4 = \frac{(C_1\alpha_2(1-\varepsilon\tau)I_M + \alpha_4 A_V)S_F}{N_H} - (\mu_1 + \delta_1 + \gamma)I_F \qquad (3.30)$$

$$F_5 = \beta_V N_V - (\sigma + \mu_2 + \delta_2)D_V \qquad (3.31)$$

$$F_6 = \sigma D_V - (\mu_2 + \delta_2)A_V \qquad (3.32)$$

We differentiate equations $(3.27) - (3.32)$ partially with respect to S_M, I_M, S_F, I_F, D_V and A_V and also putting it in mind that at disease free equilibrium,

$$I_M = I_F = D_V = A_V = 0$$

Hence;

$$J_{11} = \frac{\partial F_1}{\partial S_M} = -\frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)}{N_H} - \mu_1 \qquad J_{21} = \frac{\partial F_2}{\partial S_M} = \frac{(C_2\alpha_1(1-\varepsilon\tau)I_F + \alpha_3 A_V)}{N_H}$$

$$J_{11}(I_F = 0, A_V = 0) = \frac{\partial F_1}{\partial S_M} = -\mu_1 \qquad J_{21}(I_F = 0, A_V = 0) = \frac{\partial F_2}{\partial S_M} = 0$$

$$J_{31} = \frac{\partial F_3}{\partial S_M} = 0 \qquad J_{41} = \frac{\partial F_4}{\partial S_M} = 0 \qquad J_{51} = \frac{\partial F_5}{\partial S_M} = 0 \qquad J_{61} = \frac{\partial F_6}{\partial S_M} = 0$$

$$J_{12} = \frac{\partial F_1}{\partial I_M} = \gamma \qquad J_{22} = \frac{\partial F_2}{\partial I_M} = -(\mu_1 + \delta_1 + \gamma) = -A_1$$

$$J_{32} = \frac{\partial F_3}{\partial I_M} = -\frac{C_1\alpha_2(1-\varepsilon\tau)S_F}{N_H} = -\frac{qZ}{N_H} \qquad J_{42} = \frac{\partial F_4}{\partial I_M} = \frac{C_2\alpha_2(1-\varepsilon\tau)S_F}{N_H} = \frac{qZ}{N_H}$$

$$J_{52} = \frac{\partial F_5}{\partial I_M} = 0 \qquad J_{62} = \frac{\partial F_6}{\partial I_M} = 0$$

$$J_{13} = \frac{\partial F_1}{\partial S_F} = 0 \qquad J_{23} = \frac{\partial F_2}{\partial S_F} = 0$$

$$J_{33} = \frac{\partial F_3}{\partial S_F} = -\frac{(C_2\alpha_1(1-\varepsilon\tau)I_M + \alpha_4 A_V)}{N_H} - \mu_1 \qquad J_{43} = \frac{\partial F_4}{\partial S_F} = \frac{(C_2\alpha_1(1-\varepsilon\tau)I_M + \alpha_4 A_V)}{N_H}$$

$$J_{33}(I_M = 0, A_V = 0) = \frac{\partial F_3}{\partial S_F} = -\mu_1 \qquad J_{43}(I_M = 0, A_V = 0) = \frac{\partial F_4}{\partial S_F} = 0$$

$$J_{53} = \frac{\partial F_5}{\partial S_F} = 0 \qquad J_{63} = \frac{\partial F_6}{\partial S_F} = 0$$

$$J_{14} = \frac{\partial F_1}{\partial I_F} = -\frac{C_2\alpha_1(1-\varepsilon\tau)S_M}{N_H} = -\frac{pX}{N_H} \qquad J_{24} = \frac{\partial F_2}{\partial I_F} = \frac{C_2\alpha_1(1-\varepsilon\tau)S_M}{N_H} = \frac{pX}{N_H}$$

$$J_{34} = \frac{\partial F_3}{\partial I_F} = \gamma \qquad J_{44} = \frac{\partial F_4}{\partial I_F} = -(\mu_1 + \delta_1 + \gamma) = -A_1$$

$$J_{54} = \frac{\partial F_5}{\partial I_F} = 0 \qquad J_{64} = \frac{\partial F_6}{\partial I_F} = 0$$

$$J_{15} = \frac{\partial F_1}{\partial D_V} = 0 \qquad J_{25} = \frac{\partial F_2}{\partial D_V} = 0 \qquad J_{35} = \frac{\partial F_3}{\partial D_V} = 0$$

$$J_{45} = \frac{\partial F_4}{\partial D_V} = 0 \qquad J_{55} = \frac{\partial F_5}{\partial D_V} = -(\sigma + \mu_2 + \delta_2) = -A_2 \qquad J_{65} = \frac{\partial F_6}{\partial D_V} = \sigma$$

$$J_{16} = \frac{\partial F_1}{\partial A_V} = \frac{-\alpha_3 S_M}{N_H} = \frac{-\alpha_3 X}{N_H} \qquad J_{26} = \frac{\partial F_2}{\partial A_V} = \frac{\alpha_3 S_M}{N_H} = \frac{\alpha_3 X}{N_H}$$

$$J_{36} = \frac{\partial F_3}{\partial A_V} = \frac{-\alpha_4 S_F}{N_H} = \frac{-\alpha_4 Z}{N_H} \qquad J_{46} = \frac{\partial F_4}{\partial A_V} = \frac{\alpha_4 S_F}{N_H} = \frac{\alpha_4 Z}{N_H} \qquad J_{56} = \frac{\partial F_5}{\partial A_V} = 0$$

$$J_{66} = \frac{\partial F_6}{\partial A_V} = -(\mu_2 + \delta_2)$$

$$\text{Where } (X, Y, Z, U, V, W) = (S_M, I_M, S_F, I_F, D_V, A_V)$$

$$p = C_2\alpha_1(1-\varepsilon\tau) \qquad q = C_1\alpha_2(1-\varepsilon\tau)$$

$$A_1 = (\mu_1 + \delta_1 + \gamma) \qquad A_2 = (\sigma + \mu_2 + \delta_2)$$

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At the DFE, the Jacobian matrix is;

$$J_{E_0} = \begin{bmatrix} -\mu_1 & \gamma & 0 & -\frac{px}{N_H} & 0 & -\frac{\alpha_3 x}{N_H} \\ 0 & -A_1 & 0 & \frac{px}{N_H} & 0 & \frac{\alpha_3 x}{N_H} \\ 0 & -\frac{qz}{N_H} & -\mu_1 & \gamma & 0 & -\frac{\alpha_4 z}{N_H} \\ 0 & \frac{qz}{N_H} & 0 & -A_1 & 0 & \frac{\alpha_4 z}{N_H} \\ 0 & 0 & 0 & 0 & -A_2 & 0 \\ 0 & 0 & 0 & 0 & \sigma & -(\mu_2 + \delta_2) \end{bmatrix} \qquad (3.33)$$

We transform (3.33) represented above to an upper triangular matrix using elementary row reduction method to have

$$R_3 \to R_3 + R_4 = \begin{bmatrix} -\mu_1 & \gamma & 0 & -\frac{px}{N_H} & 0 & -\frac{\alpha_3 x}{N_H} \\ 0 & -A_1 & 0 & \frac{px}{N_H} & 0 & \frac{\alpha_3 x}{N_H} \\ 0 & -\frac{qz}{N_H} & -\mu_1 & \gamma & 0 & -\frac{\alpha_4 z}{N_H} \\ 0 & \frac{qz}{N_H} & 0 & -A_1 & 0 & \frac{\alpha_4 z}{N_H} \\ 0 & 0 & 0 & 0 & -A_2 & 0 \\ 0 & 0 & 0 & 0 & \sigma & -(\mu_2 + \delta_2) \end{bmatrix} \qquad (3.34)$$

$$R_4 \to A_1 R_4 + \frac{qz}{N_H} R_2 = \begin{bmatrix} -\mu_1 & \gamma & 0 & -\frac{px}{N_H} & 0 & -\frac{\alpha_3 x}{N_H} \\ 0 & -A_1 & 0 & \frac{px}{N_H} & 0 & \frac{\alpha_3 x}{N_H} \\ 0 & 0 & -\mu_1 & \gamma - A_1 & 0 & 0 \\ 0 & \frac{qz}{N_H} & 0 & -A_1 & 0 & \frac{\alpha_4 z}{N_H} \\ 0 & 0 & 0 & 0 & -A_2 & 0 \\ 0 & 0 & 0 & 0 & \sigma & -(\mu_2 + \delta_2) \end{bmatrix} \qquad (3.35)$$

$$R_4 \to \frac{1}{A_1} R_4 = \begin{bmatrix} -\mu_1 & \gamma & 0 & -\frac{px}{N_H} & 0 & -\frac{\alpha_3 x}{N_H} \\ 0 & -A_1 & 0 & \frac{px}{N_H} & 0 & \frac{\alpha_3 x}{N_H} \\ 0 & 0 & -\mu_1 & \gamma - A_1 & 0 & 0 \\ 0 & 0 & 0 & -A_1^2 + \frac{qzpx}{(N_H)^2} & 0 & \frac{A_1 \alpha_4 z}{N_H} + \frac{qz\alpha_3 x}{(N_H)^2} \\ 0 & 0 & 0 & 0 & -A_2 & 0 \\ 0 & 0 & 0 & 0 & \sigma & -(\mu_2 + \delta_2) \end{bmatrix} \qquad (3.36)$$

$$R_6 \to A_2 R_6 + \sigma R_5 = \begin{bmatrix} -\mu_1 & \gamma & 0 & -\frac{px}{N_H} & 0 & -\frac{\alpha_3 x}{N_H} \\ 0 & -A_1 & 0 & \frac{px}{N_H} & 0 & \frac{\alpha_3 x}{N_H} \\ 0 & 0 & -\mu_1 & \gamma - A_1 & 0 & 0 \\ 0 & 0 & 0 & -A_1 + \frac{qzpx}{A_1(N_H)^2} & 0 & \frac{\alpha_4 z}{N_H} + \frac{qz\alpha_3 x}{A_1(N_H)^2} \\ 0 & 0 & 0 & 0 & -A_2 & 0 \\ 0 & 0 & 0 & 0 & \sigma & -(\mu_2 + \delta_2) \end{bmatrix} \qquad (3.37)$$

$$\begin{bmatrix} -\mu_1 & \gamma & 0 & -\frac{px}{N_H} & 0 & -\frac{\alpha_3 x}{N_H} \\ 0 & -A_1 & 0 & \frac{px}{N_H} & 0 & \frac{\alpha_3 x}{N_H} \\ 0 & 0 & -\mu_1 & \gamma - A_1 & 0 & 0 \\ 0 & 0 & 0 & -A_1 + \frac{qzpx}{A_1(N_H)^2} & 0 & \frac{\alpha_4 z}{N_H} + \frac{qz\alpha_3 x}{A_1(N_H)^2} \\ 0 & 0 & 0 & 0 & -A_2 & 0 \\ 0 & 0 & 0 & 0 & 0 & -A_2(\mu_2 + \delta_2) \end{bmatrix} \qquad (3.38)$$

Thus the characteristics equation of the upper triangular matrix (3.38) is given by $|J_{E_0} - \lambda I|$

$$J_{E_0} = \begin{bmatrix} -(\mu_1 + \lambda_1) & \gamma & 0 & -\frac{px}{N_H} & 0 & -\frac{\alpha_3 x}{N_H} \\ 0 & -(A_1 + \lambda_2) & 0 & \frac{px}{N_H} & 0 & \frac{\alpha_3 x}{N_H} \\ 0 & 0 & -(\mu_1 + \lambda_3) & \gamma - A_1 & 0 & 0 \\ 0 & 0 & 0 & -(A_1 - A_3 + \lambda_4) & 0 & A_4 \\ 0 & 0 & 0 & 0 & -(A_2 + \lambda_5) & 0 \\ 0 & 0 & 0 & 0 & 0 & -A_2(\mu_2 + \delta_2) - \lambda_6 \end{bmatrix}$$

$$(3.39)$$

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Equating the product of diagonal of an upper triangular Jacobian matrix to zero (0) gives the eigenvalues of the matrix. Therefore the eigenvalues are

$$-(\mu_1 + \lambda_1) = 0 \qquad -(A_1 + \lambda_2) = 0 \qquad -(\mu_1 + \lambda_3) = 0$$
$$\Rightarrow -\mu_1 - \lambda_1 = 0 \qquad -A_1 - \lambda_2 = 0 \qquad -\mu_1 - \lambda_3 = 0$$
$$\Rightarrow \lambda_1 = -\mu_1 \qquad \Rightarrow \lambda_2 = -A_1 \qquad \Rightarrow \lambda_3 = -\mu_1$$
$$-(A_1 - A_3 + \lambda_4) = 0 \qquad -(A_2 + \lambda_5) = 0 \qquad -A_2(\mu_2 + \delta_2) - \lambda_6 = 0$$
$$-(A_1 - A_3) - \lambda_4 = 0 \qquad -A_2 - \lambda_5 = 0 \qquad -A_2(\mu_2 + \delta_2) = \lambda_6$$
$$\Rightarrow \lambda_4 = -(A_1 - A_3) \qquad \Rightarrow \lambda_5 = -A_2 \qquad \Rightarrow \lambda_6 = -A_2(\mu_2 + \delta_2)$$

Where identity matrix (I) is

$$I = \begin{Bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{Bmatrix}$$

Thus;

$$|\lambda I| = \begin{Bmatrix} \lambda_1 & 0 & 0 & 0 & 0 & 0 \\ 0 & \lambda_2 & 0 & 0 & 0 & 0 \\ 0 & 0 & \lambda_3 & 0 & 0 & 0 \\ 0 & 0 & 0 & \lambda_4 & 0 & 0 \\ 0 & 0 & 0 & 0 & \lambda_5 & 0 \\ 0 & 0 & 0 & 0 & 0 & \lambda_6 \end{Bmatrix}$$

$$A_1 = (\mu_1 + \delta_1 + \gamma) \qquad A_2 = (\sigma + \mu_2 + \delta_2)$$
$$A_3 = \frac{qZpX}{A_1(N_H)^2} \qquad A_4 = \frac{A_1\alpha_4 Z}{N_H} + \frac{qZ\alpha_3 X}{(N_H)^2}$$

Hence

$$\lambda_1 = -\mu_1 \qquad \lambda_2 = -(\mu_1 + \delta_1 + \gamma) \qquad \lambda_3 = -\mu_1$$
$$\lambda_4 = -\left[(\mu_1 + \delta_1 + \gamma) - \frac{qZpX}{(\mu_1 + \delta_1 + \gamma)(N_H)^2}\right] \qquad \lambda_5 = -(\sigma + \mu_2 + \delta_2)$$

$$\lambda_6 = -(\sigma + \mu_2 + \delta_2)(\mu_2 + \delta_2)$$

For stability of disease-free equilibrium Routh-Hurwitz criteria requires that all eigenvalues have negative real part. Since all the eigenvalues of (3.39) have negative real parts i.e. $\lambda_i < 0$ for

$i = 1,2,3, \ldots, 6$ implies that the disease free equilibrium is stable. Thus the disease dies out in the long run and cannot invade the population.

If $R_e(\lambda) > 0$, the disease free equilibrium is unstable i.e. invasion is always possible and the infection will be able to spread in the population.

An endemic disease is a disease that is always present in a certain population or region. In DFE, we solve to know if the disease cannot invade a population or can but DEE, we already know that the disease have invaded the population and it is persistence. Once the disease invades the population, it becomes endemic.

CONCLUSION

The study analysed the spread and control and control of Lassa fever. Lassa fever is an acute viral haemorrhagic illness caused by Lassa virus. Noting that humans usually become infected with Lassa virus through exposure to food or household items contaminated with urine or feaces of infected Mastomys rats.

The stability analysis for disease free equilibrium of our model showed that the disease dies out in the long run and cannot invade the population.

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Senior Citizen Information System

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ABSTRACT: This developmental-descriptive research sought to design and developed a computer-based system, to be known as the Senior Citizens Information System, to provide real-time information dissemination among senior citizen members in the Municipality of Batad, Iloilo pertaining to their membership status and monetary assistance monitoring. The Rapid Application Development model was employed as the SDLC in the development of the system product. More so, the three-tier architecture was used as the architectural model. There were 120 senior citizens as user-respondents and five IT experts for evaluation. The system product was evaluated using a researchers-made survey instrument to determine if level of usability and performance. Results of the investigation shows that the system product was perceived as very good with its level of usability as well as its performance.

KEYWORDS: Computer- based System, Information System, Rapid Application Development, Senior Citizen

I.INTRODUCTION

Today, information system, an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products. Other organizations rely on information systems to carry out and manage their operations, interact with their clients. Information systems are used to run interorganizational supply chains and electronic markets.

As information systems enabled more diverse human activities, they exerted a profound influence over society. These systems quickened the pace of daily activities, enabled people to develop and maintain new and often more-rewarding relationships, affected the structure and mix of organizations and influenced the nature of work. Information and knowledge became vital economic resources. (https://www.britannica.com/topic/information-system)

Apparently, the Senior Citizen's Office of Batad, Iloilo is using the traditional manual system in all transactions especially in the management of information to its member. Due to their manual way of keeping important records in the office and transactions, some problems were encountered that need to be solved. They are having difficulty in searching for individual records, encountering loss of data, having record misplacement's retrieving the past records. On the part of the senior citizens, there are times where the information intended for them are not received especially about meetings and in releasing of the senior citizen quarterly allowances. These reasons and problems lead to the development of a computer-based system that can ease the operations of their office.

In this study, the researchers focused on the transformation of the current manual system used by the Senior Citizens Office at Batad, Iloilo in giving the information to the members.

The system approach (Input-Process-Output System) is used to describe the Conceptual Framework of the study. The procedures started with the inputs, software development as a process and product evaluation as output.

The inputs are the essential to the development of the system in order to produce relevant output of the information.Thus, the input in this study included the Senior Citizen Member's Detailand type of event.The data inputs were securely processed and managed by the Senior Citizen Information System for the better output of information. The outputs of the study were the levels of usability and performance of the developed system.

Figure 1 shows the conceptual model of the study.
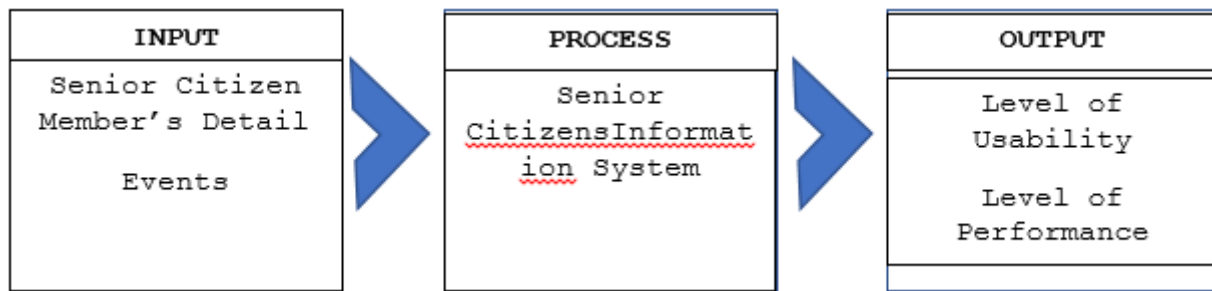
Senior Citizen information System

Figure 1. The Conceptual Model of the Study

The Senior Citizens Information System is a computer-based system aimed to efficiently manage the activities in the senior citizens office at the municipality of Batad, Iloilo.

Specifically, the study sought to:

      1. Designed and developed an information system that provides real-time information for the senior citizens events.

      2. Determine the level of usability of the developed system as perceived by the senior citizens of Batad, Iloilo in terms of learnability, understandability and operability.

      3. Evaluate the performance of the developed system as perceived by the expert evaluators in terms of time behavior and resource utilization.

The study is mainly concerned with the dissemination of information such as event and quarterly allowances of the members at Batad, Iloilo. The subjects of the study were the registered members of the senior citizens in the said municipality. This study was conducted at the Municipality of Batad, Iloilo consisting of twenty four (24) barangays. The study was conducted in the year 2018. It consist of two major components namely the development of the system prototype and the evaluation of the system product. For the development of the system prototype, the Rapid Application Design model was employed as the System Development Life Cycle.

      In the evaluation of the system product, the researchers conducted a survey to solicit feedbacks from 125 respondents on their perception of the system product based on pre-defined evaluation criteria. The Mean statistic was used to statistically interpret the result of the responses.

II. METHODOLOGY

Research Design

The research designs used by the researchers were developmental and descriptive. Developmental research is a method to investigate patterns and sequences of growth and change as a function of time (Bueno, 2016). It is used in this study to develop an efficient and complete functional computer-based system.

      Descriptive research design refers to the type of research question, design, and data analysis that was applied to a given topic. Descriptive research design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way (Bueno, 2016). In line with this study, the survey method was used to collect self-report data of thestudy; the participants were described as the objectives of the study. The purpose of the survey is to gather personal data about the existing performance of the developed system based on the specific indicators.

Software Development Life Cycle (SDLC)

In this study, Rapid Application Development (RAD) was used as the SDLC model. The RAD, described the method of software development which heavily emphasizes rapid prototyping and iterative delivery. The RAD model was, therefore, a sharp alternative to the typical waterfall development model, which often focuses largely on planning and sequential design practices.

      Utilizing a Rapid Application Development method, researchers can aggressively utilize knowledge and discoveries gleaned during the development process itself to shape the design and or alter the software direction entirely.

      The RAD generally follows a cyclical process that includes four basic steps or phases which were: Planning Requirements, User Design, Rapid Construction, Cutover/Transition or Implementation. Each step/phase, the researcher performs specified activity led to develop a system. Figure 2 shows the RAD Model.
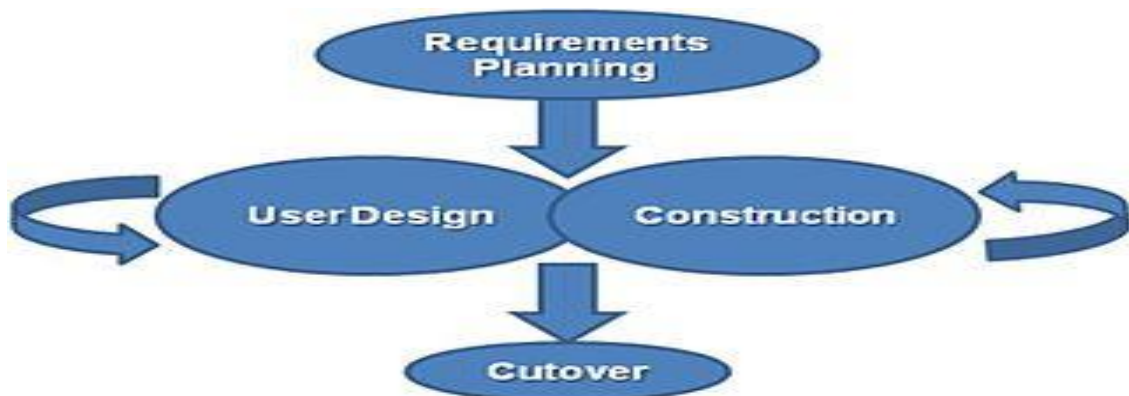
Senior Citizen information System

Figure 2. The Rapid Application Development Model

Requirements Planning Phase

During the initial stage, the researchers and users come to a rough agreement on project scope and application requirements, so that future stages with prototyping can begin.

It started with the meeting between the Senior Citizen's officers and the researchers. It was initiated by discussing of the process and establishing the agreement of the objectives for the development project in general and final result of the particular developed system.

The researchers have initially conducted the Requirements Planning phase and had able to perform the following tasks:

1. Conduct of Environmental Scanning. To be able to understand the current situation at the Office of the Senior Citizens with their activities involved, the researchers conducted a physical observation at the Office to have first-hand information that their office needs to do in order to make their manual storing of the data were each of the member secured. The researchers also conducted face to face interview with the senior citizen's officers on the manner of how the process of informing every members of the Senior Citizens Organization. The conduct of the task provided the researchers a clearer picture of the current situation.

2. Requirements Definition. The project's scope was defined in this task. The functionality of the system was expressed in terms of the business processes and the data that the system supported. The requirements definitions were expressed as functional requirements and non-functional requirements.

For the functional requirements, the project's scope was only limited within the activities of the Office on how they spread the information from the high-level of Senior Citizens Offices down to towns offices down to each member or each of the Senior Citizens in order to receive an information for their quarterly allowances. Simple interface design, easy to use, color scheme, font sizes. For the non-functional requirements, the user was able to improve the traditional way of spreading the information just a click away and that the output wasable to improve their System.

3. Finalization of Requirements. The requirements in the previous task were properly documented that serves as the basis of the development of the various functionalities of the developed system. It was presented to the senior citizens officials for their approval to proceed with the project.

User Design (UD) Phase

The objectives of the User Design phase are (i) to study the business processes related w/ the developed system area; (ii) to analyse in detail business activities associated with the previous phase; (iii) to the developed system structure in terms of the automated and manual functions that comprise the system; (iv) the developed screen layouts for the most important automated functions; (v) to select the appropriate construction approach for the system.

Design phase is to specify the components for this transformation, so that each component is also a transformation function. It seeks to develop detailed specifications that emphasize the physical solutions to the user's information technology needs. It contained functional diagrams, screen layouts, business rules, business process diagrams and ERD with a full data dictionary.

The UD phase produces a detailed system area model, an outline system design, and an implementation plan. The following tasks were conducted under this phase.

1. Detailed System Area Model. In order to produce the detailed activities for the developed system area, the researcher presented the developed system to the Senior Citizen Officers a thorough discussion on the specific functional components of the developed system. The detailed system area model wascompleted; it was possible to refine the scope to ensure that the critical functions were delivered in the required time of frame.

Senior Citizen information System

2. Data Model. After the detailed system area model was known, the next task was analysing the business data that the developed system needs.

However, the analysis of the business data was implemented through the use of the Entity Relationship Diagram (ERD). An entity relationship diagram (ERD) shows the relationships of the entity sets stored in the database. An entity in this context was the component of data. In other words, ER diagrams illustrated the logical structure of the databases. For the developed system, there were three entities made. The MEMBER entity, INFORMATION entity and EVENT entity. Relationships were set between among these entities. Thus, the following relationships were defined. One and only one member of the Senior Citizens in Batad, Iloilo received one too many information. The message contains one and only one Event which allows one too many information to the members. Figure 3 shows the ERD model.
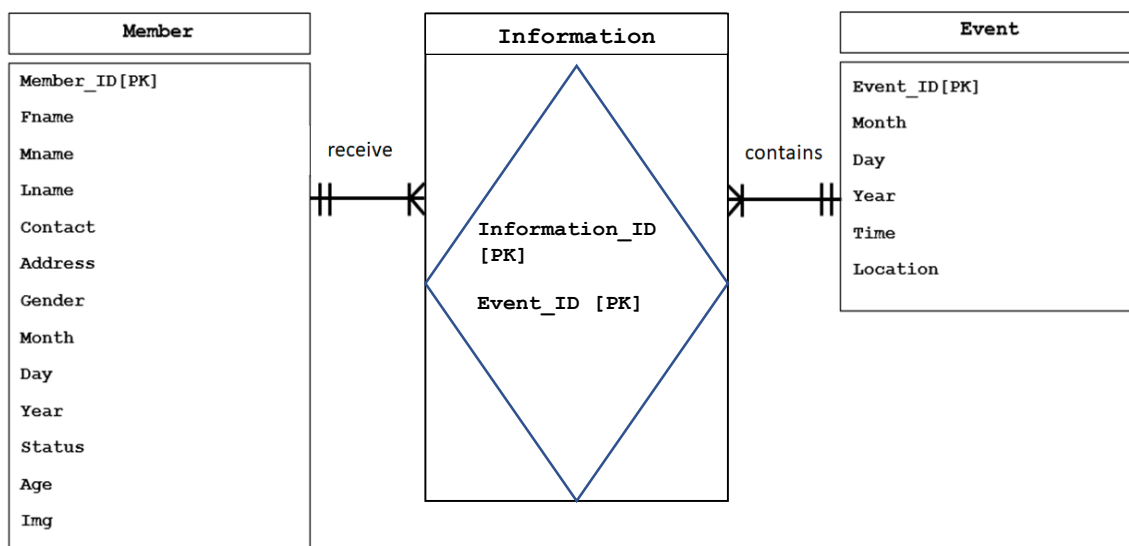
Figure 3. The Entity Relationship Diagram of the Developed System.

3. Process Model. The design that emerged reviewed by the researchers. The consistency of the analysis and design confirmed via interaction analysis and prototyping. By interaction analysis, the interactions between functions and data was analysed to be able to identify missing/ extraneous function. Through this, it shows the process model that describes business processes, the activities that people do. The process model was developed for the as-is system and/or the to be system. To show this process model the researcher described data flow diagramming, one most used process modelling techniques. The process model or data- flow diagram (DFD) was the graphical representation of the "flow" of data through an information system. DFDs also were used for the visualization of data processing (structured design). On a DFD, data items flow from an external data sources or an internal data store to an external data sink, via an internal process.

This makes use of the information and graphics to represent the process. The process shows the tasks or activities done by the system. Each process transforms inputs into outputs. The usefulness of this model extends beyond describing the software processes. There were two external agents involve in the process of this developed system. These were the administrator and the members.

The administrator who directly uses and operates the system, the one who receives and retrieves the requested information, has the full authority to use the developed system such as adding the member's information. Through this developedsystem, the office of the Senior Citizens can speed up the transaction and lessens the time in retrieving the member's record and other information needed.

The other external agents were the members. For the member's part, they can receive updated information or announcement through SMS Notification; they do not physically need to go in the office to get such nevertheless of taking their quarterly allowances.

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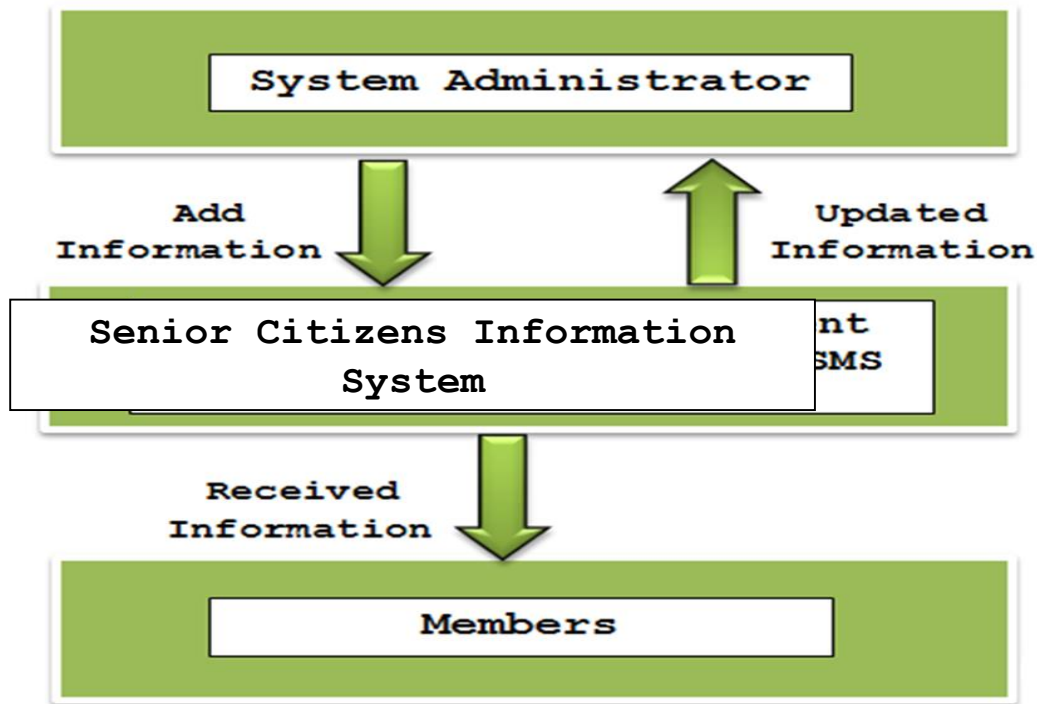
Figure 4. The Context Data Flow Diagram of the Developed System

4. Logical Architecture Design. A structural design that gives as much detail as possible without constraining the architecture to a particular technology or environment.

Through this, it showed that the Logical Architectural Design is one of the important documents that show the hardware, software and networks environments of the system. The developed system used tree-tier architecture. The researchers' designs a three-tier architecture, in which the functional process logic, data access, computer data storage and user interface were developed and maintained as independent modules on separate platforms.

The application logic was a three-tier architecture that allows any one of the three tiers to be upgraded or replaced independently.

In the presentation-tier, it serves as the topmost level of the application. The presentation tier displays information such as client interface of the developed Senior Citizens Information System in order for the user to communicate/access directly.

The next tier is the application tier or sometimes it can be the business logic, logic tier, or middle tier. This logical tier is pulled out from the presentation tier and, as its own layer, it controls an application's functionality to the application server of the developed system and at the same time in performing detailed processing through the developed system.

Finally, the data tier includes the data persistence mechanisms as MySQL server for the developed system and the data access layer that encapsulate the persistence mechanisms which exposes data to the senior citizens. This tier provides a data access layer to the application tier for the data to be stored in the said server.

5. Physical Network Topology. The final task in the UD phase was to present a model that showed physical network topology that visualizing the communication scheme of physical networks and its networks arrangement.The physical network topology depicted the placement of the components in the network. It showed the configuration of the cables, computers and other devices.

The developed system was using the client-server. The administrator is responsible to administer the system.

Rapid Construction Phase

Construction phase focused on program and application development task similar to the software development life cycle(SDLC). In RAD, however, users continued to participate and can still suggest changes or improvements as actual screen or reports was developed. Its tasks were programming and application development, coding, unit integration and system testing.

The objectives of the Rapid Construction stage were (i)to complete the detailed design of the developed system; (ii) to create and test the software that implements the developed system; (iii) to generate a system that operates an acceptable level of performance; (iv) to prepare documentation necessary to operate the developed system; (v) to design, develop, and test the required transition software and; (vi) to perform the steps necessary to prepare for the conversion of the system to production status.

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The design of the developed system was initially described in the UD stage, completed in the RC stage, and application software to implement that design was developed and tested. An activity to prepare for the transition of the system and the production status was also performed. The tasks of the RC stage are:

1. Preparation of the Rapid Construction. The development environment was finalized including workstation and workspace for the system developers, and the CASE software for their use. Additionally, the database was designed based on the preliminary data structure developed in the UD stage.

Finally, the testing strategy for the developed system were completed and the acquisition of facilities necessary to operate the developed system after it was constructed and initiated. The researchers make used of their personal laptop computer on the development of the system. Additionally, the MySQL for the database, vb 6.0language and windows operating system development environment. Installing this application package allowed the researcher to develop and test the system prototype in the local machine. For the SMS components, the researcher employed with the use of the Globe Tattoo Broadband USB stick. The device GSM-ready which means, it is capable for SMS related activities.

2. Construction of the System Prototype. The detail definition of the design of each function was completed, based on the requirements of the future end users. Software to implement the automated function was developed and tested.

3. Testing and Evaluation. This task involved the developed the necessary test data which was verified the operational capacity of the system. This data was used during the integration, system and acceptance test. Documentation explaining how the system was operated by users and computer operations personnel produced.

The developed system was undergone the series of evaluation by the expert on the field of the study and the Senior Citizens officer-in-charge as the user. After the testing, the researchers provided the researcher's made survey questionnaire that was created on ISO/IEC 25010 Software Quality Model to the respondents to allow them to evaluate user's experience which includes the usability, performance, time behavior and resource utilization of the system.

The result of the evaluation was part of the improvement of the process of the developed system. This research study utilized questionnaire to aim the user's level of experience and the overall functionality of the system.

In the study, the researchers identified two groups of users who evaluated the system. The first group was composed of five (5)experts on their field of the study and the second group was composed of one hundred twenty(120)senior citizens.

Table 1. Actual Distribution of Software Evaluators/Respondents.

Type of Respondents	No. of Evaluators	Percentage
Expert Evaluators	5	4%
Senior Citizens	120	96%
Total	**125**	**100%**

A researcher made survey questionnaire was administered by the evaluators after testing the product. A 5-point Linker scale comprising of 1 as poor and 5 as very good was used. The researchers made survey questionnaire was subjected to content validation by three members of the panel of experts in their field of information technology to help the researcher's identity whether the developed system meets the user's requirement and satisfaction. To statistically compute whether the developed system passes the evaluation criteria, the Mean statistics was applied.

The Mean has computed as:

$$\overline{X} = \frac{\sum x}{n}$$

Where $\overline{X}$ is the mean

$\sum x$ Is the summation of individual raw score

N is the total number of populations

The obtained mean score were interpreted using the following verbal descriptions:

Mean Score	Description
4.21 - 5.00	Very Good
3.1 - 4.20	Good
2.61 - 3.40	Average
1.81 - 2.60	Fair
1.0 - 1.80	Poor

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4. Finalization of the Developed System Product. After testing data of the system model, feedbacks coming from the users, more gathered and would become basis for system improvement. However, to improve the system the revisions must only up to three major chances, so that the project timeframe would not be drag by excision revisions. After the third major revisions, the final system product would be presented for the acceptance and would become ready for deployment.

Cutover Phase

The cutover phase resembles the final tasks in the SDLC implementation phase, including data conversion, testing, the changeover to the new system, and user training. Compared with traditional methods, the entire process was compress. As a result, the new system was built, delivered, and placed in operation much sooner.

The developed systemin the RC stage becomes operational in the TR stage. At this time, the developers prepared existing data for the new system and were trained users to operate the new application. They provided support to resolve any problems that arise immediately after the application becomes operational.

III. RESULTS AND DISCUSSION

Level of Usability of the Developed System in terms of Learnability, Understand ability, and Operability

Table 2 presented the mean score on evaluating the usability of the Senior Citizens Information System in terms of learnability, understand ability, and operability of the information provided to the clients. Usability refers to the degree in which a system can be used by specified users to achieve the specified goals. Learnability is the capability of the system to enable the user to learn its application quickly. Understand ability is the capability of the system product to enable the user to understand whether the system is suitable, and how it can be used for particular tasks and conditions. Operability is the degree to which a product or a system has attributes that make it easy to operate and control.

Based on the respondent's feedbacks, the level of usability of the developed system was 4.62 which interpreted as "Very Good"; Learnability had a computed mean of 4.62 interpreted as "Very Good"; Understand ability had a computed mean of 4.63 interpreted as "Very Good"; and Operability had a computed mean of 4.61 interpreted as "Very Good."

Table 2. Respondents Feedbacks as to the Level of Usability of the Developed System in terms of Learnability, Understand ability, and Operability

Implementation Indicators	Mean	Verbal Interpretation
Level of Usability	4.62	Very Good
Learnability	4.62	Very Good
Understand ability	4.63	Very Good
Operability	4.61	Very Good

Legend: 1.00 - 1.80 (Poor); 1.81 - 2.60 (Fair);
2.61 - 3.40 (Average); 3.41 - 4.20 (Good);
4.21 - 5.00 (Very Good)

Performance of the Developed System at perceived by expert evaluators in terms of Time Behavior and Resource Utilization

Table 3 presented the evaluation of the expert to the developed system. The table showed the mean score voted by the experts in terms of time behavior and resource utilization. Performance refers to the amount of work accomplish by the computer system. Time behaviour characterizes response times for given thruput, i.etransaction rate. Resource utilization characterizes resources used, i.e. CPU, memory, HDD and Network.

The total mean performance of the developed system was 4.41 which interpreted as "Very Good". In terms of time behavior the developed system had a computed mean of 4.32 being interpreted as "Very Good" and resource utilization had a computed mean of 4.50 which is interpreted as "Very Good".

Table 3. Performance of the Developed System at perceived by expert evaluators in terms of Time Behavior and Resource Utilization

Implementation Indicators	Mean	Verbal Interpretation
Performance	4.41	Very Good
Time Behavior	4.32	Very Good
Resource Utilization	4.50	Very Good

Legend: 1.00 - 1.80 (Poor); 1.81 - 2.60 (Fair);
2.61 - 3.40 (Average); 3.41 - 4.20 (Good);
4.21 - 5.00 (Very Good)

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IV. CONCLUSION

The Senior Citizens Information System was a system consists of information of the Senior Citizens that was stored in a database. Their allowances were monitored and they were barely informed if there was an upcoming event. Specifically, the study was integrated the following objectives:

Designed and developed an Information System that is able to provide real-time information for the Senior Citizens events.

Determined the level of usability of the developed system at perceived by the senior citizens of Batad, Iloilo in terms of learnability, understandability and operability of the system and the information provided.

Evaluated the performance of the developed system as perceived by the expert evaluators in terms of time behavior and resource utilization.

Developmental method of the research was employed by the researcher and RAD as the model of the Software Development Life Cycle (SDLC) was used to design the Senior Citizens Information System. The researchers used mean to determine the level of usability and performance of the developed system.

The researchers were able to arrive at these conclusions based on the findings of the study.

The level of usability of the developed system was interpreted as "Very Good" in all the implementation indicators including the learnability, understandability and operability. This means that the respondents were satisfied and they can use the system as easy to use. The respondents learn its application quickly. It enables the user to understand and the information was clear. Its attributes were easy to operate and control.

The performance of the developed system was interpreted as "Very Good"in all its implementation indicators as the time behavior and resource utilization. This simply shows that the developed system responses time for given thru put transaction rate. The response of the system is excellent and it allows quick retrieval of stored information. The system can be installed in a low to mid-range computer system based on CPU frequencies. Lastly, it can run with standard physical memory.

From the findings and conclusions of the study, the following recommendations were strongly suggested:

For the senior citizens, should cooperate and provide the needed information to the system in order to receive an important notification coming from the developed system.

The administrator should maintain and update the systems which help to maximize its potential and improve its time behavior and resource utilization. Also, conducted training before using the developed system for the familiarization especially during data entry of important inputs for the developed system to work.

For future researchers, upgrade the developed system in to an SMS. Be sure it could lessen the system lag.

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A Comparative Study on Webpage Browsing Performance between Proprietary and Open Source Operating Systems on Wireless Networks

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ABSTRACT: This experimental research study determined and compared the webpage browsing performance of proprietary and open source operating systems on wireless networks. It was intended to reveal the significant differences in the webpage browsing performance between proprietary and open source operating systems on wireless networks when classified as to hardware specifications and type's web content. The researchers used the JavaScript Console of the Google Chrome web browser application to determine the time of the webpage to fully load. Operating system was the independent variable. Hardware specifications which were classified as old system and new system and types of web content which was also classified as static and dynamic webpages were the intervening variables. Webpages browsing performance was the dependent variable. The statistical tools used were arithmetic mean, and t-test. It also revealed that there were significant differences in the webpage browsing performance between proprietary and open source operating system on wireless networks when classified as to hardware specification and web content. The proprietary and open source operating systems were statistically different when classified as to hardware specifications and type of web content.

KEYWORDS: Open Source Operating Systems, Performance, Proprietary System, Webpage Browsing, Wireless Networks Proprietary

I. INTRODUCTION

Not so long ago computers were either large machines housed in carefully controlled rooms accessed via serial terminals, or small home machines which booted from ROM. The personal computer resolutions has brought a computer to each desk, along with the noisy fans disk a modern PC requires, the maintenance nightmare of hundreds of different computer installations to maintain, and the never ending cycle of faster computers being required (McNeill, 2000).

In today's modern technology, network is one of the most valuable comprehensive innovations which pave the way to a much easier and faster data communication. Network is a bridge that fills the gap between two or more computers. Most people correlate network to their day to day kind of living. This innovation uplifts life's standard in such a way that a person can now do many transactions right in front of his computer in the convenience of his own home to the other parts of the world.

The first successful Transatlantic telegraph cable was laid in 1865. A regular Transatlantic radiotelegraph service began in 1907 (www.bizymoms.com).

Packet switching network communication idea seeded in the 1940's, with the conversion of regular telephone networks into digital lines. Advance Research Project Agency (ARPA) started working on a so-called "Inter-galactic" network in 1962, and this was the attempt to establish a sustainable Wide Area Network for communication purposes.

ARPA launched its first successful long distance packet-switching communication network in 1969 with the name ARPanet. It consisted of four universities, which interconnected the researchers working on the project at the time. In the initial communication of ARPAnet, sending only the word "login" to the others end took almost an hour. It is a fact that ARPAnet was the predecessor of the Internet (www.bizymoms.com).

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ARPA started research in 1970's, looking at means for reducing a network to the bare minimum, while simultaneously joining almost any network. TCP/IP is a layered protocol stack that provides reliability and simplicity in data communications (www.bizymoms.com).

Local Area Network (LAN) communication is another development aside from Internet. Challenging other networking standards like Token-Ring, Ethernet holds the medal to be the standard protocol for LAN communication to its speed and reliability. Ethernet development also began in mid 1970's. Nowadays Ethernet provides staggering 10 gigabits (10GB) per second speeds, known as 10G Ethernet is still an emerging technology, and remains to receive commercial acceptance (www.bizymoms.com).

By 1973, 75% of the ARPAnet traffic was email and in 1973, File Transfer Protocol (FTP) was introduced, enabling uploading and downloading of files (www.bizymoms.com).

The version 4 of the TCP/IP was standardized in 1978 with high stability. It is still the underlying standard protocol used even today in the Internet (www.bizymoms.com).

Wireless LANs are continuing to grow in popularity, particularly in enterprise environments that require or desire a high level of mobility. The increased demands for mobility and flexibility in our daily life are demands that lead the development from wired LANs to wireless LANs (WLANs). Today a wired LAN can offer users high bit rates to meet the requirements of bandwidth consuming services like video conferences, streaming video etc. With this in mind a user of a WLAN will have high demands on the system and will not accept too much degradation in performance to achieve mobility and flexibility. This will in turn put high demands on the design of WLANs of the future. A wireless LAN is based on a cellular architecture where the system is subdivided into cells, where each cell (called Base Service Set or BSS) is controlled by a Base station called Access point or AP (Vijay Chandramouli).

In the year 1993, Sir Tim Berners Lee invented the global information highway called the World Wide Web. The emergence of WWW was agreed by the scholars as one of the biggest turning points in computing related network communications in recent history (www.bizymoms.com).

A wireless LAN (WLAN) is analogous to a wired LAN with radio waves being the transport medium instead of traditional wired structures. This allows the users to move around in a limited area while being still connected to the network. Thus, WLANS combine data connectivity with user mobility, and through simplified configuration, enable movable LANs (WLAN Association, 1999). In other words, WLANS provide all the functionality of wired LANs, but without the physical constraints of the wire itself. Generally a WLAN (in Infrastructure mode) consists of a central connection point called the Access Point(AP). It is analogous to a hub or a switch in traditional star topology based wired local area networks. The access point transmits the data between different nodes of a wireless local area network and in most cases serves as the only link between the wireless LAN and the wired LAN.

The wireless nodes, also called clients of a WLAN usually consist of Desktop PCs, Laptops or PDAs equipped with wireless interface cards (WLAN Association, 1999).

Wireless networking is a rapidly changing technology. All users of wireless technology must be aware of the risks inherent in deploying cutting-edge technology. Complete functionality, adherence to standards, and interoperability are all areas in which wireless (or any other new technology) must be closely evaluated to insure a good return on the resources invested in their purchase and use. Wireless messaging is now a dynamic ingredient in the communication modes of our life. Many applications over the Internet now use wireless messages to contact with the end user (Mishra et al., 2004).In this study, the researchers focused on the three factors such as the type of operating system used, hardware specifications and types of web content because they are considered as the common factors that affect the webpage browsing performance on wireless networks. These factors were chosen to determine what type of operating system can deliver a better webpage browsing performance considering the hardware specifications and types of web content.

The operating system, which were classified as proprietary and open source systems, the hardware specification, which were also classified as old (Single Core) and new system (Multi Core), and the type of web content as static and dynamic web pages are three factors that may affect the webpage browsing performance on wireless networks.

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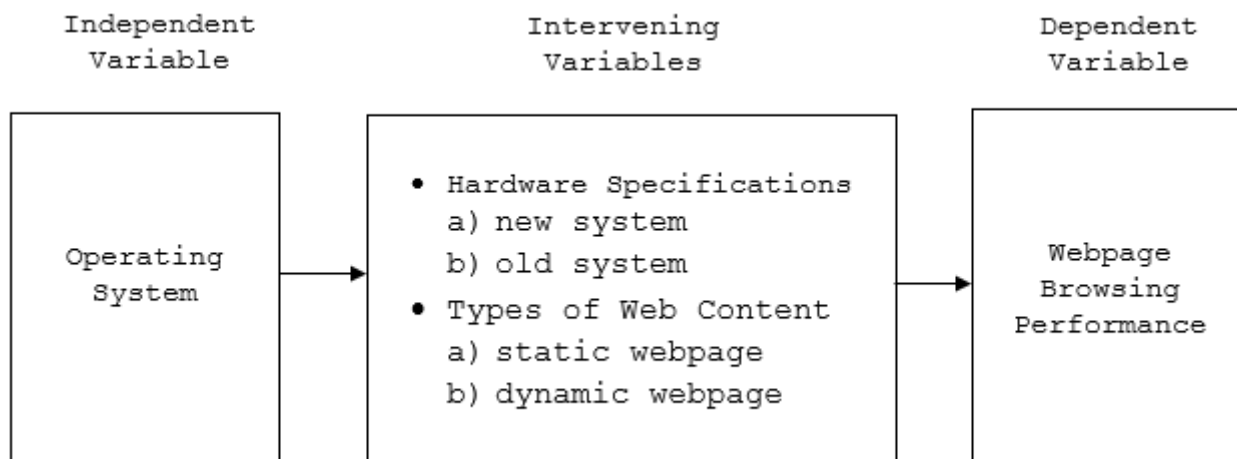Figure 1 shows the paradigm of the study.

Figure 1. Paradigm of the Study

According to Lucey (2010), processor speed also affects how quick a user can go back and forth between different webpage browsers or tabs. If the user is constantly browsing several different sites simultaneously, the processor speed affects how fast it can load the page. The speed at which the data is delivered to the computer is managed by the speed of the processor.

According to King (2012), since the web page is actually being delivered to the computer,the weight of everything on the page has a major impact on how quickly or slowly the page will load on the end users' screen. In computer jargon, the weight or sizes is measured in bits and bytes. Everything that needs to be transferred including the text used to insert comments into HTML code, has an impact on the overall download time.

This study aimed to identify and compare the webpage browsing performance between proprietary and open source operating systems on wireless networks.

Specifically, this study aimed to answer the following questions:

1. What is the average webpage browsing performance of proprietary operating system on wireless networks when classified according to hardware specifications?

2. What is the average webpage browsing performance of proprietary operating system on wireless networks when classified according to types of web content?

3. What is the average webpage browsing performance of open source operating system on wireless networks when classified according to hardware specifications?

4. What is the average webpage browsing performance of open source operating system on wireless networks when classified according to types of web content?

5. Are there significant differences in the webpage browsing performance between proprietary and open source operating systems on wireless networks when classified as to hardware specifications and types of web content?

The study was only restricted to compare the webpage browsing performance between proprietary and open source operating systems on wireless networks. This study focused on the three factors such as operating system, hardware specifications and types of web content.

There were six fully configured computers that will be used for both proprietary and open source systems on wireless networks.

This was done inside the Bossing Internet Cafe, Cudilla Avenue Street, Estancia, Iloilo. The researchers started the experiment from February 8, 2014 until February 20, 2014.

II. METHODOLOGY

1. Research Design

This study used an experimental research. According to Key (1997), experimental research is an attempt of the researchers to test the hypothesis by reaching valid conclusions about the relationship between independent and dependent variables.

The researchers observed one element in two different situations to test the hypothesis and come up to a valid conclusion. As the researchers go along with the study, they examined wireless networks using proprietary and open source

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operating systems and compare the webpage browsing performance of each situation as classified according to hardware specifications and types of web content.

In this study, the researchers focused on three factors namely: operating system, hardware specification and types of web content. The researchers used a wireless clients connected to the web server to access the different web pages stored inside it.

The study used a star topology. In this architecture, the server computer and the six wireless client computers were connected through a wireless router. Each wireless client computers requested web pages on a web server.

Sources of Data
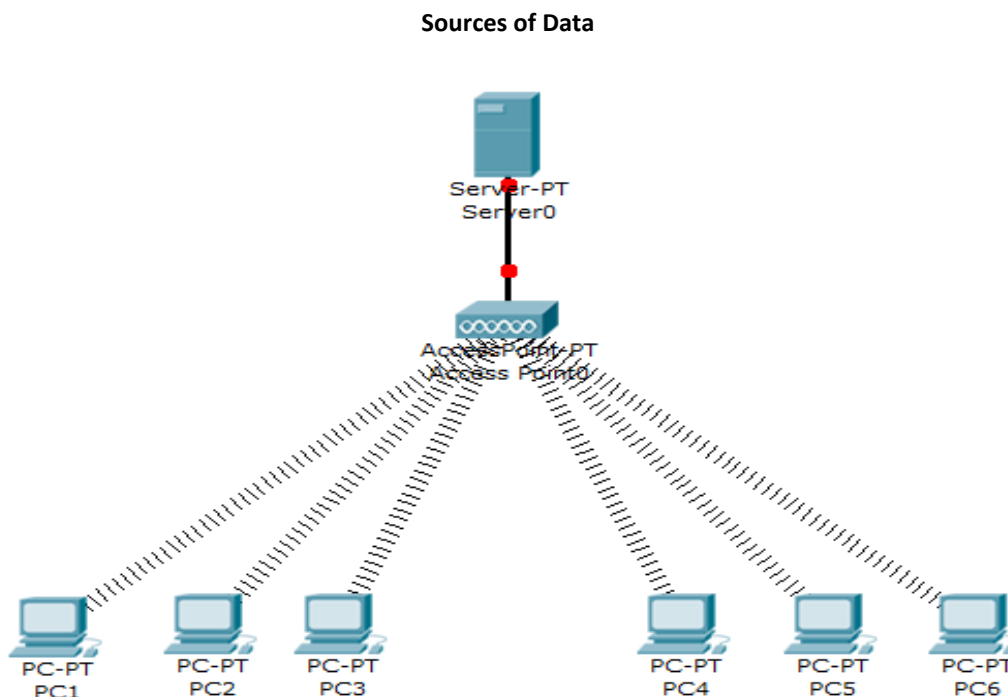
PC4, PC5, and PC6 were categorized under the new system with a Multi Core. PC1, PC2 and PC3 were categorized under the old system with a Single Core.

The computers used in this study were provided with a unique static IP Addresses. The web server was assigned with the IP Addresses of 192.168.100.1. PC1 had an IP Address of 192.168.100.2, 192.168.100.3 for PC2, 192.168.100.4 for PC3, 192.168.100.5 for PC4, 192.168.100.6 for PC5, and 192.168.100.7 for PC6. The above IP Addresses were used on both proprietary and open-source operating system.

In as far as the operating systems are concerned, the researchers decided to use the Windows XP SP3 as the proprietary operating system and the Ubuntu 10.04 DE for the open source operating system. The two operating systems have more or less similar technical specification requirements. The computers that met the requirements were borrowed by the researchers from the Bossing Internet Café.

Table 1 shows the technical specification requirements of Windows XP SP3 and Ubuntu 10.04 DE as the proprietary and open source operating system respectively.

Table 1. Technical Specifications of MS Windows XP and Ubuntu 10.04

Specifications	MS Windows XP	Ubuntu 10.04DE
Description	Can run effectively in a specified minimum requirements	Can run effectively in a specified minimum requirements
Processor	300 megahertz	300MHz
Memory	128 megabytes	128 megabytes
Hard DiskSpace	1.5 GB	1GB

The personal computers used in this study were designated as server and wireless workstations. The server computer was configured to provide operating systems to the clients. Table 4 shows the hardware specification of the computers used in the study.

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Table 2. Hardware Specification of the Computers used in the Study

	OS Serve Wireless Computer	Client Computers	
		New System	Old System
Processor 650 @	Intel®Core™i5CPU 320 GHz	AMD A4-4000APU 2.99 GHz	Intel®Pentium®4 2.80 GHz
Memory	2 GB	2 GB	2x256 MB
Hard Disk	500 GB	500 GB	80 GB

2. Instrumentation and Data Collection

In the conduct of the study, there were several materials and instruments used that provided the necessary data.

The researchers constructed a data collection form specifically for this study. It was used to reveal the result of the webpage browsing performance. To ensure for its appropriateness, the researchers subjected the instrument to a face validation.

The researchers then looked for the seven computer units including the server in the experiments. Seven computer units were borrowed from Bossing Internet Cafe, and three wireless network interface card were borrowed from Cyberlab Academic Building.

PC1, PC2, PC3 were categorized under the old system and PC4, PC5, PC6 were categorized under the new system with the open source OS and with web content of static. PC1, PC2, PC3 were categorized under the old system and PC4, PC5, PC6 were categorized under the new system with the proprietary OS and with web content of static.

PC1, PC2, PC3 were categorized under the old system and PC4, PC5, PC6 were categorized under the new system with the open source OS and with web content of dynamic. PC1, PC2, PC3 were categorized under the old system and PC4, PC5, PC6 were categorized under the new system with the proprietary OS and with web content of dynamic.

The researchers installed Microsoft Windows Server 2003 Enterprise Edition on the server and Windows XP SP3 on the client computer. The server was also configured to be a DHCP Server to automatically assign IP Addresses to all the clients computers connected to it. The researchers installed Ubuntu 10.04 DE on open source and used it as a server, gave a fixed IP Address and also installed in a client computer.

The researchers were configured the server to be an Apache Web Server by installing Apache 2.2.22 program used for proprietary system on wireless networks. After it was installed, the researchers made some changes on the permissions on an Apache Web Server using a notepad and put inside it the needed static and dynamic web pages to be access by the wireless client computers.

In open source system, the researchers installed Apache 2 and saved the web pages to the Apache folder and used as a local web server by simulating the web content.

After the configuration of proprietary system on wireless networks, the researchers started to test the webpage browsing performance by classifying the type of web content into static and dynamic webpage. There were three static web pages and three dynamic web pages that were stored on the web server. To get a valid result, the researchers tested each web page three times with the use of the JavaScript Console of the Google Chrome web browser. The researchers opened a web browser, then wait until the browser fully load, test it, clear the browsing data, close the browser, the researchers repeat the experiment two times in the same process. For open source system on wireless networks, the same methods on the proprietary system were used to test the web page browsing performance. The gathered data were recorded for interpretation.

The experiment was conducted at the Bossing Internet Cafe at Cudilla Avenue Street, Estancia, Iloilo. The arbitrary scale used in this study was adopted from the scale used by Google Chrome browser when they conducted the average pages load time of top ranking websites in Google.

If the website's average loading time is 9.81 seconds or below, the website is loading "very fast". If the website's average loading time is between 9.82 seconds and 13.84 seconds, then the website URL loading speed is on the "average". If the website's average page loading time falls somewhere 13.85 seconds and 17.98 seconds, the website loading page is "below average". If the website has an average loading time of more than 17.98 seconds, it is considered "very slow".

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Table 3. Showed the summary of the arbitrary scale.

Range (in seconds)	Description
Below 9.82 seconds	Very Fast
9.82 – 13.84	Average
13.85 – 17.98	Below Average
17.99 and above	Very Slow

Tools for Data Analysis

The statistical tools used in the analysis of data are as follows:

Mean. The mean was used to determine the average speed of the webpage browsing performance of proprietary open source operating systems on wireless networks.

T-test. A statistical test that was used to determine if there is significant difference between the mean of two groups in the webpage browsing performance of proprietary and open source operating systems on wireless.

III. RESULTS AND DISCUSSION

Descriptive Data Analysis

The data obtained from the webpage browsing performance of proprietary and open source operating systems on wireless networks when classified according to hardware specification and types of web content.

Average Webpage Browsing Performance of Proprietary
Operating System on Wireless Networks when Classified
According to Hardware Specifications

Table 4 shows the average webpage browsing performance of proprietary operating system on wireless networks when classified according to hardware specifications. The gathered data revealed that the obtained mean value for the static 1 webpage was 1.36794 seconds for the old system and was described as "very fast".

On the other hand, the obtained mean value for the static 2 webpage was 0.31449 seconds for the old system and was also described as"very fast". Likewise for the static 3 webpage the mean value was 0.29672 seconds for the old system and was described as "very fast".

The gathered data revealed that the obtained mean value for the dynamic 1 webpage was 5.1100 seconds for the old system and was described as "very fast". In dynamic 2 webpage the mean value was 4.6400 seconds for the old system and also described as "very fast". However, the mean value for the dynamic 3 webpage was 68.6000 seconds for the old system and described as "very slow".

On the new system thegathered data revealed that the obtained mean value was 1.30199 seconds for the static 1 webpage was described as "very fast". At the same time, the obtained mean value for the static 2 webpage was 0.27872 seconds for the new system and was described as "very fast". For the static 3 webpage the mean value was 0.20811 seconds for the new system and was also described as "very fast".

The gathered data obtained that the dynamic 1 webpage was 4.7767 seconds for the new system and was described as "very fast". For the dynamic 2 webpage the obtained mean value 5.4333 seconds for the new system and was described as "very fast". In the new system the obtained mean value was 69.8000 seconds for the dynamic 3 webpage and described as "very slow".

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Table 4. Average Webpage Browsing Performance of ProprietaryOperating System on Wireless Network whenClassified According to HardwareSpecifications

Types of Web ContentHardware Specification	Types of	Mean (sec)	Description
Static 1	Old System	1.36794	Very Fast
Static 2	Old System	0.31449	Very Fast
Static 3	Old System	0.29672	Very Fast
Dynamic 1	Old System	5.1100	Very Fast
Dynamic 2	Old System	4.6400	Very Fast
Dynamic 3	Old System	68.6000	Very Slow
Static 1	New System	1.30199	Very Fast
Static 2	New System	0.27872	Very Fast
Static 3	New System	0.20811	Very Fast
Dynamic 1	New System	4.7767	Very Fast
Dynamic 2	New System	5.4333	Very Fast
Dynamic 3	New System	69.8000	Very Slow

Scale	Description
Below 9.82 seconds	Very Fast
9.83 – 13.84 seconds	Average
13.85 – 17.98 seconds	Below Average
17.90 seconds and Above	Very Slow

Average Webpage Performance of Proprietary and Open Source Operating System on Wireless Network when Classified According to Types of Web Content

Table 5 shows the average webpage browsing performance or proprietary and open source operating system on wireless networks when classified according to types of web content. The gathered data revealed that the obtained mean value for the static 1 webpage was 0.23661 seconds for the open source operating system was described as "very fast". On the other hand, the obtained mean value for the static 2 webpage was 0.22778 seconds for the open source operating system and was also described as "very fast". For the static 3 webpage the mean value was 0.27022 seconds for the open source operating system which described as "very fast".

The mean value for static 2 webpage was 0.22778 seconds and was described as "very fast". On the dynamic 2 webpage the mean value was 2.57830 seconds and was also described "very fast".

The gathered data revealed for the obtained mean value for static 3 webpage was 0.27022 seconds which was described as "very fast. For the dynamic 3 webpage the mean value was 69.00000 seconds and was described as "very slow".

For the dynamic 1 webpage for the open source operating system the mean value was 1.90000 seconds which was described as "very fast". On the open source operating system for the dynamic 2 webpage the mean value was 2.57830 seconds which was described as "very fast". For the dynamic 3 webpage for the open source operating system the mean value was 69.00000 seconds and was described as "very slow".

The gathered data obtained for the proprietary operating system for the static 1 webpage was 2.43333 seconds which was described as "very fast". For the static 2 webpage the mean value was 0.36544 seconds for the proprietary operating system which was also described as "very fast". Likewise, on the static 3 webpage the mean value was 0.23461 seconds for the proprietary operating system and was described as "very fast".

The obtained mean value for the dynamic 1 webpage for the proprietary operating system was 7.98670 seconds which was described as "very fast". For the dynamic 2 webpage the mean value was 7.50000 seconds for the proprietary operating

system which was also described as "very fast". However, for the dynamic 3 webpage the mean value was 69.40000 seconds for the proprietary operating system and described as "very slow".

Table 5. Average Webpage Browsing Performance of Proprietary and Open Source Operating System on Wireless Network When Classified According to Types of Web content

Type of Web Content	Type of OS	Mean s(sec)	Description
Static_1 Webpage	Open Source	0 .23661	Very Fast
Static_2 Webpage	Open Source	0.22778	Very Fast
Static_3 Webpage	Open Source	0.27022	Very Fast
Dynamic 1 Webpage	Open Source	1.90000	Very Fast
Dynamic 2 Webpage	Open Source	2.57830	Very Fast
Dynamic 3 Webpage	Open Source	69.00000	Very Slow
Static_1 Webpage	Proprietary	2.43333	Very Fast
Static_2 Webpage	Proprietary	0.36544	Very Fast
Static_3 Webpage	Proprietary	0.23461	Very Fast
Dynamic 1 Webpage	Proprietary	7.98670	Very Fast
Dynamic 2 Webpage	Proprietary	7.50000	Very Fast
Dynamic 3 Webpage	Proprietary	69.4000	Very Slow

Scale	Description
Below 9.82 seconds	Very Fast
9.83 – 13.84 seconds	Average
13.85 – 17.98 seconds	Below Average
17.90 seconds and Above	Very Slow

Inferential Data Analysis

After the conduct of the study, the results were statistically computed. The Mean and the T-test were used as the inferential statistical tool.

Difference in the Webpage Browsing Performance between

Proprietary and Open Source Operating Systems on Wireless

Networks using Different Hardware Specification

The table 6 shows the webpage browsing performance between proprietary and open source operating systems on wireless networks when classified according to hardware specification. The obtained Sig. (2-tailed) value was 0.000 for dynamic 1 and dynamic 2 webpages, 0. Hence, the alternative hypothesis states that there are significant differences in the webpage browsing performance between proprietary and open source operating systems using different hardware specification that were accepted.

Table 6. Difference in the Webpage Browsing Performance between Proprietary and Open Source Operating Systems when Classified According to Hardware Specification

Types of Web Contez t		df	Sig.(2-tailed)	
Static_1 Webpage	0.095		10	0.926
Static_2 Webpage	0.61010			0.556
Static_3 Webpage	0.972		10	0.354
Dynamic 1 Webpage	-16.789		10	0.000*
Dynamic 2 Webpage	-9.670	5.189		0.000*
Dynamic 3 Webpage	-0.542		10	0.599

*significant at 0.05 alpha level.

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Difference in the Webpage Browsing Performance between Proprietary and Open Source Operating Systems on Wireless Networks using Different Web Content

The table 7 shows the webpage browsing performance between proprietary and open source operating systems on wireless networks when classified according to web content specifications. The obtained Significant (2-tailed) value was 0.000 for static 1 and static 2 webpage, 0.000 for the dynamic 1 and dynamic 2 webpages. Hence, the alternative hypothesis states that there are significant differences in the webpage browsing performance between proprietary and open source operating systems using different web content that were accepted.

Table 7. Difference in the Webpage Browsing Performance between Proprietary and Open Source Operating Systems when Classified According to Web Content

Types of Web Content	t	df	Sig.(2-tailed)
Static 1 Webpage	-58.352	10	0.000*
Static 2 Webpage	-3.363	10	0.000*
Static 3 Webpage	0.972	10	0.354
Dynamic 1 Webpage	-16.789	10	0.000*
Dynamic 2 Webpage	-9.670	5.189	0.000*
Dynamic 3 Webpage	-0.542	10	0.599

*significant at 0.05 alpha level.

IV. CONCLUSION

The main purpose of this study was to determine and compare the webpage browsing performance between proprietary and open source operating systems on wireless networks.

Specifically, this study sought to answers to the following questions:

1.   What is the average webpage browsing performance of proprietary operating system on wireless networks when classified according to hardware specifications?

2.   What is the average webpage browsing performance of proprietary operating system on wireless networks when classified according to types of web content?

3.   What is the average webpage browsing performance of open source operating system on wireless networks when classified according to hardware specifications?

4.   What is the average webpage browsing performance of open source operating system on wireless networks when classified as to hardware specifications?

5.   Are there significant differences in the webpage browsing systems on wireless networks when classified as to hardware specifications and types of web content?

Experimental research was used in the study. The researchers used seven computers, router, JavaScript Console of Google Chrome, Microsoft Server Enterprise Edition 2003 was used as the server, for proprietary system Microsoft Windows XP SP3 was used for wireless proprietary operating system. Ubuntu 10.04 Desktop Edition was used for wireless clients in open operating system. The computers were configured to be a wireless client computers. The researcher installed Apache Web Server on the server computer.

Permission to borrowed three wireless network interface card was secured by the researchers from the director of the Institute of Information and Computer Studies and the chairperson of the BSAIT program. The data gathered for the study were subjected to statistical treatment utilizing the Arithmetic Mean and T-test.

The average webpage browsing performance of proprietary operating system on wireless networks when classified according to hardware specifications and types of web content regarded the result as very fast. Similarly, the average webpage browsing performance of open source operating system on wireless network when classified according to hardware specifications and type of web content was also described as very fast.

A Comparative Study on Webpage Browsing Performance between Proprietary and Open Source Operating Systems on Wireless Networks

Based on the analysis of the findings of the study, the researchers concluded that the webpage loading time of open source operating system and proprietary operating system revealed a the same performance considering the hardware specifications and types of content. Both operating systems were interpreted as very fast, it was still revealed that open source operating system loads faster.

Similarly, there was a significant difference in the webpage browsing performance between proprietary and open source operating system on wireless networks when classified as to hardware specifications and types of web content. This means that the webpage loading time on wireless networks when classified according to hardware specification and type of web content delivers a different performance between proprietary and open source operating system.

In view of the findings in this study, the researchers recommend that different operating systems and web browsers should be used for similar study having the same factors. The same operating system but different web browser and factors should be used.

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Automated Security Light Motion Sensor with SMS Notification

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ABSTRACT: The purpose of this study was to assist the faculty of the Institute of Information and Computer Studies in securing their records and personal devices that were left at the office. This study made use of developmental-descriptive research. In software development, the Rapid Application Development (RAD) model was used. The system was developed using the n-tier architectural design. Because the developed system will be deployed in the IICS Building, the concerned faculty can be added as secondary users of the system so that they, along with the guard-on-duty, receive notification whenever there is motion detected during the night. A short message service (SMS) support is essential as a communication tool in notifying the room custodian and security guard-on-duty.

As part of the study, a total of 54 people were polled. The data were gathered using survey questionnaires that primarily solicited feedback from respondents using a survey instrument created by the researcher. To describe the levels of usability and performance efficiency, the mean statistic was used. According to the findings, the developed system was described as "Very good" in terms of suitability and accuracy, and its level of performance and efficiency in terms of time behavior and resource utilization was also described as "Very Good." The usability of the developed system's features was operational and accessible with effectiveness and efficiency, and the performance was appropriate to the user's needs.

KEYWORDS: SMS, system, automated security light motion, room custodian

1. INTRODUCTION

Surveillance, which ranges from households to large industries and even schools, plays an important part in ensuring our safety. Burglary and theft have always been a source of distress (Fitcher, 2017). Personal safety refers to the monitoring of people's moving information, such as actions and behavior, in order to protect, regulate, and influence personal data at school, particularly in the administration building or even in the administrators' office. Surveillance refers to the use of electronic devices such as CCTV cameras to observe from a distance.

In connection with this, the researcher wishes to create an Automated Security Light Motion Sensor with SMS notification in order to provide the Institute of Information and Computer Studies faculty with a room for the security of their files, records, and personal facilities. Furthermore, a Short Message Service Support (SMS) will be used, which will play an important role as a communication tool, sending SMS notifications to the security guard and the administrator whenever motion and intruders are detected during the night.

2. METHODOLOGY

This study is descriptive and developmental method of Research. It describes the used in development and evaluating the developed system.

Descriptive research is a study designed to depict the participants in an accurate way, describing people who takes part in the study. In this study this was applied by conducting a brief interview with the respondents and gave them ISO/IEC 25010 and McCall's questionnaire software characteristics which tested and evaluated the system and.

A. Software Development Life Cycle (SDLC)

The researcher used the Rapid Application Development (RAD) model allowing usable systems to be produced in a short time frame.

The RAD paradigm begins with a thorough understanding and definition of the client's business needs and progresses through four phases: requirements planning, user design, rapid development, and cutover. Early in the project and throughout

Automated Security Light Motion Sensor with SMS Notification

the development process, testing should be included. Throughout these phases, the researcher reviews and updates the project plan on a regular basis, closely monitoring any modification requests. During the completion of each cycle, the project's risks must be assessed, and the current state of the project must be reviewed.

The Rapid Application Development Model
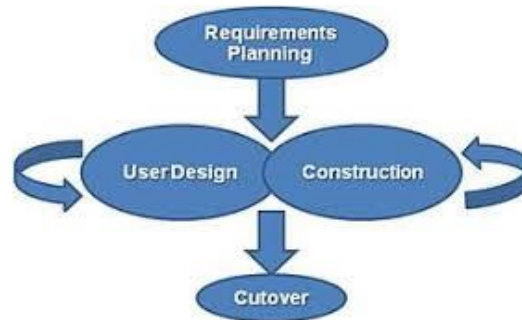
B. System Prototype User Design (UD) Phase

- Process Model
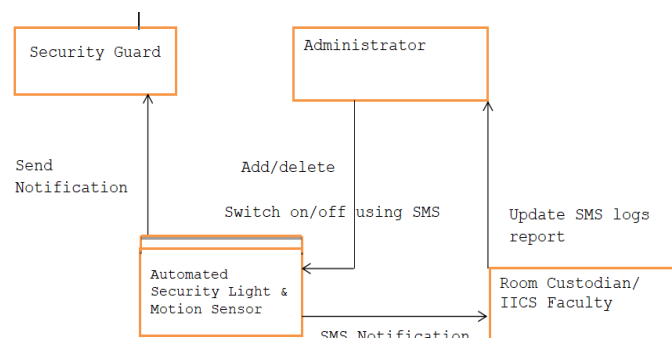
● Physical Network Topology
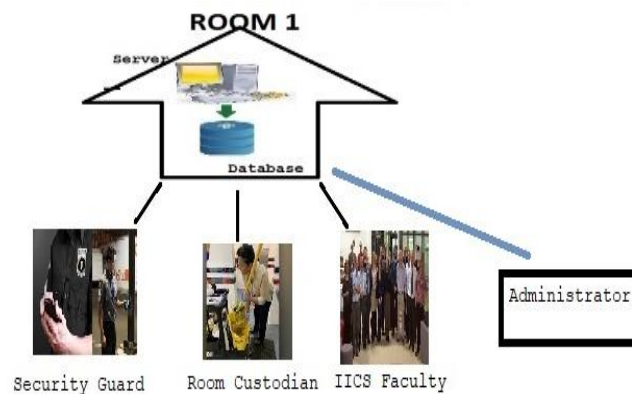
C. Testing and Evaluation and System Documents.

The development of the system prototype will not be complete without testing the execution efficiency and quality of the system to meet the end user requirements. In this task, the researchers will perform testing using a miniature doll house with light and motion sensor attached to arduino device. As the miniature opens the door or the device detects any motion the proposed system simultaneously sends notification to the phone numbers stored in the database.

2.1 Participants of the study

The first group was composed of five (5) IT experts. The second set of evaluators was composed of students and security guard. With a total of forty nine (49) students from Information Technology Department and one (1)Security Guard from NIPSC Main Campus. The researchers used the mean formula in identifying the sample size of the study in the IT Department and to the Security Guard in NIPSC Main campus.

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2.2 Research Instrument

The first group of experts was given questionnaire based from McCall's software evaluation criteria to evaluate the system. The second group of people was also given questionnaire based on the ISO/IEC 25010 standard that described a software quality model.

2.3 Validity and Reliability

Five (5) experts coming from the Institute of Information in Computer Studies which helped the researcher identify if it meets the users requirement and satisfaction, the user interface design, as well as to test the systems reliability, efficiency, and functionality. This group of experts was given questionnaire based from McCall's software evaluation criteria to evaluate the system.

3. RESULTS AND DISCUSSION

The table reflects the mean score on determining the level of usability of the developed system among the identified users group.

Table 1. Level of Usability of the Developed System in terms of Accurateness and Suitability.

Implementation Indicators	Mean	Verbal Interpretation
Suitability	4.712	Very Good
Accurateness	4.748	Very Good

The results showed that the Automated Security Light Motion Sensor with SMS Notification, for the usability characteristics in terms of suitability had a mean value of 4.71 which was verbally interpreted as "Very Good". The accurateness had a mean value computed as 4.74 which was interpreted as "Very Good".

Table 2. Level of Performance Efficiency of the Developed System in terms of Time Behavior and Resource Utilization to Meet Requirements.

Implementation Indicators	Mean	Verbal Interpretation
Time Behavior	4.72	Very Good
Resource Utilization	4.74	Very Good

The table presented the mean for the performance efficiency of the Automated Security Light Motion Sensor with SMS notification in terms of time behavior and resource utilization. The results showed that the Automated Security Light Motion Sensor with SMS Notification in terms of time behavior had a mean value of 4.72 which was interpreted as "Excellent" while for resource utilization it yielded a mean value of 4.74 which was being interpreted as "Excellent".

IV. CONCLUSION

The following conclusions were reached based on the study's findings:

1. The usability suitability, the Automated Security Light Motion Sensor with SMS notification was verbally interpreted as very good. In terms of accuracy and completeness, the interpretation was rated as very good. These findings indicated that when the Automated Security Light Motion Sensor with SMS notification was implemented, it possessed a high level of usability, allowing users to easily use the developed system due to its simple yet high performing functions. Because the system's interfaces were presented using a graphical user interface (GUI), it could be operated by someone with little computer knowledge. The Automated Security Light Motion Sensor with SMS notification has a high level of usability, according to both system Administration and users.

2. The performance efficiency of the Automated Security Light Motion Sensor with SMS notification was found to be very good in terms of time behavior, and it was also recognized as very good in terms of reliability. According to the findings, when evaluating the performance of the Automated Security Light Motion Sensor with SMS notification, respondents thought the response time and reliability, as well as the SMS notification, were impressive. It also provided precise results and allowed them to facilitate the completion of specific tasks they wanted the system to perform. In terms of the proposed system's reliability, however, respondents agreed that it was always functional, operational, and reliable.

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Ionic State of Molybdenum in Sulfuric Uterine Solutions of Rhenium Sorption and its Extraction

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ABSTRACT: The results of studies of the forms of finding and methods of extracting molybdenum from acidic solutions with a high concentration of sulfuric acid are presented. Ion-exchange resins of various modifications were tested to determine the most effective for molybdenum during its sorption from a sulfuric acid solution.

KEY WORDS: Electrochromatography; Burning; Ion Exchange; Extraction; Cation; Anion; Macroporous Weakly Basic Anion Exchanger.

I. INTRODUCTION

The technology of obtaining (extracting) molybdenum from sulphide raw materials includes oxidative roasting in furnaces and hydrometallurgical processing of roasted products [1,2]. In the process of oxidative roasting of sulphide raw materials, gases containing sulfur oxides are formed. Sulfurous gases, as a rule, enter the wet gas cleaning system to obtain sulfuric acid solutions. As a result of the formation of fine dust of molybdenite raw materials during firing, molybdenum is present in sulfuric acid solutions in certain quantities [3,4].

Considering that the content of molybdenum in sulfuric acid solutions of wet gas cleaning systems can range from 1 g / l to 5-6 g / l, additional extraction of molybdenum is of practical interest.

Ion exchange sorption is used in molybdenum hydrometallurgy [5-8.]. Sorption of molybdenum is carried out from solutions of nitric acid decomposition and solutions of soda leaching of molybdenum-containing raw materials. Molybdenum in such solutions is present in either cationic or anionic form. Therefore, the sorption of molybdenum from solutions of nitric acid decomposition and soda leaching proceeds efficiently. Molybdenum is sorbed from solutions by cation and anion exchangers.

Both strongly basic and weakly basic resins have a maximum capacity for molybdenum in weakly acidic media in the pH range from 5 to 2, those. in the area of existence in solutions of polymer anions such as $Mo_7O_{24}^{-6}$ and $Mo_4O_{13}^{-2}$, etc. With an increase in the acid concentration, the capacity of resins for molybdenum decreases due to the competing action of the acid anion [9]. The presence of cationic and anionic forms of molybdenum in sulfuric acid solutions complicates the choice of ion-exchange resin and sorption of molybdenum in general.

II. OBJECTS AND METHODS OF RESEARCH

The sulphate mother liquor of rhenium sorption was investigated. The chemical composition of the sulphate mother liquor is presented in Table 1. This solution also contains rhenium, which comes with the initial sulphide molybdenum raw material and sublimes in the process of oxidative roasting and is captured in the wet gas cleaning system. Rhenium is extracted mainly by ion-exchange sorption on weakly basic anion exchangers. The presence of molybdenum negatively affects the sorption of rhenium, because molybdenum reduces the capacity of the weakly basic anion exchanger for rhenium. After sorption of rhenium, up to

Ionic State of Molybdenum in Sulfuric Uterine Solutions of Rhenium Sorption and its Extraction

90% remains in mother liquors molybdenum from the original sulfuric acid solution of wet gas cleaning. The studies were carried out on solutions with a content of 3-8 g / l.

Table 1. The composition of the sulphate mother liquor

H_2SO_4, g/l	Re, mg/l	Mo, g/l	Cu,mg/l	Fe,mg/l
300-350	<10	3-8	10-25	35-40

III. RESULTS OF THE INVESTIGATIONS AND DISCUSSION

To determine the ratio of cationic and anionic forms, electrochromatography of the sulfuric mother liquor and oxidative titration with 0.1 N potassium permanganate solution were carried out. to determine the reduced forms of molybdenum.

For studies on the extraction of molybdenum from sulfuric acid solutions, sorption with the use of cation exchangers and anion exchangers (sorbents) of various modifications was considered.

Microstructure analysis was performed using an electron microscope …… ..with EDX energy dispersive analysis attachment. X-ray diffraction patterns of sorbents were obtained on an XRD diffractometer …… ..CuKα-radiation. Vibrational spectra (IR, Raman spectra) were recorded on an IR Fourier spectrometer in the range 400-4000 cm-1 and in the range 300-1200 cm-1 on a Raman spectrometer …… ..

The determination of molybdenum sorption indices was carried out under statistical conditions at the ratio of the volumes of solution and sorbent Vp: Vc = 10: 1. For sorption from dilute solutions and solutions adjusted to a given acid content or pH, we used the volumes of solutions corresponding to the initial ratio of 10: 1 in terms of the amount of molybdenum.

IV. RESULTS OF THE INVESTIGATIONS AND DISCUSSION

It was established by electrochromatography and sorption that in sulfuric acid solutions with a sulfuric acid content of 300-400 g / l, the main forms of molybdenum compounds are complex molybdenyl sulfate ions $[MoO_2(SO_4)_n]^{-(2n-2)}$ and molybdenyl ion MoO_2^{2+} in the composition MoO_2SO_4.

As can be seen from the data in Table 2, when the original mother liquor is diluted with water up to 200 g / l and 100 g / l with respect to sulfuric acid, the proportion of the cationic form of molybdenum increases. With a similar neutralization of the sulfuric acid solution with ammonia.

The solution retains a high content of sulfate ion. As a result, the proportion of the cationic form of molybdenum is somewhat less than when diluting a sulfuric acid solution with water. Taking into account the existing concepts, it can be assumed that anionic complexes of the $[MoO_2(SO_4)_n]^{-(2n-2)}$ type are present in the sulfuric acid solution; molybdenyl sulfate complexes, and MoO_2^{2+} cations in the composition of neutral molecules of molybdenyl sulfate MoO_2SO_4.

Table 2. The ratio of the anionic and cationic forms of molybdenum in the mother liquor depending on the acidity of the solution according to electrochromatography data

Solution name	Sulfuric acid content, g / L	Sulfate ion content, g / L (calculated)	Molybdenum fraction,%	
			Cationic	Anionic
Sulfuric acid solution	410	402	~20	~80
Sulfuric acid solution, diluted with water 2 times	205	201	~40	~60
Sulfuric acid solution diluted with water 2 times	102,5	100,5	~70	~30
Sulfuric acid solution, neutralized with ammonia, added 220 ml / l	200	328	~30	~70
Sulfuric acid solution, neutralized with ammonia, added 220 ml / l	100	291	~50	~50

The state of molybdenum in solution is characterized by equilibrium:
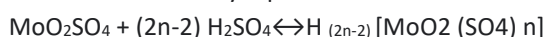
$$MoO_2SO_4 + (2n-2) H_2SO_4 \leftrightarrow H_{(2n-2)} [MoO_2 (SO_4)_n]$$

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With a decrease in the concentration of sulfuric acid, the equilibrium of this reaction shifts to the left, and the proportion of the cationic form in the form of neutral molybdenyl sulfate MoO2SO4 increases. Deeper neutralization of sulfuric acid leads to the formation of molybdic acid and further polymolybdates:

$$MoO_2SO_4 + 2NH_4OH \rightarrow H_2MoO_4 + (NH_4)_2SO_4.$$
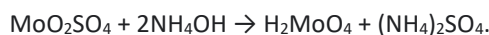
Thus, for the sorption of molybdenum from sulfuric acid solutions, it is advisable to use anionites that are selective to the forms of the anions of molybdenyl sulfates $[MoO_2(SO_4)_n]^{-(2n-2)}$

To select an ion exchange resin for molybdenum in laboratory conditions, several grades of ion exchangers have been tested. Laboratory studies were carried out on technological mother liquors under static conditions. Experimental data are presented in Table 3.

Table 3. Results of sorption of molybdenum from mother liquor under static conditions sorbents converted to H +/SO4-2 formula (Ex. Solution:Mo - 6.3 g / l; H_2SO_4- 400 g / l; Vp / Vc = 10)

№	Grade of sorbent in H + / SO$_4^{-2}$ form	Vp / Vc ratio	Residual Mo content, g / l	Resin exchange capacity, g / l$_R$	Mo recovery,%
1.	C-100x10MBH	10	5,6	7,0	11,1
2.	AB-17	10	3,9	24,0	38,1
3.	AM-2Б	10	3,2	31,0	49,2
4.	АМП	10	2,9	34,0	54,0
5.	A-600(U)	10	3,2	31,0	49,2
6.	A-500/₂788	10	3,2	31,0	49,2
7.	A-107	10	3,2	31,0	49,2
8.	S-957	10	1,6	47,0	74,6
9.	PFA-460	10	1,6	44,0	70,6
10*	A-100 Mo	19,4 pH=2	0,0137	62,73	99,57
11*	A-100 Mo	40 pH=2	0,7	112,1	78,4
12*	A-100 Mo	80 pH=2	1,22	162,4	62,46

*) at pH = 2, the initial content of molybdenum in solutions is 3.25 g / l

Сравнение обменной ёмкости по Мо различных смол

1-C-100x10MBH; 2-AB-17; 3-AM-2Б; 4-АМП; 5-A-600(U);
6-A-500/2788; 7-A-107; 8-S-957; 9-PFA-460; 10-A-100 Mo
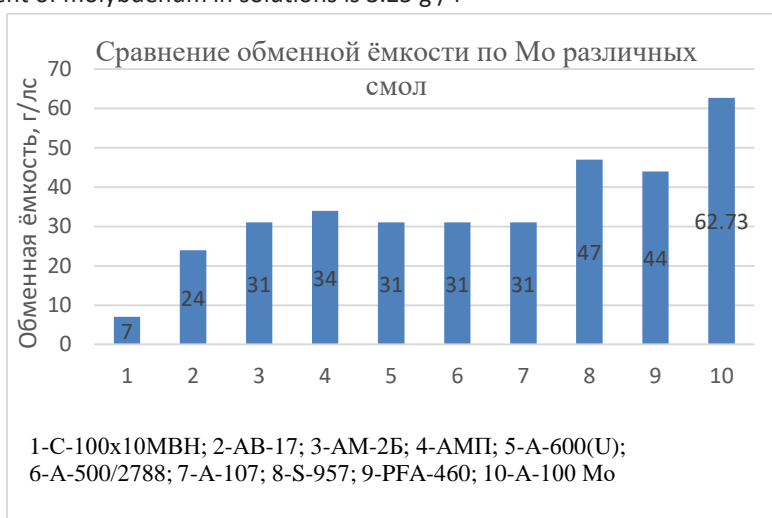
Fig. 1. Comparison of the exchange capacity of various ion-exchange resins for molybdenum from sulfuric acid solutions.

Using oxidative titration with a 0.1 N solution of potassium permanganate, it was found that there are no 4- and 5-valent molybdenum compounds in the solution, i.e. all molybdenum is present in the 6-valent state. It was found that molybdenum is present in solutions in the form of MoO_2^{2+} cations and anions in the composition of molybdenyl sulfate complexes $[MoO_2(SO_4)_n]$.

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For ion-exchange sorption of molybdenum from more acidic solutions, the set of sorbents is limited and the sorption indices are insufficiently effective (Fig. 1). The main reasons for this are the significant competition of the sulfate ion during the sorption of molybdate - and polymolybdate - ions, as well as the variety of forms of molybdenum in solution (molybdenyl sulfates, molybdenyl - ion, molybdate, polymolybdates) and the processes of transformation of forms of molybdenum in the ion exchanger phase upon interaction with sulfate - and bisulfate - by ions [2].

According to the results of the extraction of molybdenum from sulfuric mother liquors, preference is given to macroporous weakly basic anion exchangers. For further testing and development of modes of sorption and desorption of molybdenum from sulfuric acid solutions, A-100 Mo and S-957 Purolite resins were selected.

Figure 2 shows the curve of molybdenum sorption on the A-100 Mo sorbent from the waste sulfuric acid mother liquor neutralized with ammonia to pH-2.

As can be seen from Fig.3,4 separation of molybdenum from iron is achieved in both sorbents.

In fig. shows the spectra obtained on a scanning electron microscope JEOL JSM-IT200 with an energy dispersive attachment from A-100 Mo and S-957 Purolite resins before and after sorption.
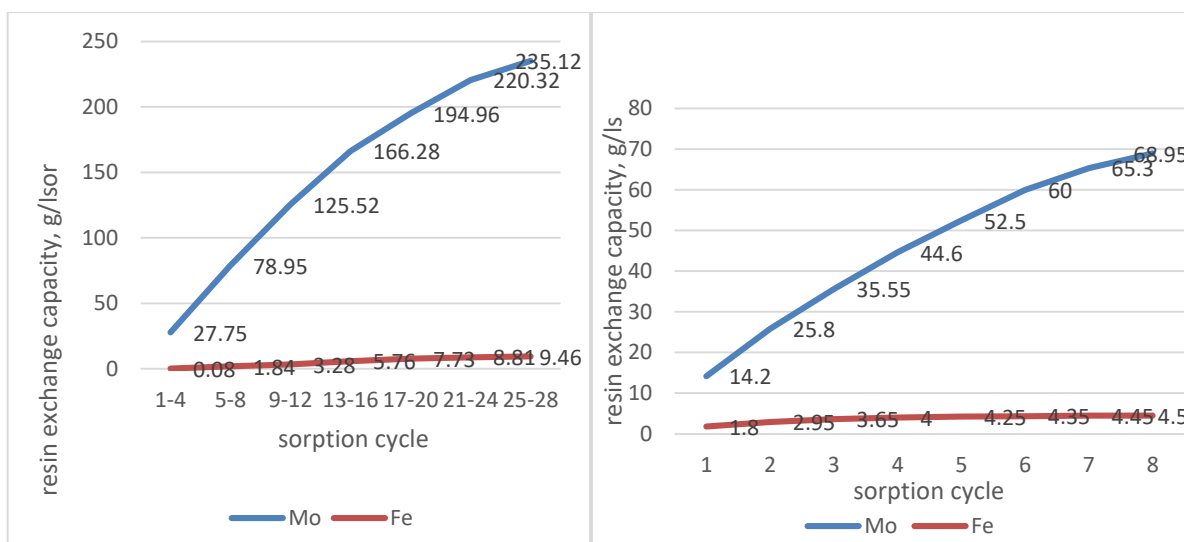
Fig.2 Curve of sorption of molybdenum on the sorbent A-100 Mo and S-957 from waste sulphate mother liquor neutralized with ammonia to pH-2.
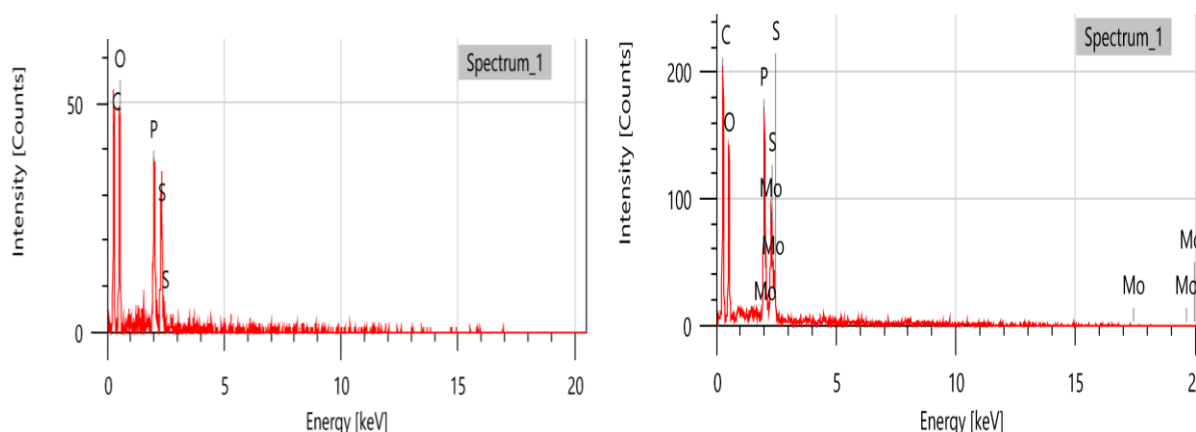
Fig. 3 SEM-EDX sorbent S-957 Purolite - before and after sorption of molybdenum

Fig 3,4. It is clearly seen that, as a result of sorption, along with the peaks of the sorbent atoms, the spectrum contains peaks belonging to molybdenum.

Desorption of molybdenum from the A-100Mo resin was carried out with an ammonia solution of 100-120 g / l (1: 1). To determine the desorption indices from the obtained saturated sorbent, desorption was carried out at a ratio Vd / Vc = 2: 1 and a cycle duration of 2 hours. The total degree of desorption of molybdenum is 91.7%.

Desorption of molybdenum from S-957 resin with 120 g / l ammonia solution with addition of 100 g / l ammonium sulfate, 30 g / l hydrogen peroxide solution, Trilon B solution, in various combinations, duration -4 hours.

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Apparently, the rate of desorption of molybdenum from the S-957 sorbent is determined by the reaction rate:

$$R_2 - MoO_2^{2+} + 4NH_4^+ \rightarrow (NH_4)\ 2MoO_4 + 2R - NH_4$$
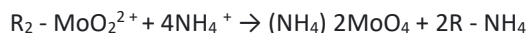
one of the stages of which is the process:

$$R_2MoO_2 + 2NH_4 + OH^- \rightarrow 2\ RNH_4 + MoO_2(OH)_2 \rightarrow 2\ RNH_4 + H_2MoO_4$$
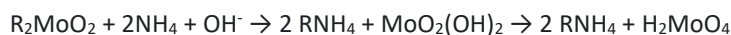
The low rate of desorption is apparently due to the course of the desorption process through several stages, and one of the slow stages may be the recombination of the molybdenyl ion in the sorbent phase into molybdic acid, which is then washed out by ammonia from the sorbent phase .

In fig. shows a microphotogram and ED-spectrum of the obtained product after desorption of A-100 Mo and S-957 Purolite resins (Fig. 4).
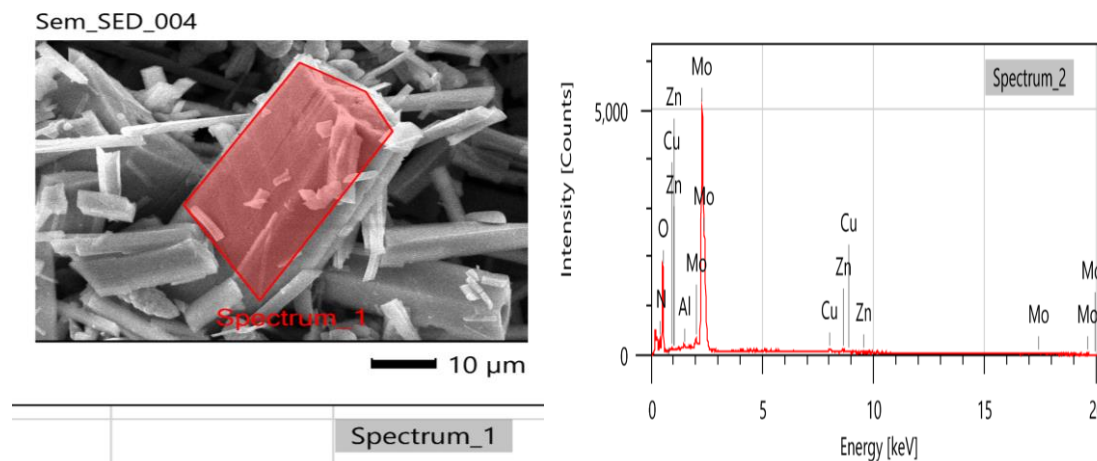
Fig 4   Microphotogram and ED-spectrum of the obtained technical ammonium tetramolybdate (ATM) product after desorption from A-100 Mo and S-957 Purolite resins

As a result of extended laboratory studies, a "rough" ATM was obtained, re-purified from impurities by fractional recrystallization. The compositions of the purified technical and ATM salt according to GOST 2677-78 are presented in table 10.

Table 4. Chemical composition of purified ATM, % (*technical ATM, ** GOST 2677-78)

MoO$_3$	Fe	As	Ni	Si	Al	Mg	Mn
76,9*	0,018	0,002	0.001	0,15	0,008	0,006	0,001
77,5	0,0012	0,0012	0,0005	0,0013	0,0013	0,002	0,001
78**	0,007	0,003	0,002	0,01	0,002	0,0015	0,003

IR and Raman spectra of ATM after purification are shown in fig. 7.
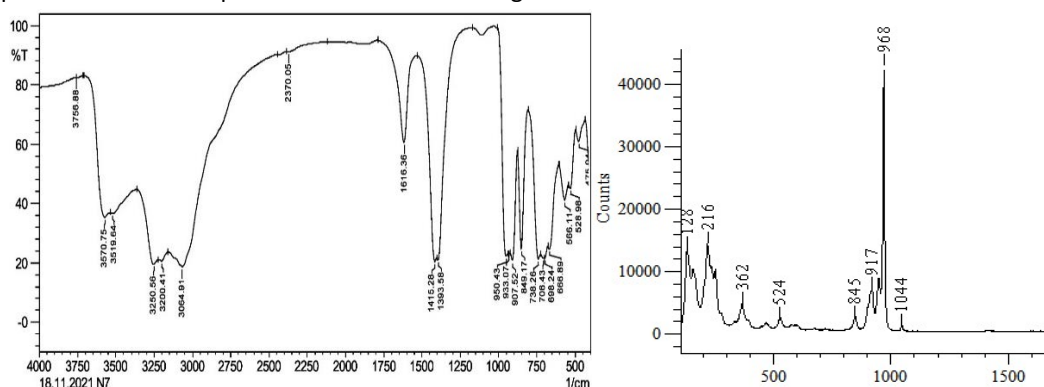
Fig. 5. IR and Raman spectra of ATM obtained from sulfuric acid solutions of rare metals plant

The value of the vibration frequency observed in the IR and Raman spectra of the obtained ATM corresponds to the data available in the literature.

Ionic State of Molybdenum in Sulfuric Uterine Solutions of Rhenium Sorption and its Extraction

CONCLUSIONS

1. According to the results of electrochromatography of sulfuric mother liquors, it was found that molybdenum in this solution is present in anionic complexes of the $[MoO_2(SO_4)_n]^{-(2n-2)}$ type; molybdenyl sulfate complexes, and MoO_2^{2+} cations in the composition of neutral molecules of molybdenyl sulfate MoO_2SO_4.

2. According to the preliminary laboratory studies, it was found that sorption is effective when using weakly basic macroporous anion exchangers and chelated cation exchangers.

3. Sorption proceeds efficiently at a specific load of 2 column volumes / hour. A 12% aqueous ammonia solution is recommended as a desorbing reagent. In this case, the degree of desorption of molybdenum from the sorbent phase into the eluate reaches 95%.

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Formation of Baked Yarn of Complex Structure, Methods for Determining The Hairiness of The Yarn and Hair Characteristics

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ABSTRACT: This paper examines the differences between the main purpose of the process of falling from individual fibers in a given linear density, density and elasticity and the methods of determining the hairiness of the yarn, the hairiness of the yarn is determined by the number of knots per unit length.

KEY WORDS: fiber, linear density, spinning, yarn, wrapping process, wicker, yarn fluff, electrostatic charge.

INTRODUCTION

The main purpose of spinning is to form a single flat yarn from scattered fibers with a uniform, defined linear density, continuous, pliable and elastic properties.

The essence of the processes performed on spinning machines is the thinning, baking and wrapping of the semi-finished product. The procedure and execution mechanisms of these three basic processes determine the specificity of the spinning methods. While all spinning methods are close in terms of the nature of the processes of thinning the semi-finished product to the level of the yarn and the resulting yarn wrapping, as well as the structure of the actuator, the method of yarn forming and baking has sharp differences. Therefore, all spinning methods are divided into spinning and non-spinning methods. In the wireless spinning method, the fibers that make up the yarn are attached using an adhesive mixture. Since this line belongs to a separate category of technological issues and is not used in the cotton industry, we will not dwell on their essence.. [1]

In spinning methods based on spinning, ie baking, the torque (force) on the moving fibrous product is affected. Such methods can be single or multi-zone, depending on the number of cooking zones and the order in which they are located.

Figure 1 illustrates the options for yarn formation by baking. In option I, the supply pair and the output pair are the boundaries of the cooking zone. Between them is a device that twists the fibrous product. If the supply and output pairs rotate in a stationary period, and the product in the intervals receives twists equal to the number of revolutions of the twisting device. In this case, the direction of the turns in both zones will be different. Such a twisting device is called a vyurok. [2]

THE MAIN RESULTS AND FINDINGS

If the baked product is released from the vortex, it will twist the fibers back under the influence of elastic forces. As long as the supply and discharge parts rotate continuously, the product passing through the rotating screw cannot twist. In other words, the product is not cooked. The above reviewed method is called the "fake cooking" method. Therefore, it is not possible to obtain a single layer of spun yarn in this method. The two-zone cooking method was used in spinning (PK-100) machines. Also, the multi-zone firing scheme was the basis for the production of yarn in the two-pronged firing method, and in this way, spinning machines were created. [3]

In the first scheme, it is necessary to wrap a part of it (vs) in a twisting device to form an irreversible loop. The winding body (tube) will need to be placed inside the twisting device to allow more twisting of the yarn while the supply speed is constant. As a result of such a change, the scheme shown in option II is formed. In the single-zone method in this scheme, real cooking is generated. Simultaneous baking and wrapping of the yarn in the wrapper located in the baking section is the only way

to practice continuous and irreversible baking. However, in this method, spinning a yarn with a large mass at high speed requires a lot of energy.
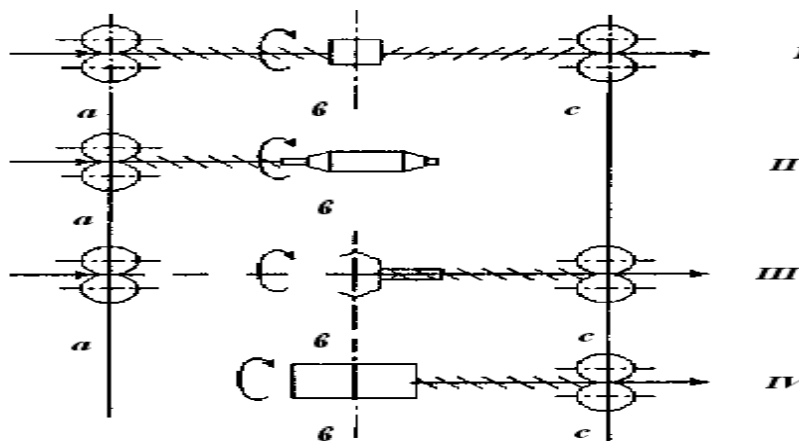
Figure 1. Threading methods

To eliminate such a defect, it is necessary to separate the cooking and wrapping processes. In order to separate, it is necessary to ensure that the piece of yarn coming to the cooking part does not accept and extend the torque. To do this, you need to temporarily break the integrity of the product coming into the cooker. Such a breakdown is accomplished by a break between the formations of the fibers of the fibrous product coming into the cooking device as a single stream. The fibers coming from the supply part move in a discrete state in zone $a\mathcal{B}$, that is the coil cannot twist in this zone. The discrete fibers coming to the cooking device are added inside the device and condensed into a pellet. The rotation of the device cooks by twisting the product in the second $\mathcal{B}c$ zone. Hence, this method also performs single-zone cooking. Thus, single-zone cooking can be organized in the following cases:

- the fibrous product is baked in zone $a\mathcal{B}$ and the product-yarn in the second zone is wrapped in a tube in the baking device; in other words by adding together the cooking and wrapping processes.

- by limiting the twisting of the fibrous product in the first $a\mathcal{B}$ zone by violating its integrity, that is by separating the ripening process from the wrapping process.

Due to the fact that the tip of the baked product rotates freely in spinning according to variant III, this method is called "free-end spinning" or "rotor spinning" in foreign literature. [5]

Theoretically, if the winding formed by cutting or folding the fibrous product from the supply part in any way turns itself, it is baked in the output part (zone $\mathcal{B}c$) and turned into yarn (variant IV). However, the resistance to deformation that occurs when wrapping or wrapping a thin fiber to the yarn level and then pulling it out of the wrapper is very low. As a result, there will be a lot of product breakdowns. Therefore, variant IV is not used for spinning from fibers. This single-zone baking is used in the chemical complex yarn baking industry. [6]

Many methods are used to determine the hairiness of the yarn. They differ from each other in some respects.
1. Gravimetric method.
2. Optical (projection) method.
3. Electrostatic method.
4. Photoelectric method.

In the gravimetric method, the degree of hairiness of the yarn is determined by the difference between the mass of the yarn and the mass of the hairless (burnt feathers) yarn. In this method you will get information about the mass of feathers, their number, the average length is not considered. Therefore, the accuracy of this method is low.

The essence of the optical (projection) method is that the number of hairs of a 1 mm long thread is counted by the image on the screen, ie projection, but when the number of hairs is large, it is difficult to count them separately. Later, this method was improved and the number of feathers, the degree of accuracy in more accurate calculation of their length was increased. In the

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study, it was proposed to determine the hair characteristics of the yarn by pre-prepared microphotography. The level of accuracy in this method is good, but it takes a lot of time and effort. [7]

The electrostatic method is a method of estimating the relative fineness of a yarn by means of an electrostatic charge.

Figure 2 shows a schematic diagram of the electrostatic method for determining the fineness of yarns. Equipment based on this method was developed at the Rouen Scientific Research Textile Institute in France. The wires 3 are charged in the electrostatic tube 2 in the area caused by the high voltage generated by the generator 1, and the hairs become perpendicular to it. In this case, the feathers are separated and flattened. As the wires pass through tube (4), the charges at the ends of the feathers separate and collect at capacitor (6). The charge on the capacitor is measured using a galvanometer (5).
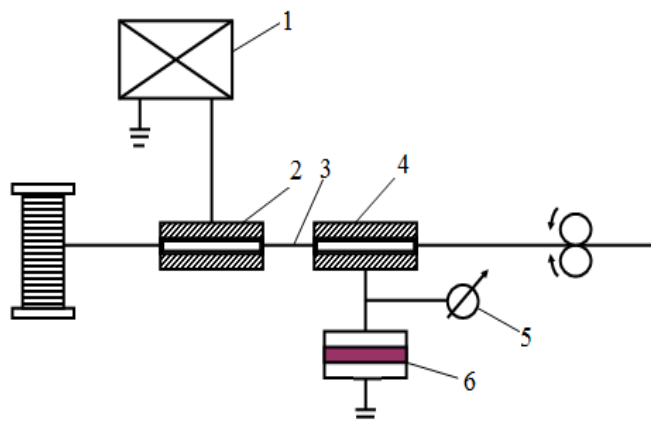
Figure 2. Schematic diagram of the electrostatic method for determining the fineness of yarns

The disadvantage of this method is that the indicators depend not only on the charge, but also on the moisture, electrical conductivity of the yarn, which makes it difficult to accurately assess the hair. It is not possible to determine the length of the feathers by this method.

The photoelectric method (using optical magnification) allows you to automatically count the number of hairs corresponding to the length of the yarn being continuously inspected. Photoelectric methods are widely used. [8]

One of the most widely used photovoltaic devices used to determine the degree of hair loss is the device of the British firm "Shirley". This device determines the total number of hairs in a 1 m thread with a length greater than 3 mm, as well as the number of hairs from 0 to 10 mm in length in a 1 mm step interval corresponding to 1 m of thread. [9]

The following are used as indicators of the hairiness of a rope: the number of feathers per unit length (usually 1 m) - n_B; average length of feathers-l, mm; total surface of hairs - S_B, mm.

The number of hairs per unit length is n_B – a commonly used indicator, which indicates that the hairs are densely packed.

Numerous scientific studies have confirmed that the distribution of the number of hairs along the length of a thread obeys Poisson's law. According to this division, the probability of hair formation can be expressed as follows:

$$P_K = (a^{\kappa} exp - a)/k!,$$

Here $a -$ is the probability of hair formation per unit length (1 cm).

Given that all the fibers that make up a thread can have a free end, the number of ends of all the fibers that come out of the surface of the thread and form a hair in 1 meter.

$$n_\text{в} = 2 \cdot 10^3 T_{un}/(T_\text{в} \ell_\text{в}),$$

Here $T_{un} -$ average linear density of yarn, tex; $T_\text{в} -$ average linear density of fibers, tex; $\ell_\text{в} -$ average length of fibers.

The formula proposed by A.Baralli to calculate the number of hairs per 1 mm of thread length looks like this:

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$$n = 1{,}57 \frac{d_{_\theta}(d_{_{un}} - d_{_\theta})}{L_{_\theta} \cdot k},$$

Here $d_{_\theta}, d_{_{un}} -$ average diameter of fiber and thread, mm; $L_{_\theta} -$ average length of fibers, mm; $k -$ correction depending on the cooking coefficient $(k = 0{,}66 \ldots 0{,}004\alpha).$

The obtained results in these formulas are approximate. The average length of hair depends on many factors and varies significantly. In particular, according to T.N. Borovikova, L = 1.07… 1.6 mm for cotton yarn, L = 1.35… 1.7 mm for wool yarn. [10]

CONCLUSION

The sum of the lengths of the hairs is an integral estimate that takes into account the number of hairs corresponding to the length and their average length. This is why many researchers have been using this characteristic. It is calculated as follows:

$$L_{_\theta} = \ n \cdot l$$

The sum of the total feather surface is also an integral characteristic. It can also be used to compare the number of hairs, the cross-sectional area of the fiber, with other yarns that differ in length, taking into account the number of hairs, their average length, and their average cross-sectional area.

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The Impact of Ancient Chinese on Baihua Language

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ABSTRACT: This article analyzes the influence of the ancient classical literary language - the Wenyan communication language on the Baihua language. Lexical and grammatical differences are discussed on both fronts of a language. Since the Wenyan language is represented by monosyllabic units, several meanings of a hieroglyph have the property of changing its semantic meaning according to the position of the hieroglyph in the sentence or sentence. It is extremely important to pay attention to this aspect in reading and interpreting ancient texts. The Baihua language, on the other hand, is represented by polysyllabic units, which are much more convenient than the Wenyan language in expressing the semantic meaning of a word. However, the Wenyan language played an important role in the formation of the Baihua language, and to this day some elements of the Wenyan language are also reflected in the Putonghua.

KEY WORDS: Wenyan, Baihua, Putonghua, monosillab, polysillab, "May 4 movement".

INTRODUCTION

By getting to know Wenyan, it will be possible to read Chinese ancient and classical art monuments in their true form and feel the true value of these sources. Wenyan has always been considered the language that separates Chinese intellectuals and the common people. The reflection of the Chinese language, its description, its internal structure, its features become more obvious to the person who studies Wenyan.

When you read the texts written in Wenyan, you feel the elegance, originality, Chinese traditions, culture, history of the Chinese language. By studying the internal structure of Wenyan, however, a deeper understanding of modern Chinese, the grammatical structure, and some of the puzzles will be solved on their own [1, 54].

In the process of studying the Baihua language, we realized that the works written in the Baihua in the ancient and medieval times were poorly studied from a linguistic point of view, and the main reason for this was that the works in Baihua were written "frivolous" way which did not attract the attention of Chinese linguists. However, by the time of the Ming and Qing dynasties (1368-1911), we can acknowledge that Wenyan was abolished by Baihua, and even after the "May 4 movement" of 1919, it gained its status as a national and state language.

By the end of the Qing Dynasty, the Baihua language had gained prominence. In Baihua, works of art, periodicals began to appear. Famous novels, one of the masterpieces of Chinese literature, were also created in Baihua. In this way, we can clearly see that the Baihua language is modern, able to meet the requirements of the time, understandable to all segments of society. However, the venyan did not disappear completely. Wenyan was still significant for its charm.

Ancient Chinese is the ancestor of "modern Chinese" and is the national language of the Han nation in the pre-May 4 movement, 1919. This language has a common linguistic basis with modern Chinese, and its lexical and grammatical structure are also compatible; but differs greatly from modern Chinese in terms of lexical system and spoken language. Ancient Chinese usually represents an ancient written language, including "wenyan" and "ancient baihua". He combined the features of the languages of earlier periods and developed various linguistic methods of writing, sometimes very complex ideas [1, 54].

By 1962 in China "明清文学语言研究会 Míng Qīng wénxué yǔyán yánjiū huì *Ming and Qing Literary Language Research Association*" was founded [2, 1]. The main purpose of the establishment of the association was to study the language of works of art in the baihua, the grammatical features of the Baihua.

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THE MAIN RESULTS AND FINDINGS

The results of the research of this association show that although there is a difference in the lexicon of works belonging to the Ming and Qing periods with the works in the early Baihua language, the influence of Wenyan in the works was certainly strong. Especially, we can distinguish two types of personal pronouns in such works "水浒传 *Water Margin*" and "三国志演义 *Romance of the Three Kingdoms*". If such pronouns as 我 wǒ *I*，俺 ǎn *I*，咱 zan *myself*，你 nǐ *you*，您 nín *You*，恁 nín *You representing the meaning of respect* (您 nín synonym of the pronoun *You*)，他 tā *he*，它 tā *it* are characteristic of oral speech, then such pronouns as 某 mǒu *I* (this pronoun more expressed the meaning of discrimination)，吾 wú *I*，汝 rǔ *you* (in reference to a peer or younger than himself)，君 jūn *You* (only for people whose career is great)，尔 ěr *you* we can say that it was mastered from Wenyan and used to enrich the effectiveness of written language.

玄德少时，与家中诸小儿戏于树下，吾为天子，此长朝殿也。其叔父刘德然见玄德发此语，曰：汝勿语戏，灭吾门。Xuán Dé shǎoshí, yǔ jiāzhōng zhū xiǎo érxì yú shù xià, wú wéi tiānzǐ, cǐ zhǎng cháo diàn yě. Qí shúfù liúdérán jiàn Xuán Dé fā cǐ yǔ, yuē: Rǔ wù yǔ xì, miè wú mén. *When Xuan was young he De used to play under the tree with the young children of his family, I am the son of the emperor and also the (master) of this palace. His uncle Liu Deran Xuan De saw him saying this, he said: "don't make fun of me, get out of my door."* [3]. In this quoted passage instead of the singular personal pronoun 我 wǒ *I* is used 吾 wú *мен* and instead of pronoun 你 nǐ *you* is used 汝 rǔ *you*. The use of personal pronouns in this way represents the arrogant tone of speech, i.e. it adds a stronger emotional tone to the speech [2, 4].

Baihua is significant in that is has a large number of two-syllable polysyllabic words. Adverbs also consist of two syllables, a condition which is observed neither in Wenyan nor in Putonghua, i.e., we can see that it is characteristic only of baihua. Such adverbs as 好生 hàoshēng may be the example of for this. This word consists of two syllables 好 hào *good* and 生 shēng *birth; creat* which is a compound word consisting of two syllables expressing their meanings. The meaning of the adverb 好生 hàoshēng was used as a function of adverb 很 hen *very* in a modern Chinese.

咱更不回书，您好生传示朱招讨道 [2, 11]。Zán gèng bù huí shū, nín hàoshēng chuán shì Zhū Zhāo tǎo dào. We can analyze the meaning of the words in the sentence:

咱 zan *myself*

更 gèng *especially*

不 bù *no; not*

回书 huíshū *to respond in writing*

您 nín *You*

好生 hǎosheng *very; exceedingly*

传示 chuánshì *to report; to convey*

朱招 Zhū Zhāo *famous name*

讨道 tǎodào *to interpret; to explain*

We can translate it as *Personally, I will not answer in writing, you explain to Zhu Zhao well* .

您好生小心勾当，事济有赏。Nín hàoshēng xiǎoxīn gòudang, shì jì yǒu shǎng.

您 nín *You*

好生 hǎosheng *very; exceedingly*

小心 xiǎoxīn *to be careful*

勾当 gòudàng *cunning work; fraud*

事济 Shì jì (事业完成；事情办成功 finish work; in the sense of completing a successful job) [4].

有 yǒu *have*

赏 shǎng *reward*

You have committed fraud very carefully, there is a reward when the work is finished.

In the both of above analized sentences 好生 hǎosheng the two-syllable degree form was used before the verb, expressing meanings such as "*very, exceedingly*". However, as noted in the the book "白话语汇研究 *Baihua lexicon research*" of Xiang Banshun, Jiang Lansheng, Bay Veyguo the the novel "红楼梦 *Dream of the Red Chamber*" the adver 好生 hǎosheng can be seen as a adverb of circumstance in some cases [2, 11]. But we could not find an example of this. In addition, this form is now found in some dialects as a adver of degree.

In Baihua texts there are many adverbs meaning such as 将次 jiāngcì *soon*，将近 jiāngjìn *in a short time*，将及 jiāng jí *coming soon* [2, 230].

小弟已差人去了，将次回也。Xiǎodì yǐ chà rén qùle, jiāng cì huí yě. *Someone sent my brother, he will be back soon.*

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The adverb meaning 将近 jiāngjìn *in a short time* may form a compound with quantity word.

自此往来，将近一月有余。 Zì cǐ wǎnglái, jiāngjìn yī yuè yǒuyú. *Since then, it will soon be more than a month.*

Unlike Wenyan and Putonghua, the two-syllable adverbs such 又复 yòu fù *else (again; another)* and 复又 fù yòu *else (again; once more)* found only in baihua texts represent the recurrence of an action. Both variants of this adverbs have the same meaning.

说毕，复又倒地。 Shuō bì, fù yòu dǎo dì。 *He finished talking and fell to the ground again.*

又复一刀，就割下头来。 Yòu fù yīdāo, jiù gē xiàtou lái. *With another knife blow, he cut off his head* [2, 187].

Furthermore, the two-syllable adverbs such 且又 qiě yòu *and again*, 又且 yòu qiě *again as well*, 况且 kuàngqiě *in addition*，且况 qiě kuàng *besides* which are synonymous with two-syllable adverbs 又复 yòu fù *else (again; another)* and 复又 fù yòu *else (again; once more)* are distinguished by the high frequency of occurrence in Baihua texts. The meaning does not change even when the two-syllable adverbs replace the first and second syllables.

吕叔湘 Liu Shusyang suggests that the hieroglyph 又 *you* is a time adverb meaning "again; both; so, once more; newly", but it also comes in the function of a connective in connected conjunctions [5, 9]. In Wenyan 又 you can be applied alone or along with the hieroglyph 而 er. But in Baihua 又 you occurs in both parts of a connected compound sentence, sometimes when the sentence consists of three parts, it occurs in all three parts, and mean "again; both; and; as well as ".

初到那里，人地又生疏，钱又不凑手（45）[6]。 Chū dào nàlǐ, rén dì yòu shēngshū, qián yòu bù còu shǒu. *When I first arrived there, and people were strangers, and the place was alien, and I had no money.*

这一碗牛奶喝下去，又香，又甜，又热和 (45)。 Zhè yī wǎn niúnǎi hē xiàqù, yòu xiāng, yòu tián, yòu rè huo. *Here is a bowl of milk to drink, both fragrant, sweet and hot.*

In these two sentences, the 又 you hieroglyph is equally connected, which is repeated in the second and third parts of the compound sentence, which is unique to the Baikhua language. In Wenyan, the first part of a compound sentence consisting of two parts is usually expressed as 既 ji, and the second part as 又 you or 而又 eryou. Since 又 you is not used repeatedly in Wenyan, we can see that in conjunctions hieroglyphs such as 而 er, 又 you, 且 qiě appear. 吕叔湘 Liu Shuxiang calls the methods used repeatedly in compound sentences and the constructions expressed by these methods parallelisms. Liu Shuxiang goes on to say that in addition to being used in parallel in compound sentences, the adverb 又 you can also have opposite meanings in compound sentences. And he explains this feature with Baihua texts [5, 20].

有时闷了，又盼个姐妹来说些闲话排遣，及至宝钗等来望候，他说不得三五句话，又厌烦了(45)。

Yǒushí mènle, yòu pàn gè jiěmèi lái shuō xiē xiánhuà páiqiǎn, jí zhì Bǎo Chāi děng lái wàng hòu，tā shuōbudé sānwǔ jù huà, yòu yànfánle.

Sometimes when he was bored, he hoped that one of his sisters would come and visit him, talk to them and spread the dust, but in reality, when Bao Chai or someone else came, he could not speak 3-4 words, he would be annoyed again.

In Baihua the adverb meaning 且 qiě *again, as well as, also* is not applicable alone, usually the adverbs 而且 érqiě *also*，并且 bìngqiě *as well as; again*，况且 kuàngqiě *as well as; again* are used to represent such meaning. In Wenyan single syllable hieroglyph 况 kuàng *again; also*, in Baihua represents with two syllable like 何况 hékuàng *as well as; more; also*.

From this it can be concluded that there was an organic connection between the baihua and the wenyan, and that the polysyllabic units were used to express the meaning more precisely by adding the monosyllabic units that had the same meaning in the baihua.

In the process of researching our topic by analizing the adverbs in baihua we have studied the views on the adverbs in I.T. Zograf's article on medieval Chinese grammar titled "Наречия в среднекитайском языке – Adverbs in medieval Chinese" and, in the book of Xiang Banshun, Jiang Lansheng, Bai Weiguo titled "白话语汇研究 Baihua lexicon research". According to IT Zograf, the morpheme 可 is an adverb and is used in interrogative pronouns and is used in conjunction with interrogative pronouns and reinforces the meaning of interrogation. This adverb is in the middle position between the subject and the predicate group, emphasizing that if there is no possessor in the sentence, then it comes at the beginning of the sentence [7, 56].

可怎生恁般厉害 Kě zěn shēng rèn bān lìhài? *How can this be so great?*

In the book "白话语汇研究 Baihua lexicon research" the morpheme 可 is defined as a prefix denoting the interrogative pronoun.

我问他可会写字，可愿出门 [8]？ Wǒ wèn tā kě huì xiězì, kě yuàn chūmén？ *I asked him if he was literate and would he like to go out?*

In this case, we see that the morpheme 可 precedes the predicate and reinforces the meaning of the question. This can be done without the participle putunghuada-morpheme. The content does not change. Thus, we can recognize that the use of

this morpheme in the way of the word family was the same in the medieval Baihua language and in the twentieth century Baihua novels. In contrast to Wenyan and Baihua, in the Putunghua the morpheme 可 means"*may; to allow; to permit* "but is not used to reinforce the meaning of the question, as in Baihua.

Prefixes. In modern Chinese the functions expressed by the prefix 向 xiang ...*to* ; ...*towards* representing the direction and the prefixe 在 zai ...*in* representing the place and time, in the baihua texts have the same meaning and are used in place of each other.

The prefixes 向 xiang and 在 zai

他有个好恶在里。Tā yǒu gè hàowù zài lǐ. *He has good and bad (qualities).*

As for the semantic meaning of the word 在 里 zài lǐ in this sentence, it consists of two morphemes in 在 zài ... and 里 lǐ, which in itself means scope. However, the word 向 里 xiàng lǐ, the two morphemes 向 xiàng ... ga and 里 lǐ are exactly the same in meaning with a compound word composed of larn. Therefore, the sentence 他有个好恶向里。Tā yǒu gè hàowù xiàng lǐ can also be interpreted as *He include (into) good and bad qualities* [2, 179].

Such interchangeable use of the prefixes 向 xiang and 在 zai is not found in modern Chinese putonghua, but it is preserved in the Guangdong dialect. For example, in Guangdong, *Where is he* is expressed in Putunghua as 他在哪里 Tā zài nǎlǐ, in Guangdong as 佢向边处 qú xiàng biān chù. Here: 佢 qú is the third person singular, 向 xiàng...*in* prefixes, 边 biān *side; toward*, , 处 chù have; available; The meanings of In this case, the prefixes 向 xiang and 在 zai have the same meaning [2, 180].

After the Middle Ages, during the Ming and Qing dynasties, in sources devoted to the analysis of novels written in Baihua, the morpheme 向 xiang was used instead of 对 dui ... *to* to express the direction of movement; the morphems meaning 和 he ... *to the side*; 替 ti..*to*; were used as an prefixes function [10, 231].

Wanyanisms (文言词语) are words derived from the ancient literary Chinese language from the Wenyan language, which are also commonly used in the modern Chinese language, which occur in the form of phraseologies and grammatical constructions.

These Wenyanisms, which are part of the lexical and syntactic system of the Chinese language, retain their meaning in a short and concise manner.

The prefix 于 is used in modern Chinese only in written speech, the prefix 在 signifies the nature of meaning, time and place.

Among the equal connectors used in classical literary monuments, 与 and 及 are now found in journalistic style, newspaper texts, socio-political texts, and are synonymous with the prefixes and connectors of the present such as 跟，同，和.

The 若 ruò *"the same; supposedly"* conjunction is often observed in written monuments of historical content, 如 rú *"such as; similar"*was more actively used in political texts. 如 rú is used in conditional sentences and is exactly the same as 如果 in putonghua.

The suffix 者 was active in the formation of professional words in modern Chinese, and it was also an independent word in Wenyan that feeds a person.

Many of the words borrowed from Wenyan have not only been preserved in Baihua, but have also been assimilated in the new language situation. For example:

如何 what?, how? and 如 此 so, like that way; or from equal binders 与 and 及; negative adverbs 无 and 非 are active in modern Chinese and are used as 无法 (没有办法), 并非 (并不).

The prefixes 和 hé and 合 hé

Modern Chinese putunghua, these two prefixes occur in a connecting function. However, if we look at the sources, these two morphemes originally came in the baihua as a pre-auxiliary function and in the Uzbek language expressing the suffix ...*to* [2, 237].

又闻得沈经历文武全才，都来合他去射箭。Yòu wén dé chén jīnglì wénwǔ quán cái, dōu lái hé tā qù shèjiàn. *Яна Шенг иш юритувчининг харбий кобилиятга эга бўлганлигини билиб, барчасини унга қарата камон отди*. In the sentence combination 合他去射箭 hé tā qù shèjiàn *Shot at him with a bow* the morpheme 合 hé has been performing the function prefix. According to Chinese linguists who have analyzed ancient Baikhua sources, the morpheme 合 hé was pronounced as *ho* in the Yuan Dynasty and the Ming Dynasty, and the morpheme 和 he as *huo*.

Later, the prefix 合 hé was expressed by the hieroglyph 和 hé, and began to be pronounced as hé. In modern Chinese, these two morphemes act as conjunctions, sometimes as verbs [2, 231].

Periodicals of the Wenyan lexicon in Baikhua had a strong influence on journalism. Although newspapers and magazines were published in Baihua, Wenyan elements played an important role in expressing the stable associations and phraseology, the sharpness of the journalistic text, and the coloring of the work of art. Although the baihua has been officially in circulation in China

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since the second half of the twentieth century, the Wenyan have not yet lost their status as the "upper class – the language of the aristocracy". It was found in the Baihua texts with its charm typical of classical literature. Such venerations appear mainly in political texts in newspapers and magazines, in speeches of statesmen, and in works of art, in the form of 成语 chengyu phraseologies, 固定词语 gùdìng cíyǔ stable associations, and enrich the text with expressiveness.

Chenggyu - 成语 – "ready phrase", ie idioms. Chenggyu is a strong phraseological phrase formed according to the norms of the ancient Chinese language, a semantic unit, a functional part of speech with a generalized figurative meaning. An important part of the phraseological fund of the journalistic style of modern Chinese is the phraseological expressions formed in accordance with the lexical and grammatical norms of the Wenyan language. Such phraseologies consist mainly of four syllables and a morpheme composition [9, 141].

If phraseology is used correctly in journalism, the article will be full of comprehensibility, clarity, naturalness, and thought-provoking features. This is sure to ensure the success of these publicist speeches. The same can be said about the reasons why phraseologies have gained public attention and are widely used by the public.

There are also regular expressions that are common in newspaper texts expressed in Wenyan auxiliary words:

此言是也 -cǐ yán shì yě - *this is exactly the truth*

诚哉此言- chéng zāi cǐ yán - *that is to say*

一以贯之 - yīyǐguànzhī - *in a systematic manner*

一言以蔽之曰 - yī yán yǐ bì zhī yuē - *in a word*

总而言之 - *zǒng'éryánzhī* - in conclusion from the above, such phraseologies are very common in modern Chinese journalism.

Phraseologisms, according to their stylistic function, are actively involved in speech. Whether a historical classic or a modern writer, they all use phraseology to expand the power of expression in their works. Among modern Chinese writers, such as Mao Dun, Lu Xin, and Lao She, the skillful use of 成语 chengyǔ in their Baihua works made the work more expressive, and the speech more attractive.

CONCLUSION

From the above, it can be concluded that in 1919, as a result of the "May 4 movement" for the Baihua, the Baihua language was officially introduced. In Baihua, newspapers, magazines and periodicals gradually began to appear. The works of art began to be presented to the general public in Baihua. However, the use of Wenyan elements in journalism and fiction remained relevant. The main reason for this is that the Wenyanisms are short and concise, expressive in expressing thought.

After Baihua gained official status, a comprehensive study of written monuments, fiction created during the Ming and Qing dynasties established in China began. From this period onwards, the direct influence of Western linguistics on the Chinese language became great. A number of reforms in Chinese linguistics, especially in phonetics, writing, and stylistics, were reflected. However, while the Wenyan also influenced the Baihua language with its charm and simplicity, the Baihua, in turn, with its intelligibility and simplicity, laid the foundation for the formation of the modern Chinese Putonghua.

When we think of Baihua lexicon, especially auxiliary word groups, they are also expressed in two syllables as independent word groups, sometimes found in language prefixes expressing a synonymous meaning.

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New Perspectives on The Tigray War

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ABSTRACT: Ethiopia's location is in the horn of Africa. It is Africa's oldest independent country and the second-largest country in terms of population in the continent. Ethiopia was historically called Abyssinia which was derived from the Arabic form of the Ethiosemitic name. And although former President Abiy-Ahmed remains the first and only Ethiopian Head of State to have won the Nobel peace prize in 2019 for bringing an end to the over one decade-long conflict with Eritrea. More importantly, he has been subject to numerous criticisms and scrutiny due to the occurrence of several mass protests, incarcerations of political figures and opponents as well as the censorship of the internet, journalists which ultimately led to the resurgence of ethnic and tribal divisions between Ethiopians. This can be termed as the cause for open conflict in the Northern region of Tigray.

This paper will investigate and establish new perspectives of the Tigray war through the backdrop of historical occurrences and how the metamorphosis of these occurrences have helped define and shape the state of affairs in Tigray

KEYWORDS: Tigray, Ethiopia, War, New, Perspectives.

THE HISTORICAL AND POLITICAL CONTEXT

Sequel to the end of the Ethiopian Civil war in 1991, the Ethiopian People's Revolutionary Democratic Front was grounded in an ethnic-nationalist consciousness generated by the cumulative grievances of Tigrayans against consecutive federal governments in Ethiopia (Berhe, 2004).

The most prominent figure of the Tigray People's Liberation front was Meles Zenawi who served as both chairmen of the TPLF and Prime Minister of Ethiopia until he died in 2012. The latter period of Meles' life were dissimilarities over notions and ideological leadership patterns which was marked by a steep contest over power. This involved struggles over power between Meles and a dozen of his colleagues, between elements broadly associated with state organs and those associated with the party apparatus, and between Tigray-based TPLF officials and those around the Prime Minister (Medhane, Tadesse, Young, 2003).

Prime Minister Hailemarian Desalegn as Ethiopian prime minister on the 15th day of February 2018; he also turned in his resignation as chairman of the Ethiopian people's Revolutionary Democratic Front (EPRDF) on the same day. This was due to over two decades of repression and growing discontent within the public. Shortly after, the closed-door election was held to decide who would chair the Ethiopian People's Revolutionary Democratic Front. An election resulted in the victory of the then OPDO Chairman in defiance of the TPLF (Tigray People's Liberation Front). TPLF officials were thus ousted from the Federal Government. The reaction to this was the TPLF officials to migrate to the Tigray region. In 1952, Ethiopia was federated with Eritrea, a pact that was merely designed to last for a decade according to Haile Semere's article title "The Origins and Demise of the Ethiopia-Eritrea Federation" he gives succinct details about the federation of both nations. On 25 April 1952, the commissioner submitted the final drafting of the federal act and the Eritrean constitution to the Ethiopian Government for approval. The British military administration was well informed to prepare the Eritrean populace for the plebiscite of their representatives for the ratification of the Eritrean Constitution. Sequel to the end of March 1952, a series of indirect elections were adopted for the selection of the Eritrean assembly across all of Eritrea, excluding the cities of Asmara, Massawa, where direct elections were organized by the British. The result was a 68-member Eritrean Assembly: thirty-four Christians and thirty-four moslems. Gross irregularities were exhibited by the British authorities when they set the guidelines for the elections in Eritrea under proclamation 121. After all these endeavors, 34 seats were assigned to the Unionist party who were ideologically pro-Ethiopia while 15 seats were delegated to the Moslem league of the western province who were also pro-British; The Eritrean Democratic Front and Independents controlled only 19 Seats. Not surprisingly, Tedla Bairu, the Secretary-General of the unionist party, was elected President of the Eritrean Assembly and Ali Mohammed Mussa Radai, the leader of the Moslem League (of the western province) was made the assembly's

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Vice President. As expected, the pro-British and the pro-Ethiopian supporters immediately formed a two-thirds majority and adopted the draft constitution without substantial revisions. The two basic documents of the autonomous unit, the Federal act, and the Eritrean Constitution were approved by the Eritrean Assembly on 10 July 1952, and by the commissioner on 6 August. The Eritrean Constitution was endorsed by Emperor Haile Selassie on August 11 as well as the federal act, the principal core of the United Nations Resolution 390 - A(V). On 11 September, the Federation of Eritrea and Ethiopia became effective on 15 September 1952. The Ethiopian Government declared that it would scrupulously respect the provisions of the federal act and the autonomy of Eritrea drawn up by the General Assembly, which constituted the Charter of the Federation (Haile, 1987).

Within the constitutional context of this issue, the 1995 Constitution of Ethiopia states in article 39.1, every Ethiopian citizen possesses the unconditional right to self-determination, including the right to secession. In a relatively recent event, there has been huge restriction in Ethiopia as regards the regulation of non-governmental organizations, the anti-terrorist proclamation, and freedom of expression, assembly and association. Liberties established by the promulgation of the charities and societies proclamation in 2009 have been increasingly restricted in Ethiopia. The ripple effect of these laws vis-a-vis the incessant harassment of human right activists, academics and journalists who investigate and comment on sensitive issues or express views critical of government policy, has been severe (Human Rights Watch, Ethiopia, 2013).

THE CAUSE AND COURSE OF THE CONFLICT

The Tigrayan people are an ethnic group that lives in the north of Ethiopia. As of 2021, the number of deaths and casualties experienced by the Tigrayan people is estimated to be around 50,000 which is more than any conflict in the world today. Before midnight on the third of November 2020, the Tigray Special Forces and its allied local militia carried out simultaneous attacks on the Northern Command headquarters of the Ethiopian National defense main office in Mekelle, Dansha's fifth battalion Barracks and numerous command posts in the North. The Ethiopian National Defense force in retaliation, declared a state of emergency right after an Ethiopian offensive was launched on the 4th of November. This was followed by the creation of an interim government for Tigray. Many scholars believe that following Abiy Ahmed's receipt of the Peace Nobel Prize, he failed to uphold the very conduct and principles that earned him the prestigious award in the first place. According to discoveries made by the Arab Center for Research and Policy Studies, the people welcomed Abiy Ahmed with open arms, particularly youth who were pivotal in the 2018 protests. Due to widespread contentment on the parts of the populace at the time, numerous amendments were made that led to the release of various political hostages whilst advocating for the creation of opposition parties and entities. In addition to this, he gave a speech calling for national unity in a country saturated with multi-ethnic pluralism. These hopes were however quickly dispelled as political unrest returned, assassinations became a norm in the country amidst continuous anti-government protests. These said protests soon came to border on rebellion, with the Oromia region being affected the most, to which Ahmed himself belongs. Furthermore, the death toll of the Oromia protests erupted in July 2020 over the killing of a popular folk artist. The government is said to have persecuted well over 4,000 people, including elderly Oromo leaders as well as opposition leaders. By the provisions of the federal constitution, one of the large ethnic groups in the South, the Sidama, submitted a request to the Federal Government in July 2018 which was mainly a request to hold a referendum for their secession from the Southern Nations, Nationalities, and People's Region (SNNPR) and the formation of a new region of its own.

However, this was the first of its kind in Ethiopia. Despite the success of the referendum in 2019, many problems remained unresolved, such as the city of Awassa which is the region's capital as well as the borders of the region, which threatened a conflict with the SNNPR region. At the national level, amidst the crisis, Ethiopia has been affected by the ongoing Covid-19 pandemic and has suffered from major economic, social, and political repercussions (Arab Center for Research and Policy Studies 2007).

Multi-ethnic federalism in Ethiopia has greatly impacted the trajectory of the Tigray and the Tigray Crisis (Habtu, 2005).

Another pivotal occurrence amidst the Tigray crisis is the Makelle offensive. On the 17th of November, the TPLF was accused by the Ethiopian government of blowing up four major bridges leading to Makelle, an accusation to which the Tigray government denied. From the period of November 17 to 19, the districts of Raya, as well as the towns of Alamata, Adwa, Axum, and Shire. On the 23rd of November, Ethiopian forces encircled the regional capital of Mekelle and encircled it. The Ethiopian military spokesperson, Colonel Dejene Tsegaye stated that Mekelle would be shelled and warned Tigray civilians to flee the city as Ethiopian forces intend to show no mercy. It cannot be categorically said that the current dilemma of the Tigray crisis is caused by intense ethnic conflict. Acute tribal cleansing is often promoted by Xenophobia. Often, threatening and cumbersome predicaments may arise which contain with them the potential for tremendous violence. The lack of factual Data and misinterpretations, problems of reliable devotion take hold, people groups set off and become anxious; the nation is incapacitated as conflict becomes inevitable (Lake, Rothchild, 1996)

New Perspectives on The Tigray War

MIGRATION CONSEQUENCES OF THE TIGRAYAN CRISIS

On the issue of migration, it is pivotal to understand the degree of the humanitarian crisis of the Tigray War. It has protracted potentially deteriorating situations with regional dimensions. Though Ethiopia's federal government claimed the Wear in the Country's Tigray region was over in November, fighting continues - at a great cost to a stricken population trapped in a multi-sided conflict. The ousting of the Tigrayan region's Leadership seems to have amalgamated it's posture in the localities within the region as it's resistance is fueled by a Tigrayan populace that assay's the region'a self - determination. Prime minister Abiy Ahmed's enlisted from Eritrea as well as Ethiopia's Amhara region, is an expression of the Federal government's numerous war efforts. This move added to Tigrayan's sense of injustice and broadened backing for the rebellion (International Crisis Group, 2021).

As regards my perspective, the migration consequences of the Tigrayan crisis have caused immense spillover. The pre-existing vulnerabilities of the war. Many Tigrayan residents have hastily established camps at Um Rakuba which is just 70 kilometers from the border and in the Tunaydbah area of Gedaref state. The high levels of migration is also due to the lack of minority protection in Ethiopia, the challenges posed by the Tigrayan Crisis makes this all the more cumbersome to address, and although federalism has been increasingly promoted and utilized in multi-ethnic countries as a means to guarantee minority rights and safeguard the harmony and integrity of the polity and state. Yet, due to the infeasibility of achieving a perfect overlap between ethnic and territorial boundaries, every ethnic-based territory will always contain ethnic minority groups (Van der Beken, 2015).

PEACE AND MEDIATION PROPOSALS

Several groups involved in the war have been involved in numerous peace talks in an attempt to not only de-escalate the war but bring it to an end. In November 2020, Debretsion requested the African Union to end the war and draft peace negotiations. A request that former Ethiopian President Abiy Ahmed and his representatives declined. Subsequently, an emergency Intergovernmental Authority of Development Summit of East African heads of government and state met on 20 December 2020 in Djibouti. According to Leenco Lata, one must understand that for peace to be attained, the actors involved must accept that democracy and versus authoritarianism cannot play a significant role in fomenting conflict between the neighboring states. On the other hand, the conflict's causes could fester out of public view to suddenly result in violent exchanges exactly because of the absence of openness and democratic accountability amongst all entities Involved (Leenco Lata, 2003).

As it stands, the major actor for the peace process in the Tigray war is the African Union. First off, I believe that the African Union should have refrained from any form of mediation process without defining a declaration of principles that will guide the process of attaining full political settlement. The bone of contention is hinged on the reality of the fact that both governments (Ethiopian Federal Government and the Tigray Regional Government) don't recognize each other, which has made the peace process so much more cumbersome if not outrightly unattainable. Sequel to the general elections held in June 2021, Olusegun Obasanjo, head of the AU Observer Mission, declared that the election had been held credibly and thus its outcomes are legitimate. If a definite peace agreement is not reached soon enough, the war in Northern Ethiopia will grind on as it's likely to worsen (International Crisis Group, 2017).

NEW PERSPECTIVES ON THE TIGRAY WAR

As the ongoing conflict continues to intensify, the Ethiopian Federal Government currently claims to have recaptured the Tigrayan City from rebels. Alamata was back under the control of the Ethiopian government, as the Tigrayan rebel withdrawal forces announced their withdrawal from Amhara towards the latter part of December 2021. Although the fighting continues, the Ethiopian Federal Government insists that it will not cease-fire against the Tigrayan region until the other side accepts defeat. The question is will the Tigrayan region result in coercion in an attempt to fill up their ranks. In the article "Membership Matters: Coerced Recruits and Rebel Allegiance", Gates explains that in the case of an inability to attract enough voluntary recruits, many rebel groups rely on coercion to fill up the loopholes from within their ranks, as such, the monopoly of the use of force is adopted in order to impel persons of all age groups, irrespective of their views, beliefs or position on the conflict. Because a lack of membership threatens the ability to sustain a course, vision, or agenda (Gates, 2017).

CONCLUSION

For well over twelve months, the devastating war in Ethiopia's Tigray region has consumed Africa's second most populous nation. The United Nations continues to call for peace and access to humanitarian aid. Due to the war, already an estimated one million people are living in famine-like conditions. As the war unfolds, it is evident that the only tenable perspective is peace. If the war continues, it could further threaten the fabric of the Ethiopian Society in the nearest future as issues such as ethnicity, nepotism, and tribalism come to dictate the political stratosphere of not only the Tigrayan region but the whole of Ethiopia.

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Brand Image and Supply Chain Performance of Automobile Marketing Firms in Rivers State of Nigeria

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ABSTRACT: This study examined the influence of brand image on supply chain performance of automobile marketing firms in Rivers State of Nigeria. The population for the study was sixty-eight (68) automobile marketing firms in Rivers State, whose wholesome list was acquired from the business unit of the Rivers State Ministry of Commerce and Industry as at October, 2020. A causal thought-out analytical model was inculcated to grasp the two hypotheses poised for the study. To arrive at the sample size for the study, the Taro Yamane's formula for determining sample size was used. The simple random technique of probability sampling was utilized to select 40 firms from the sample and the respondents for the study were verified by contacting four managers from each of the 40 automobile marketing firms under study. The number of respondents contacted was: 40 multiplied by 6, which gives 240 respondents. A 5-point likert-scaled questionnaire was administered to respondents. The accurate questionnaire sent out were 240, from which 215 responses were received, and after establishing the validity of the questions 200 (93%) The 200 questionnaires generated the useful response rate. The analysis was made up of descriptive and inferential statistics with SPSS version 22 providing aid. The inferential statistics involved three parametric inferential tests- Pearson's Product Moment Coefficient (PPMC), One Way Analysis of Variance (ANOVA) and Simple Regression Analysis. The PPMC was used to test the relationship between the variables, ANOVA was employed to test the differences in means of responses on the variables, while by means of the simple regressions, the study tested the effect of the elements of brand image on supply chain performance. The results demonstrated that brand identity has a strong, positive and significant influence on supply chain performance, and brand personality has a moderate, positive and significant influence on supply chain performance. Therefore, the study concludes that brand image significantly influences supply chain performance of automobile marketing firms in Rivers State, and recommends that, managers of automobile marketing firms should design brand image enhancing programs that are competent in bringing about positive supply chain performance in order to survive in the highly competitive and dynamic business landscape.

KEY WORDS: Brand identity, Brand image, Brand personality, Supply chain performance.

INTRODUCTION

Brand image has pulled off an elemental enormity in the contemporary market and is in use as a resource of setting vigorous knots with customers, capable of prompting brand loyalty, generating healthier profitability, cost-effectiveness and sustainability for companies (Drennan *et al.,* 2015; Hegner, Fenko & Teravest, 2017),and in recent times, most automobile marketing firms are generating brand image to appeal to a wide range of customers. Accordingly, firms have instigated reasonably, a lot of subtle brand basics, as the pursuit for an improved perceptiveness of brand image scenery in the market through a fitting position, which is cultivated by customers in association with a precise brand (Maehle & Shneor, 2010; Zainol, Omar, Osman & Habidin, 2010).

Asim Nasar *et al.* (2012) affirm that emerging businesses worldwide have the ubiquitous aspiration of growing their brand image since lots of companies are facing strong brand war in the midst of competitors to attain supreme market share. A company can gain supreme market share by means of offering unparalleled product/brand anchored on levelheaded price. It is therefore through providing most first-rate eminent brand image by means of apposite and suitable brand positioning that companies can gain a positive marketing performance.

Numerous studies have been hoisted to spot the connections between brand image and performance (Koll &von Wallpach 2014, Trump 2014, Hollebeek *et al.*, 2014), however none studied these concepts using simultaneously the dimensions and

measures adopted in this present study. This study therefore, investigates the effect of brand image on marketing performance of automobile marketing firms in Rivers State of Nigeria.

STATEMENT OF THE PROBLEM

It is clear as crystal that strict competition exists in Nigerian automobile marketing firms; thus making surviving in such competitive environment necessitates the implementation of confident marketing strategies as well as brand image. Automobile marketing firms cannot say for certain, the kind of impact, brand image has on their marketing performance. Besides, there exists a dearth of academic investigation on the subject matter, in Rivers State, Nigeria. This study therefore, investigates the influence of brand image on marketing performance of automobile marketing firms in Port Harcourt.

RESEARCH QUESTIONS

From the study objectives, the following research questions were formulated:

1.   To what extent does brand identity relate with supply chain performance?
2.   To what extent does brand personality relate with supply chain performance?

LITERATURE REVIEW AND HYPOTHESES

Concept of Brand Image

According to Kotler and Armstrong (2008), a brand is a module in an organization's attachment with its customers as it shapes consumers' perception concerning a product and the entire thing that the product symbolizes to the consumer. A brand as a name, term, sign, symbol or their combinations employed in distinguishing and differentiating a company's products from those of competitors (Okpara, 2012).Brand image is the contemporary outlook of the customers in relation to a brand. It is therefore, a unique bunch of linkages contained by the minds of target customers. Brand image presages what the brand at the split second symbolizes, constituting a deposit of beliefs held about an explicit brand. This study in collaboration with Bambong, Sukina & Wajaya (2015) adopts brand identity and brand personality as the dimensions of brand image.

Brand Identity

Brand identity takes account of all that makes a brand sweeping and exclusive, and depicts how accompany portrays itself to the customers. McCommet and Cogan (2004) noted that strong brands put forward a lucid brand identity that is well discrete and explicate, supplying a formation for the incorporation of the brand (Aaker, 2002). A strapping brand should have a coherent and inestimable identity; if it doesn't, this may necessitate that the brand craves to be modified or extended. Therefore, brand identity constitutes of an exclusive deposit of brand associations that a firm labours to put up in the market. These associations divulge what the brand is and its connected promises to the customers. Brand identity is in real meaning what firms would like their brand to be, connote or symbolize. In an exceptionally uncomplicated logic, brand identity is the quintessence and dependability of any brand. Hence, it is habitually professed or observed as the image a firm transmits concerning its product or its product grouping.

Brand Personality

Brand personality is a concept contained by the field of relational marketing was first coined by Azoulay and Kapferer (2003). Brand personality is defined as a situate of human uniqueness linked to a brand (Aaker, 1997). Brand personality portrays the inner distinctiveness of a brand (Yeoh *et al.,* 2014).

It is in no misgiving that brand personality illustrates a brand as having corresponding individuality as a person and to underpin this fact, Aaker (1997) speculates that brand personality is the set of human individuality with a specified brand. Brand personality identifies how a firm relates a brand with human personality qualities for the purpose of generating a symbolic association that is physically powerful, exclusive, distinct and steadfast to the consumer (Frelings & Forbes, 2005). Hence, as an eye-catching and conspicuous concept of marketing is very necessary for grasping all of the company's objectives, which result in trustworthiness, fulfillment and profitability? The concept of brand personality offers a major managerial advantage. It helps better understand the development and sustaining of relations between brands and consumers (Gouteron, 2008). Brand personality involves the affective, emotional and dynamic facets of a brand (Azoulay & Kapferer 2003).

The Concept of Supply Chain Performance

The term performance is expressed as an idea in contemporary business that has put up with predicaments associated with revealing its concepts in a number of quarters (Hefferman & Flood, 2000).Performance is sometimes substituted with

productivity, however Ricardo (2001) points out that there was dissimilarity between productivity and performance, productivity being a ratio standing for the quantity of work completed in a specified time frame.

Maestrini, Luzzini, Maccarrone and Caniato (2017) defined performance as "A set of metrics used to compute the proficiency and efficacy of supply chain processes and interactions, traversing several organizational functions and numerous firms and empowering supply chain instrumentation. Previously performance was measured by cost with the passage of time more financial indicators were added like return on asset, return on investment, sale and etc. (Anand & Grover, 2015). Only financial indicators are not enough for measure overall and accurate performance, consequently, with the intent of balance scorecard approach some operational indicators were added (Attia, 2015; Shahbaz, Rasi, Zulfakar, Bin & Asad, 2018). Other approaches also added values in measuring supply chain like quantitative or qualitative measures, strategic, tactical and operational measures and etc. (Arzu-Akyuz & Erman-Erkan, 2010). A comprehensive review revealed that for the good performance measure, all the performance measure should consider both financial and non-financial items, all the levels of supply chain must be considered and all process of supply chain should be included so the performance should be measured by operational performance (Shahbaz, Rasi, Zulfakar, Bin, Abbas & Mubarak, 2018).

Indicators to measure above mentioned performance are alike. Supply chain performance had been measured by operational performance and its indicators were quality performance, flexibility performance, customer service, delivery performance and cost performance (Kauppi *et al.,* 2016). Effendi (2015) has use logistic effect for SCM and its metric consisted in order fill rate, order fulfillment lead time, operations flexibility, inventory turnover, and total logistics cost.

Empirical Review

Eduardo de Paula eSilva Chaves (2017) investigated the associations amid brand identity, positioning, brand image and brand equity using a qualitative-quantitative research, and an exploratory-descriptive study. The method employed envelops a case study, a qualitative and quantitative descriptive research. The data was analyzed by means of the regression method, and the findings reveal that there is a significant association between brand identity, positioning, brand image and brand equity.

Kamran and Farzaneh (2017) investigated the influence of consumers' perception of brand personality on purchase intention of Maz Maz Company in Tehran by means of structural modeling and a causal-comparative technique. In addition, the study used library and field research techniques with a questionnaire to accumulate data from the consumers. The study's sample size was arrived at by means of Cochran's formula, while the Cronbach's alpha was used to test the validity of the study. The correlation analysis and structural modeling anchored on SPSS and AMOS software programs. The study disclosed that there is a positive and significant influence of consumers' perception of brand personality on purchase intention.

Ogbuji, Onuoha and Owhorchukwu (2016) explored brand personality and marketing performance of deposit money banks in Port Harcourt by means of the survey method. The analysis was handled with the Spearman rank correlation coefficient with the aid of SPSS version 21.0, and the study found that there is a strong and positive relationship between brand personality and marketing performance of deposit money banks in Port Harcourt.

Ibok and Etuk (2015) studied the association between brand identity and customers' loyalty in the Nigeria telecommunication industry, using mixed sampling method. Data for the study were arrived atby means of a survey of 207 customers extracted from four major telecommunication companies in Akwa Ibom State. Data analysis was conducted using descriptive and inferential statistics, the regression and correlation analysis. The study found that a strong positive and significant relationship exist between brand identity and customers' loyalty.

Muhammad Shoaib *et al.* (2012) exposed the relationships between brand image, advertisement and purchase behavior by selecting 185 family members from diverse areas. The study discovered an association between advertisements of multinational products and consumer purchasing behavior.

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Based on the review above, the following operational framework was designed:
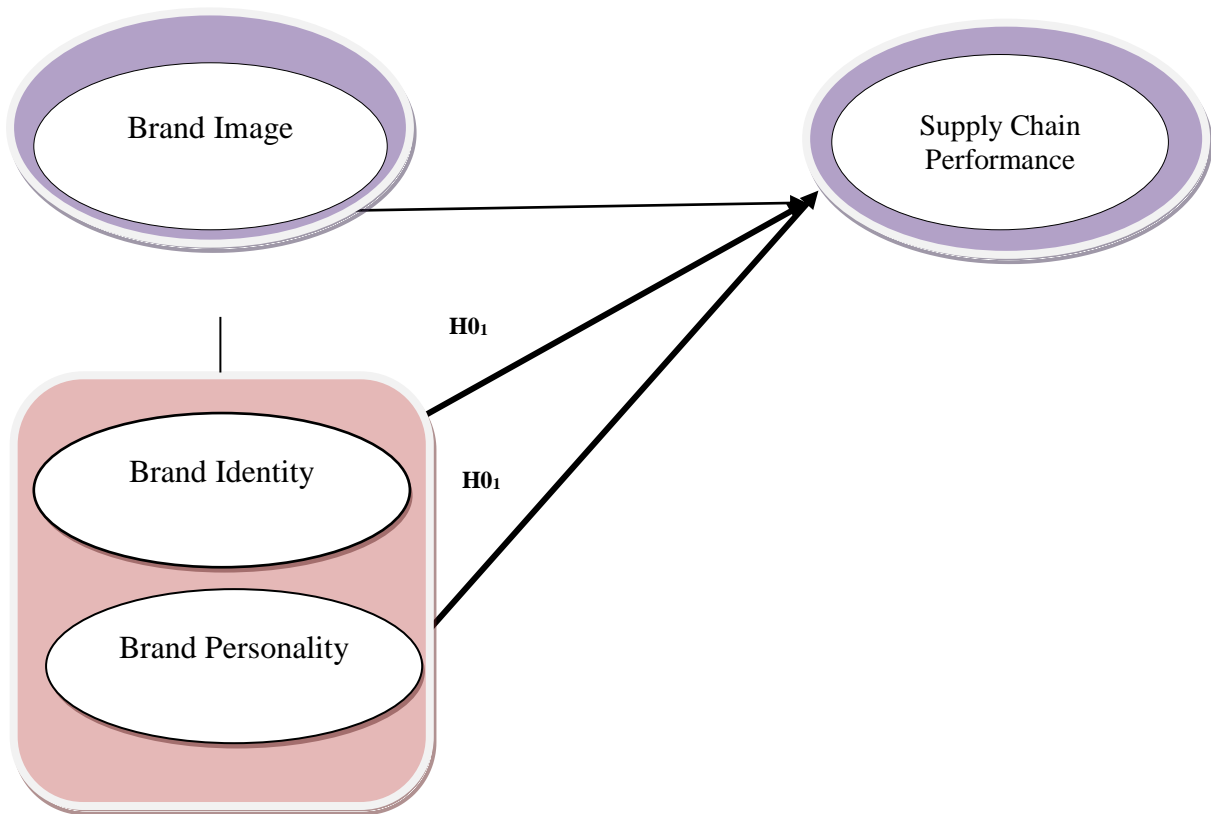
Figure 1: Operational Framework of Brand Image and Supply Chain Performance.
Sources: Bambong, Sukina and Wajaya (2015) and Harcourt and Ikegwuru, (2018).

Based on the review of literature and in line with the framework provided by the review of literature, the following research hypotheses were tested at 0.05 level of significance to show cautious association between the criterion and predictor variables:

Ho$_1$: Brand identity does not significantly influence supply chain performance of automobile marketing firms of Rivers State of Nigeria. .

Ho$_2$: Brand personality does not significantly influence supply chain performance of automobile marketing firms of Rivers State of Nigeria. .

RESEARCH METHODOLOGY
The population for the study was sixty-eight (68) automobile marketing firms in Rivers State, whose wholesome list was acquired from the business unit of the Rivers State Ministry of Commerce and Industry as at October, 2020. A causal thought-out analytical model was inculcated to grasp the two hypotheses poised for the study. To arrive at the sample size for the study, the Taro Yamane's formula for determining sample size was used.
Thus the formulae n= N/1 +N (c) squared
Where n is the sample size
 N is the population
1 is constant and
 e is level of significance (i.e. 0.05).
 Therefore; n = 68/1+ 68(0.05)2
         n = 68/1+68(0.0025) = 68/1+0.6775
         n= 68/1.677 = 29.
The sample size of this study was 40.

Brand Image and Supply Chain Performance of Automobile Marketing Firms in Rivers State of Nigeria

MODEL SPECIFICATION

This segment stipulates the following model that directed the study:

$$MP = f(BI) \text{---}1$$

Where:

SP = Supply Chain Performance

BI= Brand Image

Therefore,

$$MP = f(BI)$$

The above equation is trans- customized into econometric form by adding constant term (β) and error term (E) in the model below:

$$SCP = f(BI)$$

$$SCP = \beta0 + \beta BI + e \text{----------------------------}1$$

$$SCP = \beta0 + \beta BI + e \text{--------------------------}2$$

Mathematical form of the model is:

$$SCP = \beta0 + \beta BI$$

Where:

SCP = Supply Chain Performance

BI = Brand Image

β0 = Intercept

β1 = Coefficient of the predictor variable

e = error ter

ANALYSIS OF RESEARCH QUESTIONS

The descriptive relationships between the components of brand image and supply chainperformance are presented in relation to the research questions earlier stated in this study. Research questions one and two are combined in Table 1. The essence of this is to ascertain the extent of the interaction of the components of brand image (brand identity and brand personality) with supply chain performance. The Pearson's Product Moment Correlation (PPMC) modus operandi was assumed for the research questions in order to explain the extent of the relationships between brand identity and brand personality with supply chain performance. Correlation point in the direction of the degree of linear association between two variables. The association was investigated by testing the significance between brand image components (brand identity and brand personality) and supply chain performance.

Table 1. Correlation Analysis showing the direction and strength of the extent of the relationship between brand image components and supply chain performance

Correlations

Variables	Pearson Correlation	P value (sig.)
Brand Identity	.766[xx]	0.000
Brand Personality	.442[xx]	0.000

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

The correlation coefficient between supply chain performance and brand identity was found to be 0.766 at a P<0.01 level, and the correlation coefficient between supply chain performance and brand personality was found to be 0.442at a P<0.01 level. Therefore, it can be concluded that the extent of the relationship between brand identity and supply chain performance is strong, positive and significant, while the extent of the relationship between brand personality and supply chain performance is moderate, positive and significant. This shows that, firms putting into practice a well-organized brand image programs are inclined to have positive supply chain performance.

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STATISTICAL TEST OF HYPOTHESES

Decision Rule

Significant/probability value (Pv) < 0.05 (level of significance = conclude significant influence.

Significant probability value (Pv) > 0.05 (level of significant = conclude insignificant influence.

Test of Hypotheses One

Ho$_1$: Brand identity does not significantly influence supply chain performance.

H$_1$: Brand identity significantly influences supply chain performance.

The result of the regression analysis is presented in Table 2

Table 2. Summary of Regression Model for Brand Identity and Supply Chain Performance

Model R	R square	Adjusted Square	R std error of the Estimate
1 .766 ^{a}	.587	.585	2.104

a. Predictors: (Constant), Brand Identity

b. Dependent Variable: Supply Chain Performance

Source: SPSS Window Output, Version 22.0 (based on 2022 field survey data).

The sum of supply chain performance was regressed with the sum of brand identity to examine the influence of brand identity on supply chain performance. The value of R is 0.766. The R (coefficient of correlation) value of 0.766 represents the correlation between brand image and supply chain performance. It represents a strong correlation between the two variables. The R^2 (coefficient of determination) which indicates the explanatory power of the independent variable is 0.587. This means that 59% of the variation in supply chain performance is explained by the independent variable. It shows that brand identity makes a contribution of 59% to every change in supply chain performance. The R^2 value as revealed by the result is moderate which means that about 0.41% of the variation in the dependent variable is unexplained by the model, denoting a moderate relationship between the explanatory variable, brand identity and supply chain performance.

Test of Hypotheses Two

Ho$_2$: Brand personality does not significantly influence supply chain performance.

H$_2$:   Brand personality significantly influences supply chain performance.

The result of the regression analysis is presented in Table 3

Table 3. Summary of Regression Model for Brand Personality and Supply Chain Performance

R square	Adjusted Square	R std error of theEstimate
.195	.191	3.576

a.   Predictors: (Constant), Brand Personality

b.   b. Dependent Variable: Supply chain performance

Source: SPSS Window Output, Version 22.0 (based on 2022 field survey data).

Sum of Supply chain performance was regressed with the sum of brand personality to examine the influence of brand personality on supply chain performance. The value of R is 0.442. The R (coefficient of correlation) value of 0.442 represents the correlation between brand personality and Supply chain performance It represents a moderate correlation between the two variables. The R^2 (coefficient of determination) which indicates the explanatory power of the independent variable is 0.195. This means that 19% of the variation in supply chain performance is explained by the independent variable. It shows that brand personality makes a contribution of 19% to every change in supply chain performance. The R^2 value as revealed by the result is quite low which means that about 0.81% of the variation in the dependent variable is unexplained by the model, denoting a moderate relationship between the explanatory variable, brand personality and supply chain performance.

DISCUSSIONS OF FINDINGS

It is clear as crystal that brand image is a substantial dynamic that propels supply chain performance, for the reason that it is a significant as indicator that boosts supply chain performance. A very fundamental step in guaranteeing supply chain

performance is to understand brand image arrangements and embarks upon it appropriately. As divulged by the study's findings, brand image has significant influence on supply chain performance.

As a result, the first hypothesis declared in the null form, was statistically tested and rejected, and the alternative hypothesis that there is a significant influence of brand identity on supply chain performance was accepted. The concept of brand image as calculated in this study fingers issues projecting brand image as a positive driver of marketing performance. It becomes explicable that brand image makes Supply chain performance resourceful and thus capable of transmitting persistent outcomes. From the study's findings, it could be apprehended that when brand identity is correctly harmonized and assertively absorbed, it rubs down on supply chain performance. The study's finding is in line with the findings of Ibok and Etuk (2015) who established a strong positive and significant relationship between brand identity and customer loyalty and, Eduardo de Paula eSilva Chaves (2017) who revealed a significant association between brand identity, positioning, brand image and brand equity.

The second hypothesis affirmed that there is no significant influence brand personality on supply chain performance, but the study's finding confirms a moderate, positive and significant influence of brand personality on marketing performance. The significant result illustrates that brand personality could be a critical concept which business require to consider while crafting their supply chain performance programs. If companies take advantage of the positive effect of brand personality toward supply chain marketing performance, they will definitely achieve optimal supply chain performance. Thus, knowledge of the positive impact of brand personality on supply chain performance should be determinedly measured and mirrored by all stakeholders in the automobile marketing industry. Our research finding supports the findings of Ogbuji (2016) who discovered that brand personality strongly and positively associates with supply chain performance of deposit money banks in Port Harcourt. Our finding also corroborates Bouhlet (2011) discovery that brand personality influences customer loyalty and attachment as well as commitment for sincere and competent brand.

CONCLUSION

This work focused on investigating the influence of brand image on supply chain performance of automobile marketing firms in Rivers State. It is clear from the findings of the study that there is implied influence of brand image components (brand identity and brand personality) on supply chain performance, as the outcome of the statistical analysis reveals that brand identity has a strong, positive and significant influence on supply chain performance, and brand personality has a moderate, positive and significant influence on supply chain performance. Therefore, the study concludes that brand image significantly influences supply chain performance of automobile marketing firms in Rivers State, and recommends that, managers of automobile marketing firms should design brand image enhancing programs that are competent in bringing about positive supply chain performance in order to survive in the highly competitive and dynamic business landscape.

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The Importance of Employee Competence and Technology in Mining Increases The Performance of Village-Owned Enterprises (Bum Desa)

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ABSTRACT: The presence of Law No. 6 of 2014 on Villages provides a legitimate umbrella for the establishment of BUM Desa as a village financial manager that oversees the potential of villages to work on government assistance to residents together. The development of BUM Desa, to encourage the social welfare of the community through established business units, has not been in line with expectations. Permendesa Number 4 of 2015 on the establishment, management, and dissolution of village-owned enterprises is a guideline for regions and villages in the formation and management of BUM Desa. The existence of laws and regulations is not enough for every village to establish BUMDesa. There are hundreds or even thousands of villages that even to this day have not established BUM Desa. The cause of the condition that occurs is due to the obstacles that occur in the village. It is necessary to know the obstacles experienced by most villages in Bum Desa so that they cannot run according to the goals or expectations expected by the government.

Addressing the problems that occur above the importance of the government's role to regulate strategies in improving the performance of existing village BUM Desa In terms of the performance of BUM Desa which has been there lately, has actually experienced a fairly good improvement. However, in order to improve the performance of BUM Desa there are things that need to be considered, namely employee competence. Facing the era of globalization, competition between companies will be higher, and one of the keys to success in winning the competition is the need for quality human resources. For that reason, BUM Desa is expected to be more selective in choosing employees or SDM who have competencies that refer to good performance. The second factor that has an important effect on the performance and welfare of BUM Desa employees is information and communication technology. The technology in the existing village of BUM Desa can be said to be inadequate. Technology is a driving factor of the production function. It can be said so because if modern technology is used, the resulting production will be more efficient and with a relatively shorter time frame.

The research method used is literature review. The results obtained in improving the performance of BUM Desa competency factor plays an important role in improving the performance of BUM Desa. In the management of BUM Desa to be better, employees must have knowledge, job skills, high responsibility for a job, and good motivation. If this can be applied, it is believed that the existing village bum can develop well as well.

Faktro technology has a very important role in the performance of organizations, especially BUM Desa. Without technology in the BUM Desa organization, all organizational activities in the form of information, marketing, and planning will be slow, which has an impact on the performance of BUM Desa. The maximum utilization of technology makes it easier for BUM Desa managers to work well in promoting a product, finding information, and accessing the development of BUM Desa.

KEYWORDS: Competence, Technology, and Performance of BUM Desa

I. INTRODUCTION

INDONESIA'S DEVELOPMENT MUST START FROM THE PERIPHERY AND STRENGTHEN RURAL AREAS THROUGH THE FRAMEWORK OF THE UNITARY STATE, WHICH IS PART OF THE NINE PLANS OF THE PRESIDENT OF THE REPUBLIC OF INDONESIA WITH THE CONCEPT OF NAWACITA. NAWACITA IS A "GREAT VALUE CONCEPT," REFERRING TO THE THREE MAIN PROBLEMS FACING THE STATE IN THE STRUGGLE TO ACHIEVE NATIONAL GOALS, INCLUDING (A) DECLINING STATE AUTHORITY, (B) WEAKENING THE NATIONAL ECONOMY, AND (C) THE EMERGENCE OF PERSONALITY CRISES AND INTOLERANCE IN INDONESIA. THIS IS AN IMPORTANT TYPE OF DEVELOPMENT POLICY IN WHICH ESTABLISHING DEVELOPMENT IN THE MOST MARGINALIZED AREAS, SUCH AS VILLAGES, BECOMES A SIGNIFICANT MILESTONE TOWARD BEING ABLE TO COMPETE GLOBALLY (ABDUL MAULANA, 2016).

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As part of the district, the village has retained its original autonomy. This autonomy gives the village the authority to organize and take care of its own interests by utilizing its potential. The autonomy of the village that exists as part of regional autonomy, which is contained in Law No. 32 of 2004 on Local Government, Article 1 Paragraph (5), reads: "Regional autonomy is the right, authority, and obligation of autonomous regions to regulate and take care of their own government affairs and the interests of local communities in accordance with the laws and regulations." Widjaja (2014), stated that the things to be achieved in the affairs of the region include: developing various fields in each region, improving services to the community that need to be improved, growing and increasing regional independence and competitiveness in the process of growth. The village government, in its existence to exercise autonomy, must involve the participation of the community to participate in government and development activities. This is because the village government is closest and directly deals with the community. Each village is authorized and responsible for regulating and managing the affairs of the village government for the economic survival of the village and the welfare of its people.

Adisasmita (2013) stated that rural economic institutions remain an important part, as well as being a weak point in realizing the economic independence of the village. This must be seen by observing the existence of cooperatives, especially the Koperasi unit Desa (KUD) which has been around a long time and is dynamic with its ups and downs, but its achievements are generally still few. Therefore, regular efforts are still expected to support planned village companies to be able to deal with the limitations of key financial assets in the village, as well as encourage organizations to increase strength, perhaps even financial seriousness.

To improve the welfare of the village, the village can establish a business entity commonly called the "Village Owned Business Entity" (BUM Desa). The existence of Law No. 6 of 2014 on Villages provides a legal umbrella for the establishment of BUM Desa as a village economic actor who manages the potential of each village collectively aimed at improving the welfare of villagers. BUM Desa Institution is an economic institution that aims to improve the welfare of village communities and the village economy. This means that BUM Desa as one of the mainstays of village development, is relied upon to make the village independent and useful in taking care of its own household so that the village does not only rely on the village spending budget (funds) that have been given by the central government.

The establishment of BUM Desa capital is mainly sourced using village funds derived from the central governments giving to the village. With capital assistance from the central government, BUM Desa can explore and develop the potential that exists in the village for the welfare of the community. BUM Desa as a people's economic institution, as a commercial institution, the first thing that needs to be done is to meet the needs (productive and consumptive) of the community by conducting distribution services for the provision of goods and services such as procurement of community needs that are not burdensome (such as cheaper prices and easy to get) and profitable.

Bum Desa is right and great. The managers are a structure to understand the economy of the majority of the country in power. The realization of BUM Desa as a financial foundation for the village network affects the turnaround of public finances. Finally, the sovereign State of Indonesia is ready monetarily to face the difficulties of globalization on the scale of local and world finance.

The development of BUM Desa in Indonesia has been good. From the data obtained, the number of BUM Desa continues to increase, from 1,022 units in 2014 to 50,199 units in 2019. This is because of the huge enthusiasm shown by the village government and its community to establish BUM Desa for the purpose of changing the wheels of the village economy in every province. However, through business units built by the development of BUM Desa in an effort to encourage the socio-economic welfare of the community, it has not been in line with expectations. Referring to Permendesa Number 4 of 2015 on establishment, management, and dissolution of village-owned enterprises, these become guidelines for regions and villages in the formation and management of BUM Desa. The reality is that what happened there is still many villages and even to this day has not established BUM Desa (https://www.jurnalbengkulu.com). This condition occurs for no other reason than the obstacles that occur in the village and the obstacles experienced by most BUM Desa, so it does not run according to the goals or expectations expected by the government.

Some forms of problems that really need to be considered, such as the problem of limited human resources and lack of creativity in managing BUM Desa, lack of supporting facilities such as poor technology, inadequate facilities and infrastructure, no common understanding of BUM Desa, not yet conducive business climate, information and market access are still limited, low performance (low technology), and the low soul and entrepreneurial spirit of employees that impact the performance of BUM Desa itself.

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Addressing the problems that occur above the importance of the government's role to regulate strategies in improving the performance of BUM Desa. Performance factors are very important in increasing business income, which will later be for the welfare of employees or managers of BUM Desa. According to research conducted by (Alfirdausi & Riyanto, 2020), the benefits of the existence of BUM Desa to the community are the many programs offered by the village to the community, reducing unemployment, and providing assistance to people who want to start an enterprise. In the formulation of a strategic planning organization, it contains a list of what to achieve. In general, performance is the sum of an institution's or organization's accomplishments over a given time period (Kurniawan, 201). The form of BUM Desa performance that can be described as, for example, in terms of service aspects, can serve the community well, in terms of accountability, can accommodate various government programs, and judging from the aspect of improving living standards, can have additional income from BUM Desa.

Looking at the performance of BUM Desa in recent years, it has actually experienced an increase as the results of research conducted by Suriadi & Thamrin (2019) showed that BUM desa and Sei Rampah institutions developed well over the last 2 years since 2017. This happens because BUM Desa and Sei Rampah, together with management, continue to reform in all aspects of BUM Desa relationship in order to do development in terms of local resources, namely by utilizing village communities who are members of BUM Desa to be involved in the development of BUM Desa in the future. With various other institutions, the existence of BUM Desa increasingly exists in the running of its business wheels. Other research conducted by Soejono (2021) shows that financial performance analysis, and Force Field Analysis (FFA). Financial results fall into the category quite well, as revenue rates, net income, ROI, ROE, and NPM fluctuate. Customer perspective is in the good category because customers are satisfied with BUM Desa service, but employee productivity is in the category of quite good, because employee performance is volatile. The supporting factor of BUM Desa consists of various business units such as commercial units, savings and loan units, service units, livestock business units, and tourism units. Conversely, the inhibiting factor of BUM Desa is the establishment of standard operating procedures (SOP) in each business unit. The conclusion of the study shows that the overall performance of BUM Desa is quite good.

In order to improve the performance of BUM Desa in every village, there are several things that need to be considered, namely the competence of employees. Facing the era of globalization, competition between companies will be higher, and one of the keys to success in winning the competition is the need for quality human resources (HR), and human resources that have competencies that refer to good performance. For this reason, the company is required to be more selective in choosing the human resources that will be employed. Competence is defined as a skill and behavior used to improve performance, circumstances, or quality that is adequate or highly qualified and has the ability to demonstrate a specific role of technology (Sedarmayanti, 2017). This is supported by several studies conducted by Soetrisno & Gilang (2018); Dwiyanti, Heryanda, and Susila (2020) and Luciana (2014) whose results from these three studies are the same, equally stating that competence has a positive influence on performance.

His problem of employee competence is still the main problem faced in every BUM Desa. The level of education of BUM Desa managers, who mostly have high school education levels, and the knowledge of managing BUM Desa are still very limited, which will affect the good or bad performance of the existing BUM Desa

Regardless of the level of education, the issue of the existence of BUM Desa actually does not have the option to attract a younger age as administrators. You could say there are still many BUM Desa in Indonesia that are less desirable for most young people to work to build BUM Desa in the village. Many village governments prefer not to use the millennial government to foster BUM Desa. One of the obstacles is that it is still difficult to convince the younger generation that BUM Desa can guarantee government assistance for its activists. Bum Desa is a hope that they can use for social and monetary assistance from the village's local government. The lack of involvement of millennials makes BUM Desa actually faced with business reasons that are made up or run with customary models because they are controlled by a more established age. Perhaps, a younger age and an older age should be synchronized with each other to realize an independent village through BUM Desa.

The role of the government is needed in overcoming this problem by providing training on BUM Desa so as to provide stimulation for managers or employees to be more detailed in the field of BUM Desa. If the competence of employees or managers increases, it will affect the performance of BUM Desa and the welfare of employees who will improve. The second factor that affects the performance and welfare of BUM Desa employees is information and communication technology. The technology in the existing BUM Desa can be said to be inadequate. Adequate information and communication technology (ICT) is needed to assist in the management of BUM Desa. Technology is a driving factor of the production function. It can be said so because if a technology is used properly, then the resulting production will be more efficient and with a relatively shorter time

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frame. Technology problems in BUM Desa are influenced by many factors, including the ability of human resources to develop technology, and the continued lack of technology procurement due to the availability of capital that is still lacking. Technology is a tool used to accelerate the production process in a business. The existence of these tools, makes it very easy for workers to produce goods and will improve the performance of the workers, which will ultimately affect income levels. As research conducted by Maskarto Lucky Nara Rosmadi (2021) and states, small and medium-sized businesses have mostly involved technology in managing their businesses, especially in marketing existing products.

The use of social media is very supportive in product marketing at this time because it can streamline the work of the workforce, which can improve performance and income earned. As seen from the results of existing research, adequate technology is needed at bum desa institution to always experience new changes. In accordance with the opinion of Suparmoko and Irawan (2010) and Sudibia (2020), technology is a change in the function of production that appears in existing production techniques. Therefore, technical changes are always attempted so that there are changes and maximum use is produced in order to produce maximum performance so that it is in accordance with the income and welfare of the community.

The development of information technology today has created a competitive advantage for the business world. Within a few decades, there are four types of technologies whose development is relatively prominent, including information technology, manufacturing technology, transportation technology, and communication technology. Of the four types of technology that are growing rapidly, information technology is the most dominant in impacting the business environment.

The role of information technology as a tool in business decision making at various functions and managerial levels has become very important for business managers, especially in improving the financial performance of a company. One of the controversial issues in the field of economics of information technology is whether information technology contributes to creating added value for companies. Within its limits, it is stated that information technology has turned into a "key must" or simple device, and not a spring that has the upper hand.

Enormous work is displayed in data frameworks near association home administration to gain survival and productivity, as well as the achievement of hierarchical methodologies Kenneth C Laudon and Jane P Laudon (2004). Meanwhile, in a period of data globalization, information technology users can make their hands over associations (A.O'Brien, 2008), including supporting authoritative tasks, delivering to internal and external meetings, examining competitor exercises, and setting the pace of administrative choices that empower foundations to improve and adapt quickly to climate change. Advances in information technology must be coupled with the association's desire to proactively skip all improvements and seek to open new business doors.

Information technology investment decisions are generally taken with short-term considerations (Tallon and Pinsonneault, 2011). Information technology is also capable of creating and improving organizational performance in the medium and long term (Hazzan et al., 2009). Some research trends find that some organizations invest in strategic applications that are directly related to consumers (Tallon and Pinsonneault, 2011). The implementation of digitalization in BUM Desa has had an excellent influence on the management of business units owned so that BUM Desa can contribute more in donations to PADes (Hazzan et al., 2009). With the existence of these facilities, the organization will be able to improve its performance. So the use of information technology strategically has the impact of bringing the organization to increased profitability.

From various things that are theoretical and argumentative, as well as interesting things like the above exposure, strategies are needed to improve the competence of BUM Desa employees and maximize technology as a support for work in organizations, especially BUM Desa which will affect the increasing performance and improve the welfare of BUM Desa employees. The performance of BUM Desa improved due to the management of BUM Desa which has competence and adequate facilities and infrastructure in the management of BUM Desa. From the background of the above problems, the subject matter that will be studied in this paper includes the following: (1) how important is employee competence to the performance of BUM Desa?, and (2) how important is technology to the performance of BUM Desa?.

II. METHOD

In this study, the research approach used was a literature review. The aim of the study was to see if competence and technology had an important role in improving bum desa performance. The study's findings are based on a number of theoretical foundations and empirical studies from previous research.

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III. RESULT AND DISCUSSION

A. The Importance of Employee Competence Towards Village BUM Performance

One form of problem in the management of BUM Desa is the competence of human resources (employees) in running BUM Desa is still lacking. Some experts define the term competence" as follows: (1) Competence encompasses an individual's technical and interpersonal knowledge and skills (Robbins, 2013, p. 357). Competence is the knowledge and skills of individuals technically and interpersonally. (2) A competency is an underlying characteristics on individual that is causally related to criterion referenced effective and / or superior performance in a job or situation(Lyle M. Spencer Jr., 2003, p. 21). Competence is related to the basic characteristics of individuals associated with effective and or superior performance standards (3). The IRS Handbook on Competencies: Law and Practise (Nootjarat et al., 2012; Rankin, n.d.), divides competence into two, namely: technical competencies, often referred to as hard competencies or job related competencies, and skills, often referred to as skills). Self concept, attitudes, value traits, and motivation behavioral competencies, often called "soft competencies," are competencies determined by behavior or mental attitude.

Partly from that perspective, the author can conclude that competence is ability, and character influences execution. One model of ability that is widely recognized by academics and professionals is the model of ability put forward by Lyle M. Spencer Jr., (2003). The model is found in Figure 1 below.
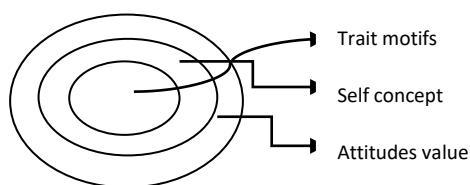
Figure 1.
Source: Competency Model: Lyle M. Spencer Jr., (2003)

That there are 5 characteristics of competence: (1) motive (motive)., consistently is what encourages (motivates individuals to do something) (2) innate traits, physical characteristics, and reactions that are social to what happens in the environment; (3) self-concept, self-value, the way individuals perceive themselves as (4) knowledge (knowledge), information that a person has about something, (5) skills (skills), ability to perform physical and mental tasks (Lyle M. Spencer Jr., 2003). Information and capabilities will be more frequently visible and fairly easy to create through a preparation program. Innate intentions and characteristics that are in a circle in the middle mask factors that are very challenging to evaluate and create. The latter is self-idea, being in the middle circle, implying that mentality, values, and self-esteem can be changed through preparation and psychotherapy or meeting positive progress, despite the fact that it takes up most of the day.

B. The Importance of Competence to The Performance of BUM Desa

Department of Organizational Behavior at Case Western Reserve University. Before getting into each of the articles, let us examine what competencies are. What is a competency? A competency is defined as a capability or ability. It is a set of related but different sets of behavior organized around an underlying construct, which we call the "intent". The behaviors are alternate manifestations of the intent, as appropriate in various situations or times. For example, listening to someone and asking him or her questions are several behaviors. A person can demonstrate these behaviors for multiple reasons or to various intended ends (Boyatzis, 2008, p. 6).

According to Michael Armstrong (1994) in Sudarmanto, (2015) competence is something that individuals bring into a task in various kinds and levels of behavior.

Meanwhile, according to Ardiansyah & Sulistiyowati (2018) "competence" is the knowledge, skills, and attitudes of someone who directly affects employee performance. Based on this understanding, competence is information, capacity, and ability that is driven by an individual and applied in performing tasks and work in the work environment. Competence refers to the underlying attributes of behavior that describe the intentions, qualities of individuals, self-ideas, qualities, information, or abilities carried by a person who dominates in the work environment. Every association anticipates achievement. To make this progress requires qualified workers.

Employees who have high competence, such as information, abilities, capacity, and mentality in accordance with the job assigned are always directed to work more productively (Rande, 2016). Michael Zwell in Wibowo 2015, 283–286 states that there are several factors that affect a person's competence, namely, (1) beliefs and values, this is related to trust or confidence

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in himself and others; (2) skills, specifically skills related to performance; the more skilled the employee, the better the performance produced; (3) experience, usually useful for communication in front of a group, making decisions and resolving problems; (4) the characteristics of personality, is an attitude or attitude that is attached to the individual; (5) Motivation, the spirit of work that is always undergoing change, for that it needs to be given appreciation, support, guidance and direction from leaders and colleagues; (6) Emotional issues, emotions tend to be obstacles to improving competence, such as, not being confident, fearing being wrong, or feeling disliked by other members; (7) intellectual ability, which is related to cognitive thinking skills, concept formation, and analytical thinking; (8) organizational culture, influencing employee competence as in the reward, training, and development system.

The importance of competence in running BUM Desa business towards improving the performance of BUM Desa To qualify for BUM Desa's efforts to be ideal, we further develop skills and knowledge, especially for BUM Desa administrators that have an impact on the performance of BUM Desa for the better. Judging from previous research, there are several factors that can affect the performance of BUM Desa. Gede et al. (2013), stated that competence has a significant effect on the performance of BUM Desa, meaning that with good competence owned by employees, it will provide improved performance.

Training and competence had a significant effect on the performance of BUM Desa (Yuli Fitriyani, Radna Nurmalina, Rina Febrianan, 2018). While the results of different studies were found in the research of Fredy (2015), Suwandi (2016) stated that training and competence had no effect on the performance of BUM Desa. In Putra and Hendriani 2020 related to competencies that affect performance with organizational commitment as an intervening factor, where from the results of his research, it is known that competence affects the performance of BUM Desa through organizational commitment. Sisiawan (2013) proves the positive influence of competence on performance. A different study was found in Renah research (2014), which showed no influence between competencies on employee performance. Several studies that have been conducted show that competence has a very important role in the development of BUM Desa performance.

According to Gordon (1998) in Sutrisno (2010), there are several aspects contained in competence, namely knowledge, understanding, ability, values, attitudes, and interests. Competency-based HR can expand boundaries and build companies because, in this case, when individuals working in the organization have the right abilities according to their work, they will really want to be good as long as the ability possessed is useful in increasing production.

The adequacy of implementation is indicated by the degree of achievement in achieving the goal. The success rate includes the quantity of work, good quality of work, and timeliness in completing employment. Employee competence also needs to be evaluated. The function of this evaluation is to be able to see and predict the results of employee performance. Competence can be used as a criterion in determining the results of employee performance. Referring to the results of research conducted by Makawi, Normajatun, and Haliq (2015), it shows the influence of employee competence on performance. Similar research results were published by Pattiasina (2018), Falilah & Wahyono (2019), Nurjaya et al., (2021), Rijal & Frianto (2020), Sutedjo and Mangkunegara (2018), Steward V. Hoke, (2018), Efendi & Yusuf (2021), Azizu, and Sari (2020), Ahyar Rasyid (2018), Dhermawan et al., (2012), and Mizanul I'tidal (2016) stated that competent human resources have a strong impact and influence on performance.

As stated by Spencer in Moeheriono (2009), the relationship between competence and performance is very close and vital, meaning that to further develop its presentation, you must have the ability that is in accordance with the obligations of your work (the right man on the right job). With a focus on the competency approach, it will have an impact on employee performance individually and also relate to the business strategy of a company (Yuvaraj, 2011)

Davis in Mangkunegara (2009) formulated that: 1). Human Performance = Ability + Motivation, performance is the result of competence and motivation, 2). Ability (competence) = Knowledge + Skill, Competence is the result of a combination of knowledge of tasks and responsibilities and work skills owned by employees. 3). Motivation = Attitude + Situation and motivation in the form of the attitude (attitude) of employees in dealing with work situations in the company (situation).

The results of the above exposure can be concluded in real terms that competence can affect the improvement of bum desa performance. In the management of BUM Desa employees who have knowledge, job skills, high responsibility for a job, and good motivation can be found. If this can be applied, it is believed that BUM Desa can develop well as well.

C. The Importance of Technology to The Performance of BUM Desa

1. Information and communication technology

The word technology, in its true sense, comes from the Latin texere, which means composing, building, making, or composing, so the term technology should not be limited to the utilization of machines, although in terms of thinness, it is not expected to be used in everyday life (Yusuf, 2010). From a broader perspective, technology can include: obtaining frameworks, associations,

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as well as methods. After all, as events turn and times advance, technology is becoming increasingly limitless, so nowadays, technology is an idea related to the types of use and information on devices and capabilities, and what can be done. So technology is a kind of augmentation of the human hand to have the option to exploit nature and the things around it. Therefore, technology basically means working for the satisfaction of human needs. Technology (science and technology) as a whole is all forms of technology related to recovery, sorting (securing), handling, hoarding, dissemination, collection, processing, and presentation of data (Sutrisno, 2010).

In the context of Indonesian culture, information and communication technology (ICT) in a very short time has become a significant structural material in the improvement of today's culture. In many countries, it is considered that understanding ICT, mastering the basic skills of ICT and having ICT ideas are essential for teaching centers, such as reading, writing and numeracy.

UNESCO states that all developing and non-industrial countries need to approach ICT and provide the best instructive offices so that children are ready to take full part in today's culture and can take part in information countries. Because of the rapid progress of ICT, consistent changes are quite difficult for parties, ranging from teaching services, teachers, and distributors. Restricted assets require a school framework. After all, ICT is critical to the future well-being of industry and business, so an interest in hardware, instructor training, and support administration for ICT-based education programs should be an administrative necessity (Rusman, 2011).

In general, technology is all involved in the retrieval, collection, processing, storage, dissemination, and presentation of information. According to Puskur Kemendiknas, the scope of information and communication technology (ICT) covers two aspects, namely:

a)   Information Technology encompasses all processes, aids, manipulation, and management of information.

b)   Communication technology encompasses all aspects of using aids to process and transfer data from one device to another.

As shown by the Oxford English Word reference in Aji Supriyanto, information systems are equipment and programming, and can combine organization and media communication that are mostly in a business environment. Often, information systems are essential for business practices that use PC electronic devices. So basically, the term "information system" is an innovation that involves the PC as the main gadget to process information into useful data (Aji Supriyanto, 2015).

2.   The Importance of Technology in the Performance of BUM Desa

The organization's need for information increases in line with the development of the organization, especially the new BUM Desa organization developing in the current era. Making decisions, planning, organizing, directing, and controlling organizational activities in a BUM Desa organization requires fast and accurate information. The importance of fast and accurate information in BUM Desa organizations requires an information system that is responsive to the needs of the organization. Seeing that many BUM Desa organizations are now changing their information systems that, in the past, used manual systems into systems based on information technology.

In the current era of globalization, the development of information technology (IT) is growing rapidly. Information technology is a device used for reasons related to handling information, including handling, obtaining, assembling, storing, and controlling information in various ways to convey quality data and make important, precise, and ideal specific data. It can also be used for individual, business, and governmental purposes, which is vital data for direction. Muzakki et al., (2016) uses information technology to handle information, organizational frameworks to connect one PC to another on a case-by-case basis, and communication media innovations are used so that information can be spread and spread throughout the world.

A 2000 study by DEW (Zentrum für Europäische Wirtschaftsforschung) in 2000, cited in Falk (2001), found that more than 54% of 4149 associations in Germany changed their data frameworks from manual frameworks to frameworks dependent on information technology. It is largely considered that technology has a very strong impact in helping associations with the implementation of further development and, in this way, achieve excellence.

Several other studies that have been conducted before, such as research conducted by Ardiany (2018), Djatikusumo (2016), Widagdo, Pamilih, Putut, Susanto (2015), and Ellitan (2003), found similar things that state that technology and its development have a strong influence on the performance of an organization.

According to Kadir & Triwahyuni (2003)"Information technology is a group of instruments that help work with data and make efforts related to data handling." It is explained that information technology is a combination of PC innovation and correspondence innovation. A PC innovation is a set of tools used to convert information into data that can be used as directional material. Meanwhile, the fundamental use of information technology universally is to help address problems with high innovation and make individuals more active in using it. The use of information technology (IT) to help various needs and

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improve associations, people, and organizations will definitely bring something positive. However, remember that IT can make us more meaningful individuals by engaging us in positive things. The benefits of information technology (IT) for positive things will certainly get a lot of help from various (Muzakki, 2016).

The various information systems literature is full of modeling of factors associated with the use or acceptance of IT by workers, decision-makers, and managers. Experts also found behavioral management information systems (SIM) approaches in psychology approaches, namely Theory Reassoned Action (TRA) and Technology Acceptance Model (TAM). The Theory of Reasoned Action (TRA) is a theory of reasoned action with the premise that a person's reactions and perceptions of something will determine the person's attitude and behavior. According to the theory of uses and gratifications, currently the media environment is changing rapidly due to the influence of information technology. In the form of changes that occur in the media environment, there are terms like "multimedia" or "internet" with features like email, newsgroups, and mailing lists, and the World Wide Web, so that communication is more widely scoped and diverse. Although the results vary, the theory of uses and gratifications can make an important contribution to understanding as the digital age shifts further and media users are faced with more choices (Severin, Werner J., Tankard (2014). The assumptions underlying the theory of benefits and gratification are: 1). To achieve the goal directed at using mass media, 2). The types of media and media content to be interpreted are chosen by the institution. 3) In addition to the media, there is also a source of need, and the mass media must compete with it. The sources are, for example, family, friends, interpersonal communication, leisure activities, sleep, and watching. 4). the audience is aware of its own needs and is able to express them when asked. They are also aware of the purpose of the media's use.

The reaction and perception of information technology (IT) users will affect their attitude towards acceptance of the technology. One of the factors that can affect it is the user's perception of the usefulness and ease of use of IT as a reasonable action in the context of technology users. One of the factors that can affect it is the user's perception of the usefulness and ease of use of IT as a reasonable action in the context of technology users. The Technology Acceptance Model (TAM) is one of the models built to analyze and understand the factors that influence the acceptance of the use of computer technology, first introduced by Fred Davis in 1986. TAM is the result of the Theory of Reasoned Action (TRA), which was first developed by Fishbein and Ajzen in 1980. Performance comes from the word "job performance" or "actual performance," which means work performance or actual achievement achieved by someone. Performance is the result of the quality and quantity of work carried out by an employee or organization in carrying out its functions in accordance with the responsibilities given to him. Performance is an achievement achieved by employees or organizations in carrying out their work in accordance with the standards given by (Muzakki, 2016;171). It can be concluded that technology has a strong influence on the performance of organizations, especially BUM Desa. Without technology in the BUM Desa organization, all organizational activities in the form of information, marketing, and planning will be slow, which has an impact on the slowing performance of BUM Desa.

3. Use of Information Technology at BUM Desa

Information technology plays a very important role, especially in the business world, especially in working on bum desa presentation. Organizations without using IT will often be sagging and undermined by liquidation. Many business competitors have started to use technology to help with their maintenance and increase their profits. As Mardhani Riasetiawan (2005) points out, technology fills several roles, specifically collecting information, handling information, overseeing information, controlling information, and creating information.

Some of the capabilities that involve a data framework in a business process consist of handling exchanges, checking for updates, and deleting data. The presence of technology-based information systems alludes to the reasons for the information system itself. For a while, as Wilkinson, Cerullo, Raval (2000) points out, information systems support the capacity to provide data to administration only as an aid method for an organization's daily functional exercises. The main benefit of technology-based information systems is that they are on the web and are constant. Reports can be created directly from information exchanges so as to reflect the current status of business tasks. All recorded exchanges can be either softcopy or printed versions, with the aim of being followed without any problems.

Currently, the utilization of technology among existing BUM Desa is still not boosted. The agreement is still made physically by listening to the talk of others, so that the advertising of goods is currently at the level of the nearest occupant as is. The use of IT, particularly by internet businesses in expanding a piece of the pie, is not ideally finished where these are opportunities and opportunities that should be solved by an increasingly innovative turn of events. The utilization of technology not only aims at the things to be promoted but also focuses more on further developing human resource capabilities. BUM Desa has so far used information technology (IT) in advertising and online sales, also known as e-commerce.

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Judging from the business settings, the advancement of ICT as a web has provided a breakthrough effect that has created another worldview in the business world as computerized advertising, which began in the mid-1970s with developments such as exchanges and electronic asset moves (Abdurrahim, 2011). One of the reasons for the rapid advancement of online business is the increase in organizational conventions and programs, and, of course, the most central reason is the growing competition and different business pressures. Furthermore, electronic businesses combine all the things that must be completed using communication and data technology (ICT) to lead business exercises between associations and from associations to buyers (Spat et al., 2000). In leading a business electronically, the ICT framework is used to connect with buyers, colleagues, and providers.

The utilization of the web causes the business cycle to get better. With the utilization of e-business, organizations need to make information available on their data framework so that organizations can provide data to buyers, colleagues, and providers and run electronically with them using the web. Clients' global data transfer capacity continues to grow. Most recently, the absolute transmission capacity of organization administrators around the world reaches 1 terabyte per second. The principal improvement is the presence of real-time features through the web to the home organization or FTH (Fiber To The Home). Thus, the worldwide shortage of transfer speeds is getting bigger. What's more, the use of public advanced publications for worldwide apps (e.g., Google and Facebook) reached USD 800 million in 2015, while computerized marketing was not taxing.

Using promotions with e-business or e-commerce and bum desa goods offerings in particular, can be done throughout the region without time restrictions and at a very minimal price from regular promotions so that donations of goods or administration can be done anytime and anywhere. As demonstrated by research directed by Mahmudi & Damayanti (2020), Dwi Pristiani (2018), Hastriyandi & Munandar (2018), Nootjarat et al., (2012), Rosmadi (2021), and Rika Fatimah (2019), technology has a tremendously solid impact on improving bum desa performance. The maximum use of technology makes it easier for village managers to work either in advancing or promoting an item, looking for data or information, or arriving at the progress of BUM Desa.

IV. CONCLUSIONS

See some of the forms of discussion above as to the conclusions that can be made:

a) Competency factors play a significant role in improving bum desa performance.In order for the management of BUM Desa to be better, employees must have knowledge, job skills, high responsibility for a job, and good motivation. If this can be applied, it is believed that the existing village bum can develop well as well.

b) Technology has an important role and has a strong impact on the performance of organizations, especially BUM Desa. Without technology in the BUM Desa organization, all organizational activities in the form of information, marketing, and planning will be slow, which has an impact on BUM Desa performance slowing down. The maximum utilization of technology makes it easier for BUM Desa managers to work well in promoting a product, finding information, and accessing the development of BUM Desa.All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.

Suggestions that can be made include:

a) For bum desa managers, in improving the performance of bum villages, it is needed to improve the competence of existing employees by providing training on the management of BUM Desa to become more professional in their fields.

b) So important is the role of technology in increasing the performance of BUM Desa, advice is given to BUM Desa management to prioritize technology utilization training in the form of applications for employees to support BUM Desa activities such as ecomercial, where this application helps BUM Desa in marketing products through online media.

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Moral Judgment Construction in The Extraordinary Democratic Party Congress News on Suara.Com

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ABSTRACT: Indonesia's ethics and political decency were torn apart in the case of the Democratic Party's internal conflict. This is due to the existence of an element of the government as a regulator who took over the position of the general chairman of the Democratic Party. News about this internal conflict appeared in various constructions by print mass media, electronic radio, television, and online media. The purpose of this study was to determine the social construction of Suara.com's coverage of the Extraordinary Congress (KLB) of the Democratic Party. For this reason, discourse theory and the social construction of reality are used. The research method analyzes text media framing model Zhongdang Pan-Gerald M. Kosicki. The research subject is the Suara.com news portal, while the research object is related to the Extraordinary Democratic Party Congress from March 5 to March 31, 2021. The research results from the syntactic structure, Suara.com journalists provide a portion, which does not feature one party and reports publicly about the Extraordinary Democratic Party Congress equally from both camps. The script written fully with 5W+1H from both sides is not directed and deserves to be read. Thematic structure, facts are written based on information from both parties. Some are sourced from written statements and analysts from political experts. The rhetorical system, the choice of words or style to emphasize the meaning from both sides, is balanced by the photos shown. Suara.com packaged and framed the news of the Extraordinary Democratic Party Congress by not highlighting the Moeldoko and Agus Harimurti Yudhoyono (AHY) camps but emphasizing the moral hazard aspect in political behavior. With this construction, Suara.com continues to voice the public interest rather than the interests of the capital owners or their political alliances.

KEYWORDS: News construction, Framing Analysis,

PRELIMINARY

Indonesia's ethics and political decency were torn apart in the case of the Democratic Party's internal conflict. This is due to the existence of an element of the government as a regulator who took over the position of the general chairman of the Democratic Party. In this case, Moeldoko, as Chairman of the Presidential Palace KSP, vulgarly through the Extraordinary Congress illegally allowed himself to be appointed general chairman of the Democratic Party, replacing Agus Harimurti Yudhoyono, the legitimate candidate chairman of the Democratic Party. This incident became a case that was declared a political robbery without heart, without ethics. There were even observers who said it was a political robber. These terms appear in various constructions of meaning, which clearly describe the ethical confusion in politics. This case also makes political news in a vortex of tug-of-war in its reporting, either showing support or otherwise for opposing parties in democratic internal politics.

The news of the Extraordinary Congress of the Democratic Party (PD) made headlines when the KLB camp of the Democratic Party held an Extraordinary Congress in Deli Serdang, North Sumatra, March 5, 2021, and elected Moedoko as General Chair, who is also the President's Chief of Staff. (KSP) Joko Widodo. The KLB results contradict the 2020 Democratic Party Congress results, which has appointed Agus Harimurti Yudhoyono (AHY) as general chairman for the 2020 to 2025 period. Through the Ministry of Law and Human Rights, the government, with its minister Yasonna Hamonangan Laoly rejected the ratification of the KLB Democratic Party led by Moeldoko on March 31, 2021. The refusal was not by the AD-ART of the Democratic Party due to the 2020 Congress and the Political Party Law. Therefore, the DPD and DPC who attended the KLB in Deli Serdang, North Sumatra, were not accompanied by a valid mandate.

News about this internal conflict appeared in various constructions by print mass media, electronic radio and television, and online media.   The development of online media makes it easier for production, distribution, and consumption lines,

especially news production. Time and space can be overcome with virtual space technology. In contrast to conventional media, producing, distributing, and consuming online media information is efficient and instant. The consequence of this speed of production and distribution of information in online media eventually raises new problems. In the past, the quality and credibility of this information was a fundamental priority for the mass media, both conventional and new media, but now this is sometimes neglected. Just for reasons of speed, page views, and business growth, online news agencies often convey information that has not been verified final to the public, so that sometimes it causes misperceptions and misinterpretation of facts (Juditha, 2016). (Saud et al., 2020)

There is nothing wrong with the speed of production and dissemination of information. Still, with online media's fast-paced and instantaneous capabilities, some sides cause problems, both for academics, practitioners, and the general public. At first glance, the issues in online reporting do not appear. Still, over time, various problems regarding online reporting, which in this study relate to political reporting, especially journalistic ethics, have begun to appear on the surface. The digital world and cyberculture climate encourage the birth and presence of online media with various reports. This online media highlights news with an entertainment dimension and deals with economics and politics. (Putra et al., 2020)

Especially regarding political reporting, quite a lot of it has drawn criticism from various groups, including academics, because political news displayed on online media often shows partiality beyond boundaries, even demeans political opponents and does not heed ethics and journalistic ethics rules. A framing analysis in this study is described as analysis to find out how reality (events, actors, groups, or whatever) is framed by the media. The framing is, of course, through construction. Social reality is understood and constructed with a specific meaning. Events are interpreted in a certain way. The result is reporting on a particular side or interviews with certain people. That is part of the journalistic technique and marks how an event is interpreted and presented. (Morissan, 2018)

The theory of the hierarchy of influences on mass media content (Theories of Influences on Mass Media Content) was introduced by Pamela J. Shoemaker and Stephen D. Reese. This theory explains the impact on the content of a media report by internal and external forces. Shoemaker and Reese divide the influence of media content into several levels. Namely, the power of individual media workers (individual level), the influence of media routines (media routines level), the influence of media organizations (organizational level), forces from outside the media (outside media level), and the last is the influence of ideology (ideology level). (Shoemaker, 1996:60).

The assumption of this theory is how the content of media messages conveyed to the public is the result of the influence of the internal policies of the media organization and the power of the external media itself. Internal influence on media content is related to the interests of media owners, individual journalists as news seekers, routine media organizations.

Meanwhile, external factors that influence media content are related to advertisers, government, society, and other external factors. Stephen D. Reese argues that the content of media messages or media agendas results from pressure from within and outside the media organization. In other words, media content or content is a combination of internal programs, managerial and editorial decisions, and external influences originating from non-media sources, such as socially influential individuals, government officials, advertisers, etc. We see how strong the power is from this theory at each level (Shoemaker, 1996:61). In the network community characteristics, speed content distribution is at a high level with relatively low centralization of control (van Dijk, 2006:33). At this point, online media often tend to ignore content news coverage's ethical values.

Nevertheless, online media is still superior because the information is up-to-date, real-time, and practiced. Up to date, because online media can upgrade information or news from time to time. This happens because online media have a more straightforward process of presenting information and simple. Real-Time, because online media can immediately give information and news when events occur. Online press reporters can send information directly to the table editor of the event's location. Practical, because online media can be accessed anywhere and anytime, as long as it is supported by internet technology facilities (Yunus, 2015: 32).

Online media also has other advantages, such as the hyperlink facility, a connection system between websites and other websites. Hyperlink facilities can easily connect one site to another so that users can search or obtain additional information. In addition, online media are increasingly chosen and favored by journalists and the public because they can seek and receive information and conduct correspondence or written communication with sources (Yunus, 2015: 33). At least, online media triggered two changes in the media industry: the substance of the press or journalistic processes and organizational forms or formats of media. If previously every type of mass media stood alone or had an organization and self-management, now they are

joined in one known as media convergence. Almost all print and electronic media accompany it in online news, e-paper, and live streaming (Iskandar, 2016: 27-29).

Online journalism, also known as cyber journalism, internet journalism, and web journalism, is a new generation of journalism after conventional journalism (print media journalism, radio, and television broadcasting)—related online journalism with many terms, such as journalism and online and websites. Online journalism can be defined as the process of delivering information through internet media or reporting facts produced and distributed through the medium of the internet (Syamsul, 2012:11-12).

This study aims to determine the framing of online media in reporting the internal conflict of the Democratic Party, and it is very appropriate to use the Zhongdang Pan M. Kosicki framing analysis model because this model is the closest model to a model in viewing news framing. Pan and Kosicki (1993), in their paper "Framing Analysis and Approach to News Discourse," Political Communication, Volume 10, Number 1, divides four structural dimensions of news texts as framing devices, namely syntax, script, thematic and rhetorical. This model assumes that every news has a frame that serves as the center of the organization of ideas. Boundaries relate to meaning. How someone interprets, an event can be seen from the signs used in the text. Pan and Kosicki also describe a detailed model for viewing news framing. This is different from other research models. Pan and Kosicki mean that framing analysis is a process of making messages more prominent, placing information more than others so that audiences are more focused on the news (Eriyanto, 2009, p. 252).

The Democratic Party is the winning party for the 2009 legislative elections. Led by the Chairman of the DPP, Agus Harimurti Yudhoyono (AHY), who is also the eldest son of Susilo Bambang Yudhoyono (SBY), the sixth President of the Republic of Indonesia. Moeldoko admitted to saving the Democratic Party to save the country by appointing himself as the General Chair of the Democratic Party DPP. Through a video uploaded to the Instagram account @dr__Moeldoko, he claimed to save the Democratic Party and save the Nation and State.

In addition to creating rival management, the Deli Serdang KLB Democratic Party also sued the Democratic Party and the general chairman of AHY to court. After holding the KLB, they asked the Supreme Court (MA) to review the Democrat Party's Articles of Association/Budget (AD/ART). Subsequently, he filed a lawsuit with the State Administrative Court (PTUN), because the Minister of Law and Human Rights, Yasonna Laoly, refused to ratify Deli Serdang's version of the Democratic Party.

The lawsuit to the Supreme Court has been canceled by a panel of judges led by Supandi. The board of judges rejected the application because the Supreme Court was not authorized to examine, hear, or decide on the application's object, namely AD/ART. The State Administrative Court has also rejected the lawsuit over the results of the Democrat Party KLB.

From the explanation above, the writer is interested in conducting a qualitative analysis of the content of the text related to the coverage of the Extraordinary Democratic Party Congress on Suara.com. The purpose of this study was to determine the social construction of Suara.com's range of the Extraordinary Congress (KLB) of the Democratic Party.

METHOD

This research is qualitative research to know the construction of the media. A relatively new online media research subject is Suara.com. The research object is the news text when there is an internal conflict between the Democratic Party. For example, the extraordinary congress of the Democratic Party in Deli Serdang, North Sumatra, until the decision of the Minister of Law and Human Rights was released.

Data collection by technique, researchers take the news by including the reporter's name, editor, and the time the information was published. In this study, researchers analyzed 18 news stories. The amount the author determines is sufficient to represent how the media frames the news. (Dwityas et al., 2020)

In qualitative research, checking the validity of the data includes 1) data credibility test, 2) transferability test, 3) dependability test, 4) confirmability test. The data validity test in qualitative research includes tests, credibility (internal validity), transferability (external validity), dependability (reliability), and confirmability (objectivity). (Creswell & Creswell, 2018)

But what is more important is testing the credibility of the data by extending observations, increasing persistence, triangulation, using other reference materials, and member checks. In this study, researchers used Source Triangulation in testing the credibility of the data by checking news capture from Suara.com media, observation, or other techniques in different times or situations. The principle is to check between documents. Documents, in this case, are to use supporting reference materials, such

as the results of news capture from Suara.com media supported by news sources that are accessed virtually and online. (Steensen et al., 2020)

The data discussants were taken from various sources to strengthen the researcher's ideas, first, from the primary source of the news text. Second, processing data also takes secondary data from books, journals, and other reading sources. The limitations of this research do not include interviews in data source collection and processing.(Çetin et al., 2012)

RESULTS AND DISCUSSION

Suara.com is a relatively new online media portal. First published, March 11, 2014, ahead of the 2014 legislative and presidential elections. According to the author, this news portal packs news in light language, without prejudice, presented 24 hours a day that can be accessed via desktops, laptops, gadgets, or other mobile devices.

In this approach, the framing device is divided into four significant structures.

1. Syntactic structure

It can be observed from the news chart. The syntax is related to how journalists organize events (statements of opinions, quotes, and observations of events) into the news. The syntactic element provides a valuable marker of how journalists perceive events and where they want to take the word. The most common syntax form is an inverted pyramid that begins with the news title, headline, setting, and closing. The sections above are more important than those below.

2. Script structure

Script structure to see how journalists package events. News is generally structured like a story. This is because, among other things, it shows the relationship between one event and the previous one and connects the written text with the reader's environment. The general form of the script structure is 5W + 1H, Who, What, When, Where, Why, and How.

3. Thematic structure

The thematic structure is the journalist's way of looking at an event into propositions, sentences, or relationships between sentences that make up the text as a whole. The thematic structure has to do with how facts are written.

4. Rhetorical structure

The rhetorical structure is related to the way journalists emphasize specific meanings described by choice of words or styles. Journalists use rhetorical tools to create an image, increase the prominence of a particular side and enhance the desired image of a story. There are several elements in the rhetorical structure, including the lexicon, the selection, and the use of words to mark or describe events. In addition to using words, emphasis can also be done through graphics in the form of pictures, tables, and photos.

Using the Pan and Kosicki model analysis, this study attempts to examine the framing of the Democratic Party's internal conflict case.

NEWS ANALYSIS 1

News title : 1,200 people in the Democrat KLB are believed to be ready to support Moeldoko to replace AHY

Summary : Former Deputy Chairperson of the Democratic Party Oversight Commission, Darmizal in a written statement, said that 1,200 people would attend the Extraordinary Democratic Party Congress (KLB) in Deli Serdang, Friday (5/3/2021).

Analysis Results

1. Syntactic structure. The media in this news report to the public that a Democrat Party KLB will be held to elect and appoint a new general chairman, Agus Harimurti Yudhoyono's replacement, namely Moeldoko. (Darmizal). In the 10th paragraph, the Deputy of Bappilu DPP of the Democratic Party admits that he received a photo of the KLB preparations. However, he emphasized that there was no KLB in the Democratic Party. If someone is acting in the name of the Democratic Party to organize a KLB, it must be illegal. The DPP of the Democratic Party has never issued a committee decision regarding the implementation of the KLB. (Kamhar Lakumaniz).

2. Script structure. Complete Script Analysis with 5W + 1H, worthy of information from both parties.

3. Thematic structure. Written based on information from the KLB organizers and the Deputy of Bappilu DPP of the Democratic Party.

4. Rhetorical structure. The contents of the news about the KLB plan and the denial that there was no KLB for the Democratic Party, the KLB in Deli Serdang was illegal. The photo illustrates the substantial test between Moeldoko and AHY.

NEWS ANALYSIS 2

News title : KLB Democrats Spotted by Foreign Media: Assistant to the President Becomes Leader of the Opposition

Moral Judgment Construction in The Extraordinary Democratic Party Congress News on Suara.Com

Summary   : The Extraordinary Democratic Party Congress (KLB) in Deli Serdang, which elected Moeldoko as General Chair, attracted the public's attention, not only at home but also in foreign media, such as Channel News Asia, based in Singapore.

Analysis Results

1. Syntactic Structure. The news headline "Democratic Outbreaks Spotted by Foreign Media: Assistant to the President Becomes Leader of the Opposition" attracted the public to follow the continuation until the end.

2. Script Structure. The formula 5W + 1H is in the news content. So the news is worth reading.

3. Thematic Structure. Well written, so that KLB appointed Moeldoko as General Chair replacing AHY attracted the attention of many parties. In addition to the attention of the Indonesian public, it also attracted the attention of foreign media and participated in reporting it, such as CNA.

4. Rhetorical Structure. KLB Democrats attract public attention at home and abroad. A key aide to President Joko Widodo was appointed chairman of the opposition party. CNA also wrote that AHY opposed Moeldoko's appointment, and he remained the general chairman of the party.

NEWS ANALYSIS 3

News title : Moeldoko Becomes KLB's Version of the Democratic Head, Observer: Lucky for Jokowi

Summary : Political observer who is also a lecturer at Paramadina University Hendri Satrio believes that President Joko Widodo has benefited from the internal conflict in the Democratic party. Because Moeldoko is the General Chair of the KLB version of the Democrats, if it is approved, it can add seats to the coalition in the DPR.

Analysis Results

1. Syntactic structure. From the title and the new leadership of the Democratic Party, that the election of Moeldoko benefits President Joko Widodo.

2. Script structure. The most highlighted is the benefits obtained by President Joko Widodo.

3. Thematic Structure. The news contains opinions or analysis of Paramadina University lecturers, to strengthen the coalition.

4. Rhetorical Structure. This news ultimately contains an illegal outbreak, said the Chairperson of the Democratic Party, AHY.

NEWS ANALYSIS 4

News title   : In front of AHY, PD Kubu KLB participants Moeldoko Stories are promised Rp 100 million

Summary   : Former Deputy Chairperson of the Kotamobagu Democratic DPC, Gerald Pieter Runtuthomas, who joined the KLB in Deli Serdang, told the spectacle of the KLB through a video that was shown and witnessed directly by AHY and the ranks of central and regional party officials at the Democratic Party DPP office in Jakarta.

Analysis Results

1. Syntactic Structure. The title used "In Front of AHY, PD KLB Participant Moeldoko Kubu Story Promised Rp100 Million" reveals the facts to the public, the story of the Democrat Party KLB participant for the Moeldoko camp.

2. Script Structure. In the script structure, testimony is told of how he defected to the KLB in Deli Serdang—accompanied by a large Rp. 100 million, the first when it arrived at the location, 25 percent of the 100 million was 25 million.

3. Thematic Structure. The confession of one of the KLB participants who was ultimately disappointed. After the event was over and he chose Moeldoko to become the new general chairman of the party, he did not get the promised money. Gerald claimed that he was only given Rp. 5 million.

4. Rhetorical Structure. The words of regret and apologies to AHY and the laughter of the Democratic cadres showed the dramatization that caused pity for the defected cadres.

NEWS ANALYSIS 5

News title   : Do not want to lose, today the Democrats of the Moeldoko camp visit the Ministry of Law and Human Rights

Summary   : Moeldoko's Democrat Management will visit the Ministry of Law and Human Rights, Tuesday (9/3/2021) to submit the Articles of Association/Budgets (AD/ART), which was previously scheduled to visit the Director-General of General Legal Administration (AHU), Monday (8/3). /2021).

Analysis Results

1. Syntactic Structure. Based on the title and the lead in the news, the two sides came to the Ministry of Law and Human Rights, showing that their side or side was right.

2. Script Structure. The news is packaged as an effort by both parties to submit written evidence in documents, AD/ART to the Directorate General of General Law Administration (AHU).

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3. Thematic Structure. The facts are written in the news. The legal basis for the KLB is based on the Law on Political Parties (Parpol). Meanwhile, AHY's base is AD/ART 2020.

4. Rhetorical Structure. The contents of this news discuss the efforts of both parties to convince the Ministry of Law and Human Rights to issue a valid Management Decree.

NEWS ANALYSIS 6

News title: Sues 10 People Regarding Deli Serdang KLB, BW: This is Democracy Brutality!

Summary: Lawyer for the Democratic Party for AHY, Bambang Widjojanto (BW) conveyed why his party sued ten people related to the Deli Serdang KLB to the Central Jakarta District Court had destroyed the fusion of democracy and democratization.

Analysis Results

1. Syntactic Structure: The headline of the news story of the Democratic Party of the AHY camp sued ten people related to the Deli Serdang KLB for assuming the brutality of democracy. The reason is explained in the lead of BW's statement "that is because they feel that democracy has been destroyed.

2. Script Structure. Completeness of 5W+1H news describing the plaintiff's reasons.

3. Thematic Structure. The emphasis on democratic brutality is understandable, something Democrat lawyers would understandably say.

4. Rhetorical Structure. Photo of the BW Democrat Party lawyer's statement to reporters at the Central Jakarta District Court.

NEWS ANALYSIS 7

News title : Foreign Researcher About This New Outbreak There Is A President Who Doesn't Know The Movement Of His Subordinates

Summary : An Indonesianist from Australia National University, Marcus Mietzner, highlighted that President Jokowi could be categorized as bad if he did not know about the movement of Chief of Staff Predien Moeldoko who was elected as General Chair of the Democrat Party according to the KLB Deli Serdang version.

Analysis Results

1. Syntactic Structure. There are five (5) quotes from Marcus Mietzner's statement which questioned whether the president did not know the movements of his subordinate Moeldoko.

2. Script Structure. In this news, the script analysis is complete according to 5W+1H,

3. Thematic Structure. This news was written based on an online discussion assessing Jokowi's attitude regarding the chaos of the Democratic Party.

4. Rhetorical Structure. According to an Indonesianist's opinion, there is a president who doesn't know the actions of his subordinates.

NEWS ANALYSIS 8

News title : Optimistic KLB Results Legalized by Kemenkumham, Jhoni Allen : I'm 100 Percent Confident!

Summary   : Secretary-General of the Democrats for the Moeldoko camp, Jhoni Allen Marbun, is confident that the Deli KLB results will be ratified by the Ministry of Law and Human Rights. Jhoni's conviction was conveyed after his party registered the results of the KLB with the Kemenkumham office.

Analysis Results

1. Syntactic Structure. If you look at the title and the lead secretary-general of the Democrat camp, Moeldoko is sure that the Deli Serdang KLB results will be ratified by the Ministry of Law and Human Rights.

2. Script Structure. In this news, the most highlighted element is the belief of Jhoni Allen Marbun and KLB for the benefit of Democratic cadres from Sabang to Merauke.

3. Thematic Structure. The fact that the Democratic Party under the leadership of Moeldoko has registered the results of the Deli Serdang KLB to the Ministry of Law and Human Rights, Monday (15/3/2021).

4. Rhetorical Structure. The words sure, belief, interest are used more than once, highlighting Jhoni Allen's optimism.

NEWS ANALYSIS 9

News title : Menkumham Yasonna: We are Researching the Application for Ratification of the Democratic KLB

Moral Judgment Construction in The Extraordinary Democratic Party Congress News on Suara.Com

Summary : Minister of Law and Human Rights, Yasonna Laoly, said that the Moeldoko Democrat Party had submitted the results of the Extraordinary Congress to the Indonesian Ministry of Law and Human Rights. This was conveyed via text message.

Analysis Results

1. Syntactic Structure. "Menkumham Yasonna: We are Researching the Application for Ratification of the Democratic KLB", which aroused public interest in the continuation of the news of the Democrat Party KLB.

2. Script Structure. 5 W+1H in news content has been included.

3. Thematic Structure. It has been written in detail that the Ministry of Law and Human Rights is working to examine the completeness of the KLB implementation documents and whether they are following the provisions of the legislation and the party's AD/ART.

4. Rhetorical Structure. Excerpts from the Menkumham starting from receiving, examining the files, if any are incomplete, are given a deadline to complete.

NEWS ANALYSIS 10

News title : Register with Kemenkumham, PD Moeldoko's Document Turns out to be Incomplete

Summary   : Minister of Law and Human Rights Yasonna Laoly gave the KLB version of the Democratic Party a deadline to complete the document. The Ministry of Law and Human Rights has also examined many documents, and some are incomplete. Therefore, he sent a letter to complete the file immediately.

Analysis Results

1. Syntactic Structure. The title "Registration to the Ministry of Law and Human Rights, PD Moeldoko's Document Turns out to be Incomplete", attracted the public to follow the continuation of the news.

2. Script Structure. It is complete with 5W+1H.

3. Thematic Structure. In writing down the facts, it is clarified from the quote from Menkumham, who immediately decided on a 7-day deadline.

4. Rhetorical Structure. Emphasizing Menkumham immediately take a decision.

NEWS ANALYSIS 11

News title : The story of the Hambalang case greeted by a thunderstorm, the Moeldoko Auto camp was shocked

Summary   : Chairman of the Honorary Council of the Moeldoko camp, Max Sopacua, was angry to hear that he was accused of being the destroyer of the Democratic party. According to Max, what damaged the Democrats was the case of corruption in the Hambalang athlete home project. As a result, several cadres were arrested and imprisoned.

Analysis Results

1. Syntactic Structure. Talking about the Hambalang case, the chairman of the honorary council of the Democrats, Moeldoko's camp, was furious because his side was accused of destroying the party.

2. Script Structure. It tells the facts about the mega corruption case of the Hambalang athlete's guesthouse project, which reduced electability.

3. Thematic Structure. The facts are written with Max's disappointment in AHY's friends who do not know the history of the Democratic Party.

4. Rhetorical Structure. On that basis, the Democrats of the Moeldoko camp held a press conference directly at the Hambamblang project site amid pouring rain and thunder.

NEWS ANALYSIS 12

News title   : Moeldoko Reveals His Decision To Be Democrat Head: To Save The Nation

Summary   : The Chief of Presidential Staff (KSP) of the Republic of Indonesia Moeldoko said that he accepted the mandate to become the General Chair of the KLB version of the Democratic Party to save the party and the nation. According to Moeldoko, there has been an ideological battle ahead of 2024.

Analysis Results

1. Syntactic Structure. Facts were revealed and compiled from excerpts from video recordings from the personal Instagram account @dr_Moeldoko.

2. Script Structure. The completeness of the news is fulfilled with 5W+1H elements.

3. Thematic Structure. The fact that was written was indeed one-sided from Moeldoko's statement which explained his decision to become the Democrat Chairman.

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4. Rhetorical Structure. The emphasized facts seem clichéd to save the Nation.

NEWS ANALYSIS 13

News title   : Moeldoko's Reason for Saving Democrats: "Saving Hanura Just Can't Do It"

Summary   : The Deputy of Bappilu for the Democratic Party, Kamhar Lakumani, said that Moeldoko's confession about the reason for accepting the position of General Chair of the Democratic Party through the KLB misled opinion. Moeldoko is a key actor who actively uses Democrat party cadres.

Analysis Results

1. Syntactic Structure. In compiling the facts, he denied Moeldoko's role in the news the day before with the title "Moeldoko Reveals His Decision to Be the Head of Democrats: To Save the Nation".
2. Script Structure. In telling the facts based on the opinion of Kamhar Lakumani.
3. Thematic Structure. Just writing down the facts of saving Hanura was impossible.
4. Rhetorical Structure. He emphasized facts on misleading opinion, as if Moeldoko is passive, even though the key actor who used former cadres was through the Democratic Party Leadership Takeover gang.

NEWS ANALYSIS 14

News title   : Response to Moeldoko's Statement, AHY: What Ideology Is ?

Summary   : Chairman of the Democratic Party Agus Harimurti Yudhoyono (AHY) questioned the ideology of the Presidential Chief of Staff (KSP) Moeldoko, who said there was an ideological struggle within the Democratic party and was later willing to become chairman of the Democratic Party based on the results of the Deli Serdang KLB.

Analysis Results

1. Syntactic Structure. The facts were compiled based on AHY's press statement in response to Moeldoko's statement asking for an ideological struggle within the Democratic party.
2. Script Structure. 5W+1H is complete.
3. Thematic Structure. Are they compiled in the form of excerpts of statements questioning the ideology held by KSP Moeldoko?
4. Rhetorical Structure. AHY emphasized that the ideology of the Democratic Party is Pancasila, while their principle is religious nationalism.

NEWS ANALYSIS 15

News title   : Official! The Government Rejects Deli Serdang's KLB Version of the Democratic Party

Summary   : The government officially rejects the application for approval of the management of the Deli Serdang Extraordinary Congress of the Democratic Party (KLB) version. The refusal is because there are still conditions that have not been met. Menkumham Yasonna Laoly conveyed the decision through a virtual press conference, Wednesday (31/3/2021).

Analysis Results

1. Syntactic Structure. The facts were compiled by quoting a virtual press statement from Menkumham Yasonna Laoly. The government rejected the Deli Serdang version of the Democrat party.
2. Script Structure. The fact is that the government issued a decision stating that it refused to ratify the results of the outbreak in Deli Medium on March 5, 2021.
3. Thematic Structure. The fact is that the Deli KLB version of the Democratic party has not yet met the requirements that must be met.
4. Rhetorical Structure. Completeness of physical documents for representatives from DPP, DPC, and not accompanied by a mandate from the chairman of DPD and DPC.

NEWS ANALYSIS 16

News title   : Kemenkumham Rejects Ratification of the Results of the Democratic KLB Chaired by Moeldoko

Summary   : Minister of Law and Human Rights (Menkumham) Yasonna H. Laoly stated that the government has officially rejected the application for approval of the management of the Democratic Party as a result of the Extraordinary Congress (KLB) Deli Serdang, North Sumatra. Because General Chair Moeldoko's version of the Democratic camp did not meet the verification.

Analysis Results

1. Syntactic structure. By writing down the fact that Democrat Moeldoko still cannot fulfill the party ratification requirements.

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2. Script structure. Completeness of 5W+1H fulfilled.

3. Thematic structure. Chairman Moeldoko's version of the Democratic Party has not yet met the verification, even though he has completed the requirements twice.

4. Rhetorical structure. The 7-day deadline has passed, according to the minister of law regulation and human rights number 34 of 2017.

NEWS ANALYSIS 17

News title : After Deli Serdang KLB was Rejected, AHY Affirmed No Dualism in Democrats

Summary : Chairman of the Democratic Party Agus Harimurti Yodhoyono emphasized that there was no dualism in leadership within the Democratic party after the government's announcement through the Coordinating Minister for Political, Legal and Security Affairs Mahfud MD and Menkumham Yasonna Laoly that they did not recognize the results of the KLB chaired by Moeldoko.

Analysis Results

1. Syntactic Structure. They were compiled based on the government's decision to reject the request for approval of the management of the Democratic Party of Deli Serdang's version of the KLB.

2. Script Structure. Completeness of news 5W+1H fulfilled.

3. Thematic Structure. Affirmation that there is no dualism in the leadership of the Democratic party.

4. Rhetorical Structure. The legitimate general chairman of the Democratic party is Agus Harimurti Yudhoyono.

NEWS ANALYSIS 18

News title : Moeldoko Camp KLB Results Rejected, AHY Thanks Jokowi

Summary : Chairman of the Democratic Party Agus Harimurti Yudhoyono thanked President Jokowi for rejecting the results of Deli Serdang's extraordinary congress through the Minister of Law and Human Rights Decree. Jokowi has fulfilled his promise that the government will enforce the law fairly.

Analysis Results

1. Syntactic Structure. Headline, lead AHY expressed his gratitude to President Joko Widodo, who rejected the results of the Deli Serdang KLB.

2. Script Structure. 5 W+1H fulfilled.

3. Thematic Structure. Paragraphs 1, 2, 3, 4, and 5 convey gratitude and praise to President Joko Widodo for rejecting the Deli Serdang outbreak's results. The law has been properly and fairly enforced in the case of illegal and institutional attacks.

4. Rhetorical Structure. It can be observed from 4 quotes, AHY is the legitimate chairman of the Democratic Party, there is no dualism in leadership within the Democratic Party.

SUARA.COM NEWS SOCIAL CONSTRUCTION ON REALITY

Based on Zhongdang Pan and Gerald M. Kosicki's framing model analysis, the author concludes from the side of the framing device (syntax, script, thematic and rhetorical). The syntactic structure, Suara.com reporter, provides a portion that does not highlight one party and covers equally from the two warring camps. From the script, written in full 5W+1H, from both sides and not directed and worth reading. Thematically, facts are written based on information from both parties, both written statements, and analysis from political experts. While rhetorically, the choice of words or styles to emphasize moral meaning is related to politeness and political ethics. This confirms that Suara.com can provide a balanced construction without compromising the outstanding value of the media. This is shown in the structure with sentences that bring enlightenment to ethical and moral political literacy. Likewise, with the appearance of photos from the displayed news. Suara.com constructed, packaged, and framed it by not highlighting Moeldoko and Agus Harimurti Yudhoyono (AHY). Thus, it can be concluded that Suara.com's online media is more voicing the public interest than the interests of the owners of capital or their political alliances.

CONCLUSION

The social construction of reality does not happen by itself, but someone creates it. In this regard, in this study, Suara.com made a social fact by publishing news about the KLB Democrat on an ongoing basis. In social construction theory, the reality is that the messages conveyed by the media through their media products are built and shaped for specific purposes. There is a motive in every note in a media product. The reason is in the form of values that the media wants to instill in the memory of its readers. In other words, the content in the news published by Suara.com results from media activities in constructing reality. The range of the KLB Democrat news is based on choices closely related to social, political, and societal realities. The news component in

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Suara.com is nothing more than the compilation of facts which is arranged in the form of a news narrative. In addition to constructing reality in the use of language, it has also determined the existence created by the language chosen to raise about that reality. So, as a result, Suara.com has an excellent opportunity to influence the meaning and the resulting picture from the truth that it has constructed.

From the business side, Suara.com frames the news with light, straightforward language and without prejudice; of course, it gets income from advertisements or advertisements. When talking about online media income, this is a concern, namely advertising and the number of views from published news. News writing is also closely related to the routines in the newsroom. The construction aspect is closely related to how journalists or reporters, and editors of Suara.com report events relevant to actual events that the audience has been waiting for. Realities and possibilities are very complex and require Suara.com to identify and classify based on the suitability of the social context in which the audience is located.

In researchers' observations, good management makes Suara.com, even though it is relatively new, it can survive. First, audience characteristics are essential information that must be known from the start. Then these characteristics are analyzed using media product management elements so that formulas and strategies are obtained to adapt to the audience's characteristics. Suara.com packs it in light language, straightforward and without prejudice, served 24 hours.

The media has the power to determine the point of view on government policies, criticizing in different ways. Therefore, through the findings of this research, it is hoped that the media will help the government as an extension of the arm, conveying positive messages and controversial ones, thereby increasing public understanding.

News concerning matters related to politics and government has its charm, especially with the advancement of democracy. Relying on news value becomes an inseparable part of a news story. News value is a set of criteria for judging whether a political event is important enough to be covered and reported. It was initiated by journalists or reporters when writing news must apply the elements of the value of the word.

The elements explained in the theoretical study are the impact and human interest elements from the news. The value of news impact is intended to measure the extent of the effects of an event. Events that have an overall impact on people's lives. This is very relevant in the KLB of the Democratic Party reported by Suara.com. We are departing from the extent of influence of the Democratic Party KLB for the Indonesian people in general, cadres, politicians in particular.

In this context, the researcher refers to every news published by Suara.com, which generally invites empathy and sympathy from the public or readers because the KLB concerns the certainty of the fate of political parties, which is one of the elements in democracy.

When talking about political parties such as the KLB of the Democratic Party, what is perceived by the public is that it is not easy to manage a political party. If the management is not solid, it may be annexed or co-opted. Therefore, the researcher observes that Suara.com is careful to prioritize facts and not take sides so that the public can trust the readers.

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The Influence of Online Marketing on Marketing Performance of Small and Medium Scale Businesses in Akwa Ibom State Nigeria

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ABSTRACT: Online marketing entails carrying out marketing activities with the use of internet-based application. The main objective of the study was to ascertain the relationship between online marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State. The sample consisted of 366 SMEs operators across the three senatorial districts in Akwa Ibom State. Survey research design was adopted by the researcher. Data were collected with the use of structured questionnaire. Two hypotheses were formulated tested and analyzed using the simple linear regression. It was discovered that there is significant relationship between the two proxies of online marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State. In line with the findings, the researchers concluded that e-mail marketing and search engine marketing does enhance marketing performance of micro, small and medium scale enterprises in Akwa Ibom State. The researcher further recommended SMEs that have not been using these dimensions to a large extent should do so in order to be competitive and enhance their performance.

KEYWORDS: Online marketing, marketing performance, small and medium scale enterprises

1.   INTRODUCTION

Online marketing is a subset of electronic marketing which requires a live internet connection for it to function. Internet has become a remarkable significant vehicle in marketing and is gradually becoming a front-end application of intelligence of the customers and as well as their purchase applications. El-Gohary (2010) opined that online marketing is a recent innovation and a current business practice that is concern with marketing goods, services, ideas and concepts with the use of electronic measures such as internet, mobile phones, extranets and intranets.

According to Wilson and Makau (2017), online marketing is a business effort to inform, converse, promote and goods and services over the Internet. Online marketing attempts to reach out to numerous existing and potential customers through the Internet at a shortest possible time. Coviello *et al* (2001) opined that online marketing as an innovative technology-based activity, has been considered as one of the projecting aspects of marketing practice that has to do with the use of internet and other communicating technologies to build and facilitate dialogue between a business and its customers. Online marketing is not just traditional marketing using the digital technology tools but it's a strategic model to achieve brand value, two way communications and provide customer satisfaction. The idea of online marketing denotes a type of marketing in which marketing objectives are achieved through the use of electronic communication tools like internet, interactive TV and mobile phones.

On the other hand, marketing performance is the application of scarce resources by companies to meet the demand of customers for market related goals such as profit margin, market share, and sales volume among others (Gakii and Maina 2019). Indicators of marketing performance include market share, total sales, customer satisfaction and customer acquisition (Gunday *et al.,* 2012; Rashid, 2008; Sullivan and Dooley, 2009). Further, measuring marketing performance allows businesses to align her marketing strategies accordingly, increase their competitive advantage and to avert or outsmart the marketing strategies of their competitors.

SMEs are a group of business entities that cut across all the sector of the economy and form the bulk of economic activities in Nigeria's economy. . Ekpo *et at*. (2017) identifies the unique characteristics of SMEs to include small scale operations, ease of entry into the economic activities and reliance on indigenous resources. The quantitative definition on the other hand focuses more explicitly on quantitative characteristics such as number of employees, value of sales and/or value of assets. Ajagu (2005) reported that Small and medium scale enterprises are engines of growth in any economy and a veritable tool for the

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development of indigenous technology, rapid industrialization, generation of employment and a key driver of sustainable economic development in Nigeria and also they occupy a place of pride in every country or state. It is also noted that the small and medium scale enterprises are the main driving force behind poverty alleviation, wealth creation, income distribution and reduction in income disparities and promoting self-experience (Aremu, 2004). Ogechukwu *et al* (2013) also opined that SMEs constitute the fountain head of essentiality for the Nigeria economy and their problems have been noticed as those of the nation by virtue of their diversity, number, penetration in all sectors of the economy and marketing contribution to employment and to the success of the particular areas in which they operate.

1.1 Statement of problem

Despite the increased use of the internet and the fact that online marketing has proven advantageous to Multinational companies like Coca-cola or Unilever, SMEs are seen to take a slow pace in adopting this strategy in their operations. Some previous studies have shown that this problem is as a result of the fact that most of the operators of Small and Medium Scale Enterprises are less informed about the modern practice and strategy of marketing. Furthermore, to the best knowledge of the researcher, no empirical evidence has been seen on the relationship between online marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State. It is on this background that this study was set out.

1.2 Objectives of the study

The main objective of the study was to ascertain the relationship between online marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State. The specific objectives were to:

i)   To determine the relationship between e-mail marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State

ii)   To examine the relationship between search engine marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State.

1.3 Research questions

i.   What is the relationship between e-mail marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State?

ii.   What is the relationship between search engine marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State?

1.4 Research hypotheses

H_{01}:   there is no significant relationship between e-mail marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State.

H_{02}:   there is no significant relationship between search engine marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State.

2.   REVIEW OF RELATED LITERATURE

2.1 Concept of online marketing

Online marketing has developed since the 1990s and 2000s and has changed the way brands and businesses utilize technology and internet for their business operations. Online marketing became more sophisticated in the 2000s and 2010s. Online marketing campaigns are rapidly becoming more popular and efficient as digital platforms are increasingly incorporated into marketing plans as many people use digital devices instead of going to their physical shops (Barron and Copeland, 2012). Online marketing techniques such as search engine optimization, search engine marketing, content marketing, influencer marketing, content automation, campaign marketing, social media marketing, social media optimization, e-mail direct marketing, display advertising, data-driven marketing and e-commerce marketing are becoming more and more common in our advancing technology (Babalola and Babalola, 2013).

Smith and Chaffey (2005) recognized that online marketing enhanced customer relations through activities that aid exchange of ideas, goods and services to satisfy both parties. Dury (2008) also affirm that the concept is not only about delivering the message but that online marketing enables receiving and exchanging perceptions in a short periods of time. Wilson and Makau (2017) agreed that online marketing offered businesses access to new market, as well as increased openings outside geographical boundaries thereby restricted international entry hitches. Early adopters of online marketing have gained a competitive advantage and reputable customer loyalty programs that have made them retain as well as get new clients (Sparkes and Thomas, 2001) as cited in Wilson and Makau (2017).

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2.2 Proxies of Online Marketing

- **Email marketing:** E-mail is the abbreviation for electronic mail. According to Babalola and Babalola (2013), email is the most personal advertising medium among all other forms of e-marketing tools in history. E-mail Marketing is a method of transmitting text files, photos, audio and video files from one computer to another through the internet. E-mail enables computer users to send messages and data quickly through a local area network and beyond through the internet. E-mail came into existence in the 1990s and has become a welcome development in business and personal communications. E-mail has made a great impact on the number of information sent worldwide. It has become an important method of sending and receiving information previously via regular mail, telephone, courier, fax, television and radio.

The use of e-mail is one of the most efficient methods of communication. Crystal (2006) stated that e-mail is the use of computer systems to transfer messages between users and that knowing how to use e-mail is an essential skill in businesses today. It is already commonly used in the corporate world and people use it every day. E-mail is also widely used in day to day activities as well as in business transaction, for example, online business, face-to-face business and in wider business environments. E-mail software transfers messages through the internet to a recipient's computer where it is placed in the particular mailbox and the recipient uses an e-mail application to view and reply to the messages, as well as to delete or save it. Because e-mail is a convenient and inexpensive form of communication, it has dramatically added value to personal and business communication.

- **Search Engine Marketing (SEM)**

Search engine is a web software program or web based script available over the Internet that searches documents and files for keywords and returns the list of results encompassing those keywords (Gurneet 2017). Google, Yahoo, Bing, AOL, Baidu are among the topmost search engines of the world and account for most of the Internet traffic. Google accounts for over 69.80% of all global desktop search traffic, followed by Bing at 13.31%, Baidu at 12.53% and Yahoo at 2.11% (Net Market Share, 2017).

Search engine marketing (SEM) has become an important strategic tool for online marketing. Most firms utilize an informal SEM strategy, where Website optimization is perceived most effective in attracting traffic (Barry and Charleton, 2009). SEM has emerged as one of the main method companies use to successfully increase the visibility of their Website. According to Jalang'o (2015) Search Engine Marketing refers to the process where companies pay to have their adverts on search engines and this happens when companies buy certain keywords that relate to their business and their adverts show up when users search the keywords they have paid for. However, businesses that use SEM pay for these adverts only when users click on their adverts. This is known as pay-per-click (PPC). Additionally companies can utilize classified adverts on websites that specializes on specific services such as car sales, real estate, hiring and beauty to promote their goods and services.

Colborn (2005) opined that Search engine marketing is the application of tactical elements linked with the search engines and manipulated to form a strategy to attain online goals. Search engine marketing is directly associated with search engines and can be described as an exercise in the marketing of the website through search engines. SMEs and companies especially those who owns website, welcomes search engine marketing because it offers information and possibility to attract a huge number of customers. The major search engines are Google, Yahoo, Wikipedia, Bing Search, among other.

2.3 Concept of Marketing Performance

It has long been recognized that marketing performance is essential to overall business performance, as well as amongst SMEs (Langerac 2003; Kara, *et al*. 2005). This essentiality is being manifested in indicators such as strong brand awareness, expressions of consumer preference sales volume, and high levels of market share (Grønholdt and Martensen, 2006). However, it is conventionally assumed that achievement of robust marketing performance is problematic for small businesses because of their distinctive features compared with large businesses (Blankson and Cheng, 2005). According to Gakii and Maina (2019) marketing performance is the utilization of scarce resources by businesses to meet the demand of consumers for market related goals such as market share, profit and sales volume.

Since a substantial amount of money, time and effort is spent on marketing activities, it is needful for the marketing department to show the effects of their efforts on the company's overall performance (Kithinji, 2014). These effects are usually measured using the number of sales or sales volume, profit margin, number of website visitors, customer's brand awareness levels and market share.

Indicators of Marketing Performance
Competitiveness

Competitiveness of a company means adapting its goods or services to the market and competition requirements, particularly in terms of quality, product range, price as well as optimal sales channels and methods of promotion (Siudek and

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Zawojska, 2014). Chao-Hung and Li-Chang (2010) also opined that a firm's competitiveness is its economic strength against its rivals in the marketplace where goods, services, people and innovations move freely despite the geographical boundaries. Some businesses looks at competitiveness as the ability to persuade consumers to select their offerings over alternatives while others opine that competitiveness is the ability to expand continuously process capabilities.

Sales Volume

Sales volume refers to the number of items sold by a firm over a specific period of time such as fiscal quarter or a year (Ndikubwimana 2016). Kelemu and Mandefro (2017) opined that the essence of sales volume and market share are prominent in many businesses and that the firm performance and profit of the firm can be summarized in sales volume. One of the crucial goal of firms is to boost sales volume and market share to attain greater scale in its processes and advance profitability and due to this fact, managers always seek to increase their market share.

To boost revenue and hit growth, a firm must continually increase sales volume by all means. Understanding your sales volume can tell you what goods or services that is selling and the once that are not selling. There are also different ways that company can use to influence her volume increase and one of it is the adoption of contemporary marketing strategy.

2.4 Small and Medium Scale Enterprises

SMEs are a group of business entities that cut across all the sector of the economy and form the bulk of economic activities in Nigeria's economy. Various terminologies found in literature such as small and medium scale enterprises, micro, small and medium scale enterprises, small and medium-sized enterprises, small and medium enterprises are used interchangeably to describe this group of businesses. SMEs may be viewed in terms of their qualitative and quantitative features. The qualitative definition tries to identify the certain features which are more peculiar to small businesses than large businesses. Ekpo *et at*. (2017) identifies the unique characteristics of SMEs to include small scale operations, ease of entry into the economic activities and reliance on indigenous resources. The quantitative explanation on the other hand centers more explicitly on quantitative features such as number of employees, value of sales among others.

SMEs in Nigeria are not devoid of problems. Ebitu (2016) opined that this enterprise faces problems such as inadequate capital, incompetent management, fraud, and production problems. Ebitu *et al* (2015) revealed that in the southern region of Nigeria, marketing issues such as difficulty in managing businesses, advertising, lack of adequate marketing research, ignorance of competition, advertising, poor branding and packaging, poor market analysis, meager promotion, poor segmentation and poor pricing technique contribute adversely in affecting SMEs' profit margin and sales volume.

Dzisi and Ofosu (2014) posits that though SMEs experience difficulties in absorbing and coping with obstacles, they need to cultivate the ability to deal with the ever increasing challenges in the global market (Leopoulos, 2006). As a step, small and medium scale enterprises should initiate marketing strategies and tactics that can aid them take decisions on a number of variables to influence mutually-satisfying exchange transactions and relationships (Taiwo, 2010).
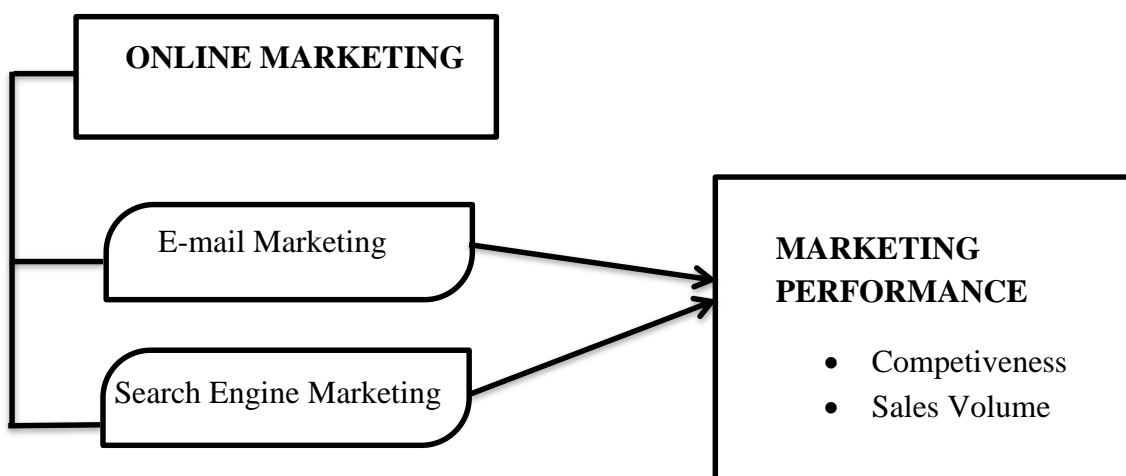

Figure 2.1. Conceptual Framework of Online Marketing and Marketing Performance of Small and Medium Scale Enterprises in Akwa Ibom State.

Source: Researcher's Model

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2.5 Theoretical Framework

This work is based on Innovation Diffusion Theory by Rogers, (1962). The theory states that individuals and organizations do not adopt innovations at the same pace but maintains that the earlier a person adopt new technology, the better for them. The four key elements of the theory are: innovation, communication channels, time and social change. Innovations here may include new technology or new idea and the adopters may be individual or businesses. There are a number of studies that used the IDT as its theoretical framework or combined the IDT with other theories and models to explain ICT adoption and use.

The justification of adopting this theory lies in its relevant to the independent variable (Online marketing) the theory identifies the essentiality of internet-based communication tool such as E-mail, Search engine, among others, in business. The theory illuminates the fact that full application and usage of online marketing dimensions, inevitably occupies a vital place in an organization.

2.6 Empirical review

Kithinji (2014) carried out a study on internet marketing and performance of Small and Medium Scale Enterprises in Nairobi. The objective of the study was to establish the extent of internet marketing application by SMEs in Nairobi. The study was descriptive in nature and used a sample size of 90 SMEs. Primary data was collected with the use questionnaires from the top management of these SMEs. The collected data was analyzed using frequencies, percentages, means and standard deviation as well as factor and multiple regression analysis. It established that the usage of online marketing was moderate and that the SMEs faced financial and technological challenges in the adoption of internet marketing. The study also revealed that Social media and websites were the most popular e-marketing strategies and their usage led to increased revenues, increase in market share, competitive advantage and growth; additionally, the loyalty of their customers increased and the SMEs were able to penetrate new markets.

Achieng (2016) carried out a study on how SMEs are using online marketing to improve their competitiveness in Kenya with a case study of Tembea East Africa Safaris. The purpose of the study was to investigate how small and medium enterprises are utilizing online marketing strategy to advance their competitiveness in Kenya. The study used a descriptive research design and the target population 103. Data for the study was collected with the use of questionnaire. The data was subjected to analysis using multiple regression, percentages, means, standard deviation inferential statistics. The study showed that the company owners perceive online marketing as an important function of the business. The study established that Tembea Kenya Safaris used online advertising to promote their travel packages to potential clients. The researcher recommended that managers should encourage online marketing to improve their customer base, increase their competitive advantage and co-ordinate their activities.

3. METHODOLOGY

The research method is as follows:

Research design: The researcher adopted survey research design as the key research design. This is because survey design permits information to be gathered from a sample of people or organizations by the use of questionnaire.

Study area: The study was conducted in Akwa Ibom State, Nigeria. It is situated in the coastal southern part of the country. The state is located in the South-South geopolitical zone, and is bordered on the east by Cross River State, on the west by Rivers State and Abia State, and on the south by the Atlantic Ocean

Population of the study: The population of the study comprised all registered small and medium scale enterprises in Akwa Ibom and it is stated as follows:

Table 3.1 Population of SMEs in the three senatorial district of Akwa Ibom State

Senatorial district	Population	Percentage
Uyo	4,396	40%
Eket	3,357	28%
Ikot Ekpene	3,837	32%
Total	11,990	100%

Source: Directorate of SMEs Akwa Ibom State, (2021)

Sample Size Determination:

Being a finite population, Taro Yamane formula was used to determine the sample size for the study. The formula is stated as follows:

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$$n = \frac{N}{1+N(e)2}$$

Where:

n	=	sample size
N	=	population
e	=	error limit (0.05 on the basis of 95% confidence level)

Mathematically,

$$n = \frac{11,990}{1 + 11,990(0.05)^2}$$

$$= \frac{11,990}{1 + 11,990\,(0.0025)}$$

$$\frac{11,990}{1 + 29.975}$$

$$\frac{11,990}{30,975}$$

$$387$$

$$n = 387$$

Sampling Techniques: A total of 387 SMEs operators were selected using simple random technique. This technique was adopted in order that all items in the population will be given an equal opportunity of participating in the study. The breakdown is as follows:

Table 3.2 Questionnaire Distribution per Senatorial District in Akwa Ibom State

Senatorial district	Number of SMEs operators	Percentage
Uyo	155	40%
Eket	108	28%
Ikot Ekpene	124	32%
Total	387	100%

Source: Researcher's Computation (2021)

Uyo senatorial district was allocated the highest copies of questionnaire because from the data gotten from the Directorate of SMEs Akwa Ibom State, the senatorial district has the highest number of SMEs in the state. It was followed by Ikot Ekpene and Eket senatorial district respectively.

Sources of Data: Primary data was the main source of data for the study. This primary data was collected from the operators of small and medium scale enterprises in Akwa Ibom State.

Research instrument: Research questionnaire tagged: "E-marketing and Marketing Performance of Small and Medium Scale Enterprises Questionnaire (EMMPSME)" was used for the study. The instrument sought to investigate the relationship between Online marketing and Marketing performance of Small and medium scale enterprises in Akwa Ibom State.

Data collection method: The research instrument used in collecting data was five (5) point Likert scale questionnaire which is stated as follows: Strongly agree (5), Agree (4), Undecided (3), Disagree (2), strongly disagree (1). The questionnaire was self-administered

Administration of Research Instrument: The researcher could not be at all locations at the same time, help was sought in administering the instrument to the respondents within the research period

Reliability of the Instrument: A trial test of the instrument was conducted using 40 SMEs operators. The internal consistency of the instrument was determined using Cronbach's Alpha method to establish reliability coefficient. The coefficient alpha for all dimensions used for this study were presented as follows:

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Table 3.3 Cronbach's Alpha Result

Variables	No. of Items	Reliability coefficients
Email marketing	4	0.633
Search engine marketing	4	0.563
Marketing performance	3	0.623

Source: Researcher's Computation (2021)

The reliability result was rationally high and therefore the reliability of the instrument was justified.

Data Analysis Techniques: Simple linear regression analysis was used to examine the extent of the relationship between the independent variables (e-mail marketing, search engine marketing) and the dependent variable (marketing performance). The two hypotheses were tested separately at 0.05 level of significance.

Model Specification

Marketing performance was estimated as a direct function of some electronic marketing proxies (online marketing and search engine marketing)

This can be expressed in functional equation form as;

$Y = F (X_1, X_2,)$

Recoded to represent the variables, it is presented as;

MP= F (Em, Se)

The simple regression model representing the relationship that exists between each independent variables (X_1, X_2,) and the dependent variable (Y) was expressed in this form;

H_{01}: $Y = a_0 + b_1 x_{1 +} e$

H_{02}: $Y = a_0 + b_2 x_{2 +} e$

To represent the variables in use, the simple linear regression equations were presented as:

H_{01}: Mp= a_0 + b_1Em + e

H_{02}: Mp= a_0 + b_2 Se + e

Where: Mp (Y) = Marketing performance
$Em(X_1)$ = Search engine marketing
$Se(X_2)$ = Search engine marketing
e = error term

The above estimated equations are linear function which was used in testing the model separately.

4. RESULT OF DATA ANALYSIS

A total of three hundred and eighty seven (387) copies of questionnaire were circulated and three hundred and seventy one (370) were recovered of which three hundred and sixty six (366) copies were found functional. This gives a response rate of 95.8 percent. Only 94 percent of the administered questionnaire was found useable. The responses were coded and the Statistical Package for Social Sciences was used to run data analysis.

Table 4.1. Summary of Simple Regression Showing the Relationship between Email and marketing performance

	B₁	SE	B₂	t-value	Significant (2 tailed)
Constant	6.200	0.544	-	11.406	0.000
Email marketing	0.345	0.036	0.447	9.544	0.000
Dependent variable: Marketing performance					
R = 0.447ᵃ					
R² =0.200					
Adjusted R-square = 0.198					
Std. Error of estimate = 1.59950					
F = 91.093					
Significance = 0.000					

significantly related at 5% (p<0.05). B₁= unstandardized beta, B₂= standardized beta, SE= standard error.
Source: Researcher's Computation (2021)

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Table 4.1 shows R^2 of 0.200 which means that the independent variable (Email marketing) accounted for 20% of the variation in marketing performance. In addition, the significant F-ratio at F =91.093, p < 0.000 suggest that the results of the regression model could not have occurred by chance and that the independent variables significantly predicted the dependent variable.

To assess the importance of the independent variable in determining the degree of change in the dependent variable, the beta coefficients for the variable; Email marketing X_1 (Em) had statistically significant standardized coefficient of β =0.345, Sig = 0.000, showing a positive significant influence on marketing performance. This finding can be interpreted that every 1-unit change in email marketing will lead to 0.345 change in marketing performance. Since the p-value is less than 0.05(p=0.000<0.05), the null hypothesis is rejected. Therefore, there is significant positive relationship between email marketing and marketing performance.

$Y = a0+ \beta_1x_{1+\dots}e$

$Mp= a_0 + \beta_1Em +\dots e$

Thus to justify the simple linear regression equation, the resulting equation is:

$Mp = 6.200 + 0.345\ Em$

Table 4.2 Summary of Simple Regression Showing the Relationship between Search engine marketing and marketing performance

	B₁	SE	B₂	t-value	Significant (2 tailed)
Constant	5.398	0.645	-	8.370	0.000
Search engine marketing	0.395	0.043	0.437	9.270	0.000
Dependent variable: Marketing performance					
R = 0.437ᵃ					
R² = 0.191					
Adjusted R-square = 0.189					
Std. Error of estimate = 1.60866					
F = 85.926					

Significance = 0.000

significantly related at 5% (p<0.05). B₁= unstandardized beta, B₂= standardized beta, SE= standard error.

Source: Researcher's Computation (2021)

Table 4.2 shows R^2 of 0.191 which means that the independent variable (Search engine marketing) accounted for 19.1% of the variation in marketing performance. In addition, the significant F-ratio at F = 85.926, p < 0.000 suggest that the results of the regression model could not have occurred by chance and that the independent variables significantly predicted the dependent variable.

To assess the importance of the independent variable in determining the degree of change in the dependent variable, the beta coefficients for the variable; Search engine marketing X_3 (Se) had statistically significant standardized coefficient of β = 0.395, Sig = 0.000, showing a positive significant influence on marketing performance. This finding can be interpreted that every 1-unit change in search engine marketing will lead to 0.395 change in marketing performance. Since the p-value is less than 0.05(p=0.000<0.05), the null hypothesis is rejected. Therefore, there is significant positive relationship between search engine marketing and marketing performance.

$Y = a0+ \beta_1x_{3+}\quad e$

$Mp= a_0 + \beta_3Se +\quad e$

Thus to justify the simple linear regression equation, the resulting equation is:

$Mp = 5.398 + 0.395Se$

5. DISCUSSION OF THE FINDINGS

Findings of the study shows that there is a significant positive relationship between the two proxies of online marketing (e-mail marketing, search engine marketing) and marketing performance of small and medium scale enterprises in Akwa Ibom state.

The result of the first hypothesis indicate that e-mail marketing influences marketing performance of small and medium scale enterprises in Akwa Ibom State with a regression coefficient of 0.345. This result is in agreement with that of Kithinji (2014) who found out that e-mail marketing is one of the key drivers of business performance.

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The result of the second hypothesis also shows a regression coefficient of 0.395 which means that there is a strong positive relationship between search engine marketing and marketing performance of small and medium scale enterprises in Akwa Ibom State. This result is in tandem with that of Wanjau (2011) who found that there is a strong positive relationship between search engine marketing and sales volume.

6. CONCLUSION

The findings of the study clearly show that embracing online dimensions does improve marketing performance. The empirical results of the study clearly highlight the following:

This study has revealed that those SMEs in Akwa Ibom State who are keen in adopting online marketing and integrating it into their business strategies, have achieved above average business performance and have sustainably transformed their businesses by synchronizing their customers, business processes and technology to profitably achieve growth in the dynamic and competitive business environment.

Email and search engine marketing are all key dimensions of online marketing which enhances the marketing performance of SMEs that are keen on realizing the benefits of online marketing.

7. RECOMMENDATIONS

i. SMEs that have not been using Email marketing to a large extent should do so in order to be competitive and enhance their performance.

ii. Advertising campaign should be emphasized more on search engine since a good number of the population makes us of this platform.

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Relationship of Arm Muscle Strength, Arm Muscle Endurance, Abdominal Strength and Balance with Arrow Achievement

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ABSTRACT: This study aims to determine: To determine the significant relationship between arm muscle strength, arm muscle endurance, abdominal muscle strength and balance on archery achievement. This study uses the correlation method. Determination of the sample using purposive sampling technique, namely 13 archery athletes in Surakarta. The variables of this study consisted of four independent variables, namely arm muscle strength, arm muscle endurance, abdominal muscle strength and balance. The dependent variable is archery achievement. The data of this study were obtained through tests and measurements. The data analysis technique used correlation analysis with normality, linearity, and hypothesis testing, namely correlation analysis. The results showed that there was a significant relationship between arm muscle strength, arm muscle endurance, abdominal muscle strength, and balance and archery achievement, with an R value of 0.921. These results indicate that there is a perfect category relationship between arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3) and balance (X4) on archery achievement (Y). The results of this study indicate that arm muscle strength, arm muscle endurance, abdominal muscle strength and balance have a significant relationship with archery achievement. It can be concluded that arm muscle strength, arm muscle endurance, abdominal muscle strength and balance have a relationship with archery achievement.

KEYWORDS: Archery, Arm Muscle Strength, Arm Muscle Endurance, Abdominal Muscle Strength.

INTRODUCTION

Archery is a sport that uses a tool called a bow and arrow and a target board that makes the main center, a bow is a tool used to shoot arrows assisted by the elasticity of the bow itself. In this archery sport, bows and arrows are the main tools in the archery process (Jannah, 2017). In addition to health, sport is also a vehicle for making the nation's name proud. From sports, there are many things that must be considered both to improve performance and for physical fitness (Ayu Reza Adzalika, Soegiyanto, 2019).

Archery is a sport that really requires coordination, endurance, strength, flexibility and balance in order to form proper and correct archery techniques (Yachsie, Prasetyo, et al., 2021). In addition, archery is also a sport that requires precise targeting, because the ultimate goal of archery is to shoot arrows at the target as precisely as possible. Thus, one of the fundamental factors needed in archery is consistency that must be carried out continuously during practice and during the match. In addition to constancy, other factors that influence success in archery are the ability to move muscles and physical condition (Sholikhin et al., 2019). When compared with other static sports such as shooting, archery has a difference that lies in the type of muscle movement ability when doing a push.

Physical problems that often arise from archery are the lack of muscle movement control during archery shooting (Manazi, 2013). If the repetition of archery movements is done excessively and uncontrollably, it can cause injury. The injury will be felt in the shoulder which initially feels little by little but if the muscle is also used continuously it will cause problems that are even worse (Hardi et al., 2020). If the archer uses his shoulder stiffly and endures the pain, then the archer's muscles will become weak and unable to perform the archery movement properly. The shoulder will lose muscle stability to perform its function normally.

Each technique in archery represents a stable sequence of movements and is ideal for learning motor control and skills acquired during kinetic and kinematic processes (Nawir, 2011). This aims to maintain the bowstring load towards the anchoring

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phase and holding phase in order to properly perform the releasing phase. Because the determination of the sport of archery lies in the releasing phase which is supported by previous archery phases such as the drawing phase and aiming phase. When the archer pushes the bow with the arm in extension which is held statically towards the target, while the other arm provides a pull in pulling the bowstring from the beginning of the drawing phase to the releasing phase it is carried out dynamically on the arm muscles and shoulder muscles (Arisman et al., 2021).

As for the drawing phase, the bow pulling arm contracts isotonic because of the concentric and eccentric movements of the muscles of the upper extremity (Hardi, 2018). Therefore, the arm holding the bow must be maintained or must be maintained for the stability of the muscle activation that occurs when the pulling movement is carried out. Thus, the muscles involved in drawing the bow should receive special attention in the sport of archery because these muscles work very extra in pulling and holding the weight of the bowstring which is quite heavy and takes place repeatedly in a series of archery movements. Therefore, these muscles must have the strength and endurance to be able to carry out the motion of pulling the bowstring which remains consistent and steady in accordance with the axis of motion. The main muscles that must be trained and developed in archery are the shoulder muscles, the pulling fingers muscles, forearm muscles, wrists, abdominal muscles, and trunk muscles (Septiana et al., 2020).

Strength is used when pulling the bowstring. Strength endurance is carried out for continuation or after the archer has made a full pull, i.e. the full pull is maintained for 3-10 seconds. This is what archers do when shooting by releasing repeatedly, it requires strength endurance (Yachsie, Suhasto, et al., 2021). Seeing the phenomena that occurred, the researchers felt the need and were interested in conducting further research on how big the correlation between arm muscle strength, arm muscle endurance, abdominal muscle strength and balance with archery performance.

METHODS

This study uses the correlation method. Determination of the sample using purposive sampling technique, namely 13 archery athletes in Surakarta. The variables of this study consisted of four independent variables, namely arm muscle strength, arm muscle endurance, abdominal muscle strength and balance. The dependent variable is archery achievement. The data of this study were obtained through tests and measurements. The data analysis technique used correlation analysis with normality, linearity, and hypothesis testing, namely correlation analysis.

RESULTS AND DISCUSSION

1. Data Description

Table 1. Description of Test Result Data

Variable	N	Mean	SD	Max	Min
Arm muscle strength	13	13,23	16,679	60	15
Arm muscle endurance	13	45,23	10,010	56	28
Abdominal muscle strength	13	34,54	10,301	49	15
Balance	13	13,08	11,221	59	25
Archery achievement	13	310,77	9,444	323	290

Based on the research data description table above, information can be obtained: a description of the data for the arm muscle strength variable based on the results of research with a sample of 13 athletes obtained an average of 13.23 with a standard deviation of 16,679, the highest score of 60 and the lowest score of 15. The description of the data for the arm muscle endurance variable based on the results of the study with a sample of 13 athletes obtained an average of 45.23 with a standard deviation of 10,010, the highest score was 56 and the lowest score was 28. The description of the data for the abdominal muscle strength variable based on the results of the study with a sample of 13 athletes obtained an average of 34.54 with a standard deviation of 10.301 the highest score of 49 and the lowest score of 15. Description of the data for the balance variable based on the results of the study with a sample of 13 athletes obtained an average of 13.08 with a standard deviation of 11.221, the highest score of 59 and the lowest score of 25. The description of the data for the archery achievement variable based on the results of research with a sample of 13 athletes obtained an average of 310.77 with a standard deviation of 9.444, the highest score of 323 and the lowest score of 290.

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2. Normality Test

The normality test of the data in this study used the Liliefors test. The results of the normality test carried out on the test results of arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3), balance (X4) and archery achievement (Y) in this study are as follows:

Table 2. Summary of Data Normality Test Results.

Variable	N	Mean	SD	Sig,
Arm muscle strength	13	13,23	16,679	0,885
Arm muscle endurance	13	45,23	10,010	0,538
Abdominal muscle strength	13	34,54	10,301	0,614
Balance	13	13,08	11,221	0,291
Archery achievement	13	310,77	9,444	0,921

Based on the results of the normality test carried out on each of these variables, it can be seen that the significance value of the arm muscle strength variable (X1) is 0.885, arm muscle endurance (X2) is 0.538, abdominal muscle strength (X3) is 0.614, balance (X4) is 0.291 and archery achievement (Y) of 0.921. The result of the significance value of each variable is greater than the value of 0.05, thus the null hypothesis of each variable is accepted. These results indicate that the data from the arm muscle strength test (X1), arm muscle endurance (X2), abdominal muscle strength (X3), balance (X4) and archery achievement (Y) are normally distributed.

3. Linearity Test

The linearity test of the relationship between each predictor, namely: arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3), balance (X4) and archery achievement (Y) was carried out with the help of the SPSS application, namely the function "Compare Means". The results of the linearity test are presented in table form as follows:

Table 3. Summary of Linearity Test Results

Variable	Sign	Sign Level	Conclusion
X1Y	0,285	0,05	Linear
X2Y	0,358	0,05	Linear
X3Y	0,553	0,05	Linear
X4Y	0,584	0,05	Linear

Based on the results of the linearity test, the value of sig. deviation from linearity of arm muscle strength (X1) with archery achievement (Y) is equal to 0.285, arm muscle endurance (X2) with archery achievement (Y) is equal to 0.358, abdominal muscle strength (X3) with archery achievement (Y) equal to 0.553, and balance (X4) with archery achievement (Y) equal to 0.584. The results of the values of the four variables are greater than the 0.05 significance level. These results indicate that there is a significant linear relationship between data on arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3) and balance (X4) with archery achievement (Y).

4. Correlation Analysis

To find out whether there is a relationship between the independent variables and the dependent variable in the study, a correlation analysis was carried out for each predictor with criteria using product moment analysis. The results of the correlation analysis of these variables are presented in the form of a table as follows:

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Table 4. Correlation Analysis of Each Predictor.

		Push Up	Plank	Sit Up	Balance	Achievement
Push Up	Pearson Correlation	1	,938**	,923**	,872**	,890**
	Sig. (2-tailed)		,000	,000	,000	,000
	N	13	13	13	13	13
Plank	Pearson Correlation	,938**	1	,927**	,899**	,881**
	Sig. (2-tailed)	,000		,000	,000	,000
	N	13	13	13	13	13
Sit Up	Pearson Correlation	,923**	,927**	1	,931**	,903**
	Sig. (2-tailed)	,000	,000		,000	,000
	N	13	13	13	13	13
Balance	Pearson Correlation	,872**	,899**	,931**	1	,884**
	Sig. (2-tailed)	,000	,000	,000		,000
	N	13	13	13	13	13
Achievement	Pearson Correlation	,890**	,881**	,903**	,884**	1
	Sig. (2-tailed)	,000	,000	,000	,000	
	N	13	13	13	13	13
**. Correlation is significant at the 0.01 level (2-tailed).						

a. Based on the correlation analysis between arm muscle strength (X1) and archery achievement (Y), a significance value of 0.00 was obtained. With N = 13. Significance value < 0.05. This shows that there is a significant relationship between arm muscle strength (X1) and archery achievement (Y).

b. Based on the correlation analysis between arm muscle endurance (X2) and archery achievement (Y), a significance value of 0.00 was obtained. With N = 13. Significance value < 0.05. This shows that there is a significant relationship between arm muscle endurance (X2) and archery achievement (Y).

c. Based on the correlation analysis between abdominal muscle strength (X3) and archery achievement (Y), a significance value of 0.00 was obtained. With N = 13. Significance value < 0.05. This shows that there is a significant relationship between abdominal muscle strength (X3) and archery achievement (Y).

d. Based on the correlation analysis between balance (X4) and archery achievement (Y), a significance value of 0.00 was obtained. With N = 13. Significance value < 0.05. This shows that there is a significant relationship between balance (X4) and archery achievement (Y).

5. Multiple Correlation Analysis

To find out the relationship between the independent variables together with the dependent variable, a multiple correlation analysis was carried out. The results of the multiple correlation analysis of independent variables together with the dependent variable of this study are presented in tabular form as follows:

Table 5. Multiple Correlation Analysis

Variable	N	Sig. F Change	R
X1, X2, X3 and X4 with Y	13	0,002	0,921

a. Based on the results of the double correlation calculation of arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3) and maximum oxygen volume (X3) with archery achievement (Y), the sig F change value is 0.002 < 0, 05. This shows that there is a simultaneous correlation or relationship between arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3) and balance (X4) with archery achievement (Y).

b. Based on the results of multiple correlation calculations, the R value is 0.921. Therefore, it can be concluded that there is a degree of perfect category relationship between arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3) and balance (X4) with archery achievement (Y).

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CONCLUSION

There is a significant relationship between arm muscle strength, arm muscle endurance, abdominal muscle strength, balance and archery achievement, with an R value of 0.921. These results indicate that there is a perfect category relationship between arm muscle strength (X1), arm muscle endurance (X2), abdominal muscle strength (X3) and balance (X4) on archery achievement (Y). The results of this study indicate that arm muscle strength, arm muscle endurance, abdominal muscle strength and balance have a significant relationship with archery achievement. It can be concluded that arm muscle strength, arm muscle endurance, abdominal muscle strength and balance have a relationship with archery achievement.

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Effects of Digital Banking on The Performance of Commercial Banks in Nigeria 2010 -2019

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ABSTRACT: In this study, the effect of digital banking on the performance of Commercial Banks was examined from 2010 to 2019. The study applied the Autoregressive Distributive Lag (ARDL) framework to examine the relationship between point of sales machine (POSG), Banking Transactions made through unstructured supplementary service data (USSDG), Web banking (WEBG) and Return on Assets (ROA) of commercial banks in Nigeria. The data were obtained from the statistical bulletins of the Central Bank of Nigeria (CBN) and annual reports of Nigeria Deposit Insurance Corporation (NDIC). The result of the analysis revealed that digital banking has positive and insignificant effect on the performance of commercial banks in Nigeria. . In the light of this findings, the study recommends the need for relatively stable network: In other to reduce number of failed transactions, banks are hereby encouraged to liaise with network providers and their engineers to develop a standardized network platform exclusively for each of the digital banking channels. Also there is need for digital banking education to bank customers on the benefits of digital banking. Equally there is need for all banks to have 24 hours working cyber security department in order to ensure that the channels are not hijacked by cyber criminals.

KEYWORDS: Return on assets, point of sales machine and web banking.

1. INTRODUCTION

The Nigerian banking industry has undergone and still undergoing operational, legislative and technological changes (Oyewole & El-maude, 2013). Aside from the legislative changes in mandatory minimum capital, liquidity levels and reserves, there has been a gross deviation from the normal day to day withdrawal, deposits and cash payments to a more digitized payment system. The business of banking which has been basically defined as the acceptance of deposits and granting of money has always been done within the halls of the bank. But today, deposit acceptance and granting of money loans are consummated outside the halls of the bank with the platforms provided by digital banking (Eze & Egoro, 2016).

Digital banking is the broad range of banking services accessed and delivered through digital channels, like Mobile phones, Personal Computers, the Internet or Cards linked to a reliable digital payment system (Ukoh, 2019). Such services include Payments, Withdrawals, Deposits and Credits, Remittances and Funds transfers, Balance enquiry, Airtime Top-Ups and even credit transactions (Ukoh, 2019). Digital banking basically refers to the moving online of all the traditional banking activities and programs that historically were only available to customers when physically inside of a bank branch.

Today, bank customers can send money to their family, friends or customers from the comfort of their bed without time restrictions. Electricity bills payments and subscriptions to television channels can now be made without paying a physical visit to the bank or taking cash to the office of the energy distribution company or television station. The streets are now clustered with people authorized by banks to carry on agent banking on their behalf. Therefore obtaining cash for petty transactions is now at the doorstep of the people.

The sudden spike in digital payments did not end with POS banking, Mobile banking, ATM banking or Internet banking. It also pervades into unstructured supplementary service data (USSD) banking and quick response (QR) banking. The USSD banking made it possible for bank customers without internet enabled devices to make and receive payments with their phones with use of codes. The QR code banking makes it easy for smart phone users the make payments by merely scanning the QR code provided by the merchant from whom he/she wants to purchase from. Today, the unavailability of bank branch in any particular

location does not hinder banking services. These channels and many other upcoming digital channels has made banking seamless and without boundaries. The ever evolving digital channels have won the heart of the management of most financial institutions in Nigeria (Oyewole & El-maude, 2013). This may be because of the comfort and convenience it provides for its customers.

The digital banking services are spearheading greater portion of the payment system globally and in Nigeria as well. In Nigeria today, digital banking services have diversified from basic money transfer and bill payments to credit, cross-border remittances, savings, bulk disbursements and other value-added services like pay-as-you-go utility bills, etc (Taiwo & Agwu, 2017). On the other hand, banks as business organizations are expected to make some profits and grow the wealth of the shareholders. Profitability of a bank is the financial strength of the bank over a period of time on the basis of certain criteria like return on assets, returns on investments, earnings per share, etc. These measures are used to verify the extent to which resources of the bank are adequately utilized to create wealth for the shareholders.

In their bid to make profits, they are always faced with measures to maximize profits and minimize losses. This is also accompanied with the challenge of keeping up with the competition in the industry. Hence they adopt all measures within the regulatory purview to keep up with their day to day operations, remain competitive in the industry and at the end, make profits for the shareholders. In an attempt to make these profits, several processes and procedure are removed, reorganized or changed. These changes in modes of operation brought about the foundation of digital banking in Nigeria (Ukoh, 2019).

The digital banking in Nigeria however has been accompanied by enormous challenges ranging from regulatory challenges to digital theft and robbery (Taiwo & Agwu, 2017). The platform provided by the digital banking has created room for identity theft, unauthorized access to someone's funds, forgeries and difficulty in apprehending the digital thief/arm robber. In an attempt to curb these identified problems, the Central Bank of Nigeria has come up with policies that are consciously aimed at regulating the use or the extent of the use of these platforms provided by digital banking. Some of these policies include specifying the amount of transactions that a customer of a bank can carry on using any of these platforms per day/week, ensuring appropriate approvals are obtained before using any of these platforms and ensuring that adequate security gadgets are provided in areas where these platforms are used. All these policies/measures also have costs implication on the banks which ultimately has an effect on the profitability.

Various research work Okiro and Ndungu (2013) , Malhotra and Singh (2009), Agu Onay (2008) Oyewole et al (2013), David-West et al (2018) , Monyoncho (2015) and Abaenewe et al (2013) etc has been carried out on this subject matter and results show that digital has significant effect on performance of commercial banks while other results show insignificant effect. Their findings are contradictory and it is on this background that the study was motivated to fill the knowledge gap on the effects of digital banking on the performance of commercial banks in Nigeria from 2010 -2019. The paper is arranged as follows. Section two focuses on literature review, section three focuses on theoretical framework, section four on methodology, section five on results and discussion, section six on conclusion and policy implication.

2. LITERATURE REVIEW

The word digital means "expressed as series of digits or numbers 0, 1 - 9" (Scott & Davis, 2015). Certain authors have viewed digital banking as e-banking, internet banking etc. There has not been a generally accepted definition of digital banking owing to the evolving dynamic and sophisticated technological platform on which it operates. E-banking, digital banking and electronic banking all involve manipulation or transfer of money in the form of digits, they however differ on the platforms providing such services (Taiwo & Agwu, 2017). While internet banking platforms basically involves connection to internet before movement of digits, digital banking in addition to the e-banking also encompass all other methods of movement of digits for banking transactions such as the unstructured supplementary service data (USSD).

Oyewole, Abba, Gambo and Abam (2013) termed e-banking as automated delivery of new and conventional banking products and services directly to customers through electronic, interactive channels. Some of the channels through which digital banking services are consummated include Automated Teller Machines (ATMs), Point of Sales (POS), Unstructured Supplementary Service Data (USSD), Mobile apps, web portals etc.

IBM Global Services (2015) notes that digital banking is a set of alternative delivery channels for banking services. It has to do with conducting financial transactions through various electronic means, without physically interacting with the bank. Digital banking can be said to be alternative options for processing banking transactions other than the normal traditional means (Chebii, 2013). Digital banking may include branchless banking, implying availability of distribution channel strategy used for delivering financial services without relying on bank branches. While the strategy may complement an existing bank branch

network for giving customers a broader range of channels through which they can access financial services, branchless banking can also be used as a separate channel strategy that entirely forgoes bank branches. Digital banking may include e-banking, electronic banking, online banking, virtual banking, direct banking and high tech-banking.

The advancement in communication and computer technology have made it possible that one can do most banking transactions from any location even without stepping into a physical financial structure through digital banking channels. In an effort to reach the unbanked people and financial institutions outreach on alternative banking channels, a revolution in the range of payment solutions has been witnessed. Digital banking channels used includes all modern means of banking such as ATM, internet banking, bank automation, core banking, credit cards, debit cards, mobile banking (Ukoh , 2019). Chebii (2013) notes that digital banking adopts alternative channels which have highly been in use include Mobile banking, POS Banking and Internet Banking. Ogilvie (2008) argues that alternative banking channels are the newer methods of carrying on banking operations. Some of these digital banking channels are discussed below;

2.1 Point Of Sales (POS) Banking
The word "POS" is an acronym for point of sale. POS is a commercial term used to refer to a place in a shop where a product is passed from seller to the customer. POS banking refers to a method whereby people can access banking services via card terminals. POS banking, also known as agent banking involves the transfer of funds, withdrawal of funds, sales of recharge cards and bill payments such as Gotv, DSTV and electricity bills (Chebii, 2013). The business is an extension of services offered by financial institutions like banks through which customers get convenience. Therefore the fee charged on customers for this services is sometimes called convenience fee. The use of agents diminishes transaction costs as well as addressing the lack of inducements or capacity to institute formal branches in definite areas (Ndungu, 2015). Regulation allowing agent banking enables for sufficient business enticements for both agents and financial institutions to amplify outreach by delivering financial services via a network of agents (Melzer, 2006). The use of agents offer the possibility of massive outreach to people in locations that remain underserved, especially those in hard to reach rural areas. Ivatury and Lyman (2006) noted that agency banking has enable bank customers to access the basic banking services, for example, cash deposit and cash withdrawal conveniently or what would be termed as within the comfort of their neighborhood. The convenience of access to banking services and the extended hours that the agencies work has been the most attractive features to the customers.

2.2 Unstructured Supplementary Service Data (USSD) Banking
The unstructured supplementary service data (USSD) is currently one of the leading technological innovations that deliver mobile financial services to both low and high-income customers (Ukoh , 2019). The USSD banking makes use of specific code for each bank operating in the financial system. The bank code is a convenient, fast, secure, and affordable way to access your bank account 24 hours a day, 7 days a week through your mobile phone without internet data (NIBSS, 2018). They are codes that ease the stress associated with banking in Nigeria, making it more efficient and giving the customers complete access to their accounts. USSD banking occurs where customer of any bank dials the USSD code and completes a banking command. It sounds interesting that queuing up in the bank, trying to complete accounts recharge or making transfers has been taken away with this USSD code mobile banking service. It makes everything easy, and seamless (Taiwo & Agwu, 2017). The USSD code is for every bank, and everyone that owns accounts for each bank. That means, if you are using First bank, you are fully entitled to use their transfer code for easy mobile banking (NIBSS, 2018). Whether you are saving account holder, current account holder, you are completely authorized to use your prospective bank codes and it is easy to use. The below list contains USSD code for some banks in Nigeria.

2.3 Web Banking
Web banking, also known as internet banking, is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website (Ginn, 2011). Internet banking software provides personal and corporate banking services offering features such as viewing account balances, obtaining statements, checking recent transaction and making payments. In recent time, many banks began to view web-based banking as a strategic imperative. As at 2008 almost all the Nigerian banks have fully developed websites and web portals for online banking (Taiwo & Agwu 2017). This type of banking has also advanced into the use of mobile banking applications. The attraction of banks to online banking are fairly obvious: diminished transaction costs, easier integration of services, interactive marketing capabilities, and other benefits that boost customer lists and profit margins (Abaenewe, et al. 2013). Additionally, online banking services allow institutions to bundle more services into single packages, thereby luring customers and minimizing overhead.

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To access a financial institution's online banking facility, a customer with internet access will need to register with the institution for the service, and set up a password and other credentials for customer verification (NIBSS, 2018). The credentials for online banking is normally not the same as for telephone or mobile banking. Financial institutions now routinely allocate customers numbers, whether or not customers have indicated an intention to access their online banking facility. Customer numbers are normally not the same as account numbers, because a number of customer accounts can be linked to the one customer number. Technically, the customer number can be linked to any account with the financial institution that the customer controls, though the financial institution may limit the range of accounts that may be accessed to, say, cheque, savings, loan, credit card and similar accounts.

2.4 Digital Banking Enablers
Token

This is additional security instrument usually attached to an account for the purpose of providing additional authentication before a transaction is concluded. This instrument is usually used by people using web banking applications or mobile app. This support device can be in hardware or software.

Quick Response Codes (QR Codes)

While they may look simple, QR codes are capable of storing lots of data (Ukoh, 2019). When scanned, the QR code allows the user to access information instantly. QR code payment is a contactless payment method where payment is performed by scanning a QR code from a mobile app (Ogutu & Fatoki, 2019). This is an alternative to doing web, POS or USSD banking at point of making a purchase or sale of goods or services. This avoids a lot of the infrastructure traditionally associated with electronic payments such as payment cards, payment networks, payment terminal and merchant accounts. To use a QR code payment the consumers scans the QR code displayed by the merchant with their phones to pay for their goods. They enter the amount they have to pay and finally submit.

2.5 Financial performance

Ndungu (2015) explained that Performance is the degree to which an achievement is being or has been accomplished. It is the act of performing; execution, accomplishment, fulfillment, etc. It is the accomplishment of a given task measured against preset standards of accuracy, completeness, cost, and speed.

The firm's success, conditions, and compliance is measures through performance. On the other hand, financial performance is a measure of the change of the financial state of an organization, or the financial outcomes that results from management decisions and the execution of those decisions by members of the organization (Greenwood & Jovanovic, 1990). Financial performance is conceptualized as the extent to which a firm increases sales, profits, and return on equity. Financial performance is essential to the survival of firms in the competitive and uncertain environment (Sousa & Voss, 2006). The success of an organization is gauged highly on financial performance hence, performance has been highly measured using financial measures. Financial performance ultimately reflects whether or not service quality is realized in a firm.

Galor and Zeira (2000) proposed four possible types of measurement for organizational performance name1y: outcomes (turnover, absenteeism, job satisfaction); organizational outcomes (productivity, quality, service); financial accounting outcomes (return on assets, profitability) and capital market outcomes (stock price, growth, returns). However, scholars have proposed a broader performance construct of business performance to incorporate non-financial measures including market share, customer satisfaction and new products. Measures recommended for financial analysis that determine a firm's financial performance are grouped into five broad categories: profitability, liquidity, solvency, repayment capacity and financial efficiency (Crane, 2010). The components of CAMELS - an acronym for Capital Adequacy, Asset Quality, Management Quality, Earnings Potential, Liquidity, and Sensitivity to Market Risk have traditionally been the yard stick for an assessment of banks' performance. Since CAMELS combines the financial soundness (credit risk) and market (market risk) indicators, it is used by banking sector supervisory authorities (King, Nuxoll, & Yeager, 2006) and rating agencies (Rawcliffe, Peach, & Shaw, 2008) to assess soundness of banks.

3. THEORETICAL FRAMEWORK
3.1 The Technology acceptance theory (TAT)

Technology acceptance theory was first proposed by Davis, Bagozzi and Warshaw (1989) to examine the conceptual model of the intention of user or the degree to which information system or new technology has been done. TAT is designed on the basis of perceived usefulness and ease of use of the new technology. Perceived usefulness of technology suggests the personal conviction to better the degree of work performed by a specific new technology or information system. Perceived ease of use of

new technology implies how easy a person can learn the way to use or run a new technology or information system (Scott & Davis, 2015). The TAT has stressed on the way perceived ease of use of new technology directly influences perceived usefulness of the technology. External variables such as environment factors surrounding an individual intervene in influencing perceived ease of use and usefulness. Hence, Technology Acceptance Theory has a basis in both crucial perceptive factors that is perceived usefulness and perceived ease of use. Technology Acceptance Theory is applied vastly on the researches involving information technology. Liu and Arnett (2000) analyzed the important variables to come up with a successful website which has its basis on TAT. The TAT is relevant to this study in that it looks into how easy a person can learn the way to use or run a new technology or information system. As stated in the problems of this study, one of the earliest fear that were expressed by people on digital banking is that the technology is new to the environment and that not everyone knows how to use it. It therefore follows that a new technology will likely pass the general acceptability test if it is perceived useful to the people and also easy to use.

3.2 Agency Theory

Agency Theory was developed primarily by Jensen and Meckling (1976). Agency theory analyzes the relationships between a business and its agents. The key issues in agency theory center upon whether adequate market mechanisms exist for agents to act in ways that maximize the utility of a firms where ownership and control are separated. Under the terms of agency theory, a principal (P) passes on authority to an agent (A) to conduct transactions and make decisions on behalf of the principal in an effort to maximize P's utility preferences.

Agency problems can arise if: P and A have different goals; P and A have disparate skills in evaluating A's performance; P and A possess different sets of information relevant to the managerial decisions A must make as a representative of P; or P and A have different degrees of risk aversion. At the core of agency problems is the fact that principals may not be able to monitor agents, either perfectly or costless, as to the agent's actions or the information behind those actions. In the commercial banking industry, ownership is becoming increasingly diversified among individual and institutional shareholders, and the dominance of individual stockholders in the industry appears, on the whole, to be decreasing. These trends may exacerbate "agency problems" in the banking industry if these problems truly exist. Agent banks are retail establishments contracted by the banks and authorized by the central banks to render services for banks. This theory points out the possibility of emergence of problems if the coordination between the banks and digital banking agent is not well managed. Some of such problems may arise where agents may increase transaction costs in order to make more profits however against the principals objective of providing low transaction cost in order to increase and retain its' customer base.

3.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT was first proposed and theorised by Venkatesh (2003). Several researchers including Venkatesh (2003) reviewed eight models regarding the usage of ICT, they are; the social cognitive theory and model, Diffusion of Innovations (DOI), Technology Acceptance Model (TAM), the model of PC utilization, the motivational model, Theory of Reasoned Actions (TRA) and Theory of Planned Behaviour (TPB). UTAUT was created mainly to help researchers in the field of IT/IS in the process of adoption and diffusion. In the theory, it is argued that there are 4 major: "Effort expectancy, performance expectancy, facilitating conditions and social influence". The four constructs have positive effect on IS/IT behavior intents and ultimately behaviour (Venkatesh, 2003).

UTAUT also provides a foundation for the current study. It discusses in details on how innovative technologies in banking sector is adopted and used by the employees of the bank as well as the clients of the bank. The model sought to discuss the intension of the user to adopt ICT and the succeeding behaviour of user. UTAUT offers the managers with decision-making tools that they can adopt to comprehend the introduction of new technology for prediction and elaboration of the behaviour of users in accepting IT.

Finally, this study is anchored on Technology Acceptance Theory. This is because, the TAT is a key theory that underpins the current study on how digital banking affects the commercial banks profitability in Nigeria as it looks into the perceived usefulness and ease of use of a new technology. The idea is that for banks to drive profitability through digital banking, it must be accepted by the people and to be acceptable to the people, it should be perceived useful and also very easy to use.

3.4 Empirical Review

Okiro and Ndungu (2013) investigated the impact of mobile banking and internet banking on financial performance of financial institutions in Kenya. The study also sought to identify the extent of use of mobile and internet banking in financial institutions. The population of interest in the study consisted of 61 financial institutions operating in Kenya. Sample survey with the use of questionnaire was adopted to obtain relevant data. The study was analyzed using T-test of the SPSS version 20.0. The result revealed that among the financial institutions surveyed, commercial banks had the highest usage of internet and mobile

banking; SACCOs had the second highest usage whereas none of the microfinance institutions used internet banking. The study found out that mobile banking faces various challenges which include system delays by the mobile money transfer service providers, slow processing of transactions especially during the weekends, high transactions costs, limit on the amount of money that can be withdrawn in a day and fraud. They concluded that mobile banking and internet banking has contributed to the financial performance of financial institutions in Kenya although efforts should be made to tackle the challenges raised.

Malhotra and Singh (2009) studied the impact of internet banking on bank performance and risk in India. The study was done on 85 commercial banks over the period 1998-2006 which represented nearly 39 percent of total scheduled commercial banks in India. Using information drawn from the survey of 85 scheduled commercial bank's websites, the results showed that nearly 57 percent of the Indian commercial banks are providing transactional Internet banking services. The univariate analysis indicated that internet banks are larger banks and have better operating efficiency ratios and profitability as compared to non-Internet banks. Internet banks rely more heavily on core deposits for funding than non-Internet banks do. However, the multiple regression results reveal that the profitability and offering of internet banking does not have any significant association, on the other hand, internet banking has a significant and negative association with risk profile of the banks. Since the study was based on only internet banking it's important to extend the study to cover to cover other forms of electronic banking.

Onay (2008) studied the impact of internet-banking on banks profitability in Turkey. The analysis covered 13 banks that had adopted online banking in Turkey between 1996 and 2005. By using bank specific and macroeconomic control variables, they investigated the impact of internet banking on the return on assets(ROA) and equity(ROE), the interest spread, overhead expenses, commission and fee income controlling for systemic bank crises in the country during the timeframe. The study included time-lagged measures of internet banking adoption to exhibit the changes in effect over time. The results showed that internet banking starts contributing to banks' ROE with a time lag of two years confirming the findings of while a negative impact is observed for one year lagged dummy. The results provided some evidence that investment in e-banking is a gradual process.

Oyewole et al. (2013) examined E-banking and Bank Performance in Nigeria. The study covers all the banks in Nigeria and data obtained covered 2008 to 2012. Variables used in their study include Return on Asset (ROA), return on equity (ROE) and net interest margin. Ordinary Least Squares model was used to analyse the data obtained. The result of their study showed that e-banking begins to contribute positively to bank performance in terms of ROA and NIM with a time lag of two years while a negative impact was observed in the first year of adoption.

In another study, David-West et al (2018) made a state of the market report on digital financial services in Nigeria. They used survey design to examine the Percentage of banked and under banked male, Percentage of banked and under banked female. They concluded that financial inclusion is a stimulant for economic development. They also observed that Nigeria recorded progress in growing the banked and under-banked segments, but a significant number lack access to formal financial services and are yet to be categorized as banked. Another observation is that digital banking services awareness and utilization is low and non-existent among target segments under-banked and unbanked.

Monyoncho (2015) appraised relationship between banking technologies and financial performance of commercial banks in Kenya. The variables used in the study include ATMs, Mobile, Internet, Debit and Credit cards transactions. The data obtained were analyzed using SPSS version 21 Pearson moment correlation. The result of the analyses showed that ATM innovations offer financial institutions the opportunity to transform the ATM from a cash dispenser to a customer relationship management tool, helping to enhance loyalty among all customers. They also observed that credit cards are being adopted by the banks so as to increase income, and to reduce credit and liquidity risks while mobile banking was found to have major impacts on the profitability of commercial banks.

Abaenewe et al (2013) did a study on electronic banking and bank performance in Nigeria. Their study covered the period of 2007 to 2012. The variables in their study include Electronic naming transactions, Returns on equity (ROE) and returns on assets (ROA). Standard statistical technique and ordinary least square regression of E-views were used as analytical tool. Their study revealed that the adoption of electronic banking has positively and significantly improved the returns on equity (ROE) of Nigerian banks. On the other hand and on the contrary, it also revealed that e-banking has not significantly improved the returns on assets (ROA) of Nigerian banks.

Ogutu and Fatoki (2019) examined effect of e-banking on financial performance of listed commercial banks in Kenya. Their variables for the study include Mobile banking, agency banking, ATM banking and online banking. The ordinary least square regression technique was used. Their results showed that there was strong positive relationship between mobile banking, agency banking, ATM banking and online banking and financial performance of listed commercial banks in Kenya. They further

observed that financial performance of commercial banks and m-banking were strongly and positively correlated. They also recorded a strong positive correlation between financials performance of individual commercial bank and agency banking.

In a similar study, Eze and Egoro (2016) examined electronic banking and profitability of commercial banks in Nigeria using frequency tables and charts. Their study covered 2010 -2015. The variables for their study are estimated transactions on ATM, POS and profit before interest and taxes. The data obtained were analyzed using tables, chats and ordinary least square regression (V.20). From the result of their study, they concluded that the impact of electronic banking on the profitability of commercial banks was significant; whereas, the impact of the individual channels was varied.

Juddy (2013) examined the effect of digital banking on financial performance of commercial banks in Kenya. Their study covered 2007 to 2012. The study was carried out using sample survey. Credit cards, Debit cards and ATMS Transactions were used as proxy for digital banking. The result showed that Fees and commission from debit cards, credit cards and mobile banking has a significant effect on returns on asset whereas fees and commission from internet banking as well as the amount of money that commercial banks invest in electronic banking to install, training staff and maintain the platforms has no or minimal effect on return on assets. He concluded that the adoption of digital banking has enhanced performance of commercial banks due to increased efficiency, effectiveness and productivity.

Taiwo and Agwu, (2017) explored the role of e-banking on operational efficiency of banks in Nigeria. Pearson correlation was used to analyse the results obtained using the Statistical Package for Social Sciences (SPSS). The variables used for the study include profit before interest and taxes, mobile application and ATM transactions. The study showed that Banks' operational efficiency in Nigeria since the adoption of electronic banking has improved compared to the era of traditional banking. This improvement was noticed in the strength of banks, revenue and capital bases, as well as in customers' loyalty.

Ndungu (2015) studied the effect of alternative banking channels on financial performance of commercial banks. Operating expenses, agency banking, mobile banking and customer deposits based were used as variables for the study. The study established that 73.4% of the variation in financial performance of commercial banks in Kenya was explained jointly by operating expenses, agency banking, mobile banking and Customer deposits. That agency banking, mobile banking, customer deposits and operating expenses were positively related to financial performance of commercial banks.

Kairiza, Kiprono, and Magadzire (2017) studied the effectiveness of electronic banking in ensuring efficiency of services in commercial banks using data from listed commercial and merchant banks in Zimbabwe. The study covered the period 2010 to 2016. The Automated teller machines, and POS banking were used as variables for the study. The data obtained were analysed using ordinary least square regression. They found out that eletronic banking channels has helped in improving quality of services in commercial banks. However, they also found out that POS banking has not contributed positively to efficiency of banks in Zimbabwe for the period studied.

Kongiri (2012) studied the effects of cashless banking on digital banking in Kenyan commercial banks. The study covered the period of 2007 to 2011.Internet banking and ATM banking were used as variables for the study. The study adopted a panel data design and descriptive research design to meet its objectives. Annual financial statements of 37 Kenyan commercial banks from financial years 2007 to 2011 were obtained from the Central Bank of Kenya (CBK). The data made up of a sample of 185 study units was analyzed using multiple linear regression method. Findings led to the conclusion that cashless banking has grossly increased Internet banking, ATM banking.

Rosen (2013) investigated effect of the use of mobile banking and agent banking in the banking system in Kenya. Their study covered the period of 2007 - 2012. Their mobile banking and agent banking data were obtained and analyzed using OLS. Potential financial gains were identified and these gains were later explored on an individual bank survey. The survey examined the effects from these non-conventional channels on banks based on their level of operation, customer base and profitability. Findings from this study suggest that mobile banking and agent banking have facilitated the delivery of financial services to the population in Kenya that was previously excluded and the result is an efficient, responsive and profitable banking system.

Yorulmaz (2018), made an analysis of the construction of global digital banking indices. His study aims to measure the extent of financial access by constructing a broader multidimensional digital banking indices which contain aggregate information of the extent of the digital banking channels. The study covered the period of 2003 to 2015. The variables used in the study are geographic ATM penetration, geographic branch penetration, deposit accounts per capita, and fees of ATM cards. The study showed and increasing periodic index of the selected variables. The results also showed that adding new indicators of digital banking into the index construction process does not have any detrimental effect on the index.

Isibor et al (2018) examined the impact of electronic banking technology on customers' satisfaction and economic growth in Nigeria. The researcher went to four banks in Sango Ota in Ogun state: Zenith Bank, Guaranty Trust Bank, Access Bank plc, and UBA plc and then distributed 120 questionnaires to various customers within the-banking premises. The Pair Sample t-test statistical parametric analysis was employed to test the significance through the use of SPSS statistical package. The researcher's

intention was to establish the level of significance of electronic banking and customers' satisfaction on the one hand and electronic banking and profitability of banks on the other hand. It was observed that the average people prefer electronic banking to manual banking. They also concluded that electronic banking has improved banks' profitability.

Olaiya, and Adeleke (2019) investigated electronic banking and profitability of deposit money banks in Nigeria between 2010 and 2018. The study relied on the secondary source of data collection. Data for the study were obtained from Central Bank of Nigeria's (CBN) Statistical Bulletin and CBN Financial Stability Reports. Data were analyzed by conducting unit root test and co-integration bound test. Estimation was done by employing Autoregressive Distributed Lags using E-view 9.0 version. In the specified model for this study, four variables, namely, automatic teller machine transaction value (ATMTV), point of sale transaction value (POSTV), mobile banking transaction value (MBTV) and internet banking transaction value (IBTV) while commercial banks performance was proxied by returns on assets (ROA). The study revealed that two independent variables namely ATMTV and POSTV individually have positive relationship ROA, while both MBTV and IBTV defied apriori expectations as they individually have negative relationship with ROA. However, a combined test for all the four variables revealed a no significant relationship with ROA. The study therefore, concludes that digital banking channels have no significant effect on the performance of banks in Nigeria in the short run for the period covered by the study.

Auwal, Shafiu and Haslinda. (2015) appraised the impact of online banking on the performance of Nigerian banking sector.Their study covered the period of 2000 to 2014. They measured E-banking by the expenditure made on information and communication technology (ICT) investments, number of debit cards issued to customers, and number of automated teller machines (ATMs) installed by the banks. Return on assets (ROA), return on equity (ROE), and net interest margin (NIM) was used as performance variables. The impact of e-banking on the bank performance was examined in two periods: pre-consolidation (i.e., before adopting the e-banking) and post-consolidation (i.e., after adopting the e-banking). Secondary data was gathered from annual reports of 21 Nigerian banks. The SPSS software was used for data analysis. It was argued that majority of the business sectors, including banks, have taken advantage of using IT to enhance their business operations. They concluded that online banking has significant positive effect on the profitability of banks.

Ibrahim and Daniel (2019) looked into the impact of E-banking on the development of banking sector in Nigeria. Their study covers a mortgage bank in Wuse, Abuja, namely Infinity Trust Mortgage bank. Questionnaire was used as research instrument for the study. From a total of ninety two (92) copies of the questionnaire distributed to the respondents, eighty (80) copies representing 87% were duly completed and returned while (12) copies representing 13% were not returned. The questionnaires were analyzed using SPSS analytical tool. From their analyses, they discovered that electronic banking has both negative and positive impact in the Nigerian banking sector. While it has greatly improved service delivery on the positive angle but on the negative side, it is prone to electronic fraud and unauthorized access to information.

4. METHODOLOGY

This study on effects of digital banking on performance of commercial banks in Nigeria made use of expost-facto research design. This is because data used in the study were results of the events that happened in the past. The data include the growth rate of the volume and value of POS, USSD and Web banking transactions from 2010 – 2019. Autoregressive Distributed Lag was used in the study in order to examine the effects of digital banking on the performance of commercial banks in Nigeria. In order to achieve the objective of the study, the model of Oyewole and El-maude (2013) was adopted and modified. Their model is stated thus:

$ROA = f (MB_{tr} + NIP_{tr} + INT_{tr})$

However this model was modified to suit the current study hence the function;

$$ROA = f (POS_b + USSD_b + WEB_b) \tag{1}$$

The econometric function then becomes;

$$ROA = \beta_0 + \beta_1 POS_b + \beta_2 USSD_b + \beta_3 WEB_b + \mu \tag{2}$$

The model above specifies the econometric relationship between the dependent variables ROA , and the independent variables POS, USSD, WEB. These digital variables were selected based on their perceived effect on bank profitability by the researcher.

Where;

ROA = Return on Assets

$POSG_b$ = Banking transactions made through Point of sales machine

$USSD_b$ = Banking Transactions made through unstructured supplementary service data

WEB_b = Web banking

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β_0= Constant

β_1, β_2, β_3 = Estimation Parameters

μ = Error Term.

Definition of Variables

Dependent Variable: (ROA) Return on assets is an indicator of how profitable a company is relative to its total assets. ROA gives a manager, investor or analyst an idea as to how efficient a company's management is using its assets to generate earnings. It is an indicator of how profitable a company is relative to its total assets.

Independent Variables: (POS Banking) POS refers to "Point of Sale", a machine which banks issue to their merchant customers to enable them sale or make purchases through the use of cards.

USSD Banking: USSD refers to "quick codes" or "feature codes" used as a communication protocol by GSM cellular telephones to communicate with the mobile network operator's computer or bank. All commercial banks in Nigeria have USSD codes which enable customers of banks to make transactions of various sorts.

Web banking: This refers to transactions carried out on the internet; either through the web of the bank or through the bank's mobile application.

The first step in this analysis is to describe the variables used in the study before we proceed to carry out stationarity test. Stationarity test was conducted using ADF test and PP test. The result of the ADF and PP test is shown in Table 2 to 5.

5. RESULTS AND DISCUSSION

The characteristics of the data series used in the analysis are presented in Table 1. The table shows the summary of descriptive statistics used in the analysis. The mean value was shown to be 1.081000 for ROA, 89.16110 for POSG, 105.2718 for USSDG and 53.08971 for WEBG. The median value was shown to be 2.475000 for ROA, 69.12500 for POSG, 68.61704 for USSDG and 47.20925 for WEBG. The maximum and minimum of the series are 3.910000 and -9.280000 for ROA, 235.3800 and 34.44000 for POSG, 353.1895 and 10.87690 for USSDG, 137.9640 and -47.03900 for WEBG. The series standard deviations are 3.870692 for ROA, 59.82092 for POSG, 101.3594 for USSDG, 52.91478 for WEBG.

Table 1. Descriptive Statistics

	ROA	POSG	USSDG	WEBG
Mean	1.081000	89.16110	105.2718	53.08971
Median	2.475000	69.12500	68.61704	47.20925
Maximum	3.910000	235.3800	353.1895	137.9640
Minimum	-9.280000	34.44000	10.87690	-47.03900
Std. Dev.	3.870692	59.82092	101.3594	52.91478
Skewness	-2.140185	1.616503	1.587417	-0.102982
Sum Sq. Dev.	134.8403	32206.88	92463.59	25199.77
Observations	10	10	10	10

Source: Author's Computation

The variables for the analysis were subjected to two types of unit roots test to determine whether there are unit roots or stationary series. In conducting this test, the Phillips-Perron (PP) and the Augmented Dickey-Fuller (ADF) unit root test with intercept would be employed to determine the stationarity of data. The unit root text from table 2 to table 5 shows that the variables are stationary at first difference which allow for ascertaining the cointegration relationship.

Table 2. Result of ADF Unit Root Test at level

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
ROA	-10.68529 (0.0000)**	-4.420595	-3.259808	Stationary
POSG	-2.937079 (0.0789)**	-4.420595	-3.259808	Not Stationary
USSDG	-2.473889 (0.1509)**	-4.420595	-3.259808	Not Stationary
WEBG	-4.382766 (0.0105)**	-4.420595	-3.259808	Stationary

Source: Author's Computation

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Table 3. Result of ADF Unit Root Test at 1ST Diff

Variables	ADF Test Statistic	Test Critical Value at 1%	Test Critical Value at 5%	Remark
ROA	-12.58734	-4.582648	-3.320969	Stationary
POSG	-4.995416	-4.582648	-3.320969	Stationary
USSDG	-4.421883	-4.582648	-3.320969	Stationary
WEBG	-5.994405 (0.0021)**	-4.582648	-3.320969	Stationary

Source: Author's Computation

The Augmented Dickey-Fuller (ADF) unit root test indicates that the variables were stationary at level and first difference hence the need to confirm the unit root test. In order to achieve that Phillips-Perron (PP) unit root text was conducted and the result shown in table 3 and 4.

Table 4. Result of PP Unit Root Test at level

Variables	ADF Test Statistic	Test Critical Value at	Test Critical Value at 5%	Remark
ROA	-12.55821 (0.0000)**	-4.420595	-3.259808	Stationary
POSG	-2.936985 (0.0789)**	-4.420595	-3.259808	Not Stationary
USSDG	-2.482557 (0.1492)**	-4.420595	-3.259808	Not Stationary
WEBG	-4.382766 (0.0105)**	-4.420595	-3.259808	Stationary

Source: Author's Computation

Table 5. Result of ADF Unit Root Test at 1ST Diff

Variables	ADF Test Statistic	Test Critical Value at	Test Critical Value at 5%	Remark
ROA	-31.17599 (0.0001)**	-4.582648	-3.320969	Stationary
POSG	-8.761169 (0.0002)**	-4.582648	-3.320969	Stationary
USSDG	-7.429905 (0.0005)**	-4.582648	-3.320969	Stationary
WEBG	-9.212776 (0.0001)**	-4.582648	-3.320969	Stationary

Source: Author's Computation

ARDL Co-integration Relationship

The affirmation of the non-stationary of the data through the unit root test of ADF and PP permit for the determination of the co-integration relationship between the dependent and explanatory variables in the models. The ARDL was chosen as against the traditional Johansen co-integration because it is structured in such a way that it takes into account the different order of integration of financial time series data. **Co-integration test For Long-run Effect**

Pesaran and Shin (2001) showed that co-integrating systems can be estimated as ARDL models; it has the advantage to estimate co-integrating relationship on variables that are either I(0) or I(1). According to Pesaran et al. (2001), the asymptotic distribution of the F-statistic is non-standard regardless of whether the regressors are I(0) or I(1), and provide two adjusted critical values that establish lower and upper bounds of significance. The bound test follows the critical criterion at the lower bound and upper bound value for decision at the three levels of significance in 1%, 5% and 10%.

Table 6. ARDL Bounds Tests for Co-integration

Test Statistic	Value	k
F-statistic	248.2288	3
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Source : Author's Computation Using E-Views 10 Software

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Given a computed F statistics Value of 248.2288 which is greater than the lower and upper critical bound values at 1%, 2.5%, 5% and 10% respectively, thus indicating the existence of a steady-state long-run relationship among the variables. This suggest that the various selected variables have a long run relationship with performance of commercial banks in Nigeria.

Decision rule: We reject null hypothesis of the co-integration relationship to accept the alternative that there is Co-integration. We thus, conclude that digital banking instrument as represented by POSG, USSDG and WEBG has a long-run effect on return on asset commercial bank in Nigeria.

Nature of Long Run Relationship/ARDL Error Correction Model
The ARDL result has proven that return on asset, Point of Sale, USSD Banking and Web banking are co-integrated/related in the long run. Consequently, the determination of the nature of the long run relationship becomes necessary as well as the speed of the adjustment to equilibrium.

Table 7. ARDL Co-integrating and Long Run Form for ROA→POSG+USSDG+WEBG

ARDL Error Correction Regression				
Dependent Variable: D(ROA)				
ECM Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CointEq(-1)*	-1.084838	0.021774	-49.82257	0.0000
R-squared	0.996520	Mean dependent var		1.343333
Adjusted R-squared	0.996520	S.D. dependent var		4.933541
S.E. of regression	0.291055	Akaike info criterion		0.473829
Sum squared resid	0.677703	Schwarz criterion		0.495743
Log likelihood	-1.132230	Hannan-Quinn criter.		0.426539
Durbin-Watson stat	1.225551			
* P-value incompatible with t-Bounds distribution.				

Source: Author's Computation Using E-Views 10 Software

The speed of adjustment in Table 7 reveals that the model move toward equilibrium following disequilibrium in the explanatory variables. The ECM is significant and negatively signed with a coefficient of -1.084838, a suggestion that -108.4838% of error generated in previous period is corrected in current period.

Diagnostic Test
Serial Correlation LM Test

Table 8. Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.230979	Prob. F(2,2)	0.8124
Obs*R-squared	1.688743	Prob. Chi-Square(2)	0.4298

Source: E-views 10.0 version data output

From table 8, the p-value is greater than the chosen level of significance of 5%, indicating the absence of autocorrelation in the models. The result of the serial correlation shows that the probability value is 0.8124 which is greater than 0.05 implying that we accept H_0 and reject H_1. We then conclude that there is no serial autocorrelation in the model and that the model is appropriate for the study.

Normality Test
The normality test was done using the Jarque-Bera Normality test, which requires that for a series to be normally distributed; the histogram should be bell-shaped and the Jarque-Bera statistics would not be significant. This implies that the p-value given at the bottom of the normality test table should be greater than the chosen level of significance to accept the Null hypothesis, that the series is normally distributed (Brooks, 2014).

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Series: Residuals	
Sample 2011 2019	
Observations 9	
Mean	8.02e-16
Median	0.111684
Maximum	0.327117
Minimum	-0.553816
Std. Dev.	0.291055
Skewness	-0.831274
Kurtosis	2.460900
Jarque-Bera	1.145511
Probability	0.563969
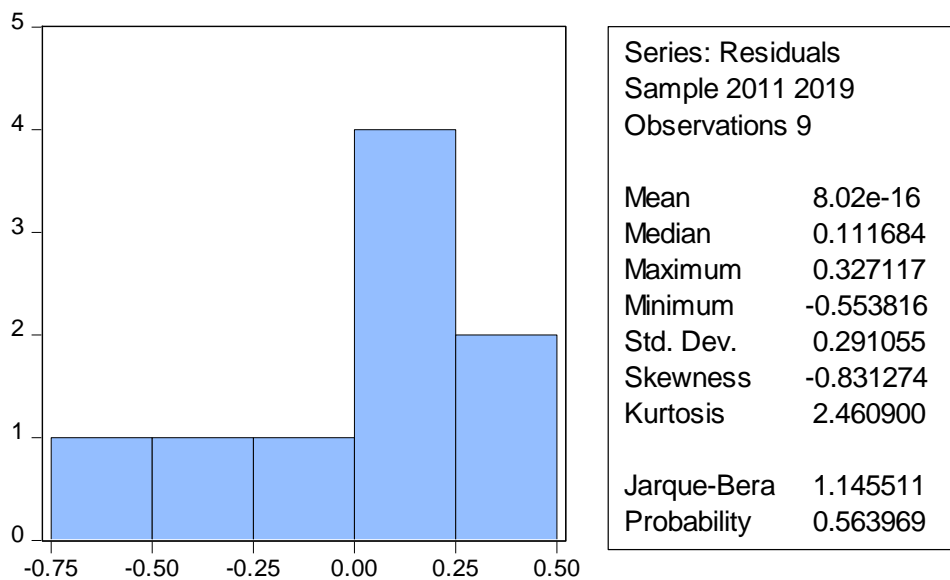
Fig. 1. Normality Text

Source: E-views 10.0 version data output

The result of the normality test shows that the probability value of 0.563969 is greater than 0.05.Based on this however we accept H_0 and reject H_1. We then conclude that the residuals are normally distributed and random.

Ramsey Reset Test
Table 9. Ramsey Reset Test

	Value	Df	Probability
t-statistic	0.311761	3	0.7756
F-stati tic	0.097195	(1, 3)	0.7756

Source: Author's E-view 10 computations

The result of the Ramsey RESET test shows that the p-value of about 77.56% (0.7756) are greater than the critical value of 0.05..This shows that there is no apparent non- linearity in the regression equations and it would be concluded that the linear models are appropriate.

CUSUM and CUSUM of squares tests of stability
The stability test results are shown in figure 2 and 3. The CUSUM and CUSUM of squares are the tests used to check stability within the model. The results of stability test show evidence that the model is stable. This is indicated by a movement of blue lines located within the critical lines (two-red dotted lines) in the figures. Therefore, at 5% level of significance, the CUSUM and CUSUM of squares stability tests confirm good performance of the model.
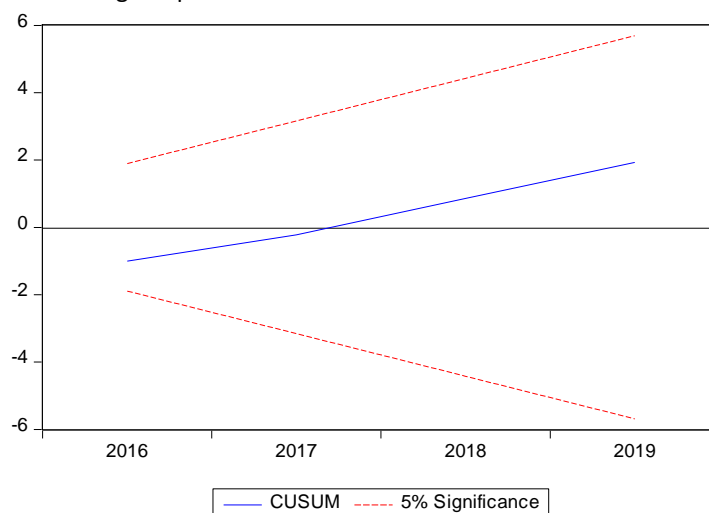
Fig. 2 CUSUM Text
Source: E-views 10.0 version data output

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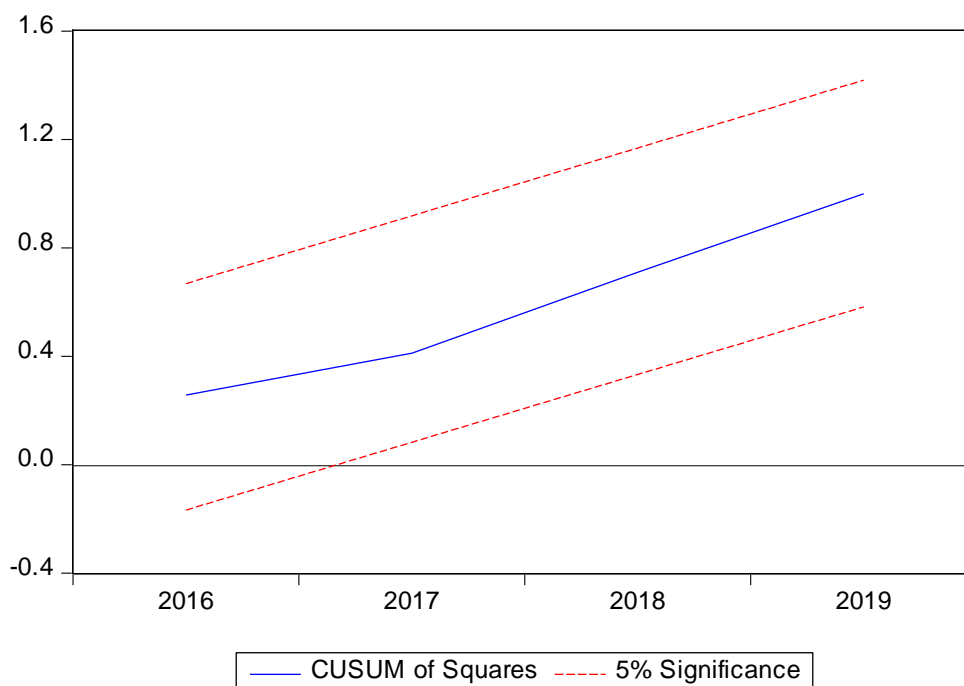
Fig 3. CUSUM of Squares Text

Source: E-views 10.0 version data output

Short Run OLS Relationship

In estimating the short run nexus between digital banking and performance of commercial banks, the ARDL was applied and the result depicted in Tables 10. The outputs were interpreted using the coefficients of the individual variables, Adjusted R-square, f-statistic and Durbin Watson.

Table 10. ARDL: Return on Asset and Digital Banking Instruments

Dependent Variable: ROA				
Method: ARDL				
Dynamic regressors (0 lag, automatic): POSG USSDG WEBG				
Fixed regressors: C				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
ROA(-1)	-0.084838	0.047169	-1.798593	0.1465
POSG	-0.072258	0.011151	-6.480029	0.0029
USSDG	0.034380	0.006384	5.385177	0.0057
WEBG	0.003652	0.003837	0.951811	0.3951
C	4.838579	0.412989	11.71599	0.0003
R-squared	0.956452	Mean dependent var		2.232222
Adjusted R-squared	0.912904	S.D. dependent var		1.394729
S.E. of regression	0.411614	Akaike info criterion		1.362718
Sum squared resid	0.677703	Schwarz criterion		1.472287
Log likelihood	-1.132230	Hannan-Quinn criter.		1.126268
F-statistic	21.96309	Durbin-Watson stat		1.225551
Prob(F-statistic)	0.005524			
*Note: p-values and any subsequent tests do not account for model selection.				

Source: Author's E-view 10.0 computations

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A Priori Expectation and Text of Probability

The constant parameters for the study are positively related with return on assets. It has a positive coefficient of 4.838579 which implies that if all explanatory variables are held constant in the short-run, return on assets will increase by 4.838579 units. The probability value of 0.0003 which is less than 5% and the t-statistics value of 11.71599 which is greater than 2 shows that the constant is significant therefore if all the variables are held constant (C) has positive and significant effect on ROA.

Meanwhile the individual variables shows that POSG has significant effect on ROA while USSDG and WEBG has insignificant effect. The result indicates that in the short run digital banking has positive but insignificant effect on performance of commercial banks in Nigeria. The result is consistent with the study of (Oyewole et al ,2013; Abaenewe et al ,2013; Ogutu and Fatoki ,2019; Olaiya, and Adeleke ,2019; Ibrahim and Daniel,2019) which shows that digital banking has contributed positively to performance of commercial banks but has not significantly impacted the Banks when considering digital banking infrastructure and the number of population in the country. The coefficient of multiple determinants (R^2) showed a coefficient of 0.956452 ≈ 0.95 which implies a 95% explanation of the behaviour of Return on assets by the totality of the explanatory variables: (POSG,USSDG and WEBG) on the short-run. The Adjusted R^2 further prove this with the adjusted value of 0.912904 ≈ 0.91 which implies that 91 percent explanation of the behaviour of return on assets by the totality of the explanatory variables with the remaining 9percent behaviour attributed to other variables outside the model otherwise referred to as the stochastic variables.

The F-statistic indicates that the model is well fit for the estimation because F-stat for the model is 21.96309 which is greater than F-critical value of 5.19 at 95 percent significance level. However, the Durbin Watson Statistic value of 1.225551 is symptomatic of auto correlation. Hence the autocorrelation text in table 8 which shows, there is no auto correlation problem in the model and could be used for statistical inference like hypothesis testing and forecasting.

Granger Causality Test

Table 11 shows that there exist unidirectional relationship between POSG and USSDG on ROA with causality flowing from ROA to POSG and USSDG. This goes to show that digital banking will allow banking customers to access banking service from anywhere which in turn improve the profitability of of commercial banks in the country.

Table 11. Pairwise granger causality test on input variables

Null Hypothesis:	Obs	F-Statistic	Prob.
POSG does not Granger Cause ROA	8	0.08587	0.9199
ROA does not Granger Cause POSG		17.2103	0.0227
USSDG does not Granger Cause ROA	8	0.01529	0.9849
ROA does not Granger Cause USSDG		16.5284	0.0240
WEBG does not Granger Cause ROA	8	2.38789	0.2396
ROA does not Granger Cause WEBG		4.87675	0.1141

Source: Granger Causality test output data using e-views 10

6. CONCLUSION AND POLICY IMPLICATION

Technology Acceptance Theory states that perceived ease of use and usefulness of technological tool determines the extent of consumer acceptance. The idea is that for banks to drive profitability through digital banking, it must be accepted by the people and to be acceptable to the people, it should be perceived useful and also very easy to use. Despite the benefits of digital banking in Nigeria there are a lot of challenges facing the introduction of digital banking like the issue of poor network, security, frauds and cyber crimes.

Various studies on this topic have been undertaken by various researchers and their results are contradictory as such the study tends to fill the knowledge gap in literature by studying the effect of digital banking and performance of commercial banks in Nigeria from 2010 to 2019. Descriptive statistics was used to explain the characteristics of the data series, thereafter that the unit root status of the variables was established and was discovered to be intergrated at order I(0) and I(1).This necessitated the use of Autoregressive Distributed Lag in the study and the result indicates that digital banking has positive and insignificant effect on performance of commercial banks in Nigeria. The result is in line with the previous studies of (Oyewole et al ,2013; Abaenewe et al ,2013; Ogutu and Fatoki ,2019; Olaiya, and Adeleke ,2019; Ibrahim and Daniel,2019) . The study therefore agrees with Technology Acceptance Theory that for digital banking to affect performance of commercial banks it must be easy to use and acceptable to banks customers. Despite the importance of digital banking to the country and commercial banks ,there

seems to be a lot of challenges in order to make it easy and generally accepted in the country as such the study makes the following recommendations Provision of a relatively stable network: In other to reduce number of failed transactions, banks are hereby encouraged to liaise with network providers and their engineers to develop a standardized network platform exclusively for each of the digital banking channels. This will help reduce traffic on their network and improve efficiency. Ease of tracing of transactions can also be achieved. Dedication of helpdesk for resolving digital banking related issues only: With the increasing number of failed transactions leading to increasing customers' complaints, it is advised that each bank creates a separate desk for resolving digital banking related issues. This will lead to timely resolution of customer's complaints and also improve service delivery thereby ensuring overall customer satisfaction and loyalty. Digital banking education: Since digital banking has proven to be effective in driving income, all parties involved in digital banking (banks, telecom companies, cards companies, unified payments) should put resources together to drive digital banking education so as to get more people activated on digital banking channels. If the banking populace are well educated the are likely to embrace digital banking with all their heart (as opined by the technology acceptance theorists). Creation of Cyber Security Department: With advancement in technology and increasing number of people signing up for digital banking channels, it is recommended that all banks should have 24 hours working cyber security department. This department should be separated from the internal control department and should be manned by professionals in area of cyber security. This is to provide 24 hours surveillance, protect the bank from cyber attacks, and provide safety for users of digital banking (especially web banking) so as to sustain and improve on the existing performance on the channels and to ensure that the channels are not hijacked by cyber criminals.

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Correlates of Self Rated Health among Elderly Men and Women from Different Social Classes: A Prospective Study

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ABSTRACT: Majority of elderly women experience apprehensions of health and disability especially when they enter 60 plus years. One of the psychological markers of long life is self-rated health which is revealed by western and eastern longitudinal studies on longevous individuals. Self-efficacy beliefs of health as a moderator variable that determine physical wellbeing which in turn leads to mental well-being. Keeping aforementioned in view, data on SRH and its correlates have been identified from a 3-year prospective study carried out on three cohort groups (55-60; 61-65; 66-70). A sample of 480 community dwelling elderly men and women of different social classes (schedule class, schedule tribe & general open category - non-SC & ST groups) were drawn from 50-59(N=160), 60-69(N=160), and 70-79 (N=160) age groups. Multistage random sampling technique was used to draw subjects from rural areas of Chittoor, Kadapa and Nellore districts. Data pertaining to 480 middle aged and elderly men and women over three consecutive years of testing indicate a significant association between self-rated health with self-regulation, state and trait anxiety, anger, social supports, physical and mental activity, health behavior motivation, health behavior practices and stress, Health care implications are discussed.

KEYWORDS: Self-Rated Health, Elderly, Social Classes, and Prospective Study.

INTRODUCTION

The self-rating of health is an important psychological parameter in the evaluation of health of an elderly person. Such self-assessment of health (SAH) has intrigued because SAH is an important predictor of number of future health outcomes, such as mortality (Benyami & Idler, 1999), new morbidity (Boswirth & Schaie, 1997), functional ability (Idler & Kasl, 1995), health care utilization and hospitalization, recovery from illness, and future physical ratings of health (Maddox & Doughlass, 1973).

Aging is associated with an increased reliance on health-related and support services. Old age often goes hand in hand with increasingly complex and often-interrelated problems, encompassing physical, psychological, and social health. In 2007, 11% of the population worldwide was 60 years of age or older; this figure is estimated to increase to 22% by 2050. Most public policy debates are concerned with the physical issues of aging, whereas social issues, such as social support, tend to be ignored. Older people are faced with greater losses, given fewer social resources and less adequate social support, in both subjectively perceived support and the frequency of contact. Physical activity (PA) also plays a key role in maintaining health and mobility in old age; the evidence for the health benefits of PA is stronger for adults 65 years and older than for any other age group because the consequences of inactivity are more severe for this age group. Furthermore, older people with a high-level social support may achieve the recommended PA more easily than those with lower social support levels, thereby maintaining health and physical functioning (Bohm, Mielke & da Cruz, 2015).

One of the objectives the study is to assess the correlates of self-rated health (Subjective) among elderly. To realize this an attempt has been made to examine the association of SRH and a set of independent variables viz., self-regulation, state anger, trait anger, anger in and anger control, social supports, health behaviour-practices, health behaviour-motivation, physical, and mental activities and stress included in the study and subjected through correlational analysis in $time_1$, $time_2$, and $time_3$

Health can be conceptualized and measured in many ways. In many health surveys and questionnaires, respondents are asked to provide a global assessment of their own health. One of the differences between self-ratings of health and physician ratings of health is that the former may embody feelings of psychological well-being, in addition to physical health. Studies reporting SRH

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among the general population are few. Relative to SRH, some indicators provide direct evidence to the health status of individuals, including previous and current diseases (diagnosed by physicians), and clinical parameters measured in the hospital. These have been termed as "actual" or "objective" health. Some health-related factors, such as demographic characteristics, health history, life habit, life stress and work strain, are closely associated with objective health (Jozefien, Heejung & Batja, 2015).

Objectives:

1. To carry out a prospective assessment of self-rated health in a sample of community dwelling elderly men and women from different social classes.
2. To study the how self-rated health is correlated with stress, social supports, health behavior motivation, health behavior practices and physical and mental activities, social supports, anger and state and anxiety of elderly men and women among different social classes, prospectively.

METHOD

Participants for the study:

A sample of 480 community dwelling elderly men and women of different social classes (schedule class, schedule tribe & general open category - non-SC & ST groups) were drawn from 50-59(N=160), 60-69(N=160), and 70-79 (N=160) age groups. Multistage random sampling technique was used to draw subjects from rural areas of Chittoor, Kadapa and Nellore districts. The sample was drawn from different age, gender and education (with or without) subgroups of different social classes (viz., schedule tribe, scheduled classes, and general open category groups). The community dwelling elderly men and women with different social classes who are cognitively intact and capable of communication were included in the sample. The sample was tested prospectively (repeatedly) at three different time periods viz., Time-I (1st year), Time-II (2nd year), and Time-III (3rd year). Sample attrition through mortality in the late adult years is a common issue in fresh sample has been recruited as and when it is required a prospective study like this.

MEASURES USED IN THE STUDY

To collect relevant data as per the objectives, an attempt has been made to select suitable measures. These tools which were selected for purposes of current research were tested afresh to check for their relevance. All the tools were translated into Telugu, the regional language and were administered on a small sample as a tryout. The reliability and validity assessments were carried out for each tool to be used in the present study. The description of details of finalized are given below:

A.   Personal Data Form (PDF)

To seek information on relevant socio-demographic characteristics of the participant, a Personal Data Form (PDF) was used to collect information on participant's age, gender, caste (OBC, SC & ST source of income (Salary, Pension, property, family help, others) educational level in four categories (viz., no education, can only read and write, primary school, high school education and higher secondary / college level education)), marital status in terms of never married, married and widowed and living arrangements (with whom the elderly is living at present) were gathered through the PDF. An item of self-rated health used to collect the data on self-rated health from the

B.   Life Events Scale (Assessment of Stress):

The Life Events Scale used in the present study was adopted version of the life events scale with 20 items, in which 15 of them are related to the negative life events (loss of spouse, separation of children, sudden accident etc.) and five item are positive life events (like gaining sudden properties recovering from severe health problem etc.) the scale used here not only indicate the incidence of stress through life events but also measure the intensity of stress, the person experienced on each event, with five point scale rating from no stress at all (1) to severe stress (5). The scale was readopted and standardized by Jamuna and Ramamurti (1999) as part of a major research project on psychological profiles of Long- lived persons, where it covers only ten life events. Higher scores indicate higher intensity of stress and low score indicates low intensity of stress. The scale was administered on a sample of thirty elderly men and women with an interval of 10 days. The test-reliability was 0.86. State, Trait and Anger Expression Inventory (Assessment Personality):

C.   Spielberger's State-Trait Anger Expression Inventory (STAXI)

Spielberger's State-Trait Anger Expression Inventory (STAXI) was used to evaluated anger isolated from hostility and aggression, covering the anger's experience and expression. It comprises 44 items to rate the intensity of state – trait anger expression. Internal consistency using the Cronbach's alpha coefficient was 0.84 (Spielberger et al., 1985) on a set of 26 representative items were selected from the original inventory (Jamuna, 1991). The correlation of 0.93 indicated that the shorter version was as good

as the original. The test-retest reliability was 0.86. The inventory covers five areas of hostility viz., state anger, trait anger, anger control, anger in and anger out. High score on this scale is an indication of high state and trait anger.

D. Measure of Perception of Social Supports Inventory

For purposes of the present study, perception of social supports was measured by using an inventory which was developed by Jamuna and Ramamurti (1991).

The inventory has satisfactory content validity and temporal reliability. Pearson's 'r' was 0.93. A set of 10 representative items were selected from the original inventory (Jamuna & Ramamurti, 1991) to construct a short form of social supports. The original and its short form were both administrated to 30 community dwelling elderly men and women. The correlation of 0.94, indicated that the shorter version was as good as the original. The test-retest reliability was 0.91. Each item has a 5-point rating scale ranging from good support almost all the time (1) to no support (5). The inventory covers five areas of social supports viz., perception of family supports, financial supports, traditional and custom supports, community supports, health and disability support. High score on this scale is an indication of favorable perception of social supports.

E. Self-Rated Health:

It was assessed through a single item i.e. How would participants rate his/ her (overall) health at present comparing with the last five years. The subject ranked his perception towards health using a rating scale. The responses for this were rated on a five-point scale ranging from not satisfactory (1) to excellent (or) very satisfactory (5). The test – retest reliability for SRH was found to be 0.76 and 0.89 respectively. Thus, the item to measure subjective (self) rating of physical health was found to be reliable and valid. This was standardized on Indian aged as part of major ICSSR Project (Jamuna, 2014) on Fears, Worry and Anxieties of Elderly. Self-Regulatory Scale

F. Measure of Health Behavior (Health Practices and Motivation towards Health)

An inventory of 5 items to assess the knowledge of diseases, an inventory of 10 items to assess health practices and an inventory of 7 items to assess the health motivation were administered used to collect the data on health practices and motivation towards health. The reliability of knowledge and attitude of health and diseases and health practices inventories were found to be 0.79 and 0.85, respectively. The reliability of health motivation was found to be 0.81 (interval 15 days N=30). A high score on knowledge of health and diseases, health practices and health motivation, inventories indicate good knowledge of health and diseases, health practices and health motivation towards health, respectively.

Physical and Mental Activity Scale:

A scale of 10 items to measure the physical and mental activities, were administered to collect the data. reliability and content validity. Each item is enclosed with 5-point rating scale (5 to 1). A score of 5 indicates high activity and a score of (1) indicates low activity. Based on the pilot study results, certain modifications were carried-out in the content and meaning of items.For purpose of present study only 5 items were selected from the scale. The test-retest reliability of this scale was found to be 0.81

Statistical Analysis:

Person product movement correlation technique was used to analyze the trends as per the objectives of the study.

RESULTS AND DISCUSSION

The results pertaining to correlational analysis are presented in (table-1). It is clear that the self-rated health (subjective) has been significantly positively correlated with (Subscales of personality), Social supports, health behavior practices, health behavior motivation, and physical mental activities. Only anger control and anger out (Subscale of personality) negatively significantly correlated with self-rated health (subjective).

Table-1: Correlation of Independent Variables and Self-Rated Health (subjective) in Time 1

Dependent Variable	SRS	TA	SA	AI	AC	AO	SSI	HBP	HBM	PMA	Stress
SRH	0.071[@]	.074[@]	.082[@]	-.126[**]	.190[**]	-.232[**]	.409[**]	.264[**]	.040[@]	.195[**]	.021[@]
SRH=Self Rated Health, SRS=Self-Regulation, TA=Trait Anxiety, SA=Sate Anxiety, AN=Anxiety In, AC=Anger Control, AO=Anger Out, SSI=Social Supports, HBP=Health Behavior Practices, HBM= Health Behavior Motivation, PMA=Physical and Mental Activity, SRH (O) =Self Rated Health Objective											
*p<0.05; **P<0.01 @ = Not Significant											

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Elderly supported by family members and other significant others, who have good self-regulation, those who do regular exercise, who do physical and mental exercises and activities and who are motivated to improve their health, were found to have positive perception towards their health irrespective of objective health. Elderly who cannot control anger and express outwardly were found to have negative perception towards their health.

Nextly an attempt was made to examine the association between self-rated health (subjective) and independent variables prospectively on the same sample of 480 elderly men and women, who were tested in the 1st year.

Table-2: Correlation of Self-Rated Health (subjective) and Independent Variables in Time 2

Dependent Variable	SRS	TA	SA	AI	AC	AO	SSI	HBP	HBM	PMA	Stress
SRH	.260*	0.071@	.050@	.064@	.019@	.011@	346**	.386**	.179**	.180**	-.360**
SRH=Self Rated Health, SRS=Self-Regulation, TA=Trait Anxiety, SA=Sate Anxiety, AN=Anxiety In, AC=Anger Control, AO=Anger Out, SSI=Social Supports, HBP=Health Behavior Practices, HBM= Health Behavior Motivation, PMA=Physical and Mental Activity, SRH (O) =Self Rated Health Objective											
*p<0.05; **P<0.01 @ = Not Significant											

The results pertaining to correlation analysis are presented in (table 2). It is clear that self-rated health (Subjective) was significantly positively correlated with self-regulation, social supports, health behavior practices, health behavior motivation, physical and mental activities, and stress. Elderly supported by family members and other significant others, those who participate in physical   activities and who are motivated to improve their health were found to have positive perceptions towards health and positive self-rated health. The correlates of self-rated health (Subjective) were examined prospectively in third year on the same sample who were tested in 1st and 2nd year.

Table-3: Correlation Between Independent Variables and Self-Rated Health (subjective) in Time 3

Dependent Variable	SRS	TA	SA	AI	AC	AO	SSI	HBP	HBM	PMA	tress
SRH	.014@	.013@	-.150*	-.115*	.086	-.115*	.387*	.034	.138**	.536**	-.115**
SRH=Self Rated Health, SRS=Self-Regulation, TA=Trait Anxiety, SA=Sate Anxiety, AN=Anxiety In, AC=Anger Control, AO=Anger Out, SSI=Social Supports, HBP=Health Behavior Practices, HBM= Health Behavior Motivation, PMA=Physical and Mental Activity, SRH (O) =Self Rated Health Objective											
*p<0.05; **P<0.01@ = Not Significant											

The results were presented in table –3, shows that Self Rated Health was significantly positively correlated with, Social support, physical and mental activities, health behavior practices, health behavior motivation. State anger,anger in, anger out, and stress was significantly and negatively correlated with SRH. Elderly who can control anger, supported by family members and other significant others, participate in physical activities, who are motivated to improve their health and who practices health behavior were found to have positive perceptions towards health. Elderly who are anger in vulnerable occasions were found to have poor self-rated health.

The results presented in Table 1 to Table 3 attempted to examine how SRH change or stability prospectively over three time periods (T1, T2, T3). Accordingly in this project on SRH in three successive years (T1, T2, T3) sample of subjects were examined and also assessed in each year i.e., in T1, in T2 and in T3. Also, an attempt was made to examine the psychosocial correlates of SRH in Time 1, Time 2 and Time 3. In Time$_1$ the correlation results highlighted that motivation to keep health & fitness, self-regulation behavior, control of anger & anxiety, good health practices, family supports, social supports were found to be significant correlates of SRH in the elderly men and women. It is obvious that objective health consumes a major chunk of variance, good motivation, regulation of one's health habits and certainly influence one's perception towards health.

Similarly, the same elderly men and women, in Time 2 (Table 2) when they advance in age i.e., in Time 2 self-regulation, social supports, physical and mental activity, health behavior motivation, health practices, anger control were found to be significant correlates of self-rated health. These results also suggest that the social supports do influence perception of health followed by self-regulation, anger control, physical & mental activity, health behavior motivation, health practices of an individual do play a significant factor one's perception towards health i.e., one's self perception of health.

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In Time3 (Table 3) only social supports, health behavior motivation, physical and mental activities behavior was seemed to be significant correlates among many psychological variables. To conclude, the variables such as social supports, self-regulation activities, anger control, physical and mental activities, health behavior motivation, health behavior practices with advancing age were found to be critical in influence the self-perception of health. It is reported that personality, self-regulation, social supports, health behavior-practices, health behavior-motivation, physical and mental activity significantly correlate with self- rated health (subjective). As reported in Chapter – II among many health issues in old age, self-rated health is a significant one. Over the decades, continuous debate is going on how to develop positive perception towards health in the elderly. Several factors are suspected to affect self-rated health. These factors could be personal or individual related factors. Brinda, Attermann, Gerdtham and Enemark (2006) reported low income, increasing age, female gender, low social caste, rural residence, absence of morbidity and pension supports were significant correlates of poor SRH. Individuals who never attend school has reported poor self-rated health. The results of the present to same extent agree these explanations. The results show that SRH was better in Time 2 compared to Time 1 and Time 3, which explains that in the first wave the sample objective health was found to be positively associated, whereas with increasing age, certain objective health issues plus signs of ageing may appear influence one's self perception.

Functional status and self-rated health are two important indicators of health in old age. They are also important elements of quality of life and are widely used indicators to calculate healthy life expectancy or disability- free life expectancy. Self-rated health describes how a person perceives his or her own health and is an indicator of well-being (Hoeymans et al. 1997).

Hays et al. (1996) reported that among the elderly, poorer self-rated health correlated with depressive symptomatology, poor functional status, and comorbidity, as well as some socioeconomic factors. Self-rated health was an important factor associated with muscle strength among different age groups. Poor self- rated health has been reported to be associated with being more dependent in daily life activities (Ebly et al. 1996), and it may also worsen the quality of life. There have been many studies that have evaluated self- rated health among the Japanese elderly (Ai and Hoshi 2005). However, few have studied younger (middle-aged) generations. The results of the present study are in line with these trends. To improve and maintain self- rated health among community residents, it is important to clarify the health-related factors that could affect self-rated health depending on age, which leads to establish public health strategies for each age group.

In several longitudinal studies, self-rated health has been found to be a good predictor for survival and for future health-even better than a physician's assessment .Self-rated health also corresponds closely with general hospital care, old people's home care and physician visits of people aged 65 or over. The subjective well-being of elderly people is related most strongly to perceived health, which in turn is strongly influenced by objective health assessments (Mitrushina & Satz, 1991).

José (2010) disclosed that SRH is determined by a large array of factors, such as chronic disease conditions, genetic markers, stress factors, and health behaviors. Joana, Angerika and Penka (2015) stated that social factors (education, financial resources and monthly income have direct effect on SRH and these social factors influence the relationships of psychological stress and some behavioural factors to SRH. Borg and cristensen (2000) described that lower the social class, the higher the proportion with deterioration of SRH, Which is contradicted with presented study. The results of the study are in agreement with the findings of some studies carried out. Number of studies reported that a social gradient with regard to SRH and changes in SRH over time. The associations between social class and SRH remained statistically significant due to work environment and life style factors. According to Anatharaman (1981) older people, SRH correlated highly with social participation activity and personal attitudes, which is similar to present study findings. There is consistent association between personality factors and self-perceived health. Evidence suggests that personality characteristics such as hostility operate through risky behaviors are associated with health perception. The present study results correlated with the above study. Alos it was found that social supports were significantly correlated with SRH. Mossey and Shapiro (1982) declared self-regulation could contribute to positive perception towards health. It was reported that Health behaviors, physical and mental activity affected positively the Self Rated Health in elderly. Loeb (2004) suggested that promoting self-motivation might increase older men's perceptions of health and well-being.

Therefore, it suggests that these three variables viz., social supports, self-regulation behavior, physical and mental activities, practices, motivation to improve health, and anger management are to be manipulated in health intervention strategies to inculcate positive perception towards health and overcome apprehension of negative thoughts towards health. Since SRH seems to be a critical factor in health and has survival value the outcome of the study would certainly provide certain inputs to promote healthy and active aging. Thus, SRH can serve as a global measure of health status not only in elderly population but also in younger population.

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Development of Scientific-Based Introduction Practicum Guidelines and Laboratory Techniques to Improve Student's Skills

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ABSTRACT: This study aims to determine the practicality of developing scientific-based introduction practicum guides and laboratory techniques. This type of research is development research using the Plomp Model. The sample of this study were students of Biology Education STKIP PGRI West Sumatra. The instrument used is a practicality questionnaire compiled using a Likert scale with five answer options. The data were processed using the percentage formula and categorised by the level of practicality obtained and then analysed descriptively. The practical test results showed that the practical guide was very practical (93.4%) in the small group. Then proceed with field testing. The field test results also obtained very practical results with a value of 90.2% from lecturers and 81.7% from students. The introduction of scientific-based laboratory techniques and introduction practicum can provide convenience in terms of use, efficiency of use, and benefits for students and lecturers in carrying out practical activities.

KEYWORDS: Practicum Guidelines, Introduction And Laboratory Techniques, Scientific Approach, Practicality

I. INTRODUCTION

At universities with biology education study programs, introduction courses and laboratory engineering are mandatory subjects. This course introduces equipment and how to use tools, manufacture of reagents for biology practicum activities, administration and management of biological laboratories, study the hazards of working in laboratories, etc. Introduction courses and biology laboratory techniques equip graduates to acquire basic knowledge to manage laboratories so that teachers can carry out practical activities in the laboratory.

Difficulties in sharpening student skills in the use of tools and materials, sample preservation, and first aid in work accidents can be due to several reasons, one of which is that students memorise the material they find and are less able to interpret laboratory engineering concepts to be implemented in practical and practical activities—resulting in their inability to relate this knowledge to the latest situations and conditions. One of the impacts is knowing the names of tools and materials but not knowing their shape, nature, function and maintenance. This inability can also impact other courses in the following semester where students should have been skilled in and able to interpret the observations, but this did not happen.

Difficulties will also impact if the availability of tools in the laboratory is lacking, so it will cause unfavourable student activities in practical learning. The same thing was conveyed by Thalib et al. (2020) when practicum activities in the field were active due to interactions between friends and supported by laboratory equipment. In this process, some students were less active because there was nothing due to the limitations of the existing tools.

In practical activities, it is also important to evaluate student performance related to the work skills on the practical material carried out. So far, the practicum guide provides an assessment of the understanding of the practicum material, and it is rare to find a rubric for assessing student performance. At the time of the practicum exam, there was a performance test, but the assessment was always on the final result, not on the process. So it is not known the level of student skills in working in the laboratory. Also, the lecturer has not evaluated what part of the student's inability to work in the laboratory.

Usman et al. (2014) say that the process of implementing scientific activities or student practicums requires a separate assessment so that it can provide comprehensive information on student learning outcomes, where the object used as an assessment is psychomotor and cognitive abilities. However, the same constraints stated by Usman et al. (2014), where the majority

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of teachers in the lab do not use a rubric assessing performance assessment lab, just based on everyday experience of the work of students and based on whether or not to see the report and in the report.

Become from this problem, and it is important to develop a practicum guide that can train and assess student skills, such as selecting, operating, and maintaining tools and materials and working safely, efficiently with chemicals. In addition, a scientific approach is also needed in the practical guidebook because working in a laboratory requires students' ability to think scientifically. Ghozali (2017) states the scientific learning approach of students will be able to develop knowledge, thinking skills, and psychomotor skills through direct/indirect interaction with designed learning resources. With this approach, student learning achievement can increase to achieve the criteria for achieving educational goals.

II. RESEARCH METHOD

This research is a type of development research or R&D using the Plomp Model. This research sample is a student of Biology Education STKIP PGRI West Sumatra. The instrument used is a practical questionnaire arranged using a Likert scale with five answer options.

Before field testing, practicum guides are first tested in small groups to find out the feasibility of the display of products developed. In the field test, practical instruments are given to students and lecturers (users) after practicum activities to determine the ease of use of practicum guides in practicum activities.

The results obtained are recapitulated and then tabulated according to the assessed indicators and the number of assessed users. Data is processed using percentage formulas and categorised by the level of practicality obtained and then analysed descriptively.

Practical Values = (SP : SM) x 100%
Description:
SP = Acquisition Score
SM = Maximum Score

Table. 1 Practicality Criteria Guide Practicum Introduction and Scientific-Based Laboratory Techniques

Practical Values	Practicality Criteria
81-100%	Very Practical
61-80%	Practical
41-60%	Quite Practical
21-40%	Less Practical
0-20%	Impractical

(**Source:** Riduwan, 2012)

III. RESULT AND DISCUSSION
RESULT
a. Practicum Guide Practicality Results

Small group trials were trial to seven students. The aspects assessed are images and colours, type and size of letters, layout, presentation of material, and the language used of the five aspects obtained an average value of 93.4% with very practical criteria. Details of the results of the small group trial are in Table 2.

Table 2. Results of Practical Tests for Small Groups Experimental Guidance on Introduction to Scientific-Based Laboratory Techniques by Students

No	Rated Indicators	Amount		Average	Category
		SP	SM		
1	Display images and colours	66	70	94.3%	Very Practical
2	Font type and size	32	35	91.4%	Very Practical
3	Layout	32	35	91.4%	Very Practical
4	Material presentation	67	70	95.7%	Very Practical
5	Language	33	35	94.3%	Very Practical
	Overall Average			93.4%	Very Practical

Description; SP: gain score, SM: maximum score.

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After the practicum guide trials, field tests on lecturers and students. Questionnaires were given to lecturers and students, aiming to find out the ease of use of the developed practicum guide. The aspects assessed are ease of use, efficiency of use, and the benefits of practicum claimants. Details of the practicality test results are in Tables 3 and 4.

Table 3. Results of Practical Testing of Introduction to Scientific-Based Laboratory Techniques by Lecturers

No	Rated Indicators	Amount		Average	Category
		SP	SM		
1	Ease of use	201	220	91.4%	Very Practical
2	Interpretation	18	208	90%	Very Practical
3	Efficient use of practical guide	88	100	88%	Very Practical
4	Benefit	128	140	91.4%	Very Practical
	Overall Average			90.2%	Very Practical

Description; SP: gain score, SM: maximum score.

The practical aspects of practicum guides assessed by students are ease of use, the efficiency of use, and the benefits of practicum claimants. The results can see in Table 4

Table 4. Results of Practical Testing of Introduction to Scientific-Based Laboratory Techniques by Students of the Biology Education Study Program, STKIP PGRI, West Sumatra

No	Rated Indicators	Amount		Average	Category
		SP	SM		
1	Ease of using the practical guide	425	525	81%	Very Practical
2	Efficient use of practical guide	122	150	81.3 %	Very Practical
3	Benefit	186	225	82.7%	Very Practical
	Overall Average			81.7 %	Very Practical

Description; SP: gain score, SM: maximum score.

DISCUSSION

Introduction and Laboratory Techniques practicum guide developed using a scientific approach and designed as needed to be used by subject lecturers and biology students. The development of this practicum guide has adapted to the syllabus for Introduction to Laboratory Engineering and scientific activities such as (1) orientation, given discourse, (2) formulating problems, (3) formulating hypotheses, (4) collecting data, (5) testing hypotheses, and (6) formulate conclusions.

Development begins with conducting initial investigations in curriculum analysis, student analysis and guiding analysis. The analysis results carried out during the initial investigation were used as material for consideration in designing the prototype, namely the content of the material, the form of activities and the practicum learning approach used in the Introduction and Laboratory Engineering practicum guide. Following Zural and Susanti (2017) that from the results of curriculum analysis which is one of the initial investigative activities, learning objectives formulated and the main points of learning materials systematically arranged so that learning is more directed and organised.

From the initial investigation results, a prototype worked on a practicum guide to the needs of students. After that, the prototype will self-evaluate with a check sheet to find out the errors that appeared. Then a feasibility test is carried out on the product, which is given to the validator. After that, a one-to-one trial was carried out on four students and continued with a small group trial for seven students.

Practicality questionnaires were given to seven small group students to determine whether the scientific-based introduction and laboratory technique guide still had deficiencies before the next stage, namely the *field test*. Plomp (2013: 35) states to determine the practicality and effectiveness of the products developed, and small group trials were conducted. The small group results obtained get a positive response with a very practical category. Students feel that the practicum guide is easy to use because the instructions in each activity can also optimise student work in the implementation of practicum. Students can raise bee practicality because all students in the *small group* can interpret every scientific activity and practicum work properly and systematically and have the same equivalence from every student who reads it. So that in practicum activities, students are found to be enthusiastic in collecting practicum data.

Development of Scientific-Based Introduction Practicum Guidelines and Laboratory Techniques to Improve Student's Skills

In line with the opinion of Alfiriani and Hutabri (2017), that practicality refers to the condition of teaching materials that can be easily used by students so that the learning carried out is meaningful, interesting, fun, and useful for students, and can increase creativity in learning and have a degree of effectiveness. On the learning outcomes of these students. Following the opinion of Alfiriani and Hutabri (2017), the product test to the next stage.

The practical test of scientific-based Introduction and Laboratory Techniques practicum guide aims to determine the lecturer's response to the developed product. The practical results of the Introduction and Laboratory Techniques practicum guide given by the lecturer received a positive response in the very practical category. Positive response in the very practical category shows that the Introduction and Scientific-Based Laboratory Engineering practicum guide has convenience for lecturers including; make it easier for lecturers to guide, organise work and assisting lecturers in developing students' creativity, activities and scientific attitudes. The practical guide is also easy to interpret because it has prepared in informative language.

From these results, it is similar to that expressed by Plomp (2013: 29) that a developed media is said to be practical if the media can be used easily by users (lecturers, practicum supervisors and students) in learning. Nurhadi et al. (2018) state learning media are said to be practical about the ease with which the user uses the media, in which the purpose of the practicum is adjusted to student achievement, clear and systematic scientific steps, guidance for students in carrying out scientific steps, study the theory with picture shows that make the practicum easier for students to understand.

Introductory Guide to Scientific-Based Laboratory Techniques is very efficient to use by both lecturers and students because this design is easy to use with columns for writing reports of results, data analysis and conclusions, and have been equipped with columns for scientific steps. The column can be used directly by students during practicum activities to fill in questions when formulating problems, fill in answers when formulating hypotheses, write results and analyse data obtained and make conclusions. So that the scientific step columns and the lab results report columns can help lecturers determine the level of student understanding of the material is practised.

From the results of interviews conducted by Susilo et al. (2015) to students regarding practicum reports, some students had difficulties writing practicum reports. The student stated that the systematics of writing and the boundaries between the report sections were not clear. From this report, student requests more detailed demands and what aspects should in the practicum report. Some request indicates that students still need more intensive guidance in writing reports. So that students need guidance as an alternative to improve students' abilities in writing practicum reports. So referring to the problem of Susilo et al. (2015), the Practical Guide to Introduction and Scientific-Based Laboratory Techniques has prepared well every data written by students in the practicum guide as a form of report that must create. Practicum guide, in addition to making it easier for lecturers to check practicum reports, also makes it easier for students to make practicum reports.

In the practicum guide assessment sheet, a performance assessment helps lecturers determine the level of student work skills acquisition in the laboratory. Performance assessment also helps lecturers to find out the difficulties experienced by students in collecting practicum data. Fitriyani et al. (2013) also agreed, where the assessment for work affects students more on the material provided compared to the assessment of work results. Because with performance assessments, teachers will know more about the ability of students to understand the products they have produced. Besides that performance assessments make students play a more active role in the learning process.

IV. CONCLUSION

The study results concluded that developing a scientific-based introduction to laboratory guide and scientific-based biology laboratory technique for students is very practical and can be tested further to the effectiveness stage.

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Teachers and Students Perception of Factors Influencing Girls Performance in WASSCE; The Case of a Girl Senior High School

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ABSTRACT: There has been persistent reports of low performance of girls in final examination of Senior High School especially in Northern Ghana. Academic achievement at the Senior High School is a critical milestone in every Ghanaian student's educational path and a critical step toward transition to higher levels of education. However, the rate of girls making the necessary grades in the final examination to enable them progress lags behind particularly in Northern Ghana. Far more attention has been paid to ensuring that girls enroll in school. This study investigate the determinants of girls' performance in the West African Secondary School Certificate Examination using the case of a girl Senior High School. Participants were purposively selected from teachers who had experience in teaching final year students and past students of the school. Data was collected from fifteen (15) sampled teachers, and fifteen (15) past students of the school through interviews.

The study finds school related and individual student factors accounting for girls' success. The key factors that enhances girls' success in WASSCE were individual ambition and efforts, self- discipline and determination, quantity and quality of teaching, encouragement from teachers, conducive environment, and school discipline. Several other factors including school related, individual factors, peer influence, social media use and sexual relationship explains the low pass rate of girls in WASSCE. The findings point to the need for school authorities, parents and other stakeholders to pay critical attention to the factors limiting girls' success and work a way out to address them. This should be a priority area for all actors concern with girls' education and women empowerment.

KEY WORDS: *Determinants, Girls' WASSCE performance, Girls schools, Senior High Schools, Ghana*

INTRODUCTION

Girl's education has been at the forefront of national governments, development partners and donor agencies agenda in developing countries, with attention being focused on promoting girls' educational attainment with emphasis on access, retention and completion particularly at primary school level. The focus on educational attainment has been attributed to set international and agreed targets like the Education for All Agenda, Millennium Development Goals/Sustainable Development Goals (MDGs/SDGs) (Lloyd, 2013). These policy concerns are geared towards ensuring girls' access to school so that they can achieve parity with boys. Although gender parity has been the focus of policy, attention is turned towards gender parity of educational attainment, measured through examination scores and years of schooling completed (Aikman & Roa, 2012). In Ghana, educational attainment in terms of enrolment, retention, completion rates and years of schooling are important measures, however, these are not used to determine placement in higher education or job. For job placement or progress to higher levels of education, achievement credentials are used. It is the passing of examination which is used to determine students' eligibility. For an individual to progress to post-secondary or tertiary level of education, it is mandatory to obtain the necessary grade point at the end of secondary schooling. The emphasis on examination credentials points to the need to realign educational discourse, so that emphasis is not placed solely on gender parity of access alone but also performance as well. In line with the need to refocus on education, Blimpo, Gajiga and Pugateh (2015) suggest that education policies should promote both opportunity and achievement, and the need for it to take a center place in national agenda. This implies that academic performance should be central in policy discourse as well as the promotion of educational opportunity. Promotion of

education opportunity is necessary but that alone does not lead to the realization of educational goal of empowering people for healthy, productive and meaningful life.

For girls, secondary education is acknowledged to have potentially transformative economic and social impacts (Rihani, 2006; Tembon & Fort, 2008; UNICEF, 2014). Although, earlier research acknowledged primary education provides much benefits to the individual, however some studies have demonstrated that returns to secondary education is much higher than was initially speculated for girls. For instance, findings from a global study of developed and developing economies, which includes Ghana, showed that the average rate of return to secondary schooling is 8.7% for females compared to 7.1% for males (Montenegro & Patrinos, 2014). Girls' secondary education is acknowledge to have positive benefits like increased earnings, reduction in fertility , elimination of poverty inter alia, with the returns being more for developing countries, which mostly exceed those observed in developed countries and for boys (UNICEF, 2014). This suggest secondary education has the potential of bringing more benefits to females if it is meaningfully attained.

Promotion of girls' educational attainment has seen several efforts being made by national and international agencies and other organizations to ensure girls educational attainment is at par with boys. In Ghana some of these efforts include the establishment of the girl child educational unit within the Ghana Education Service, the promulgation of some recent educational policy like the free senior high school policy which aim to ensure educational access to secondary education for both boys and girls. Despite these efforts girls' performance in national examinations have not match up to the gender parity of access. For example, the Ghana education sector analysis report in 2018, showed gender parity of access as of 2016/17 at the SHS level had reached 0.96, however the same report showed a general pass rate of girls being 20% against boys with 26% with indication of a wide gender and regional disparity in the West African Secondary School Certificate Examination (Ministry of Education, 2018).

The general poor performance in WASSCE is reechoed in the Education Strategic Plan (2018-2030) indicating that learning outcomes in terms of results from the West African Senior Secondary Certificate Examination (WASSCE) has been poor for both core and elective science and mathematics subjects. This points out that a large proportions of students are completing secondary school without attaining functional literacy (McCarthy et al, 2015; Ministry of Education, 2018). Inspite of these evidence of low performance of girls in the final examination there is a dearth of research on factors that account for the performance. Some studies have examined determinants of poor performance of students in WASSCE with respect to selected subjects like social studies (Angbing, 2014), science and mathematics (Abreh et al, 2019). This paper explored the determinants of girls' performance in WASSCE.

STATEMENT OF THE PROBLEM

Academic success or passing of examination is central in educational development, since it is the main yardstick for progressing to higher levels of learning and reaping the benefits there off. Girls' education has been hailed as one of the best investment based on the potential benefits it has for girls, the family and the entire society. It has been reported that the benefits of girls education is more at the secondary school level comparative to the primary school level. However much focus has been at the primary level with emphasis on parity of access to boys. Girl's education has being a priority area in both education and development arena with a lot of intervention/efforts directed towards promoting the educational attainment of girls. This basically has been propel by international development goals. Current trends however requires obtaining the necessary credentials to progress or be able to obtain the benefits of secondary education.

For individual students to progress particularly from the secondary school level to higher levels of education one needs to obtain the necessary passes in the final examination. The ability of students to successfully pass their examinations has been the concern of schools, parents and students. In Ghana, the eligibility for entry into tertiary education or post-secondary education is the ability of a candidate to obtain the qualifying grade (Grade A1 to C6) in six subjects (three core subjects namely English, mathematics and science or social studies and any three elective subjects) in the West African Examination Secondary School Certificate Examination (WASSCE). The extent to which students' progress from the senior high school to tertiary or post-secondary education depends on their ability to get the minimum required grades in the relevant areas. On the eligibility of students, reports of the education sector have pointed to the performance of girls in WASSCE to be on the low side coupled with some studies highlighting the issue (Associate for Change, 2011; CAMFED, 2012; MOE, 2018)

Studies on determinants of academic performance is widely researched with some examining it in specific subjects, and others looking at various factors in general. Looking on studies on girls education in Ghana, the trend has centered on

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challenges/barriers to girls education   (Lambert et al, 2012; Atta, 2015; Yindol, 2015). Research on girls education particularly at the Senior High School level in Ghana have mainly concentrated on promotion of girl child education, factors leading to drop out, factors affecting educational attainment and barriers to female education (Lambert et al, 2012; Atta, 2015; Yindol, 2015; Rubio, 2018). Yindol (2015) assessed the factors influencing Girl-Child participation in Senior High School Education in the Bolgatanga Municipality of Ghana. The study revealed that Girl-Child access and participation in Senior High School Education is influenced by bad cultural practices such as exchange marriage, betrothal, early marriages, and poverty coupled with parental attitude and perceptions of educating the Girl-Child (Yindol, 2015).

Studies focusing on girls academic performance at secondary schools and determinants have being carried out in mixed and day schools in some African countries showing home background variables and school related factors playing key roles in girls learning outcome (Makewa,et al 2014; Akinyi & Musani, 2015). However, scanty research has specifically looked at the determinants of girls' performance in the final examination of Senior High Schools particularly in Northern Ghana. Associate for Change in a mapping exercise on girls' education in Ghana and the Ghana Education Sector 2018 report analysis, did identify the general low performance of girls relative to boys in the West African Secondary School Certificate Examination (Associate for Change, 2011; Ministry of Education, 2018). Campaign for Female Education (CAMFED, 2012) did express concerns about gender disparities in learning outcomes with high failure or low scores (based on national pass rate) which is observed to be more pronounced in economically marginalized regions of Ghana. The pass rate is an indicator showing the proportion of students who qualify to higher level of education in the country. Indicators from the West African Examination Council for the case study (Bolgatanga Girls SHS) showed 20.83%, 24.09%, 5.45% and 28.70% of candidates qualify for higher education for 2016, 2017, 2018 and 2019 respectively. This trend suggest that the school since 2016 have not had any single year where up to 30% of candidates who sat for WASSCE qualify for higher education. This pattern suggest a worrying considering the number of girls coming out year each without the necessary passes to progress.

This further gives an indication that good number of girls who are turn out from the school are unable to qualify for higher education and hence the chances of reaping the benefits of formal education at this level might be minimal for most of these girls. Therefore, there is need to explore the determinants of girls' performance in the final examination in the school with a view of suggesting possible intervention strategies to improve girls learning outcomes. The study did investigate perceive factors that enhance and diminished the success of girls in WASSCE.

RESEARCH OBJECTIVES
The main objective of this paper is to investigate the main factors accounting for girls' performance in WASSCE using the case of a girl school. The specific objectives are:
1. To examine the factors that enhances girls' success in WASSCE in the school.
2. To investigate the major factors contributing to the low performance level of girls in WASSCE.
The study address the following questions:
1. What major factors are perceived to be accounting for girls' success in WASSCE?
2. What factors are perceive to be contributing to the low performance level of girls in WASSCE?

REVIEW OF RELATED LITERATURE
Determinants of Girls Academic Performance
It is unusual in education to find only one factor influencing/determining student educational achievement. It is rather the case that several, or even many factors from outside and inside the school influence how well or poorly students achieve/perform in school (Hirsch, 2007). Bole and Tesha (2006) drew conclusion that researchers need to consider many different factors that influence the performance and participation of girls and boys, with suggestions that capturing issues like sexism, home background environment, subject distortion and cognitive preferences whiles neglecting critical variables like the teaching environment play a part in explaining low performance and participation. In general, student learning and achievement has been directly related to a number of factors which can broadly be categorized into: family background/home environment, institutional, school and personal factors (Yussif, Yussof & Noor, 2011; Chowa et al, 2013; Angbing, 2014; Balcazar, Narayan & Tiwari, 2015).

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Family Background Factors and Girls Academic Performance

Family background factors play a major role in determining the academic success or failure of girls in examinations and their educational attainment (enrolment, attendance and progression). Family background factors identified in literature tends to have influence on girls' academic performance which includes socio-economic status, parental education background, income and family structure (Egunsola, 2014; Muandu, Parsitau and Wambugu, 2015). These factors can also lead to many girls absenting themselves from class, recording poor performance in examinations and eventually dropping out of school. Muandu, Parsitau and Wambugu (2015) finds parents' economic status to significantly correlate with girls' academic performance, suggesting that girls whose parents have higher economic status tend to perform better academically than those with low economic status. The influence of parental socio-economic status is reflected in the support parents give girls in terms of providing their physical and educational needs.

Parental education has also been pinpointed as one of the home background variables that play a key role in determining the success level of children in school. It is reported that high level of parental education has the potential of increasing the success level of students. Parental education enhances academic success of girls through interest shown in girls' education. It is established that educated parents perceive the need of girls' education in a better way than those who are not educated. In most cases, educated parents often seek to facilitate girls' learning at home and school, by given encouragement to their girls and making continuous follow up to schools where possible, provision of material support to girls which encourages them to perform better academically. On parental education influence on girls, Mohammed (2015) finds a strong correlation between educational background and income level of the parents on performance of girls at secondary schools in Somalia. Rwegarisa (2017) also identified poor academic performance of girls to be attributed to lack of effective parental support for girls' education.

Rwegarisa (2017) study on home and school based factors that determines poor academic performance of girls in community secondary schools in Tanzania, found poor performance of girls emanating from poor participation of girls in classroom activities, excessive domestic activities for girls at home, lack of effective assistance from parents relating to their schooling, lack of food supply at school, lack of stationary services in schools, and long traveling distance from home to school. Kimondo (2013) equally examined factors affecting girls' academic performance in secondary school in Embakasi District in Kenya and results shows family background factors, cultural factors, availability of mentors, and sexuality influencing the academic performance of girls.

Individual Factors as Determinants of Girls Academic Performance

Several individual personal factors have been identified as strong correlates of academic achievement. Among such individual factors identified with strong influence on girls performance in examination includes attitudes of girls towards learning, expectation of girls about their schooling, learning styles, approaches to teaching and girls sexuality (Kyei et al, 2011; Mubeen et al, 2013; Mohammed, 2015; Amusala, 2019). One key individual factor of girls that influence the performance is attitudes towards studies. Attitudes towards subjects of study is identified as an important determinant of academic success and achievement. In order to succeed in a subject or school, positive attitude towards a subject or studies in general is very important. This has been found to apply in the case of mathematics performance between girls and boys in a study at secondary school level in Paskistan (Mubeen et al, 2013). The study found boys demonstrating a better attitude towards the subject which reflected in higher achievement for boys than the girls (Mubeen et al, 2013). Similarly, Kyei, Apam and Nokoe (2011) finds lack of self-confidence reflecting in negative attitude girls' causing difference in performances between girls and boys in mathematics. Kyei and colleagues also points out that, students' interest in mathematics is greatly influenced by personal interests and teaching methods. The demonstration of girls' attitude as evidence in the case of mathematics performance could possibly manifest in their general disposition towards learning.

Future expectation of girls is found to contribute to girls' academic performance. Expectation drives action and behavior of individuals since people tend to behave positively when they are hopeful of obtaining some benefits. Mohamed (2015) assess girls 'attitude towards education by measuring performance at certificate of secondary school education in Somalia. The study found girls 'expectations of their school performance and career prospects playing a significant role in their persistence at school and in their performance. The findings showed that about 30 percent of the girls did not aim at pursuing their education up to university level (Mohamed, 2015). Mohamed (2015) findings are in line with Ampofo and Osei-Owusu (2015) who contend that student's academic ambition and effort are the main determinants of academic performance. When students are not poised for higher academic achievement, they turn not to devote much time and effort in their studies. This can reflect in poor learning or paying less attention in the learning process.

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Mohamed (2015) also sees the mind set of girls to have the tendency to contribute to poor academic performance, since they perceived themselves as academically weak and therefore do not believe that they can make it academically. When girls perceived themselves as academically weak, they tend to believe that they cannot make it in school. This believe could have a negative impact on their studies which could manifest in girls developing a lackadaisical attitude towards their studies leading to poor academic performance.

Amusala (2019) examine the influence of adolescences crisis on academic performance of girls in high school in Kenya. The study revealed that at adolescence stage, the influence of sexuality is very intense and conflicting in some ways for high school girls which often leads to poor performance. Poor performance of girls has been attributed to levels of intelligence or patterns of thought at adolescence. At adolescence, girls attention is focused on the opposite sex and concern with physical appearance, which propel them to engage in intimate relationship with boys/men. Amusala also found that some girls in high school have their academic performance affected by the personal fable. Personal fable is explained as the belief or myths that one is unique and has a personal mission in life (Amusala 2019). According to Amusala (2019) these girls have the feeling that they are un-destroyable, immortal, and incorruptible and have the belief that nothing can harm them. These beliefs make adolescents to engage in many strange behaviours like pre-marital sex, alcoholism and drug abuse. However engaging in these acts have a potential to affect their learning and learning output since the mind is divided between concentrations on studies and engaging in the behaviours identified. Thus the adolescence crisis could have likely impact on girl's achievement if proper education through guidance and counselling is not offered to girls in this transitional period of life.

School characteristics as Determinants of Girls Academic Performance

At the school level, some school characteristics work together to lower or enhance the performance of girls in schools. Among such factors identified in literature are the attitudes/behaviour of teachers in promoting girls learning, quantity and quality of teachers, discipline, school and academic emphasis of the school, sexual harassment in schools and the general school environment (Akinsola, 2010; Nisar, Mahmood and Dogar, 2017).

On the quality of teachers as a school variable, Akinsola (2010) finds a positive and significant relationship among quantity and quality of teachers and students' academic performance. This results shows that teachers competency and adequacy is a panacea for attainment of educational goals and objectives. Ajayi (2014) avers that both school quality and match quality determine student outcomes. Ajayi (2014) used a selection on observables approach and regression discontinuity design in a study on whether school quality improve student performance with evidence from Ghana, and found students admitted to more selective schools (high quality) are more likely to stay in the same school and complete on time, but demonstrate only marginal improvements in overall completion rates and examination performance. However, the performance of girl's is mostly affected when quality of teaching is compromised.

Mohammed (2015) finds teachers attitudes towards girls to have a negative effect on their learning outcomes. Cultural beliefs that position women/girls as restricted in roles and expectations in the household are sometimes reflected in the school system through teachers' belief and treatment of girls in the school. Some teacher's belief boys are more capable of engaging in certain field of study and these tend to manifest in their teaching practice. Some of these teacher attitudes and belief about the girl child have cultural bearing as there are beliefs that girls have less thinking and intelligence capacities which some teachers translate into the classroom making girls to be passive participants. Effective learning requires teachers to engage learners as active participants and not spectators or passive participants.

The gender composition of teaching staff is found to have influence on girl performance (Mohammed, 2015). The presence of female teaching staff in a school have the potential to inspire girls to learn and aim high as they serve as role models to the girls. The availability of female mentors and role models influences performance of girls (Mohammed, 2015). The author assessed that most of the schools were dominated by male teachers and the students lacked role models in schools and even at home leading to low self-esteem and reflecting low grades in examinations.

School climate is also a significant predictor of academic achievement of students (Azigwe, 2015; Nisar, Mahmood and Dogar, 2017). Azigwe (2015) finds good school climate leading to better study habits of students and hence better academic achievement of students, whiles poor school climate cause poor study habits of students and low academic achievement of students. A related factor to school climate which affect academic performance of girls is sexual harassment within the school environment. This factor creates a hostile environment for girls' effective learning. Some research have identified sexual harassment as major factor that affects girls learning and learning outcomes (Kimondo, 2013; Rwegarisa, 2017). Kimondo (2013) for instance report of girls in secondary schools

suffering sexual abuse from the male teachers, colleagues and male members of the society. These acts of males in the school tend to affect girls schooling and performance as some drop out or are not motivated to learn.

In general several factors have been identified as determinates of girls success or failure rate in examination particularly at the secondary school level. These are broadly categorized into home background related, student attributes or personal characteristics, and school related factors.

METHODOLOGY

The study adapted a qualitative research approach using the case of a school. This study used the descriptive case study based on outcomes by providing narratives of the case (Yin, 2009 cited in Cohen et al, 2018). Since the current study seeks to examine the factors perceived by teachers and past students to be accounting for the performance of girls in final examination of SHS, the researchers find this approach appropriate. The choice of the research design is basically informed by the nature of the research issue. Accordingly, interviews were administered to teachers who have taught final year students and have had experience in preparing candidate group for the final examination. Past students who pass through the school with experience of the school and the final examination are also included in the study.

The study purposively selected fifteen (15) teachers who have taught final year students due to their experience in handling final year students and fifteen (15) past students. The past students (old girls) are former students of the school who completed the school between 2017 and 2019. The data was collected by means of face to face interviews with the teachers. However, the past (students) girls were interviewed through telephone calls using snow balling where one or two old girls were contacted and they in turn identified and gave contact numbers of their colleagues to be interviewed. The old students based on their experience in the school final examination, had a clear idea of what contributed to their success or inability to succeed.

The perceived factors accounting for the performance level were analyze descriptively using themes that emerged from the responses.

RESULTS AND DISCUSSIONS

The results of the study are presented and discussed according to the research questions. The first research question sort to examine the perceived factors that contribute to girls' success in WASCCE. This question was addressed with teachers, and past students' responses. The question asked participants to state three major factors that accounted for students' success in the final examination. The response ranged from varied school related factors to student background factors, students characteristics and other contextual factors.

Students Factors Accounting for Success in WASSCE

Individual issues were the most common explanatory factors among all other factors identified. Factors that enhance success of girls in WASSCE involve students own efforts in learning, attitudes towards studies, self-discipline and determination. Among all the past girls interviewed, the general consensus was that student's own effort in learning played a leading role in their passing of WASSCE. Out of the fifteen (15) past students interviewed, ten (10) had their needed passes (qualifying grades of A1-C6 in three cores and three electives subjects) of their choice of programme of study in one siting of the school examinations, whiles the other five (5) had some challenges in qualifying for higher education using the school final examination. All the old girls interviewed attributed level of success to the effort put in learning towards the examination. In other words the effort put in place by the candidate whiles preparing for the examination enhances the individual girls' success. This gives the implication that, those girls who did their best in terms of putting maximum effort in learning, were mostly successful whiles those who 'lazy' about often struggle to get the necessary grade point. In line with this, one old student respondent had this to say; '*I did not learn much that is why l could not make my grades in the school final examination'.*

Teacher responses also identified positive attitude of girls towards studies, self-discipline and determination as key factors determing success in the final examination. The explanation given indicates that those students who took their studies serious and put in the best effort in studying in most instances are able to obtain the necessary grades in WASSCE. The opposite is the contrary. In effect, teacher's responses on the key students' factor influencing the success level in WASSCE centered on self-discipline and determination to succeed. Thus the teacher responses on individual student factors correspond with the old students responds. This findings is affirmed by Ampofo and Osei-Owusu (2015) that student's academic ambition and effort are the main determinants of academic performance.

Equally, group studies were identified as one practice that helped some of the girls to make their grades. A good number of old students pointed to encouragement from some teachers to engage in group studies that helped a lot in their learning efforts. In relation to this, one old student had this to say.

"Learning from my colleagues help me a lot to obtain some of the passes. I had difficulty in understanding what is taught in class, but my friend was good and she help to make things clearer for me. If it had not be her and other colleagues the passes I got would not have been possible"

Teacher Factors enhancing Girls Success

All past students interviewed, identified the role of teaching in their passing of WASSCE. These were of the view that the teaching in the school was generally good except some few teachers who did not play their roles effectively in helping them to learn and pass their examination. Even those who did not make their results at once acknowledge the teachers did their best but it was left for the individual students to do their part.

The past students indicated that some teachers helped a lot by providing guidance to them on how to effectively learn, encourage them to do group learning as well as the use of pass questions to help them understand the nature of the final examination and the best ways of answering questions in their respective subjects. Words of encouragement coupled with effective teaching by teachers, were identified as helpful to girls success in the final examination. Respondents (teachers and past students) identified quality and quantity of teaching, teacher dedication and teacher guidance were relevant for students' success. The school is acknowledged as having qualified and dedicated teachers. The teacher quality and quantity was collaborated with background information gathered from the school. For teacher qualification the data showed that out of the total teaching staff strength of 101 teachers as of 2019/2020 academic calendar, 25 of the teachers were professionally trained with master's degree, and 74 were professional trained teachers with first degree and only 2 were nonprofessionals. Going by this data, it means the school is well staffed with qualified teachers and it is expected that their output should be good enough to reflect the staff qualification.

The teacher quality was further supported by teachers' responses totaling 10 teachers (70%) emphasize the availability of qualified and dedicated staff as school related factor that enhanced the passing of the students in the final examination. This findings are supported by Akinsola (2010) and Ajayi (2014) that quality and quantity of teaching are important variables that enhances students learning and achievement. For girls in particular quality of teaching is a key factor in enhancing their learning outcomes whereby Ajayi (2014) opines that girls suffer most and may drop out of school when quality of teaching is poor or compromised. Therefore, the quality of teaching when is at its best offers the chances for girls to learn and achieve better.

School Factors Enhancing Girls Success in WASSCE

For the school factors that accounted for success of girls in WASSCE, the old students' responses captured issues such as good teachers in the school, school discipline, scheduling of routine school activities and conducive environment. These factors were identified as relevant in enhancing girls' success in WASSCE. Scheduling of school activities according to them created an orderly environment that helped them to order their lives and learn. The indication is that guidelines for students' daily activities like timing for classes, preps, waking up time inter alia, provided definite direction for individual engagement in school activities that ensures effective use of time which actually help them to effectively learn and further reflect in better learning outcomes.

The school discipline was equally identified by past students as helpful to them to put up the right behaviour in the school. Some respondent indicated that many of them were compelled to do what is right due to the fear of the sanctions for misbehavior and that really helped them to be better and attain the purpose for coming to the school.

Among other major factors identified by both teachers and past students were conducive school environment for learning, availability of teaching-learning materials and provision of career counselling to students. However on a low side, school vision for academic excellence, good management of school were acknowledged as contributory factors. The findings in this study are confirmed by Akinsola (2010); Nisar, Mahmood and Dogar (2017) studies. These other studies identifies school discipline, academic emphasis of the school, and the school environment as key in promoting learning of students.

For background factors and other external factors only a few participants (past students) mentioned parental support and encouragement, but the teachers did not point to this factor as having an influence on girls passing of WASSCE. This means the success of students depends much on individual factors and school related factors.

Teachers and Students Perception of Factors Influencing Girls Performance in WASSCE; The Case of a Girl Senior High School

The second research question sought to identify factors that account for girls' inability to perform well in WASSCE.
In addressing this research questions the issues that emanated from the respondents in the school related to students' attitudes/behaviour, teacher and teaching related issues, school factors, media use, family background factors, peer influence and others. Most of the girls when asked about their year group performance did admit most of their colleagues could make the qualifying grades in the first WASSCE sitting at the school level and some had to re-write the papers through remedial classes and studies. But they could not give any definite answer as to how well they performed as a group except on individual accounts on how they fared in the examinations.

Student Attitudes and behaviour
From the interviews with both teachers and old students, most of the accounts given on the factors limiting girls from excelling in WASSCE were related to the individual factors. Negative attitudes towards learning was identified as a key factor accounting for most girl's inability to obtain the needed grades in the school examinations. These negative attitudes borders around laziness, misuse of time, procrastination and unpreparedness of girls to learn. In one past student narration, she admitted that she did not learn hard and that caused her failure. This particular past student could not make the needed grades when she sat for the final examination at the school level but had to do remedial classes for some few years before getting the required grades to enter University. The respondents acknowledged that most of their colleagues at the time, engaged less in effective studies as they rather preferred entertainment to learning. They also indicated that some students procrastinate a lot. The argument is that many of such students think of the availability of time and so they do not learn adequately before the examination, and so majority are caught in the situation where they enter for the final examination and realized that they have limited knowledge to address the questions put before them.
Laziness on the part of students and some teachers do affect the level of success. This was identified as a major factor by the teachers, as well as the past students. Accordingly, most students are described as being simply lazy and are not ready to put in the minimum best in learning which tend to affect their chances of passing. On the attitudes of girls influencing performance in examination, studies by Mubeen et al, (2013) and Kyei, Apam and Nokoe (2011) attest to this with indication of negative attitudes being demonstrated by girls resulting in lower performance against boys who had a better attitudes towards learning.
Responses from majority of the teachers' interviewed, pointed out that the major issue lies with the quality of the students admitted. Here the reference is made in relation to the prior level of student's achievement before Senior High School. Respondents highlighted that most of the students admitted, had weak foundations from the junior high schools with a situation where some are not able to cope with academic work at the senior high school level. Thus, the quality of students admitted were many of such students who had weak grades in the basic school certificate examination which happens to be a major factor affecting the school performance. The respondents showed some of these students are unable to read nor write effectively, coupled with the policy of no repetition and withdrawal on poor academic performance, the school is forced to produce wholesale students and that is a major contributory factor for the poor academic performance.

School Factors
Other factors emanating from the school covered several issues which includes sexual harassment from male teachers, the school not compelling students to learn, inability of some teachers to teach effectively for students to understand and negative attitudes of some teachers towards work.
The school not compelling students to learn is seen as a major issue affecting girl's performance, since a lot of them idle around or engage colleagues in conversation and noise making during preps which disrupt a lot of them from learning effectively. This factor borders on strict adherence to study time and its effective use in enhancing students learning. Even though the time is created for students to have personal studies, the respondents indicated that many of them do not use it properly. Three past students lamented that some teachers even facilitate this by engaging students in conversation during that time which disrupt others from learning.
On sexual engagement with teachers' four (4) of the past girls expressed worry about how some male teachers interfere with the prep time for individual studies and learning. The narration given indicates that some male teachers do come in the night to classes and engage with some students in conversation distracting other students from learning. A male teacher's response collaborated the students' accounts, where the teacher stated that one of the factors accounting for girls' inability to pass WASSCE is the harassment of student girls by some 'unscrupulous teachers'.

Teachers and Students Perception of Factors Influencing Girls Performance in WASSCE; The Case of a Girl Senior High School

Parental/Family Background Factors

The old students' responses indicated that family background factors like poverty, parental inability to support girls schooling/neglect affect them most in their learning. Many accounts where given were girls mindset are distracted from studies due to lack of basic needs. One past girl said, *I did not have basic textbooks to help me learn and even things like gari-*(a locally produced staple food) *and other provisions that most students come to school with, were difficult for me to come by*. The home background factors identified usually reflect in girls' school performance through parental neglect, inadequate provision of support for girls' education due to low socio-economic status or cultural values like not valuing girls education as necessary and lack of involvement of parents in monitoring or supporting the school to guide girls in their learning and development. Parental neglect or lack of support from parents affects their learning and the outcome. The parental neglect affects them mostly through lack of educational materials like textbooks, being able to afford the basic necessities of life like sanitary pads, soap. These were said to affect their concentration and hence the output of learning. The findings here are supported by (Chinyoko, 2013; Chinyoka & Naidu, 2014) who shows that poverty and material deprivation affects girls learning and learning outcomes.

Societal expectation of girls was also identified as a factor that contribute to girl's level of performance. According to the narration from the former students, they explained that some girls had mindset that education to a higher level is not their portion especially most girls from Islamic background tend to tune their minds to marriage and eagerly anticipate to complete school and marry, and some of them actually marry immediately after completing their secondary education. In another narration, it was captured that the societal expectation of girls also come from families where some families think girls do not need to obtain higher education and subsequently, such families rather pressurize girls at   this level to marry and when the girls disobey parental orders their parents tend to neglect them. This is largely backed by cultural practice of encouraging early marriage from families. Some girls are said to suffer parental neglect based on this if they defy family pressure for marriage and continue to advance in education. This assertion align with a teachers response who think that the girls are not determined to pass the examination as they are content with any grade that they attain. These findings are further corroborated by Yindol (2015) study that assessed the factors influencing Girl Child participation in Senior High School Education in the Bolgatanga Municipality of Ghana. With findings indicating girl child access and participation in Senior High School Education is influenced by bad cultural practices such as exchange marriage, betrothal, early marriages, and poverty coupled with parental attitude and perceptions of educating the Girl Child.   The family background factors identified in this study are seen as major barriers not only to girls educational attainment as evidence from Yindal (2015) study but they equally manifest in performance in examination limiting the chances of these girls social mobility out of poverty. The students in this part of the country are mostly from poverty stricken areas, however the findings of this study suggest that less chances of advancing in education which is hauled as panacea to poverty.

Other Contextual Factors

Other factors that are seen as major factors influencing the low performance are peer influence, overreliance on external help during examination, use of social media and engagement in sexual relationship with boys/men.

Peer influence was identified by both teachers and past students. Six (7) of the old girls and eight (8) teachers interviewed identified the peer influence as the critical factor limiting girls inability to acquire the necessary grades in the schools examination. The past students indicted that majority of the girls were being influenced by their peers to engage in bad conduct like not studying, lazing/idling about, engaging in sexual activities, playing truancy in school without parental and teachers knowledge. Some of the respondents indicated that some girls who fall victims in most cases will report to school very late by going to stay with men friends for some time before reporting to school or finding ways and means to always stay away from school without the knowledge of the school authorities and parents. Due to these engagements, some of such students who fall prey to peer pressure end up coming out with poor grades even though some might have been very good students.

Engagement in boy/girl sexual relation and peer influence were identified to be closely linked. These two factors were on the high side. Engagement in sexual relationship with boys has been pointed out by Amusala (2019) as being intense at adolescence and mostly tend to conflict in some ways for high school girls which often leads to poor academic performance. Amusala (2019) attributes levels of intelligence or patterns of thought to be greatly influenced at adolescence, and girls' attention mostly turn to focused on the opposite sex and concern with physical appearance. The challenges of adolescence crisis propel some girls to engage in intimate relationship with boys/males. Responses from the past students confirm this assertion as eight (8) of the respondents indicated the adolescence stage affects them most. They explain that engagement in these kind of relationship often compromise the attention on

studies as girls tend to concentrate on the boys rather than their studies. This they said is exacerbated by peer influence, parental neglect and lack of guidance on their conduct at this stage of their live.

Social media used is one other major factor that came from girls as well as the teachers. Respondents indicated the use of mobile phones were not helpful to students in their studies as most of them used these phones to chart and converse with their boyfriends particularly in the night to the detriment of their studies.

An equally important happening in relation to the examination is the overreliance on external help known as "apoo"-the leakage of examination questions. This factor was captured by teachers and the past students. In one narration an old girl had this to say;

"At the time of the examinations some of my colleagues suffered because they relied on 'apoo' from a certain guy who promised to give questions that were sure banker to land in the exams, which they contributed money and paid for. But when they entered for the exams they were swift as none of those questions came and they struggled to write as they had learn nothing besides what was given in the 'apoo'. This should have accounted for some of my colleagues not getting their papers".

In summary, varied factors diminished the ability of girls to excel in the final examination of senior high school which is a critical stage of girls at this level. The outcome of this level of education determine to a greater extend the progress of girls to higher levels of education and even job placed to a limited scale.

Conclusion

This study is a descriptive narrative of factors influencing the success and failure of girls in their final examination of secondary schooling using the case of a single school. The study explored the perception of past students who went through the school and completed with the experience of the school and examination alongside sample teachers who had experience of handling students to write the WASSCE.

The findings showed factors that determine the success of girls in the final examination were varied. The study finds school related and individual student factors accounting for girls success, while several factors including school related, individual factors, peer influence, social media usage and sexual relationship explains the low pass rate of girls in WASSCE. In all, the study finds individual ambition and efforts, self- discipline and determination on the part of the students defining success level together with the quantity and quality of teaching coupled with encouragement from teachers, conducive environment, and school discipline.

However, major factors identified to be limiting the ability of girls in acquiring the necessary grades in WASSCE ranging from school, individual, family background, peer and social media influence. The findings point to the need for school authorities, parents and other stakeholders to pay critical attention to these factors and work a way out to address them. This should be a priority area for all actors concerned with girls' education and women empowerment to design strategies that will enhance learning and learning outcomes instead of concentrating all efforts on only educational attainment.

Conclusions should however, be interpreted cautiously since they refer to a particular context and time and may not be generalized to all situations, their implications are very relevant for the design of educational-policy measures and school practices.

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Moderating Effect of Audit Committee Financial Expertise on Relationship between Monitoring Attributes and Audit Quality of Listed Oil and Gas Companies in Nigeria

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ABSTRACT: *Audit committee financial expertise, audit report quality, financial reporting accuracy, and corporate governance are under increased scrutiny. The audit committee, which is responsible for credible financial reporting, can play a significant role in overseeing the audit process. The study covered the period of 215–2919, and the* population consisted of ten listed oil and gas companies on the Nigerian Stock Exchange (NSE). Since Afroil Plc was delisted in 2009, it was excluded from the study population. Data was extracted from the companies' published annual reports and accounts, which *was analysed with the aid of Stata 13 version in order to obtain a result. Financial literacy appears to be more effective in diversified firms and in firms with mandatorily established audit committees. Independent directors serve a governance role that improves financial reporting quality, audit quality, and earnings quality. The study found that the audit committee's interaction with the audit committee has a strong statistical influence on the association between audit quality and non-executive directors.*

INTRODUCTION

Corporate scandals at the turn of the century, as well as the 2008 financial crisis, are the most recent events to pique worldwide interest in audit report quality, financial reporting accuracy, and corporate governance. As a result, the public has been paying close attention to the truth and openness of reported financial accounting figures. The magnitude of the problem has also created expectations of further regulation in the economy, which has had a significant influence on reporting, auditing, and governance. As a result, financial analysts, regulators, and investors have become more worried about the integrity of financial reporting, with audit quality serving as a key indicator.

The efficiency of corporate governance aligns managers' and owners' interests in one direction (Fama & Jensen, 1983). In light of the monitoring process, several other control mechanisms, notably shareholder compositions and audit committees, are adopted to assure the authenticity of financial reporting. These consist of the names of independent directors and non-executive directors, as well as the nature and identity of equity owners.

The roles of the audit committee include overseeing the financial reporting process and monitoring management because management intends to manipulate figures for their own interests. Accordingly, external auditors play the role of giving independent opinions on the financial statements of firms if the financial statements are prepared with due care to avoid any material bias or misstatements. Hence, the audit committee and external auditors play a significant role in ascertaining the validity, acceptability, and reliability of financial statements (Mbatuegwu & Musa, 2021).

Mbatuegwu, Aza, and Uwaleke (2019) asserted that the audit committee, which is responsible for credible financial reporting, can play a significant role in overseeing the audit process and helping to mediate disputes between the board and the auditor. The Blue-Ribbon Panel (1998) concerned audit committee knowledge and financial expertise as it could affect their effectiveness. The panel states that members of the audit committee should be financial experts. As a result, it can affect the monitoring process and possible financial fraud. Financial literacy appears to be more effective in diversified firms and firms with mandatorily established audit committees (Yoon, 2012).

Gao, Omar, and Shelley (2019) posit that companies with vibrant independent directors serving on the audit committee have higher financial reporting quality, more efficient audits, and higher earnings quality. This suggests that lead independent directors

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on audit committees serve a governance role that improves financial reporting quality, audit quality, and earnings quality. Independent directors are also audit committee members and create direct connections between audit committees, external audit firms, and companies' CEOs.

This study seeks to moderate the effect of audit committee financial expertise on the relationship between monitoring attributes and audit quality of listed oil and gas companies in Nigeria.

The need to ensure a sound monitoring system for corporate organizations cannot be overemphasized. This is based on the fact that an effective monitoring system is essential to improving the quality of financial reporting, which, in turn, has an impact on the confidence of investors.

In Nigeria, the oil and gas sector are pivotal to economic progress since the bulk of the government's revenue is generated from this sector. It is expected that this sector should receive the most attention in terms of monitoring and supervision, given its economic importance. However, the reverse is the case. Premium times Nigeria (2013) reported that Trafigura and Vitol are oil and gas companies suspected to be involved in siphoning $6.8 billion of crude oil revenues. Also, the cases of Willbros Group Inc., ABB Vetco Gray, Trafigura, and Vitol. According to the Department of Justice (2004) and (2008), ABB Vetco Gray and Willbros Group Inc. is a US company with a UK subsidiary in Nigeria that admitted to making corrupt payments to officials of oil and gas companies and its subsidiary NAPIMS to the tune of $1 million and $6.3 million to favour them in bidding and recommendation. According to Sanusi (2013), oil and gas companies have not remitted over $49.8 billion in proceeds from crude oil to the federal government. According to Vanguard (2017) and *Premium* Time (2018), the director of Ontario Oil and Gas Limited was convicted for 10 years for defrauding the Federal Government of Nigeria of the sum of N754 million with respect to oil and gas subsidy fraud that existed between 2012 and 2014. Not to mention the recent case of Oando Plc (2018), where the director of the company was found guilty of fraudulent financial reporting and was relieved from operating as the CEO of the company.

Consequently, to fill the existing gap in the literature, first, some of these studies were carried out in foreign economies, which, given the differences in economic variables, cannot be applied to the Nigerian situation for policy and decision-making because of the problem of external validity. Also, even the Nigerian studies were carried out in other sectors (Adeyemi & Temitope, 2010; Mgbame and Onoyase, 2015; Ndubuisi and Ezechukwu, 2017; Ebimobowei, 2013), and as such, their findings cannot be applied to the oil and gas sector given the differences in the nature and operations of such companies (Sectorial Peculiarities). Again, this study combines variables of both boards of directors and ownership structure (non-executive directors, ownership concentration, and audit committee) to constitute the monitoring attributes, which, to the best of the researchers' knowledge, have not been applied by previous studies. The timing gap will also be filled as this study uses data from the 10 listed oil and gas companies from 2017 to 2020.

Furthermore, the measurement of audit quality has been done using audit firm size for most of the previous studies. This study introduces other measures of audit quality, such as audit tenure and auditors' industry specialization, to ascertain the effect of each of the monitoring attributes on these individual measurements.

The study also interacts with the effect of audit committee financial expertise with monitoring attributes to ascertain their effects on audit quality. Given the problems articulated and the gaps existing in the literature, this study seeks to examine the moderating effect of audit committee financial expertise on the relationship between monitoring attributes and audit quality of quoted oil and gas companies in Nigeria.

1. What is the moderating effect of the audit committee's financial expertise on the relationship between non-executive directors and the audit quality of listed oil and gas companies in Nigeria?
2. What is the moderating effect of the audit committee's financial expertise on the relationship between ownership concentration and audit quality of listed oil and gas companies in Nigeria?

The broad objective of this study is to examine the effect of monitoring attributes on the audit quality of listed oil and gas companies in Nigeria. Specifically, the study aims to

1. identify the moderating effect of the audit committee's financial expertise on the relationship between non-executive directors and the audit quality of listed oil and gas companies in Nigeria.
2. Determine the moderating effect of the audit committee's financial expertise on the relationship between ownership concentration and audit quality of listed oil and gas companies in Nigeria.

The following hypotheses will guide the study:

H_{01}: Audit committee financial expertise does not significantly moderate the relationship between non-executive directors and the audit quality of listed oil and gas companies in Nigeria.

Moderating Effect of Audit Committee Financial Expertise on Relationship between Monitoring Attributes and Audit Quality of Listed Oil and Gas Companies in Nigeria

H₀₅: Audit committee financial expertise does not significantly moderate the relationship between ownership concentration and audit quality of listed oil and gas companies in Nigeria.

Audit Committee Financial Expertise

Researchers have defined audit committees in a variety of ways. According to Cadbury (1992), the audit committee is a formal institution used by corporate owners to discipline organizations. Morrin and Jarrell (2001) argued that an audit committee is a special group of experts that controls and safeguards the interests of capital market investors, corporate owners, managers, employees, suppliers, and creditors.

An audit committee is not only a group of people but also a set of processes, policies, laws, and institutions affecting the way a corporation is directed, administrated, or controlled. A perfect audit committee can strengthen intra-company control, reduce opportunistic behaviours and lower the asymmetry of information, so it has a positive impact on the high quality of disclosed information (Li & Qi, 2008).

The audit committee, thus, is considered to be an additional internal governance mechanism whose impact is to improve the quality of financial management of a company and enhance its performance. In this respect, an audit committee has four main characteristics that should be considered: audit committee independence, audit committee size, audit committee diversity, and audit committee meetings.

The Nortel failure illustrates the consequences of ineffective audit committees, where independent directors lacked understanding of due diligence and yet the audit committee failed in its duties to oversee the internal and external audit processes (Thain, 2004). Based on the literature, it would seem that the audit committee serves primarily to reduce agency costs and thereby improve the net performance of the firm.

The Concept of Audit Quality

There are many attempts to define the concept of audit quality either at the professional organization level or at the academic level. At the professional organization level, for example, the International Federation of Accountants (IFAC, 2009: 12) pointed to the concept of auditing quality in the international standard on quality control. It stated that "the objective of the audit firm is to establish and maintain a system of quality control to provide it with reasonable assurance that:

(a) the firm and its employees adhere to professional standards as well as applicable legal and regulatory requirements; and

(b) Reports issued by the firm or engagement partners are appropriate in the circumstances "(IFAC, 2009; 15). This means that the concept of quality from the perspective of IFAC lies in compliance with professional standards and legal and regulatory requirements.

In the same context, the International Auditing and Assurance Standards Board (IAASB, 2010) in its framework for audit quality mentioned that the purpose of an audit is to enhance the degree of confidence of intended users in the financial statements. This can be achieved through gathering sufficient appropriate audit evidence to express an opinion on whether the financial statements are prepared, in all material respects, by the applicable financial reporting framework. This indicates that the IAASB found a link between auditing quality and audit evidence that is used to express an opinion about firms' financial statements according to financial reporting standards.

ICAEW (2002) suggested a definition for audit quality by stating that, at its heart, audit quality is about delivering an appropriate professional opinion supported by the necessary evidence and objective judgments. As long as the auditors provide an independent audit opinion that is supported by adequate audit evidence, the regulator assumes that such auditors have performed a quality auditing service.

Also, Deis and Giroux (2002) argued that auditing quality is the auditor's ability to detect weaknesses and gaps in the accounting system for the client and the reporting. However, Copley and Doucet (2013) went in another direction by defining auditing quality as the application of professional standards related to fieldwork and reporting standards.

The importance of audit quality lies in the reduction and mitigation of agency conflicts, providing confidence and credibility in financial statements that have been audited. "Audit quality" is a set of methods and techniques that work to reduce errors and fraud. The probability of detection is a matter of competence, whereas the probability of revelation depends on the independence of the auditor. (Abu Ijela & Hamdan, 2010, Piot & Janin, 2005).

Measures of Audit Quality

Although several studies have sought to measure "actual" audit quality, what has prevailed in the literature, since DeAngelo's study (1981), are the metrics that try to capture "perceived" audit quality, such as (i) the auditor's size, particularly big-4, as in DeAngelo (1981), Ilaboya and Ohiokha (2013), Dang (2004), Gu, Lee and Rosett (2005), Behn, Choi and Kang (2008), Kanagaretnam,

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Krishnan and Lobo (2010), and Zagonov (2011); (ii) auditor specialization, as in Behn et al. (2008), Chambers and Payne (2008), Romanus, Maher, and Fleming (2008) and Kanagaretnam, Krishnan et al. (2009, 2010); (iii) auditor issuing going concern opinion as in Teoh and Wong (1993) and Ghosh and Moon (2010); and (iv) accrual models as in Dang (2004) and Behn et al. (2008). For this study, audit firm size is used as a measure of audit quality.

Summing up, DeAngelo (1981); Palmrose (1988); Deis and Giroux (1992); Becker et al. (1998); Francis and Krishnan, (1999); Krishnan and Schauer (2000); Kim, Chung, and Firth, (2003) and Krishnan, (2003) agree on audit quality as a function of audit firm size and demonstrate that larger (Big 8, Big 6, Big 5 or Big 4) audit firms possess a greater capacity to measure audit quality. Wooten (2003) found that detecting material misstatements is influenced by how well the audit team performs the audit, which in turn is influenced by the quality control system and management resources of the audit firm.

The Concept of Monitoring Attributes

Monitoring is the steady reflection and recording of activities that might take place in an organization. Monitoring involves the process of tracking, reviewing, and regulating the development of plans and goals described in the administration plan (Farber & David, 2005). In addition, monitoring consists of status reporting, development size, and outcome estimation (Guide, 2001).

In early 1967, the whole idea of monitoring attributes received great attention, although the expected functions of this committee were uncertain. The American Institute of Certified Public Accountants (AICPA) (1967) made some recommendations that audit committee boards be established so that external auditors can communicate and interact with the audit committee in respect to the organizational goals and objectives, which are materialistic in respect of audit or verification and classification to produce audit quality (Enofe, Aronmwan & Abadua, 2013). Furthermore, according to Onofe et al. (2013), the Security and Exchange Commission (SEC) issued accounting series No123 in 1972, requiring standing audit committees to be composed of outside directors.

Furthermore, apart from the Companies and Allied Matters Act (2004) as amended, which provides for the establishment of the audit committee (which is one of the numerous mechanisms for monitoring corporate organizations), in the work of Lindsell (1992), monitoring attributes are part and parcel of the audit committee mechanism in checking the quality, credibility, and objectivity of financial reporting because it forms part of accounting and audit oversight functions.

A company is an economic body in which the owner is expected to be separated from those that manage the business. Failure stands for the incapability of a concern to achieve its primary arm and objective, which is "profit-making" in the long run. On the other hand, failure is a term used interchangeably with pain, illiquidity, bankruptcy, unrelenting loss, liquidation, and winding up.

Executive Directors

According to the Australian Institute of Company Directors (2001), a non-executive director is not employed by the organization. This is not the same as an independent director who is not only not employed by the organization (non-executive director) but also has no relations with the organization other than being a director of the firm. Non-executive directors can additionally be referred to as' part-time ',' independent ', or 'external directors', taking all the essential actions as advisers to management and making certain that the enterprise is run in the nice pastimes of the shareholders (Houston & Lewis, 1992; Kakabadse & Kakabadse, 2007; David, Uwaleke & Azah 2020).

According to the Institute of Directors (2010**), a** non-executive director (which can be abbreviated as NED, non-exec, or NXD), or external director, is a member of the board of directors of a company or firm who does not fully participate or does not form part of the executive management team of the organization. Because they are not employed by the company or any of its associated ways, they are different from inside directors, who are members of the board who have served the organization or who have previously served as decision-making managers of the company or organization. (Mbatuegwu & Musa, 2021)

Directors that are more experienced, have specialist skills, and better networks are usually paid more by the marketplace. Zakaria (2012) required that one-third or two members, whichever is higher, of the total number of directors be independent. It also shows that directors with greater independence are often not rewarded.

Non-executive directors are outside directors who are independent of the company. They are also called "independent directors" because they have neither personal nor business relationships with the company (Ogbechie & Koufopoulos, 2010). A non-exec is any director who is not a representative or member of the immediate family of a shareholder and who has had no business relationship with the firm for the past three years or more.

Non-executive directors provide superior benefits to the company due to their independence from the management of the organization. This single act of independence attracted investors to invest more in the organizations as it helps them make better investment decisions. Furthermore, the presence of non-executives is generally believed to have provided better governance, effective monitoring, and quality.

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Ownership Concentration

Ownership concentration refers to the amount of time spent on the existence of large block holders in a firm (Thomsen & Pedersan, 2000). Usually, a stockholder who holds 5% or more of the company's equity is reflected as a major stockholder. The shareholding of an owner should be significant enough to provide for monitoring the actions of the management. The major shareholder can be an individual, a domestic or foreign corporation, an institutional investor, or the state.

Ownership concentration refers to the spread of the shares owned by a certain number of individuals or institutions; ownership mix, on the other hand, is related to certain institutions or groups such as governments, private companies, or foreign partners among the shareholders (Claessens & Djankov, 1998).

The role of ownership structure in the setting of concentrated ownership is to assess the cash flow contents with regard to the block holder's role in the perspective of diffused ownership. The accounting literature contains extensive research on how the agency problem between owners and managers affects earnings quality as well as the quality of accounting information of firms.
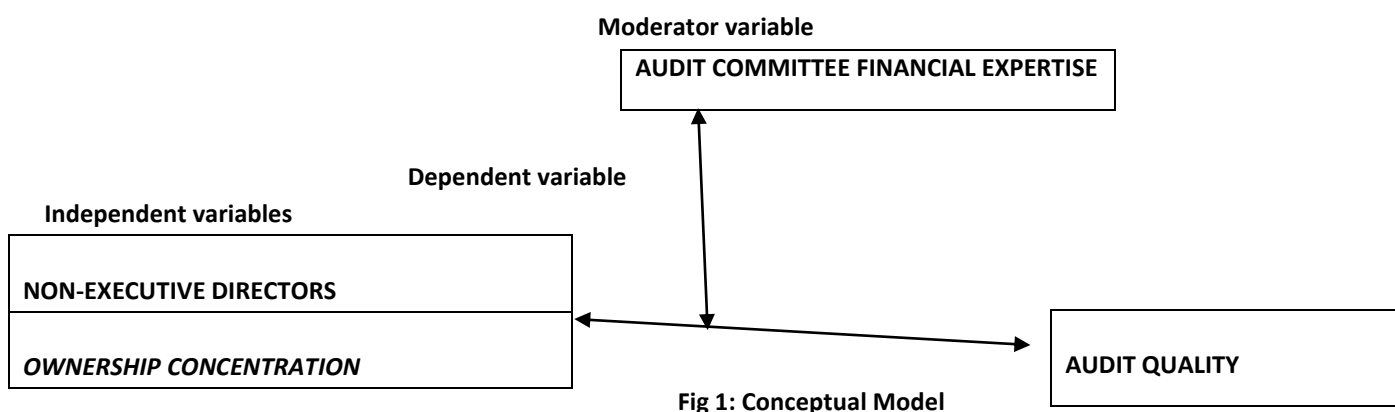

Fig 1: Conceptual Model

The audit committee's financial expertise, being the moderator, intervened in the relationship between the independent variables (non-executive directors and ownership concentration) and the dependent variables (audit quality) of oil and gas companies in Nigeria.

EMPIRICAL REVIEW

Audit Committee Financial Expertise and Audit Quality

Ojeka, Fakile, Iyoha, Adegboye, and Olokoyo (2019) examined the impact of audit committee objectivity (contingent on CEO power) on the quality of financial reporting in the Nigerian banking sector. The study adopted a survey research approach and secondary data was extracted from the financial statement. The OLS and LSDV analyses were used to investigate the impact of audit committee objectivity on the quality of financial reporting with or without CEO power and influence. The findings showed that while audit committee independence impacts positively on the relevance and reliability of the financial report, the same cannot be said when there is CEO power. CEO power in the audit committee mitigated the benefits of independence and caused its overall effects on financial reporting quality to be of no significance in terms of relevance and reliability. This study adopted a survey research approach, while this current study will adopt a descriptive approach, extracting secondary data from annual reports of oil and gas companies from 2009 to 2018.

Khudhari, Al-Zubadi, and Ali (2018) explored the impact of internal and external governance mechanisms such as board size, audit committee independence, audit committee expertise, and audit committee meetings on the quality of audits in selected firms. The study was carried out on a sample of Iraqi non-financial firms. The dependent variable is the audit quality, measured as a dummy variable, and it receives 1 if a firm receives audit services from one of the big four auditing firms and zero otherwise. To achieve the research objectives, the study uses a logit regression technique. The results indicate that there was a positive relationship between audit quality and the percentage of non-executive directors in the audit committee.

This study, although employing the use of Big4 to measure audit quality like the current study, was done in a foreign country with a difference in economic variables, which accounts for the measure difference in this study.

Asiriuwa, Aronmwan, Uwuigbe, and Uwuigbe (2018) examined audit committee attributes and audit quality with emphasis on the specific requirements of the 2011 SEC code. The study applied the deductive approach via the ex post facto research design and the binary probit regression model in analyzing the various hypotheses put forward in the study. The data used for the study was gathered for 150 firm-year observations from the annual reports of quoted companies on the floor of the Nigerian Stock Exchange.

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Findings from the study revealed that audit committee size, frequency of meetings, number of experts, and overall effectiveness all have a positive relationship with audit quality. However, only size and overall effectiveness were significant in their relationship. Audit committees possessing greater levels of financial expertise are associated with higher audit fees. Ghafran and O'Sullivan (2017) investigate the impact of audit committee expertise on one measure of audit quality: audit fees paid by FTSE350 companies. Their findings highlight the usefulness of segregating financial expertise between specialists and non-specialists, something which regulators in the UK and the USA currently do not do. This study was carried out by the two economic powers in the world, which, given the level of our economy, their outcome cannot be used to make decisions.

The results show that audit committee expertise and meetings have positive and non-significant effects on the audit quality of listed consumer goods companies in Nigeria. This study is similar to the current study concerning this particular variable since it measured audit quality using the size and also used multiple regression as a statistical technique. However, the study of sectorial peculiarities calls for a major difference in the world.

Non-executive Directors and Audit Quality

Shukla, Narayanasamy, Ayyalusamy, and Pandya, (2020). Observational research explores the impact of independent directors (non-executive directors) on the business risks of Indian banks. The paper is based on data collected over seven years (2009–2016) for a set of 29 Indian banks making up the National Stock Exchange 500 Series. Data on the independent directors of the sampled banks is extracted from the bank's annual reports, while data on the contingent and control variables is obtained from the Ace Equity and Reserve Bank of India databases. The research uses a panel data methodology to analyze the data generated by the sample banks. The study concludes that independent directors are increasing business risks for Indian banks (measured through equity beta). This study is similar to the current study concerning this particular variable because it measured the consistency of the audit using its size and also used multiple regression as a statistical technique. However, the analysis of the sector's peculiarities calls for a significant difference throughout the world.

Akhidime (2015) examined the impact of the board structure of Nigerian banks on the audit quality. The study is based on the published audited accounts of 19 banks that were selected by simple random sampling technique from the population of the 25 Nigerian banks over the post-consolidation/reform period of five years. The variables of the study were analysed using binary logistic regression analysis. The hypotheses of the study were tested using F-ratios. From the results of the pooled binary regression of the pooled data at a 5% level of significance, Results of the study confirm that non-executive directors positively impact the banks' audit quality. This study was on Nigerian banks and used logit regression as a statistical technique for data analysis, while this current study will be on oil and gas companies and will employ multiple regression analysis as a technique for data analysis, giving us the problem of sectoral peculiarity and differences in statistical techniques for analysis.

Adelopo (2010) ascertained the effect of non-executive directors on audit quality in non-banking institutions. The study covered a period between 2002 and 2008. NED was measured using the proportion of non-executive directors on the board, and audit quality was measured using total fees paid to auditors. The study used regression analysis as a statistical tool. The result indicated that the higher the number of independent non-executive directors there are on the board, the higher the total fees (both audit and non-audit) that are earned by the auditor from their client. The result suggests that rather than reducing the value of services purchased from the external auditors, non-executive directors will signal preferences for auditing and reporting quality and auditing coverage by buying more services from the auditors to signal transparency to the market and boost market confidence in the reports of the firm. Although this study was done in Nigeria, the data for the study was collected up to 2008, and given the trend of occurrences in the Nigerian economy from 2008 to date, the result of the study cannot be used to make an informed business decision on current issues concerning board structure and audit quality.

Adeyemi and Fagbemi's (2010) study provided evidence on corporate governance, audit quality, and firm-related attributes from a developing country, Nigeria. Logistic regression was used in investigating the questions that were raised in the study. Findings from the study show that ownership by the non-executive director has the possibility of increasing the quality of auditing. Evidence also exists that the size of the company and business leverage are important factors in audit quality for companies quoted on the Nigerian Stock Exchange. The study suggests that the composition of non-executive directors as members of the board should be sustained and improved upon to enhance audit quality. The findings of the previous study cannot be used to make informed decisions in the oil and gas sector based on sectoral peculiarities.

Concentration of ownership and audit quality

Murtaza, Noor, Aguir, and Batool (2020) research on the role of ownership concentration and dividend policy in the firm production of Pakistani chemical industry firms. The research used secondary data from the annual reports of the companies listed on the Karachi Stock Exchange (KSE). Nevertheless, the criteria for inclusion of the 26 publicly traded companies are from 2012 to

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2017. The study was based on the Least Squares Generalized Model. The findings show that the concentration of ownership has a clear positive association with the financial performance of the company. This argues that larger shareholders should attribute the alignment of management incentives to shareholder interests. They're also monitoring the team very precisely and effectively. The dividend strategy has a good relationship with ROA. Leverage and tangibility have a strong negative relationship with firm performance. The study was performed abroad and was not at the critical time of COVID-19. Also, it cannot be used to make decisions in the oil and gas sector based on sectoral peculiarities.

Nam, Chi, and David (2020) investigate corporate governance connections with firm risk-taking and results in a traditional border equity market marked by a high concentration of ownership and poor investor security. Using a wide sample of Vietnamese listed companies and finding no association between the concentration of ownership and the profitability of the company, There is a non-linear relationship between the concentration of ownership and the value of the firm, and concentrated ownership increases the risk of accounting success. However, there is no evidence of a correlation between the concentration and the risk of market performance. In the end, the results confirm the important discrepancies in the usage of the two output alternatives. The results of the previous study cannot be used to make more informed decisions in the oil and gas sector based on sectoral peculiarities.

Alzeaideen and Al-Rawash (2018) examined the combined effect of ownership concentration, foreign ownership, and institutional ownership on the audit quality of listed companies on the Amman stock exchange. The sample of the study consisted of 132 companies from 2005 to 2016. The analysis of logistic regression was used to investigate the relationship between the audit quality measured based on the audit firms' size as a dependent variable. The results provided evidence that foreign ownership, institutional ownership, and ownership concentration have a positive and statistically significant effect on audit quality. The current study differs significantly from the current study because it will be a combination of monitoring attributes and not restricted to only ownership structure as a surrogate for audit quality. Other variables such as board structure and audit committee effectiveness are included, which accounts for the significant difference. The current study will use multiple regression against the logit regression used in this study.

Rad, Salehi, and Pour (2016) assessed the effect of the interaction of audit quality and ownership structure on earnings management of listed firms on the Tehran Stock Exchange. The variables examined are auditor reputation, auditor tenure, ownership concentration, and institutional ownership as indicators of audit quality and ownership structure, respectively. Also, the absolute value of the discretionary accruals model of Modified Jones (1995) as a direct indicator of earnings management has been used. 100 firms from listed firms on the Tehran Stock Exchange for 5 years (2009-2013) have been tested. Multiple linear regression models with panel data and fixed effects are used. The results of the research hypotheses show that ownership concentration weakens the negative impact of auditor reputation and auditor tenure on earnings management. The measure of audit quality for the current study differs from the previous study as it will use audit firm size as a measure of auditing quality.

THEORETICAL FRAMEWORK

For the purpose of this study, theories such as agency theory and source dependency theory were succinctly discussed. However, agency theory provides a backdrop against which this study stands.

Agency Theory

An agency theory connection is defined as a contract under which one or more people (the principals) engage another person (the agent) to perform some service on their behalf that involves delegating some decision-making authority. Jensen and Meckling (1976) essentially describe the relationship between two parties: the owner as a principal and management as an agent. The theory states that the separation of ownership from control of modern-day businesses has turned the relationship between the owners (shareholders) and controllers (managers) into that of an agent and a principal.

More so, Fama and Jensen (1983). Shleifer and Vishny (1986) note that strong corporate governance within a firm would moderate the problem of information asymmetry and reduce agency costs through the alignment of interests between the managers and shareholders. The theory is relevant to this study because higher audit quality could be expected in firms with stronger corporate governance.

Resource Dependence Theory:

The resource-based theory of the firm, propounded by Wernerfelt (1984), is regarded as one of the theories of strategic management that is widely referenced, particularly because of its practical relevance to contemporary management practices. Resource dependence theory provides a theoretical foundation for the role of the board of directors as a resource to the firm (Johnson, 1996; Hillman & Cannella, 2000). Penrose (1959) stressed the importance of unique bundles of resources and firm control that are crucial for its growth.

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The resource dependence theory contends that organizations attempt to exert control over their environment by co-opting the resources required to survive (Pfeffer & Salancik, 1978). From this point of view, firm governance structures and board composition are viewed as resources that can add value to the firm. (Barney, 1991; Daft, 2006; Mbatuegwu, 2021).

RESEARCH METHODOLOGY
This study adopts a descriptive correlational research design to investigate the moderating effect of monitoring attributes on audit quality among listed oil and gas companies in Nigeria.

Population of the Study
Table 1

S/N	Name of Company
1	Forte Oil Plc
2	MRS Oil Nigeria Plc
3	Total Nigeria Plc
4	Mobil Oil Nigeria Plc
5	Conoil Plc
6	Afroil Plc **
7	Oando Plc
8	Eterna Oil & Gas Plc
9	Japaul Oil & Maritime Services Plc
10	Beco Petroleum Products Plc

As of December 2019, the population consists of 10 listed oil and gas companies on the Nigerian Stock Exchange (NSE) as of December 2019, though the number of companies was reduced to a working population of nine (9). Afroil Plc (**) was excluded from the study population because it was delisted in 2009 and had no published financial reports for the 2015–2019 period. Secondary data was extracted from the companies' published annual reports and accounts, as well as the NSE factbook, for the relevant years and analyzed using Stata 13 version.

Logit regression is used to examine the moderating effect of audit committee financial expertise on the relationship between monitoring attributes and audit quality of listed oil and gas firms in Nigeria. The model is for testing the hypothesized link between a non-executive director, ownership concentration, and auditing quality in quoted oil and gas companies in Nigeria.

Though employing a more comprehensive approach, the study builds on the previous models of Adeyemi and Fagbami (2010); Salleh et al. (2006); Abdullah (2008); Seyedah (2016); Glover-Akpey and Azembila (2016) with minor modifications to suit the particular purpose of the study. The model is presented below:

$AQ_{it} = \beta_0 + \beta_1 NED_{it} + \beta_2 OC_{it} + \beta_5 ACFE_{it} + \beta_6 NED_{it} *ACFE_{it} + \beta_7 OC_{it} *ACFE_{it} + \beta_7 IS_{it} *ACFE_{it} + \beta_8 ID_{it} *ACFE_{it}\ e_{it}.....$ (i)

Where;

AQ stands for Audit Quality.

NED=Non-Executive Directors

OC stands for Ownership Concentration.

ACFE= Audit Committee

β_1-β_3 = are the parameters estimated or coefficients in the equation.

β_0 = is the intercept

e_{it}=error term

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MEASUREMENT OF VARIABLES

Dependent variable

Many researchers measure the concept of audit quality by using different proxies of audit quality. For example, Manry et al. (2008) used an estimated discretionary accrual to measure audit quality, and Li and Lin (2005) used non-audit fees to examine audit quality.

For the current study, the dependent variable AQ will be measured using a proxy of Audit Quality Assessments (AQ) and coded as (1) or else 0. Also, in line with DeAngelo, 1981; Deis & Giroux, 1992; Becker et al., 1998; Francis & Krishnan, 1999; Krishnan & Schauer, 2000; Krishnan, 2003; Okoli & Izedonmi, 2014; Okoli, 2014; Ugwunta, Ugwuanyi & Ngwa, 2018, Mbatuegwu 2021.

Descriptive Statistics

This section contains the description of the properties of the variables, ranging from the mean of each variable to the minimum, maximum, and standard deviation.

Table 2: Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max
AQ	.6777778	.4699457	0	1
AC*NED	.230867	.095639	.137648	.412568
AC*OC	.346754	.146834	.116754	.643875

Source: STATA OUTPUT 2021

Table 2. also showed that the moderating effect of the audit committee financial expertise on non-executive directors improved audit quality by 23%. This means a mix of the audit committee and non-executive directors can improve the quality of audits of financial reports in oil and gas firms in Nigeria. The minimum contribution is 13% while the maximum is 41%. The Table also indicated that the moderating influence of audit committee on ownership concentration and audit quality of oil and gas firms in Nigeria have an average of .34% during the period of the study, from the mean of .346754 with a standard deviation of .146834, and the minimum and maximum value of .116754 and .643875 respectively. The standard deviation suggests that the data is spread around the mean.

Test for Normality

An assessment of the normality of data is a prerequisite for many statistical observations because normal data is an underlying assumption in parametric testing. The Shapiro-Wilk W test for normality is the most powerful in most situations.

Table 3: Normality Test

Variables	Obs	W	V	Z	p-values
AC*NED	90	0.874563	7.654	4.875	0.00004
AC*OC	90	0.86765	8.675	4.876	0.00000

Source: STATA Output, 2021.

From table 3, it can be seen that the total number of observations was 90, while the W value stood at 0.874563 and 0.86765 for audit quality, the interaction between institutional ownership and independent directors, respectively. The result, as indicated, showed that the data for all variables is normally distributed. This is based on the submission that the test statistic W may be written as the square of the Pearson correlation coefficient between the ordered observations and a set of weights which are used to calculate the numerator. Since these weights are asymptotically proportional to the corresponding expected normal order statistics, W is roughly a measure of the straightness of the normal quantile-quantile plot. Hence, the closer W is to one, the more normal the sample is.

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Test for multicollinearity.

The non-existence of multicollinearity is a key assumption of linear regression analysis. Multicollinearity occurs when the explanatory variables are not independent of each other. Multicollinearity is examined using tolerance and variance inflation factor (VIF) values. The result of the multicollinearity test is shown in the table below.

Table 4: Tolerance and VIF values

Variable	VIF	1/VIF
AC*NED	1.56	0.3426
AC*OC	1.48	0.4325
Mean VIF |	2.47	

Source: STATA Output, 2021.

Based on the evidence presented in Table 4, it can be concluded that there is no Multicollinearity problem. This is because the VIF values for all the variables are less than 10 and the tolerance values for all the variables are greater than 0.10 (rule of thumb). Meanwhile, the goodness of fit test which is a statistical hypothesis test to show how sample data fit a distribution from a population with a normal distribution shows a Pearson chi2 value of 81.57 and a corresponding probability of 0.0044. This indicated that the adjustment of the observations problems is well and no errors exist underlining the general fitness of the model.

Regression Results

The results of the logistics regression model are presented below as well as the test of the hypotheses.

Table 5: Logistic Regression Result

AQ	Coefficient	Z	p-value	Remark
NED	5.688247	1.87	0.061	Insignificant
OC	-.1014958	-10.34	0.000	Significant
AC*NED	7.241269	2.22	0.027	Significant
AC*OC	-4.135281	-2.77	0.006	Significant
R-Square	0.4338			
LR chi2(4)	45.13			
Prob. of chi2	0.0001			

Source: STATA Output, 2021.

The R-square value showed the level at which the explanatory variables explain the dependent variable. Table 5 revealed that the R-square is 0.4338. This implied that the monitoring variables in the study explained the audit quality (AQ) to the tune of 43%. The value of F - statistic is 45.13 with a probability of chi2 = 0.0001. The probability of chi2 is significant at 1%, indicating that the model is fit. This serves as substantial evidence to conclude that the monitoring attributes selected can be used to predict the dependent variable in the area covered by the study.

Audit committee financial expertise does not significantly moderate the relationship between non-executive directors and audit quality of listed oil and gas companies in Nigeria.

The result of the logistics regression shows that the moderating effect of audit committee financial expertise has a significant effect on the relationship between non-executive directors and audit quality of quoted oil and gas companies in Nigeria. This is

evidenced by the p-value of 0.027 and coefficient of 7.241269 which evidences that the interaction of audit committee expertise has strong statistical influence on the association between audit quality in the area covered by the study. Based on this, the study rejects the null hypothesis which states audit committee financial expertise does not significantly moderate the relationship between non-executive directors and audit quality of listed oil and gas companies in Nigeria.

Audit committee financial expertise does not significantly moderate the relationship between ownership concentration and audit quality of listed oil and gas companies in Nigeria.

Again, the logistic regression shows that audit committee financial expertise as a moderator has a significant negative effect on the relationship between ownership concentration audit quality of listed oil and gas companies in Nigeria, from the coefficient of -4.135281 with z-value of -2.77, which is statistically significant at 5% level of significance (p-value of 0.006). This result suggests that an increase in ownership concentration is likely to affect the audit quality of financial reports of firms in the oil and gas sector. Based on this, the study rejects the null hypothesis which states that audit committee financial expertise does not significantly moderate the relationship between ownership concentration and audit quality of listed oil and gas companies in Nigeria.

DISCUSSION OF FINDINGS

Moderating Effect of Audit Committee Financial Expertise on monitoring attributes and Audit Quality.

The study tested whether audit committee financial expertise as a moderator has any significant effect on the relationship between non-executive directors and the audit quality of listed oil and gas companies in Nigeria. The study found that audit committee financial expertise significantly moderates the relationship between non-executive directors and the audit quality of listed oil and gas companies, suggesting that non-executive directors help to ensure high-quality audits, especially when the company has audit companies' members with finance and accounting expertise.

Consequently, a higher proportion of non-executive directors on boards are expected to induce a more effective monitoring function which then leads to more reliable financial reporting. This finding supports those of Olatunji and Stephen (2011), Akhidime (2015), Ibrahim and Jehu (2018), Abdulmalik (2015) who revealed that non-executive directors have a significant influence on audit quality. Suggesting that an increase in the number of non-executive directors does enhance the audit quality as predicted by the agency theory.

The moderating role of the audit committee financial expertise has a positive and significant influence on the relationship between ownership concentration and audit quality of listed oil and gas companies in Nigeria. The import of this finding is that there is a likelihood that an effective audit committee expertise will contribute to improving the influence of ownership concentration on audit quality.

The formal linkage between the board of external auditors is to typically collaborate with management in selecting the external auditor, often subject to shareholder ratification. Since the auditor is to look to the board as its client, it is reasonable to expect the board to review the overall planned audit scope and proposed audit fee.

These relationships are guided by agency theory. The finding is in line with the findings of Musa and David (2020), David, Uche, and Azah (2019) Ojeka, Fakile, Iyoha, Adegboye and Olokoyo (2019), Mohamed and Ozkhan (2010), Akhidime (2015), Khudhari, Al-Zubadi and Ali (2018), Ghafran and O'Sullivan (2017).

Summary

The operation of a good monitoring system reduces the negative effects of earnings management as well as the likelihood of creative financial reporting arising from fraud and errors. Several corporate reporting failures over the years have been attributed to the inherent weaknesses in the monitoring systems of companies. The study examined the combined effects of non-executive directors, ownership concentration and audit quality of quoted oil and gas companies in Nigeria.

The study examined issues regarding corporate monitoring and audit quality from a global perspective and in Nigeria. It highlighted the scant literature as well as an increasing level of poor governance and oversight roles, which results in poor audit quality of financial reports. To investigate the effect of monitoring attributes on audit quality, some basic research questions, research objectives, and hypotheses were raised in line with the specific variables of the study. The study spans from 2015 to 2019. The chapter also highlighted the significance of the study within the framework of various stakeholders.

The study employed a correlational research design and used data from all the ten oil and gas firms listed on the Nigerian stock exchange. The empirical review was also, done to identify the gaps the study intended to fill. The study discussed theories such as the agency theory, stewardship theory, resource dependency theory, and positive accounting and through the filtering process, nine of the companies were used for data collection.

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Finally, the result of the logistic regression which was obtained with the aid of STATA 13 was statistically described, presented, analyzed, and discussed using the software. The result of the regression analysis showed that moderating effect of audit committee financial expertise and monitoring attributes can be used to predict the audit quality of financial reports of oil and gas companies in Nigeria.

Specifically, the result showed that non-executive directors' ownership concentration has a significant effect on the audit quality of quoted oil and gas companies in Nigeria when moderated by audit committee financial expertise.

CONCLUSION

There is a significant positive association between monitoring attributes and audit quality of listed oil and gas companies in Nigeria when moderated by audit committee financial expertise.

The study has statistical evidence to conclude that ownership concentration has a strong influence on audit quality. This infers that companies with concentrated ownership have large shareholders that can affect management, especially when they become board members, and they have a lot beyond the board. These perceptions can be used to predict the audit quality of companies. Financial mastery is fundamental to guarantee that the audit committee satisfies their essential obligations of regulating the financial reporting and upgrading financial reporting quality. The Financial Expertise of the Audit Committee is essential since the committee is in charge of the auditing process and audit quality. These relationships are guided by agency theory as they are directly related to the functions of the audit office.

RECOMMENDATIONS

The study recommends that the composition of non-executive directors as members of the board should be sustained and improved upon to enhance audit quality. It also recommended that companies should increase the percentage of block holders as this may cause positive changes in an organization. This will increase the preference for big4 external auditors since strict monitoring is required by block holders who are willing to pay any cost.

Contribution to Knowledge

This research contributed to the knowledge in the study of the effects of corporate governance on the quality audit of listed oil and gas companies in Nigeria by:

1. Showing the importance of the Non-Executive Director, Ownership Concentration, and Audit Committee to the quality audit level of the listed oil and gas companies in Nigeria.
2. This opens the floor for further research in corporate governance and audit quality in the oil and gas sector to fill the gap of inadequate research work in the area.
3. immense significance for policy formulation, practice, and contribution to knowledge.

Limitations of the Study

The impact on the compensation exposed by the disparity in the percentages of ownership concentration named by one or more investors could also be an attractive problem to be addressed.

Suggestion for Studies

The new code of corporate governance addresses so many issues bothering on monitoring and governance hence, new endevours can make massive use of the new code. The study dis nit capture moderating variables as such other studies may consider variables that were not used in this study.

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Educational and Mandatory Fitness Standards in the Firefighting Profession

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ABSTRACT: Firefighting is a physically demanding and hazardous occupation. The hazards of firefighting include exposure to flames and heat, building collapse, and continuous work in a toxic environment, which are the most commonly perceived risks, but the most deadly hazard to on-duty firefighters is that of Sudden Cardiac Death. This qualitative study aimed to explore the educational programs available to the firefighters that can potentially reduce the on-duty sudden cardiac deaths and determine why there are no mandatory fitness standards. The study aimed to offer those responsible for the training of firefighters the specific training and education available and how to motivate firefighters to accept the training and education. The researcher conducted interviews with firefighter respondents who discussed their views regarding firefighter physical demands, mandatory training, and their perceptions on general fitness requirements to meet the research objective. From the evaluation of the findings, it was noted that firefighters have a negative attitude towards training. However, it is evident that physical training is necessary to ensure that the firefighters remain in the best shape to carry out their duties successfully. Besides, fitness will ensure a reduction of the sudden cardiac deaths that have become prevalent among on-duty firefighters. The lack of awareness is a problem that needs to be evaluated through a collaborative approach involving all the stakeholders.

KEYWORDS- Firefighter Education, Healthcare Research, Physical Training, Educational Training, Human Subjects

I. INTRODUCTION

During the detailed documentation process of the NFPA from 1987 through 2019, there were a variety of factors that caused the death rate for on-duty firefighters to fluctuate. The majority of the death rate fluctuations resulted from incidents involving multiple firefighter deaths, including the September 11, 2001, terrorist attacks that resulted in 341 firefighter deaths at the World Trade Centers in New York[1]. The number of deaths as a direct result of the 9/11 attacks is continuously rising as a number of the 15,700 emergency responders are dying from the toxins they were exposed to[2]. Though trauma type of duty-related injuries and deaths are what are perceived as the most dangerous to firefighters, the actual leading cause of on-duty firefighter deaths is Sudden Cardiac Death[3].

Cardiac-related issues and Sudden Cardiac Death (SCD) have been the causes of death for on-duty firefighters before official accounting began in 1977 by the NFPA. Fire ground deaths related to "heart attacks" are documented in many records of US fire departments and media reports back to the 1800s[4]. With the exception of 2001, SCD has been the leading cause of death of on-duty firefighters, according to the NFPA reports, since 1987[5]. The number of overall on-duty deaths has fallen to its lowest number since official reporting began, and the trend remains the same: firefighters are more likely to die from SCD than any other fire-related event[6].

The fire service has recognized the risk to firefighters from cardiac-related medical issues and developed several pre-hire and pre-entry tests to apply for the job of a firefighter. In a 2011 survey of executive fire officers, 88% reported the use of Physical Abilities Tests (PATs) for pre-hire screening[7]. Since then, other fire departments have also added PATs to the pre-hire process as one of the primary requirements of the original application process. Even though pre-hire PAT numbers are closing in on being required to work at all fire departments in the U.S., only a quarter of these departments require physical standards as a yearly measurement of health and endurance. Fire service administrators report this lack of mandatory yearly physical fitness assessments from pushback by firefighters themselves[7].

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Physical and Health Requirements of Firefighters

As physical abilities tests continued to be recognized as a measurement of physical standards, the correlation was also recognized that those able to pass the tests were more physically conditioned and therefore healthier. Through the detailed tracking of firefighter injuries and deaths that started in 1977, there was a clear understanding that overall Sudden Cardiac Death (SCD) was the leading cause of on-duty firefighter deaths[8]. Sudden Cardiac Death is not a rare phenomenon in the U.S. and occurs at an approximate rate of 6 in every 100,000 Americans. Sudden Cardiac Death is immediate compared to other types of cardiac issues, and the sufferer will see a full cessation of cardiac activity within an hour of the first symptoms if symptoms are even recognized. Causes related to SCD can be genetic, structural, or coronary artery disease[9]. According to the American Heart Association (AHA), the lack of physical activity is one of the causes of coronary artery disease that contributes to SCD. An overall cardiorespiratory fitness leads to the reduction of coronary artery disease and other health issues, including cancer and stress[9].

The evidence that SCD is the leading cause of on-duty deaths among firefighters is well documented[10], as is the research that coronary artery disease is one of the three contributing factors in SCD. The two other contributors to SCD, genetics and heart structural damage, are detectable through cardiac screening that is required at the entry-level for firefighters and firefighter trainees[11]. Therefore, it can be concluded that firefighters may develop coronary artery disease over time. Maintaining physical standards requires the firefighter to stay active, and with standards directed towards cardiorespiratory and strength training, the firefighter will also reduce the risk of coronary artery disease. With all these factors being well documented and known to firefighters, there continues to be resistance to mandatory yearly physical fitness standards in the fire service.

The fire service has a multitude of governing agencies and associations representing government entities, chief executive officers, and the firefighters themselves. The majority of these groups, including the firefighter's union, recommend mandatory fitness regimens and standards, but only approximately 27% of agencies participate in such programs[7]. Originally, costs and the perception of firefighters working out on duty were limiting factors to implementing fitness standards. Fire service administrators worried that public perception would be a barrier to firefighters working out on duty, but that was later proven insignificant when the general public became educated in how maintaining fitness standards are necessary for a para-military organization[12]. As fitness levels were increased among firefighters, the frequency of work-related injuries, such as strains and sprains, reduced, saving agencies money[13]. Costly workout equipment was many times purchased with grant money or donations from businesses and the firefighter associations. Additionally, firefighters developed or adapted workout routines that both increased their fitness levels and incorporated routine work tasks[13]. Overall, maintaining a physical standard was both a cost and a lifesaving venture for firefighters. The resistance from implementing these programs originates from the line firefighters and officers who would be required to maintain the standards.

II. RESEARCH PROBLEM

The problem is that there are no standardized physical requirements for firefighters, triggering various medical health risks in the U.S. In the U.S., on-duty firefighter deaths and serious injuries are meticulously tracked and reported[14]. For the last decade, the leading causes of on-duty firefighter deaths have been due to sudden cardiac arrest. Though this data is readily available, there is a gap in information as to why there is no mandatory training or education available to prevent the incidents.

The National Fire Protection Association (NFPA) has been studying firefighter deaths in the U.S. since 1977[5]. The data collected includes the cause of death, the activity the firefighter was involved in, and other demographics, including age and sex[5]. There are studies related to the cause of the cardiac incident, including autopsy reports indicating the percentage of firefighters who had pre-existing cardiac disease. The physiological factors that caused the heart to fail are also documented in detail, showing the medical factors that contributed to mortality[8]. Researchers have investigated the effects of firefighters being exposed to high heat that may cause blood clots[3,6]. Additionally, there is literature reviewing the need for firefighter on-duty fitness programs and the barriers to those programs being put in place. The information that is lacking is to what training programs are available to educate firefighters in preventing cardiac risk factors and why mandatory physical fitness standards have not been put in place in the fire service when there is evidence that SCD is the leading cause of on-duty firefighter deaths.

The main question of this study is: What are the effects of mandatory physical training and education for firefighters? Additional questions for this qualitative research related to the firefighter's perceptions and experiences were:

RQ1. How does physical training impact on-duty cardiac arrest cases among the firefighters?

RQ2. What educational and physical standards are required to improve firefighters' health and

occupational readiness?

RQ3. What is the perception of firefighters towards mandatory physical fitness training?

III. LITERATURE REVIEW

On Duty Cardiac Arrest Among the Firefighters

There are three main specific firefighting duties: alarm response, fire suppression, and training[8]. All these duties are associated with high risks of death as a result of cardiac-related events. The greatest risk of cardiac death often occurs during or within a short period after fire suppression, a period when the odds are 10-130 times higher than during fire station activities[8]. Moreover, strenuous physical exertion, especially among people unaccustomed to such duties, has been identified as a trigger of SCD in the general public[15]. It has been established through research that firefighting is a strenuous activity, with evidence showing that the firefighting activity requires spending a considerable amount of energy of between six and thirteen metabolic equivalents (METs)[15]. Other studies have also established that firefighting places considerable strain on the cardiovascular system, including increased coagulatory state, reduced plasma volume, impaired endothelial function, reduced diastolic function[8,16], and optimal or near-optimal heart rate[16]. These physiological changes have been found to cause plaque interference, thrombotic occlusion, and myocardial ischemia, which contribute to a cardiac event, particularly among people with underlying disease. As a result, various studies have suggested that the strenuous nature of firefighting work could singularly, or together with other common firefighting physiologic stressors like fire-ground contaminants' exposure, elevated sympathetic nervous system, dehydration, and heat stress, precipitate cardiac deaths among vulnerable firefighters[8,9].

Impact of Training on On-Duty Cardiac-related Cases

Sudden cardiac events have been identified as the leading cause of on-duty-related deaths since the NFPA started tracking on-duty firefighting fatalities more than four decades ago. SCD has consistently represented the largest percentage of on-duty-related annual deaths among firefighters, averaging 43% over the last three decades, as illustrated in figure 1[8].
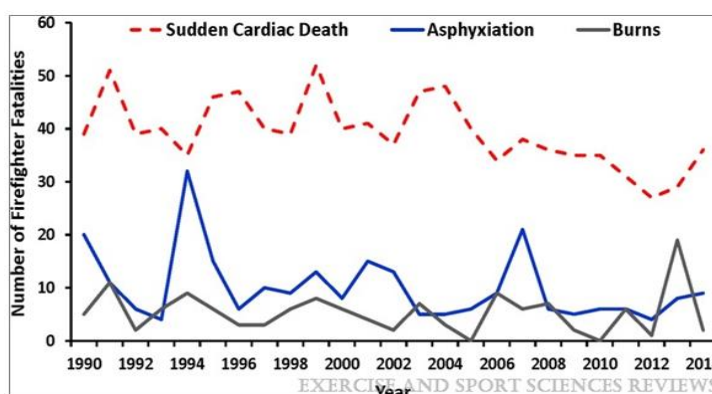
The above percentage is conspicuously high compared to the death of other public safety workers such as police officers and emergency medical service workers, whose deaths account for 7% and 11%, respectively. However, the number of cardiac fatalities has been trending downwards, as evidenced in figure 1. Such an encouraging trend could be attributed to on-duty training efforts undertaken by bodies such as the National Volunteer Fire Council (NVFC), the International Association of Fire Chiefs (IAFC), and the International Association of Firefighters (IAFC). These organizations have been undertaking rigorous campaigns to promote firefighters' fitness and wellness and increase their medical evaluations. Most of these wellness and fitness promotion campaigns often focus on psychological support, physical training, and nutrition education[17]. Wolkow et al. [17] also noted combining these interventions could be the most effective approach to improve the cardiovascular health of firefighting personnel.

Critical Issues and Health Concerns Among Firefighters

Generally, firefighters tend to be expected to respond to any form of emergency in their community. It is evident that firefighting is an inherently dangerous occupation considering that the job tasks involve suppressing the fire and providing the emergency medical services, the rescue operations on the fire site, and the response to the emergencies of the hazardous material that takes place in that area. Considering the unique and challenging role of the firefighters, readiness and the ability to respond to the moment's notice are key considerations for emergency preparedness. In this regard, much research has been conducted to evaluate the relationship between firefighting and health implications. Specifically, researchers have focused on the relationship between firefighting and cancer, cardiac health, injury, and physiological health, among others. There are

numerous occupation-related risks for firefighters that make them at an increased risk for different diseases and injuries. Kales et al.[18] noted that there are several chronic stressors, which include the long periods of sedentary activities, exposure to smoke, and the challenges to shift work and other acute stressors such as irregular physical exertion, smoke exposure, extreme physical exertion, excessive heat and dehydration, and the alarm responses that are likely to lead to an increased risk. Therefore, with the increased understanding of the firefighters' unique job tasks and exposures, there has been increased attention on the impact of the firefighting duties on the health of the firefighters. Organizations like the USFA and National Volunteer Fire Council (NVFC) have partnered to investigate the emerging concerns and provide solutions to firefighters' health issues. Different critical issues have been identified following their research.

Barriers to Fire Services Physical Training

Barriers to physical training can take place at the individual or even the departmental level. Studies have been conducted to analyze the perception of the training initiatives. It is noted that firefighters could avoid the working out processes while on the shift for the fear that it can interfere with the response to an emergency call. For example, it was noted that training on duty is avoided in some instances to not arrive at a scene fatigued. Although this is a major concern for the firefighters, a study examined the effects of exercise on occupational performance[19]. In order to represent a worst-case scenario, the participants engaged in the simulated fire ground tasks. They included hose drag, climbing of stairs, ladder raise, carrying equipment, and forcible entry. This was carried out for ten minutes after a fatiguing circuit training exercise protocol. According to the study findings, although the exhaustive training exercise protocol hindered the fire ground performance, the physically trained firefighters outperformed the others who were not trained and the non-fatigued colleagues even when they were fatigued.

Despite the findings, recommendations and guidelines have demonstrated the need to avoid exhaustive exercises such as the near-max efforts and the rating of the perceived exertion while on duty or to exercise during the low call volume times to ensure that they have a peak performance. Another barrier that the firefighters in the U.S. may have been fighting is the unawareness of their current health status. According to a study, about 68% of the sampled 768 professional firefighters underestimated their BMI classifications[20]. Additionally, the firefighters' self-perceived fitness levels did not align with the actual fitness that was measured by the aerobic capacity. This lack of personal awareness among the firefighters implies that the perceived need to improve individuals' general wellbeing and health may be diminished. This illustrates that the state can provide mandatory and non-punitive health screenings and appropriate consultations. This can help the firefighters identify the weaknesses and even begin to improve upon the poorer components of health.

Benefits of Physical Training

Studies have demonstrated that the fire departments can also benefit from the health promotion programs since it applies to the improved job performances. Occupational tasks can require a high amount of aerobic fitness as well as muscular strength, which is greater than or equal to 68 kg for an extended period of time. It should be noted that considering the strain that is caused by the environment, such as anxiety, heat, and dehydration, the tasks are performed in the protective gear that weighs at least 23 kg. This means that if a firefighter is not physically able to execute the tasks in harsh conditions, the safety of the public, the engine, and the self tend to be placed at risk. Considering the physical nature of the job, it is evident that more fit individuals tend to be more likely to execute the physical job tasks better. In order to support this further, previous studies have shown that there is an association between fitness and job performance. For example, a study showed that firefighters who had higher abdominal strength, upper body endurance, as well as anaerobic power had a better and enhanced performance on time to completion of the fire ground tests[21]. In addition, the performance of the firefighters decreased with an increase in the body mass index, body fat, and waist circumference. These findings demonstrate the need for physical training to facilitate peak physical job performance.

IV. METHODOLOGY

This study used qualitative research methodology. It is an appropriate method that can be used to understand how people tend to experience the world. This method was chosen to help understand the perceptions and opinions of the firefighters in the U.S. regarding physical training. The aim of the study is to investigate and understand the perceptions of the firefighters in the U.S. and the reasons that they are not willing to take physical training activities, which can protect them from illnesses like cardiac arrest.

A. *Participants*

The population that was described as the target population of the firefighters in the U.S. is significantly a large one, implying that the researcher may not be able to interview each and every member of the population. A simple random sampling

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technique was used to identify the sample for the study. After the analysis, interviews were conducted in the selected population of 15 respondents which were selected as the representative sample for the population. Since this study focused on interviewing a homogenous group of participants, the sample population of 15 was deemed as adequate to gather the needed information and make conclusions regarding the understanding of their perceptions.

B. *Data Collection*

Permission was obtained from the fire departments that allowed employees to be interviewed. Potential participants were then contacted, and interviews scheduled. The data for this study was collected using interviews. Although one-on-one interviews provide a better engagement with the respondents, other choices like phone interviews were chosen considering the avoidance of physical contact due to the COVID-19 regulations and guidelines of social distancing. The information collected was recorded for the responses that were used in the analysis.

V. DATA ANALYSIS AND RESULTS

A. *Analysis*

Both semi-structured and open-ended questions that enabled the researcher to gather closed-ended information for this specific type of research as well as the opinions of the respondents were utilized. Each respondent has unique experiences and can share the unique responses that can inform the findings and the conclusions made from these findings. The use of a combination for these types of responses is important as it allows for flexibility in data collection. For example, it was important for this study to demonstrate whether the firefighter was subjected to any form of training when they were recruited and how it was in case they were subjected to it. In addition, it was vital to give the respondents an opportunity to express their opinions about the type of physical training programs that would be suggested and their potential benefits, if any.

B. Results

RQ1: How does physical training impact on-duty cardiac arrest cases among the firefighters?

The first research question sought to evaluate the impact of physical training in the on-duty cardiac arrest cases among firefighters. This research question was important in the evaluation of the physical training that has been suggested as the solution to cardiac arrest cases, with the aim of establishing the necessary knowledge from the participants regarding the role of physical training on heart-related problems, and specifically the on-duty cardiac arrest cases among the firefighters. Through the evaluation of this research question with various questions, it would be possible to understand the nature of the participants and their call to add into knowledge regarding how their behavior affects their health and physical fitness to carry out the job properly. In this regard, the participants were asked whether they had knowledge of sudden cardiac death and their knowledge on the same regarding being a major cause of deaths among the firefighters. Participants were also asked them whether they have ever been diagnosed with any cardiac-related cases and whether they understood the relationship between cardiac illnesses and physical fitness. From the evaluation, one main theme of lack of information/ uncertainty was identified. This theme was identified as many of the respondents indicated that they did not have enough information about cardiac arrest and physical exercises. Although some of the respondents have heard about cardiac arrest cases among the firefighters, majority of them do not have knowledge of the problem and how it relates to physical fitness.

The current literature suggests that physical fitness has an important role in improving the general health of the firefighter and ensuring that there are reduced cases of cardiac illnesses. However, it is evident that majority of the firefighters do not have enough knowledge about this issue. It should be noted that the different firefighters have not been meeting the recommended levels of fitness across the U.S., considering the cardiovascular and metabolic demands of the job. In the same regard, many fire departments in the U.S. have noted adopted any standardized means of ensuring physical exercises and training that should keep the employees fit and avoid cardiac illnesses. The study showed that although the recruits have been required to undertake extensive training sessions and programs, most of the departments fail to uphold the needed training levels and fitness standards among the incumbent firefighters. In this regard, the major theme of uncertainty and lack of knowledge that was established from the findings of the interviews is supported by the available literature that shows that most of the firefighters, including the managers or directors of the fire departments, are not properly equipped with enough knowledge about physical fitness and prevalence of sudden cardiac deaths among firefighters.

This conclusion is also supported by the andragogical model or the adult learning theory that was used as a basis of this study. This is a model that entails the application of various learning theories, such as the contiguity and sensory-stimulation theory. The contiguity theory asserts that firefighters ought to understand specific actions to take when operating in immediately dangerous-to-life-and-health (IDLH) settings that result from fire outbreaks. Another theory that discusses the situation is sensory stimulation theory that states that people are likely to invest in their senses to process a change. However,

the sensory stimulation theory argues that individual firefighters may not appreciate or understand the significance of fire safety training due to the lack of proximal experience in fire conditions in which senses detect and cause bodily reactions to combustion products such as heavy smoke, reduced-oxygen atmosphere, and high temperatures. From the evaluation of these theories, it is evident that the conclusions of the study are in line with the andragogical model that suggests the ignorance or lack of knowledge of individuals based on their exposure of lack of it. One of the bases of this conclusion is that most respondents agreed that they had not been exposed to any educational training or resources that demonstrate the significance of physical training. The lack of education among the firefighters makes them unknowledgeable as they feel mandatory training is a form of punishment.

RQ2: What educational and physical standards are required to improve firefighters' health and occupational readiness?

The second research question was designed to investigate and understand whether the participants had knowledge about educational and physical standards that would be important to improve their health and prevent them from various cardiovascular illnesses and specifically sudden cardiac deaths. Physical fitness is important for firefighters. However, the research study established that there are few departments that have implemented any form of standardized physical training. For this research question, the participants were asked to describe various aspects of physical fitness such as the Physical Abilities Test (PAT), their experiences with the same as well as the Candidate Physical Ability Test (CPAT) that are Department Specific or any other. The participants were also asked about their physical fitness levels and the activities that they undertake to ensure high levels of fitness. From the evaluation of the interviews, two main themes were identified from the responses of all the participants who addressed this question effectively. The first theme was disinterested, and the second theme was on on daily routine. The first theme reflected that the firefighters are generally not interested or are resistant to the physical fitness training and standards. Although they agree that fitness is generally an issue with most firefighters, they do not want to engage in any form of training. In the same regard, the second theme of lack of daily routine emerged. A majority of the participants noted that they have a personal responsibility in engaging in physical exercises, although they lack a daily routine in doing so.

The current literature suggests that the mandatory training of firefighters can significantly influence their work abilities and improve their physical health. The recent statistics show that firefighters in the U.S. have an increased risk of cardiovascular incidents or even injury[15]. However, it is evident that the United States has not been able to adopt standard practices for physical exercises and fitness. In this regard, the use of mandatory fitness tests to ensure that the participants have the required levels that can help them perform their tasks effectively is important[18]. It is also important that all the recruits undertake extensive training sessions and programs. However, many departments have failed to uphold the needed training levels and fitness standards among the incumbent firefighters. This has resulted in an increase in unhealthy behaviors such as lack of the required physical fitness, poor sleep habits, as well as unhealthy diets, which makes the firefighters be physically unprepared for duty. The findings show that while majority of the governing bodies in the U.S. Fire Service, such as the NFPA and the IAFF, have encouraged the mandatory annual health screenings and on the duty exercise, only about 27% of the U.S. departments tend to provide the resources successfully. Through proper implementation of the standards, there will be a significant improvement in the overall health and fitness of the firefighters.

The Candidate Physical Ability Test (CPAT) was also noted to be an important standard that can significantly help the improvement of firefighters' physical and cardiovascular health. This is evident from the literature as well as the study findings. The CPAT is a test that is designed in a manner that it can evaluate the entry levels of firefighter candidates on various essential physical capabilities that are required to perform their duties satisfactorily. It is a standardized test that has been recommended in the United States that demonstrates the readiness of the firefighters regarding the physical demands of the job. The analysis of the findings shows that majority of firefighters do not understand the implications of overexertion in the workplace that has led to death and injuries. It can be concluded that one of the main reasons that the firefighters failed to engage in any form of physical exercise is a lack of knowledge. Although many departments have implemented the CPAT as a way of evaluating the entry abilities of firefighters, it rarely follows on the existing employees. Therefore, it is concluded that many entities and employees lack enough knowledge on physical fitness, exercises, the type of exercises, and generally the lack of educational resources and standards has led to ignorance, hence poor cardiovascular health of the firefighters.

RQ3: What is the perception of firefighters towards mandatory physical fitness training?

The aim of the last research question was to investigate and understand the attitude that the firefighters have regarding the suggested mandatory physical fitness training with the aim of improving their general health. This research question was developed with the notion that many firefighters have a negative attitude towards the mandatory physical training that has been suggested in various platforms and departments. The investigation demonstrated that although physical training is a good initiative that seeks to promote the overall wellness of the firefighter, it has become a challenge to implement protocols as the

initiative is not supported by a majority of the participants. To have a proper understanding of the perception and attitude of the respondents, the researcher asked the respondents about their opinion on the mandatory physical standards, their thoughts on the mandatory physical fitness training, and their opinion on the general training that should be made mandatory. It can be concluded from the findings that most of the firefighters are generally not interested in physical exercises or training. One of the main reasons the firefighters do not want the physical training to be made mandatory is the fear of injuries, including deaths, while others are just resistant to change. The two main themes that were evident from interviews are the resistance to change and the fear of injuries. It can be concluded that people will generally resist change at first, and firefighters are no exception. While some of the respondents may demonstrate a preference for the change process, most of them are not interested in mandatory physical standards since they have not been implemented yet. However, the preference for injuries that have been associated with physical training has been a problem that has led to a negative attitude and perception of firefighters about making physical training mandatory.

The literature supports the study findings that firefighters have a negative attitude toward mandatory physical training[5,7,9,12]. Many firefighters lack self-motivation and ambivalence, which leads to poor perception about the engagements of the fire departments[14,17,19]. In most cases, self-motivation and ambivalence are highly influenced by social groups such as the firehouse culture. It is such trends that become a deterrent to exercises and positive attitudes towards training among the firefighters. The conclusions suggest that interpersonal relationships could positively influence firefighter fitness[5,7,9,12]. It is important to highlight that the initiation of group-based exercises can improve exercise adherence, shift cohesion, and the creation of a sense of accountability. Another issue that could be affecting the negative attitude of the firefighters is the nature of the exercises. In some notable cases, the participants engage in simulated fire ground tasks that are not easy to undertake. For example, they included hose drag, climbing of stairs, ladder raise, carrying equipment, and forcible entry, among others. These are mainly carried out for ten minutes after a fatiguing circuit training exercise protocol. The participants who take part in such activities are significantly strained. In this regard, more awareness may improve their perception and help them form a positive attitude towards engaging in mandatory training.

The main factor that is likely to influence this conclusion is that most of the participants who were interviewed in this study have not been engaged in any form of education that highlights the importance of training. There is a significant lack of knowledge among the participants who, thereby, tend to resist taking part in the physical training. Many of the respondents doubt whether the mandatory physical fitness exercises are good and whether they can actually be implemented. Some of the responses indicated that "It's good as long as it is "doable." From such opinions, it can be concluded that such a respondent may not be willing to engage in any form of physical training that is mandatory. In fact, such a response shows that that physical fitness exercises are not good at all. This can be demonstrated by one of the respondents who argues that "I don't think they are good because it really doesn't…well it's not fair to everyone. With more knowledge, such respondents are likely to change their minds and take part in the mandatory training. It is established that working with the firefighters is just not a matter of sending them to work when there are emergencies, but also continually educating them about the activities that they undertake and the importance of any requirement at workplace. Their desire to engage in mandatory training and physical fitness stems from proper education about the entire process.

EVALUATION OF THE FINDINGS
VI. CONCLUSIONS
In summary, firefighting is an important profession that has an important role in society. However, it is one of the most demanding occupations across the globe. The engagement involves exposure to high temperatures, equipment weights, and the requirements for constant readiness outweigh the performance levels of even the well-trained athletes. Due to its nature, there is a need for the firefighters to always be at the optimal level of performance, and at times, they do not take any preparation in case of an emergency, even when they are asleep. Therefore, researchers demonstrated that firefighting engagement is a type of exertion is a musculoskeletal and cardiogenic human stressor[22]. Therefore, physical conditioning is the primary factor in preparing firefighters to endure the physiological demands required to perform at any time[23]. There are a lot of risks that have threatened the lives of firefighters while on the job, including the collapse of buildings, exposure to dangerous toxins, as well as direct exposure to flames, and excessive heat. Therefore, there has been a lot of concern regarding the overall health of the firefighters, and particularly the cardiovascular illnesses and deaths. Studies have recommended that physical training can be of significant help to ensuring that the firefighters have good physical and cardiovascular fitness that reduces the prevalence of sudden cardiac deaths while they are on duty. In relation to this, this study was carried out to investigate the impact of mandatory training in the reduction of sudden cardiac deaths. However, it was noted that many departments had not adopted any mandatory training or physical training standards due to the opposition from the participants.

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Although physical training is important and can improve the overall fitness of the firefighter, including reducing sudden cardiac deaths, there is not enough information among the firefighters and the departments on how to successfully implement the protocols while avoiding injuries. The lack of awareness among the firefighters demonstrates that the perceived need to improve individuals' general wellbeing and health may be diminished. This illustrates that the state can provide mandatory and non-punitive health screenings and appropriate consultations with the stakeholders, especially formulating educative programs for the firefighters to understand its significance. It is evident that the physical training of the firefighters bears benefits for the city as well as the administration and all the parties involved. In this regard, there is a need for a more collaborative approach to ensure the positive development of the programs and implementation. Before the implementation, a wellness committee should be formulated to assess the situation that comprises all the key stakeholders. This will ensure more knowledge and less resistance.

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Prevalence of *Enterobius vermicularis* Infections Among The Inhabitants of Okordia, Biseni and Zarama Communities in Yenagoa Local Government Area, Bayelsa State, Nigeria

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ABSTRACT: *Enterobius vermicularis* (pinworm) is one of the helminthic worms belonging to the class nematode. It causes Enterobiasis which is a known public health problem in tropical and subtropical countries. This study was carried out between November 2020 and August 2021, and aimed to evaluate the prevalence of E. *vermicularis* infections among the inhabitants of Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State. A cross sectional survey was adopted and a total of two hundred (200) stool samples were randomly collected from the inhabitants in these communities. Wet preparations (saline and lugol's iodine), and formol ether concentration technique were used to analyzed the stool samples. The preparations were examined microscopically with 10× and 40× objective lens respectively. Overall results revealed a prevalence of 6(27.2%) *Enterobius vermicularis* infections among the inhabitants in the communities of which, males 4(66.7%) and females 2(33.3%). Among the inhabitants in the three communities, people within the ages of 5-15 years had the highest prevalence rate of about 50%. Our study demonstrated a high prevalence of E. *vermicularis* among the inhabitants in Okordia, Beseni and Zarama communities in Yenagoa Local Government Area, Bayelsa State. This parasite is common among the people living in these communities; hence more epidemiological survey should be carried out in the studied area.

KEY WORDS: *Enterobius vermicularis*, Inhabitants, Okordia, Beseni, Zarama Community

INTRODUCTION

Enterobius (E.) *vermicularis* is generally known as pinworms. It is one of the helminthic worms belonging to the class nematode. This helminthic worm caused an infection called Enterobiasis is a public health problem, especially among school children in tropical and subtropical countries [1, 2]. Several researchers estimated that over 1 billion persons suffers from infections caused by *Enterobius vermicularis*. These intestinal parasites are mostly found in the rural areas in the developing countries such as Africa, Sub-Sahara Africa, Asia and Central America. These continents are often linked with enterobiasis due to poverty, other social problems like poor environmental sanitation, lack of portable water, and inadequate education [3, 4, 5, 6]. The lack of basic social amenities, and poor sanitary condition, inability to use latrines is indicators that increase the spread of these worms [7].

In Nigeria, infection with helminth is a major cause of morbidity and mortality among individual with comorbidities [8, 7, 9]. In Bayelsa state, a prevalence about 19.0% intestinal parasites among school children were reported in Amakalakala community, Ogbia Local Government area, Bayelsa State, Niger Delta in the Southern parts of Nigeria [10].

However, individuals suffering from enterobiasis are asymptomatic. Although, common symptoms of Enyerobius *vermicularis* infections include itching, irritation of the perianal region, and vaginal pruritus in females [11]. In complicated cases, the symptoms may include insomnia, weight loss, vomiting, abdominal pain and as well appendicitis [2, 12]. However, this parasite undergoes a simple life cycle, where it is transmitted through a contaminated finger, inhalation or reinfection [1, 13]. In various regions of the world, the prevalence of E. *vermicularis* infections differs between 0.21–54.86% [2, 14, 15, 16]. In Thailand, there is divergence prevalence of E. *vermicularis* infections of 0–50.90% [17, 18, 19, 20]. Although various studies have been conducted on the distribution and prevalence of E. *vermicularis* infections. Information on enterobiasis is lacking for several remote regions, especially. It is on record that people living in crowded environments with low personal hygiene are mostly infected with this infection [21]. This infection greatly and largely depends on the contamination of the environment with human faeces containing

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helminthic larvae or egg (22) Among other commonly encountered helminths include *Ascaris lumbricoides, Stronyloids stercolaris, Trichuris trichiura, Necator americanus, Teania saginata, Teania solium* [23].

The World Health Organization in 198-1990 declared a programme called Sanitation Decade with the sole goal of improving the sanitary condition in a country, where the Nigerian government adopted this approach by means of observing Monthly National Sanitation Programmes with the viewpoint of combating the burden of diseases including parasitic infections. In Bayelsa state, Government had also declared Steady Monthly Sanitation Policy and empowered processes of Regular Inspection of Public Utilities. Thus, even with all these efforts, there is still concern is helminthic infection, as exercise is seen to be not effective especially in the rural settlement in the state. Consequently, this study aimed to evaluate the prevalence of *E.vermicularis* infections among the inhabitant of Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State.

MATERIALS AND METHODS

Study Area: This study was carried out in the following communities: Biseni, Zarama and Okordia. These are communities in Okordoa-Biseni-Zarama clan, Yenagoa Local Government Area of Bayelsa State. The inhabitants of these communities are majorly fisher men, peasant farmers, petty traders and civil servants. Yenagoa as their Local Government Head Quarters is the capital of Bayelsa State. Yenagoa local Government where these communities are domiciled is one of the oil rich regions in Nigeria, yet no attention from the oil exploration companies, government and as well needed basic social amenities. It covered an area of 706km^2 and a population of 352,285 at the 2006 census.

Study Design: A cross sectional survey was adopted for this work.

Ethical Clearance and Sample collection: Ethical clearance was obtained from the Department of Medical Laboratory Science; Faculty of Basic Medical Science and the subjects consents were sought and consciously approved by them before given sample container for collection.

Sample size calculation: The sample size was determined using Cochran formula as stated:

n = [Z^{2}pq]/d^2; where q = 1-p

n = [Z^2 p (1-p)]/d^2

n = sample size,

Z = level confidence at 95% (Z = 1.96)

P = proportion; of which p = 19.0% (P =0.19)

d = precision at 5%

Sampling and Sample Collection: A simple random technique was used in this study. A total of 236 stool samples was collected from the inhabitants of the three communities. The people were educated on how to collect the fresh stool samples. They were instructed to put a small portion of their early morning stool sample in the labeled universal container using the spatula attached to the sample container. On retrieval, only 200 respondents complied and the samples were immediately transported to the Laboratory, Medical Laboratory Science, and Niger Delta University for parasitological examination. A well-structured questionnaire was also administered on each subject prior to the samples collection so as to obtain socio-demographic data such as: age, gender, type of latrines used, source of drinking water, and toilet system.

Stool analysis

Macroscopy: Each stool sample was carefully examined macroscopically for its consistency, colour, and presence or absent of blood/mucoid stain, and presence of adult worm or segment of worm. The results of the outcome were noted.

Microscopy: The stools samples were examined microscopically for parasites. A direct wet saline and ludol's iodine method was used adopting the protocols of. [5]. Samples not processed on same day was preserved by will be storing in the refrigerator for not more 48 hours in accordance with the protocol of. [23]. A small proportion of the well mixed of each stool sample were collected with the aid of separate clean applicator stick and placed on one side of a clean glass slide. Each containing a drop of 0.85% normal saline. It was thoroughly mixed to obtain a smear. This procedure was repeated using a drop of 1% lugol's iodine solution on the opposite side of the same glass slide. A clean cover slip will be placed on each smear. The smears were thin enough that print was read through. Preparations were examined thoroughly and systemically under Olympic microscope for the presence of larva, eggs or ova of helminths using ×10 and ×40 objective lens respectively. Formol ether concentration technique was used. 1ml of well mixed of each stool sample were put into separate test tube containing 4ml of 10% formalin. 3ml of the 10% formalin was added and mixed by shaking. The supernatants were sieved using a coffee strainer into a clean centrifuge test tube. 3ml

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diethyl ether was added and stoppered accordingly. They were mixed by shaken for 1min. The stopper was removed and each suspension centrifuged for 1min at 400rpm. The entire column of the fluid below the fecal debris and ether was carefully removed using a Pasteur pipette and transferred into fresh and clean centrifuge test tubes. 10% formalin was added to each suspension to make up to 10ml. They were re-centrifuged for 10min at 1000rpm. Each supernatant was decanted and bottom of the tube taped to re-suspend the deposit. The deposits were examined microscopically using ×10 and

×40 objective lens respectively as recommended by Cheesbrough [24].

STATISTICAL ANALYSIS
Data collected was analyzed in percentages and presented on tables and graphs.

RESULTS
Out of the 200 stool samples analyzed, 22(11.0%) parasites were detected, of which 6(27.2%) were *Enterobius vermicularis*, and 4(66.7%) were found in males while 2(33.3%) were from females as shown in (Table 1-3). Out of the 60 stool samples examined in Beseni community, 6(10.0%) different parasites were detected. Of which 3(50.0%) parasites each were detected from males and females respectively. The parasites detected were 2(33.3%) *Enterobius vermicularis*, 3(50.0%) *Ascaris lumbricoides* and 1(16.7%) *Fasciola hepatica*. Of these parasites detected, males in age 5-15 years had 1(33.3%) *Enterobius vermicularis*, age 21-29 years had 1(33.3%) *Ascaris lumbricoides* and *Fasciola hepatica* respectively, while females in age 5-15 years had 1(33.3%) *Enterobius vermicularis* and *Ascaris lumbricoides* each (Table 1).

Table 1: Showing Distribution of Parasite Seen Using Age Range for Beseni Community

Male	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	1	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	1	0	0	0	1
30-35	0	0	0	0	0	0

Female	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	1	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	0	0	0	0	0	0

Total	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
	2	3	0	0	0	1

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In Okordia community 60 stool samples examined, of which 9(15.0%) different parasites were seen. Of these parasites 7(77.8%) were detected from males and 2(22.2%) females. Of which 3(33.3%) *Enterobius vermicularis*, 5(55.6%) *Ascaris lumbricoides* and 1(11.1%) *Trichuria trichuris*. Of which, males in age 5-15 years had 1(14.3%) *Enterobius vermicularis* and *Ascaris lumbricoides* each, age 30-35 years had 1(14.3%) *Enterobius vermicularis*, 1(14.3%) *Trichuria trichuris* each, and 3(42.9%) Ascaris lumbricoides while females in age 5-15 years had *Ascaris lumbricoides* and 30-35 years had 1(50.0%) *Enterobius vermicularis* (Table 2).

Table 2: Showing The Distribution of Parasite Seen Using Age Range for Okodia Community

Male	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	1	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	1	3	1	0	0	0

Female	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	0	1	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	1	0	0	0	0	0

Total	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
	3	5	1	0	0	

Out of the 80 stool samples examined in Zarama community, 7(8.8%) different parasites were detected. Of these, 3(42.9%) parasites each were detected from males and 4 (57.1%) from females. The parasites detected were 1(14.3%) *Enterobius vermicularis*, 4(57.1%) *Ascaris lumbricoides*, 1(14.3%) *Trichuris trichuria* and 1(14.3%) *Schistosoma haematobium*. Of these parasites detected, males in age 16-20 years had 1(33.3%) *Trichuris trichuria* and *Schistosoma haematobium* each, age 30-35 years had 1(33.3%) *Trichuris trichuria* while females in age 5-15 years had 4(100.0%) *Ascaris lumbricoides* each (Table 3).

Table 3: Showing Distribution of Parasite Seen Using Age Range for Zarama Community.

Male	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	0	0	0	0	0	0
16-20	0	0	1	1	0	0
21-29	0	0	0	0	0	0
30-35	1	0	1	0	0	0

Female	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
5-15	0	4	0	0	0	0
16-20	0	0	0	0	0	0
21-29	0	0	0	0	0	0
30-35	0	0	0	0	0	0

Total	E. vamicularis	A. lumbricoides	T.Trichuria	S.heanatobium	S. mansonia	F. hepatica
	1	4	1	1	0	0

Table 4 showed occupation specific prevalence of *Enterobius verrmicularis* among the inhabitants of Beseni, Zarama and Okordia communities in Yenagoa Local Government Area of Bayelsa State. A total of 200 respondents were recruited for this work, of which 60(30.0%) respondents each were from Beseni and Okordia communities, while 80(40.0%) respondents were from Zarama community. Out of the 60 stool samples examined in Beseni community were 13(21.7%)farming and trading each, 21(35.0%) student, 5(8.3%) fishing while 4(6.7%) transporter and hair stylist each respectively. The number of samples infected by occupation community were student (4.7%) and fishing (20%). Out of the 60 samples examined in Okordia community were 18(30.0%) farming, 4(6.7%) trading, 19(31.7%) student, 9(15.0%) fishing, 7(11.7%) transporter and 3(5.0%) hair stylist. The number of samples infected by occupation were (5.6%) farming, (22.0%) trading and (5.2%) student. Out of the 80 stool samples examined in Zarama community were12(15.0%) farming, 13(16.3%) trading, 30(37.5%) student, 5(6.3%) fishing, 10(12.5%) transporter and hair stylist each. The number of samples infected by occupation were (8.3%) farming.

Table 4: Showing Occupation Specific Prevalence Of *Entrobius Vermicularis* Among Inhabitants Of Beseni, Zarama And Okodia Communities All In Yenagoa Metropolis, Bayelsa State.

Occupation	Beseni		Okodia		Zarama		Total no of infected in all 3	Total no of samples examined in all 3	Prevalence in percentage rate (%)		
	NE	NI	NE	NI	NE	NI			Beseni	Okodia	Zarama
Farming	13	0	18	1	12	1	2	43	0%	5.6%	8.3%
Trader	13	0	4	1	13	0	1	30	0%	25%	0%
Student	21	1	19	1	30	0	2	70	4.7%	5.2%	0%
Fishing	5	1	9	0	5	0	1	19	20%	0%%	0%
Transporters	4	0	7	0	10	0	0	21	0%	0%	0%
Hair stylist	4	0	3	0	10	0	0	17	0%	0%	0%
Total	60	2	60	3	80	1	6	200			

Key

NE – Number of samples examined

NI – Number of samples infected

The most infected occupational group was trader (25%) followed by fishermen (20%).

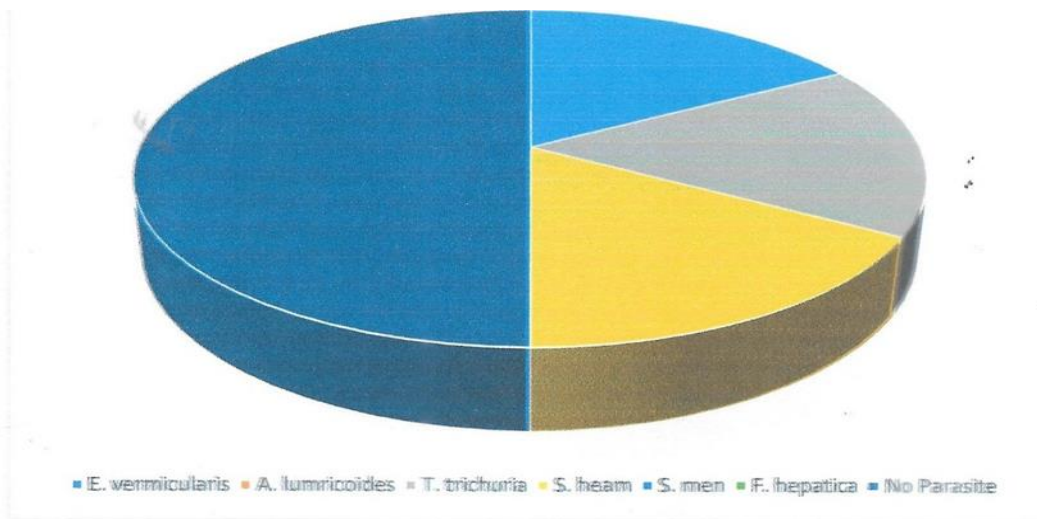**FIGURE 4.2-4.6** showed the frequency distribution of *Enterobius vermicularis*

Figure 4.1: Pie chart illustrating frequency of parasites seen in males of Zarama community

Figure 4.2: Pie chart illustrating frequency of parasites seen in females of Zarama community

Figure 4.3: Pie chart illustrating frequency of parasites seen in males of Okordia community
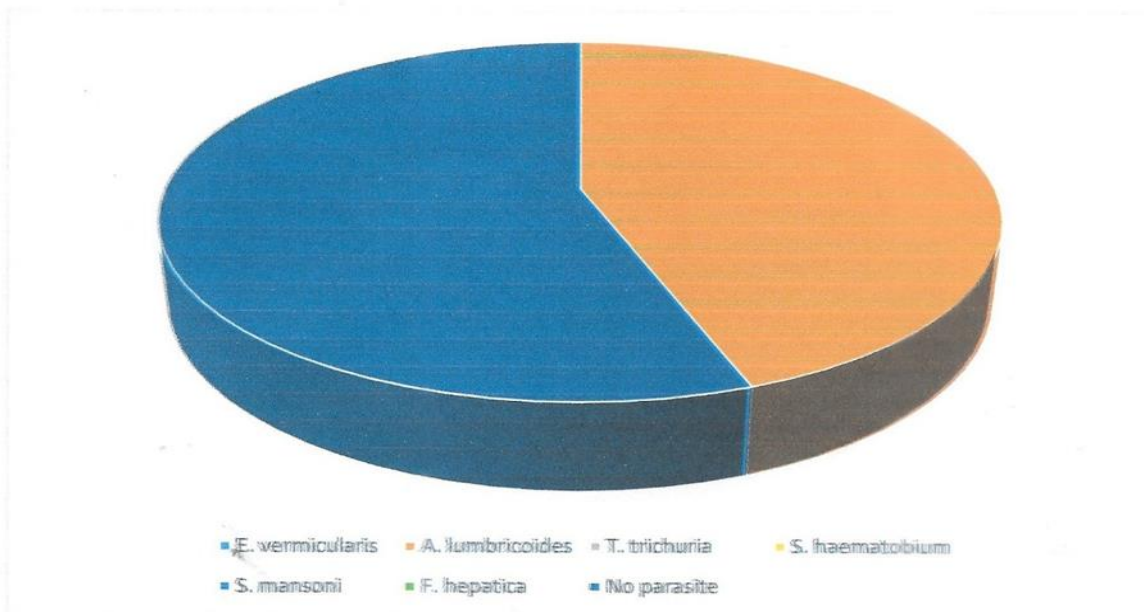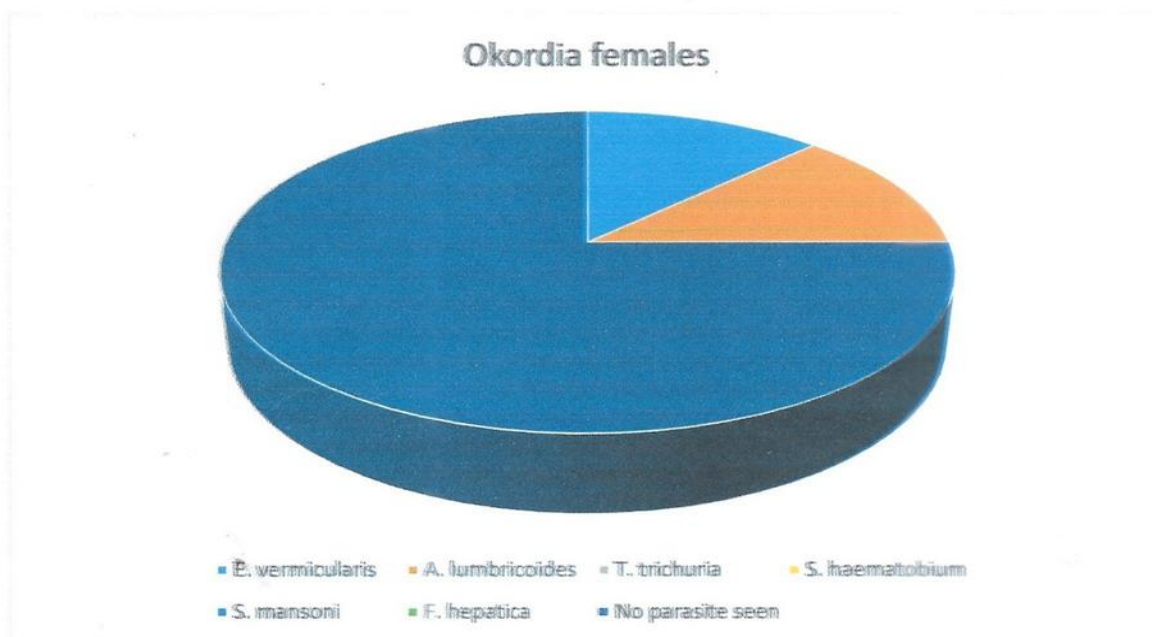

Figure 4.4: Pie chart illustrating frequency of parasites seen in females of Okordia community

Prevalence of *Enterobius vermicularis* Infections Among The Inhabitants of Okordia, Biseni and Zarama Communities in Yenagoa Local Government Area, Bayelsa State, Nigeria
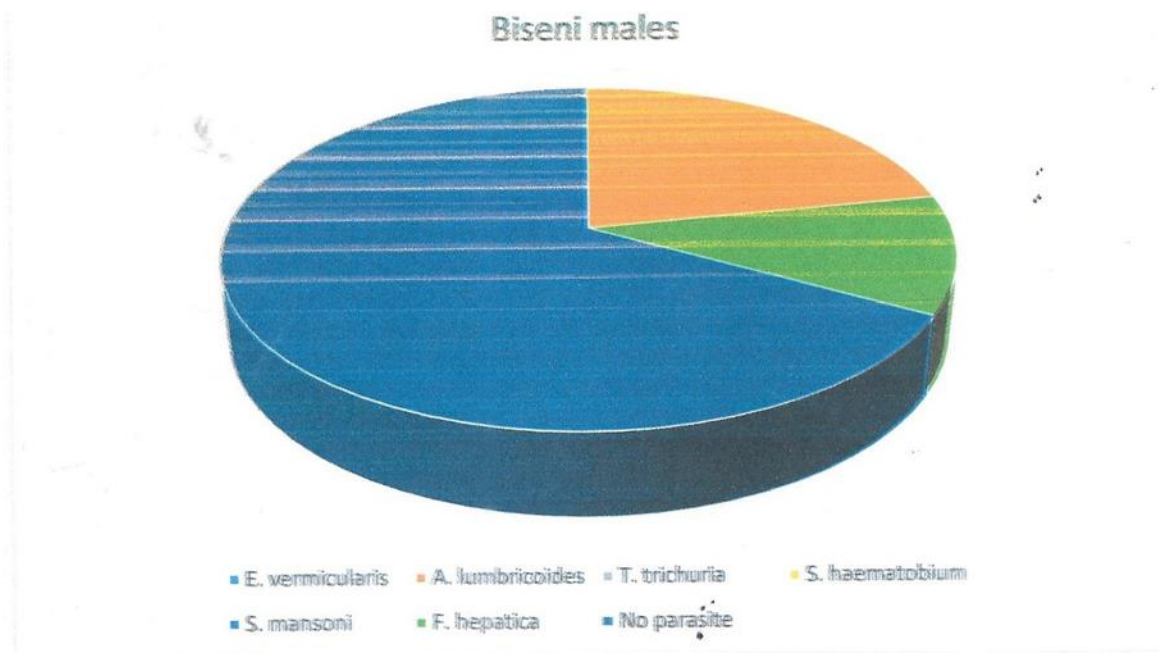
Figure 4.5: Pie chart illustrating frequency of parasites seen in males of Biseni community
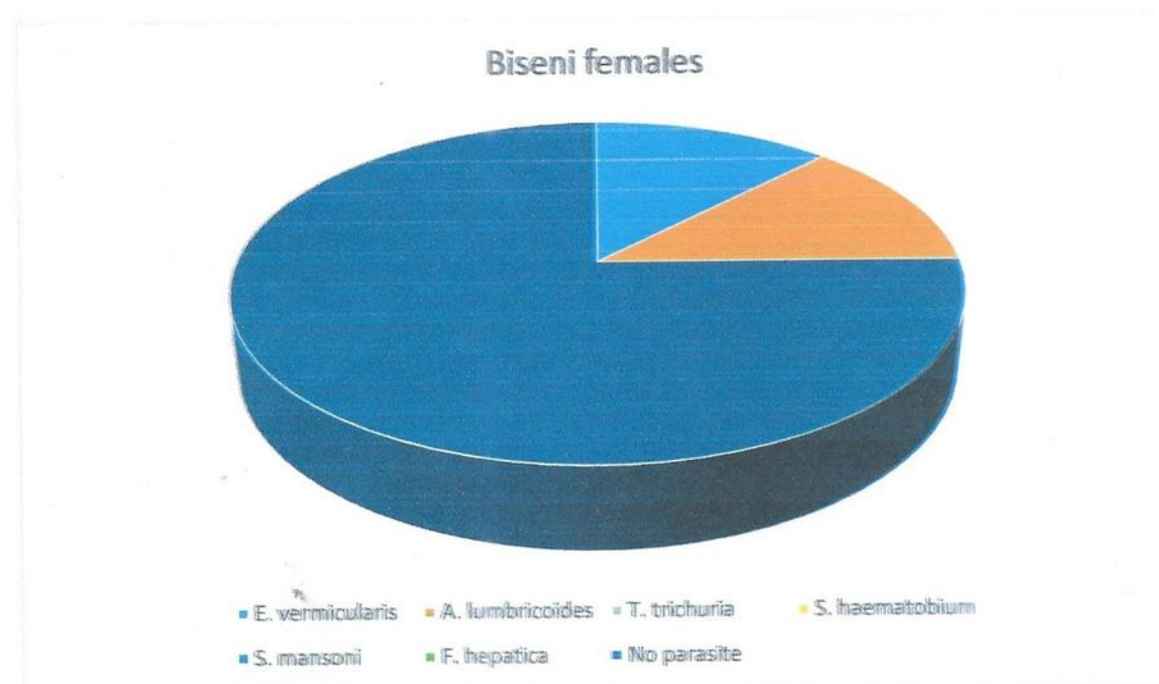
Figure 4.6: Pie chart illustrating frequency of parasites seen in females of Biseni community

DISCUSSION

This was the first study carried out in Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State on the prevalence of *Enterobius vermicularis* infections. The overall results of this study revealed that *Enterobius vermicularis* infections has a prevalence of 27.2% among the inhabitants of the three communities. This finding is higher than the one done by Abah and Irene [10] which showed a lower prevalence of in *Enterobius* infections.

The study revealed that male was more infected with E. *vermicularis* than their female counterparts with a prevalence of 66.7%. The high rate of Enterobiosis in males may be attributed to the facts that males much more involved in strenuous activities, tends to be in closer contact with females' counterparts. Males also seems to be indulged in poor personal hygiene practice than their

Prevalence of *Enterobius vermicularis* Infections Among The Inhabitants of Okordia, Biseni and Zarama Communities in Yenagoa Local Government Area, Bayelsa State, Nigeria
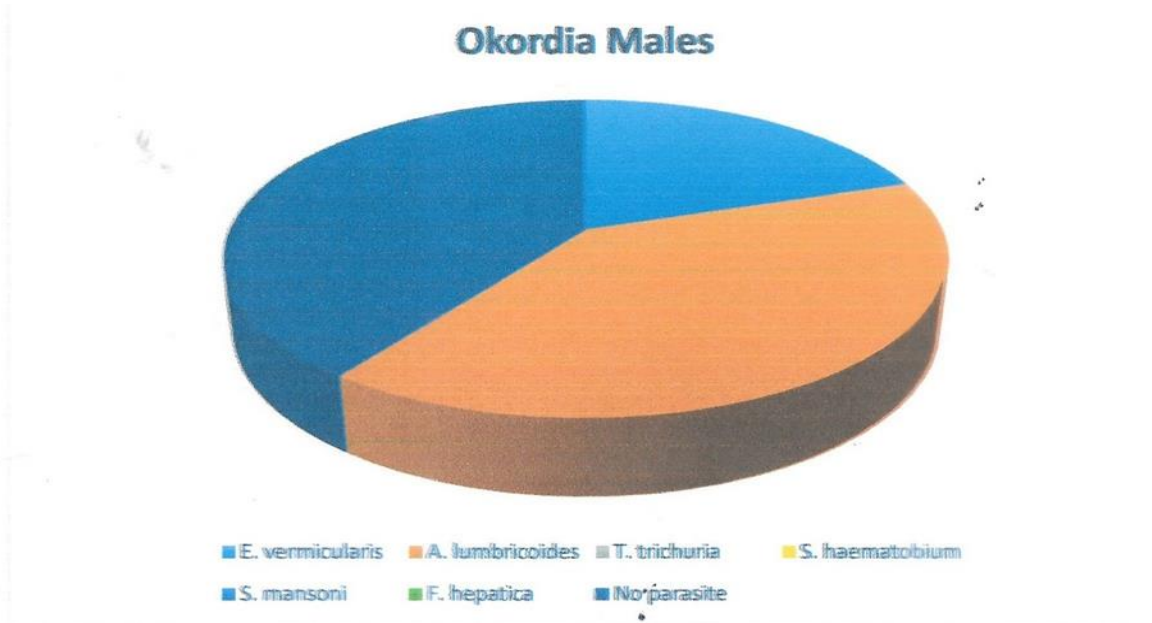
female counterparts. These findings are also in agreement with the work done in previous studies by Park et al. [14] and Gunawardena et al. [15].

Among the inhabitants in the three communities, people within the ages of 5-15 years were observed to be more at risk of Enterobiasis. This could be because these age brackets have more group activities which bring them together with closer proximities. This could also be an indication as a significant independent predictor promoting the transmission of *Enterobius vermicularis* infection as a result of the peoples' habit like trading in an untidy environment, poor personal hygiene and health illiteracy. Observation showed consistency with previous studies carried out by Li et al. [16], Laoraksawong et al. [19] and Taylor eta al. [20].

CONCLUSION

This study demonstrated that the high prevalence of *E.vermicularis* infections among the inhabitant in Okordia, Beseni and Zarama communities in Yenagoa Local Government Area of Bayelsa State was a significant independent predictor. The transmission of *Enterobius vermicularis* may occur as a result of the peoples trading habit as mostly traded in an untidy environment. Hand washing habits and keeping fingernails short should be an important preventive measure against the infection. Moreover, health literacy or health education, especially for parents should be implemented to reduce E. *vermicularis* infections. Therefore, policy makers and public health providers should be encouraging to design and implement programmes that would be geared toward health promotion and controlling pinworm infections.

ACKNOWLEDGEMENT

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The State of the Nasal Cavity of Patients with Exudative Otitis Media

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ABSTRACT: The state of intranasal structures was compared in patients with EOM and AR and EOM without AR. It was determined that the most likely cause of the violation of the protective function of the nasal mucosa in patients with EOM and AR is serous inflammation, manifested by a number of structural and functional changes. Structural changes are characterized by de-epithelialization of the mucous membrane in the acute phase, an increase in the number of goblet cells, a change in the viscosity of the medium, and a change in the pH of the medium. Each of the described processes ultimately leads to a slowdown in mucociliary transport, which occurs in the patients with EOM and AR that we examined. Thus, the curvature of the nasal septum and other features of the architectonics of intranasal structures in patients with EOM to a lesser extent than in patients with EOM and AR affect the development of the disease.

KEYWORDS: Exudative Otitis Media, Allergic Rhinitis, Nasal Cavities, Ciliary Epithelium, Deviation Of Septum Of The Nose.

INTRODUCTION

The prevalence of exudative otitis media (EOM) is especially high among children: according to some foreign authors, the disease occurs in 5-25% [1,2,6], and others - in 6.5 to 10.9% [4]. This indicator reaches its maximum values at the age of 2-5 years, and by the age of 10, 80 children have a history of at least one episode of EOM [3]. As noted by B. Sedlmeier et al. (2009) [7], boys are more susceptible to the disease. In studies, a number of authors have shown [5] that in Europe EOM is the main cause of hearing loss in children aged 2 to 7 years (during mass examinations of children in this age group, it is found in 30.2 cases) [11]. The high frequency of EOM in children - 4 times more often than in adults - is associated with anatomical prerequisites: a short horizontal auditory tube contributes to infection of the middle ear cavity [8,9,10].

The development of exudative otitis media can be promoted by inflammatory diseases of the nose and paranasal sinuses, hypertrophy of the lymphoid tissue of the pharynx, cicatricial changes in the nasopharynx, paresis of the muscles of the soft palate, deviated nasal septum, as well as malignant neoplasms of the nasopharynx [6], if they interfere with the drainage function of the auditory tube. However, the presence of these diseases in itself is not always accompanied by the development of EOM [12,13].

The results of O.V. Stratieva (1999) showed the importance of the architectonics of the middle ear cavity and pneumatization of the mastoid process in the development of EOM. The high dome of the jugular vein in the hypotympanum in combination with closely spaced ridges in 65 cases contributes to the formation of cysts, early fibrosis, and the low topic of the vein in 45 cases predisposes to prolonged exudation in the area between the hyporethrotympanum and latent mucoperiostitis in the zone of the posterior paralabyrinth and parafacial cells [14].

In the works of K. Apostolopulos et.al. [15] found a relationship between blood type and predisposition to EOM: in representatives of II (A) and III (B) blood groups, the incidence of otitis was higher than in people with I (O) and IV (AB) blood groups. Hereditary genetic predisposition also matters: according to S.N. Loginova (2005) [14], latent dysfunction of the auditory tube was found in 98 Evenki schoolchildren, which explains their high incidence of otitis media (360.8‰). In an experimental study by F.F.Depreux et.al. [16] found that the absence of the Eya4 transcription activator in mice leads to abnormal structuring of the Eustachian tube, being a predisposing factor in the development of EOM. In patients with congenital cleft lip and palate, there is a pathological attachment of the muscles that stretch and lift the palatine curtain to the auditory tube, which causes a high prevalence (up to 56) of exudative otitis media in this group of patients [4].

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A relationship has been found between certain perinatal factors (caesarean section, preterm birth) and a tendency to recurrent EOM, which the authors attribute to a deficiency of the surfactant system in the eustachian tube epithelium [2]. In the study by E.V. Garova et al. EOM is considered as an early manifestation of Wegener's granulomatosis [6].

J.L. Desseyn suggested the role of modified mucin as a result of genetic disorders, which may be the reason for the increase in mucus viscosity [17].

M.Yu. Boboshko and T.V. Klimantseva in their studies pay attention to the presence of a vegetative imbalance with a predominance of the influences of the parasympathetic nervous system as one of the factors predisposing to the occurrence of exudative otitis media. [12,18]

O.T. Petukhova suggested the role of endothelial dysfunction in the violation of vascular permeability and, as a result, the occurrence of tubal disorders [19].

In the study [6] of exudate from the middle ear in patients with EOM for the presence of free radicals in all samples, an increased content of lipid peroxidation products, known for their altering effect, was found.

Also, in the works of domestic and foreign authors, it is indicated that pharyngolaryngeal reflux can become one of the causes of the development of exudative otitis media - with concomitant pathology of the gastrointestinal tract, reflux was detected in 83.7 patients with EOM [14].

Given the sharp increase in allergic diseases over the past decades, the authors began to study the role of allergic, immune and autoimmune mechanisms in the development of exudative otitis media [8]. So, when observing a large group of children suffering from bronchial asthma or allergic rhinitis (AR), it was found that 30 children had otoscopic changes in the middle ear, while 5% of them had a type B tympanogram, and 20 had a type B tympanogram. At the same time, according to some authors, it is difficult to say with certainty whether exudative otitis media is an allergic disease or just the result of allergic edema of the nasopharyngeal mucosa [20]. Other researchers believe that it is an unfavorable allergic background, concomitant allergic diseases or a local allergic reaction that play a leading role in the occurrence of exudative otitis media [21].

MATERIAL AND METHODS

From 2017 to 2021, we conducted a comprehensive examination and treatment of 220 children who were at the pediatric ENT department of the MDC of TMA with exudative otitis media, who underwent clinical, audiological, allergeological, immunological and laboratory-instrumental studies on the effectiveness of complex treatment. in children of the younger age group, there is an insufficient detection of this disease. So, for example, the parents of 63 children, who had adenoids and acute rhinosinusitis, did not go to the doctor earlier with complaints of hearing loss. Prior to admission to the clinic, conductive hearing loss was detected in 134 children. Previously, 102 children received treatment for EOM. EOM is twice as common in boys as in girls. Seasonal changes in the incidence of EOM are also noticeable, which increase in the autumn-winter period.

Among the patients we observed, there were 65 children (unilateral processes), and 135 children (bilateral processes) suffering from acute EOM.

Acute EOM identified:
• In the primary phase - in 53 children (29,4%)
• In the secretory phase - in 123 children (68,3%)
• In the fibrinous phase - in 24 children (22,4%)

One of the reasons that preceded the development of the EOM were:
- Adenoids and rhinosinusitis - in 4 3% of children;
- atrophic and cicatricial changes in the area of the pharyngeal mouth of the auditory tube - in 5% of children;
- local malformations of the nasal cavity - in 15% of children;
- vasomotor salpingo-otitis and rhinitis - in 8% of children;
- hypertrophy of tubal folds - in 8% of children;
- adhesions of the auditory tube - in 3% of the studied children.
- physiological obstruction of the pharyngeal mouth of the auditory tube in 18% of children;
- adhesions of the auditory tube - in 3% of the studied children

We have noted a change in the causes of EOM, depending on the age of children. In children in the younger age group (from 3 to 6 years), adenoiditis was more common (in the amount of 43% of the studied patients), physiological obstruction of the pharyngeal mouth of the auditory tube (18%). In children aged 7 to 11 years, local malformations of the nasal cavity (15%),

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hypertrophy of the tubal ridges (8%), cicatricial processes in the nasopharynx (5%) were more common. At the age of 12 to 14 years - acute rhinosinusitis (41%).

Patients with addiction etiology (allergic rhinitis) were divided into 2 groups:

Group 1 - patients with exudative otitis media and allergic rhinitis;

Group 2 - patients with exudative otitis without allergic rhinitis.

The control group consisted of practically healthy children aged 2 to 14 years (6.8±1.6).

RESULTS AND DISCUSSION

Rhinoscopy revealed certain features characteristic of each group of examined patients. The most pronounced changes were noted in patients with EOM and AR: swelling of the nasal mucosa of varying degrees, pallor or cyanosis of it, mucous discharge in the lumen of the nasal passages. Such changes alone or in combination were detected in 107 (89.2%) patients of the main group (EOM and AR).

In contrast, patients of group 2 (EOM) more often had hyperemia and slight swelling of the nasal mucosa, sometimes mucous discharge in the nasal passages (Figure 3).

A more detailed examination of the nasal cavity and nasopharynx was performed using a rigid endoscope (KARL STORZ). For this study, it was important to compare the rhinoscopy picture in EOM and AR and EOM. The identified changes and their frequency are shown in Table 1.

From the data presented, it can be seen that patients with EOM and AR more often had swelling of the nasal and nasopharyngeal mucosa. At the same time, the rhinoscopic picture in EOM patients did not have a clear change (Fig. 1,2,3,4).

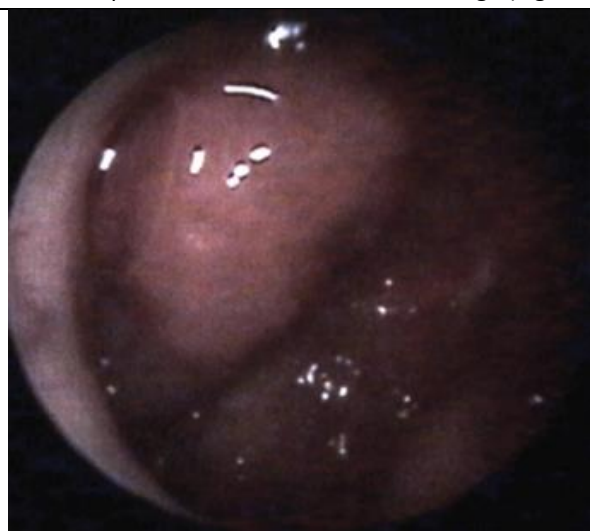**Fig.1. Adenoids of the IV degree, blocking the mouth of the auditory tube.**

Fig. 2. Hypertrophy of the tubal tonsil in a child with the secretory stage of EOM

Fig. 3. Rhinoendoscopy of allergic rhinitis.

Fig. 4. Rhinoendoscopy of allergic rhinitis.

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Table 1. Rhinoscopic picture in patients of groups 1 and 2

Identified changes (signs):	Feature frequency in the group: %	
	1 group (n=120)	2 group (n=100)
Swelling of the nasal mucosa	81,6	31,2
Discoloration of the nasal mucosa	76,6	46,8
Deviation of septum of the nose	53,4	56,5
Edema of the mucous membrane of the nasopharynx in the area of the mouths of the auditory tubes	49,6	30,2
Adenoid vegetations in the nasopharynx	13,5	9,3
Other anatomical features (conchabullosis, large uncinate process, hypertrophy of the ethmoid bulla, etc.)	4,1	2

In addition, Table 1 shows that deviated septum in patients with EOM and AR and EOM without AR occurred with almost equal frequency.

However, by comparing otoscopic and rhinoscopic data in patients with unilateral otitis media, we found a significant difference in the results obtained between the main group (EOM and AR) and group 2 (EOM). The results are reflected in the table 2.

Table 2. Combination of unilateral otitis media with deviated septum in patients with exudative otitis media

Comparison criteria: rhinoscopy data and their combination with otoscopic data:	Number of patients with unilateral otitis matching criteria: %	
	1 group (n=120)	2 group (n=100)
Deviation of septum of the nose	57,1	45
The direction of the curvature of the nasal septum coincides with the side of the otitis	33,6	26
The direction of the curvature of the nasal septum does not coincide with the side of the otitis	37,2	32

The table shows that in patients with EOM, nasal septal curvature was significantly more often (p=0.009), and the direction of the curvature coincided with the otitis side significantly more often (p=0.004). In the group with unilateral EOM, the difference between the number of patients with and without deviated nasal septum was insignificant (p=0.821). While in the corresponding category of patients with EOM, the difference turned out to be significant (p<0.001): the ratio of the number of patients with and without deviated nasal septum was 6:1.

To clarify the degree of influence on the development of EOM and AR, and EOM of the features of the architectonics of intranasal structures, we conducted a comparative analysis of the anamnesis and rhinoscopy data (Table 3).

Table 3. Comparative analysis of anamnesis and rhinoscopy data in patients of both groups

Comparison criteria: anamnestic data and their combination with rhinoscopy:	Number of patients matching the criterion: %	
	1 group (n=120)	2 group (n=100)
history of otitis media	60,1	42
History of repeated otitis media	53,7	37
History of repeated unilateral otitis media	28,6	16
Repeated unilateral otitis media in history with appropriate architectonics of intranasal structures (coincidence of the direction of curvature of the nasal septum)	35,2	14

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Thus, the curvature of the nasal septum and other features of the architectonics of the intranasal structures in patients with EOM to a lesser extent than in patients with EOM and AR affect the development of the disease.

In addition, the results of a comparative analysis of the history and rhinoscopy data clearly demonstrate the dependence of relapses of exudative otitis media on the state of intranasal structures in patients of group 1 and the absence of such in patients of group 2. Therefore, we can assume that pathological changes in the intranasal structures are one of the main causes of the development of EOM. And we regard this factor only as an accompanying one. In further studies, it is required to determine the cause of the pronounced swelling of the nasal mucosa, identified in the majority of patients with EOM, and to assess its significance in the development of the disease.

It turned out that the proportion of patients who had exudative otitis media and a history of AR was only significantly higher than in other groups. However, patients with EOM were significantly more likely to have a history of recurrences of unilateral otitis media ($p=0.001$), especially with existing pathological changes in the intranasal structures ($p<0.001$). At the same time, the similarity of the results of the study in patients with EOM and AR is noticeable.

The study of the functions of the nose revealed a difference in changes in patients between the main and 2 groups (Table 4).

Table 4. The results of the study of the functions of the nose of patients of groups 1 and 2

Indicator	Patients with EOM (n=220)		Control, n=20
	EOM and AR, n=120	EOM, n=100	
Mucociliary clearance (min)	31,2±2,21***	28,14±1,46*	11,8±1,4
Indicators of the concentration of hydrogen ions (pH)	7,42±0,06**	7,1±0,03*	7,0±0,01
Suction function (pupil reaction time (min))	75,3±0,68**	71,34±0,75*	67,2±0,6
Excretory function (cotton weight (mlg))	48,6±0,13**	46,32±0,11*	41,2±0,08

The table shows that in patients with EOM, a slight change in the studied functions was revealed. On the contrary, in patients with EOM and AR, there was a decrease in the protective function of the nasal mucosa and a shift in the pH of the nasal secretion to the alkaline side.

From the results of previous studies described in the literature, it is known that the pH shift of the nasal secretion to the alkaline side is one of the signs of serous inflammation occurring in the mucous membrane, including AR. Given the results of this study, we hypothesized the presence of a similar lesion of the nasal mucosa in patients with EOM and AR. It is more difficult to determine the possible causes of impaired protective function, based only on the results of this study. This is due, first of all, to the peculiarities of the structure of the mucociliary apparatus. In addition, there are many conditions that ensure the coordinated activity of all its structures and a significant number of external and internal factors that can cause their morphological and functional changes.

Comparing the results of this and previous studies, we believe that the most likely cause of the violation of the protective function of the nasal mucosa in patients with EOM and AR is serous inflammation, manifested by a number of structural and functional changes. Structural changes are characterized by de-epithelialization of the mucous membrane in the acute phase, an increase in the number of goblet cells, a change in the viscosity of the medium, and a change in the pH of the medium. Each of the described processes ultimately leads to a slowdown in mucociliary transport, which occurs in the patients with EOM and AR we examined.

CONCLUSION

Thus, the curvature of the nasal septum and other features of the architectonics of the intranasal structures in patients with EOM to a lesser extent than in patients with EOM and AR affect the development of the disease. The results of the study of the functions of the nose suggest the presence of serous inflammation of the nasal mucosa in patients with EOM and AR.

In addition, the results of a comparative analysis of the history and rhinoscopy data clearly demonstrate the dependence of relapses of exudative otitis media on the state of intranasal structures in patients of group 1 and the absence of such in patients of group 2. Therefore, we can assume that pathological changes in the intranasal structures are one of the main causes of the

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development of EOM. And we regard this factor only as an accompanying one. In further studies, it is required to determine the cause of the pronounced swelling of the nasal mucosa, identified in the majority of patients with EOM, and to assess its significance in the development of the disease.

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Acceptability and Usability of Quick Response Code for on Line Document Tracking in a Higher Education Institution in the Philippines

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SUMMARY: The Online document tracking using Quick Response Code is an online-based program that can be accessed anywhere provided with the presence of an Internet connection. For security, username and password will be provided to the user including the level of access.

The study revealed that the school head and staff respondents' assessment was "Average" on all dimensions of the existing Practices of Documents Tracking except in terms of functionality where the staff respondent gave an evaluation of "Good". The school head respondents ' assessment on all dimensions of Quick Response Code for tracking of online documents was Excellent except on Reliability where the rating was Good. The staff respondents had given a rating of "Excellent" on all dimensions. In terms of acceptability, the school head respondents' evaluation was "Highly Accepted" while "Accepted" on performance. The staff respondents' assessment was "Highly Accepted" on the dimensions towards Quick Response Code for tracking of online documents.   In terms of readiness, the school head respondents indicated that they are "ready" to use the system while the staff was "Very Ready" as to information system faculty and user/technical personnel.

Based on the summary of the investigations conducted, and the conclusions arrived at, the researcher recommended that for better document tracking, the Quick Response Code for tracking documents for President Ramon Magsaysay State University is highly endorsed and recommended for use; that the system shall be cascaded to offices to all colleges and in satellite campuses for effective and efficient tracking of documents; that the used of Quick Response Code for tracking documents is highly recommended for use which demonstrate global competitiveness and adhere to Civil Service advocacy and principle of efficient service to clients; that the used of Quick Response Code for tracking documents is highly recommended which adhere to ISO certification in providing quick, fast and efficient services and lastly to conduct a parallel or similar study with in-depth and wider in scope so as to validate the findings obtained in the study.

KEYWORDS: Acceptability, Quick Response Code, Document Tracking

1.   INTRODUCTION

Documents may be created quickly and in large quantities using modern computing methods [1]. Methods like this are available. facilitate several versions of storing documents in a database, numerous users to work on simultaneously to the stored document. In many applications, it's useful to know who was responsible for the last update of a certain document version. Employees must enter their unique identification number before producing copies, allowing the company to track the number of copies made by each employee. Employees also provide an identification of the project they are working on in more complex systems, allowing a corporation to track costs related to certain projects. When employees have virtually unrestricted access to copy machines, it might be difficult to prevent sensitive papers from being copied. Trade secrets, employee payroll information, and company checks are all examples of sensitive papers. In most cases, a corporation will have a few people who are permitted to copy some or all of the sensitive documents, while the rest of the staff are not. Limiting a person's access to sensitive papers is a popular way to prevent unauthorized personnel from duplicating them. In more complex systems, employees can also identify the project they're working on, allowing a corporation to track costs related to certain initiatives. When employees have virtually unrestricted access to copy machines, it might be difficult to prevent sensitive papers from being copied. Trade secrets, employee payroll information, and company checks are all examples of sensitive papers. In most cases, a corporation will have a few people who are permitted

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to copy some or all of the sensitive documents, while the rest of the staff are not. Limiting a person's access to sensitive papers is a popular way to prevent unauthorized personnel from duplicating them.

However, circumstances occur wherein employees who are not authorized to copy particular sensitive documents nonetheless have access to the documents. As a result, it would be desired to create new technologies. methods of protecting sensitive documents from being copied and accessed by unauthorized persons.

In recent years and continuing, securing of information resources has been increasing, regardless of whether they are individuals or businesses. The spread of computer viruses, the availability of security flaws, the need for client information security control, and the demand for upgraded information systems are all factors driving this development. Many information security standards exist, such as ISO 15408, ISO 17799, BS 7799, or ISMS, and ordinary offices are implementing security policies and/or information security management. To achieve a uniform and consistent document management, "policy-based" document security systems have been developed. In these Document security policy is formed as a framework for managing document security, and documentation systems and other types of devices and equipment are linked together. In a rule table, the policy is described as a series of rules. Using the rule table, a server can provide security management for document production and/or copy jobs in an integrated manner. A document security management and maintenance system can be structured in the domain by putting the server in it. Document security is handled in this situation by document identifiers and user attributes that have been pre-registered. For computer-generated or word-processed electronic documents are only some of the requirements that organizations To take advantage of what these documents say and signify, they and their leaders must meet. In today's educational institutions, vast amounts of paperwork are frequently produced [2].

QR codes are two-dimensional barcodes that may be scanned with web-enabled mobile devices [3]. These codes link to a website, video, phone number, or text message, giving users immediate access to information resources whenever and wherever they need it. QR codes are increasingly being employed for additional useful uses in document management and, more specifically, document control [4]. You can use QR codes to direct your customers. The use of technology makes clear that organizations have begun to advances in paper documents. Documents are slowly becoming obsolete with the rise There are a variety of online solutions for viewing and maintaining online documents, as well as incorporating e-signature technology. Document management systems have unquestionable capabilities, from workflow management to document security. The advantages of a document management system are sufficient to persuade businesses to use one. If you're still not convinced, these top 6 recent trends in document management systems can just persuade you that this platform is going to play a role in the future of businesses.

For administrative and academic employees at such schools, among many others, this can be a laborious and time-consuming process[2].

The necessity to keep track of files has grown increasingly vital in today's world, particularly in higher education institutions. However, there is little discussion of this in the literature. The majority of the time, files are physically moved from one desk to another inside a department or between departments. The File Tracking System provides a clear view of file movement throughout the file processing process (DMD, 2010). A file may need to pass through numerous people before it is deemed acceptable. However, there are disadvantages to moving these files from one desk to another, such as losing them or neglecting to document the transfer. As a result, a system that can provide solutions to such challenges while conserving administrative staff' time and energy is required. In this case, file tracking systems are a possible option. A file and document tracking software was released in 2013 [5].

The software is a simple barcode-based tracking system that is easy to use. The National Informatics Centre (NIC) in Kerala created the Information and Data Exchange Advanced System (IDEAS) as a file tracking system using Free and Open Source Software (FOSS), Karela [6]. It's a web application with the goal of keeping track of files that come into a government office, such as citizen petitions.

Through the use of a web interface, government officials can easily record or query information regarding petitions or files received at their offices via the Internet. Users, including residents and police officials, may also trace the transit of files, making the system more transparent. This system has the disadvantage of being inflexible. was designed to serve files in government offices rather than universities or other higher education organizations.   One of the most pressing issues at today's universities is finding files. Time is squandered archiving or searching for files, energy is expended tracking down misplaced files, deadlines are missed, and files are occasionally lost. With these problems, the researcher came out in the decision to have an application to make a system for file tracking as the solution to solve these problems. With the objective to design and develop a file tracking system using Quick Response Code for Ramon Magsaysay State University and determine its Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability. Security, Maintainability and Portability.

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This proposal will investigate the feasibility of incorporating QR codes into an online document tracking system for use in schools, as well as the possibility of integrating QR codes into other settings. The codes serve as a link between the flat content and the internet. Despite the fact that QR codes are not as popular as some projected, the notion of the codes is maturing into image recognition (IR), which has intriguing educational applications. Teachers and students finding novel methods to use technology for learning can still use QR codes. 6

2. EXPERIMENTAL CONSIDERATION

Research Design

For the purpose of this study, descriptive research was used to obtain opinions of selected respondents on the evaluation of the Quick Response Code (QRC) for on line document tracking. System. Descriptive research is designed to provide a picture of a situation as it naturally happens. It was used to justify current practice and make judgement and also to develop theories [7].

The researcher focused on gathering, investigation and analysis on the procedures used by Ramon Magsaysay Technological University regarding the document and workflow management. The study will also cover the view of the head officials and staff of the university on the level of quality, acceptability and the institution's readiness of the developed system. Bhat [8] defined the descriptive research as a research technique for describing the features of the population or phenomenon being investigated. This strategy concentrates on the "what" of the study topic rather than the "why" of the investigation.

The topic of the investigation A descriptive study's purpose is to characterize a phenomena and its characteristics. This study is more interested in what happened than than how or why it happened. As a result, observation and survey tools are frequently utilized to collect data [9]. In such research, the data may be collected qualitatively, but it is often analyzed quantitatively, using frequencies, percentages and averages.

The Use Case illustrated different process and functions within the Electronic Document Management and Processing System. Similarly, the said model show the flow of the process and the relationship between them. As presented, the administrator is limited to the functions related to accounts and miscellaneous settings in the system. The staff were those personnel assigned in each offices the is only capable of organizing and managing documents. Lastly, the head in the diagram pertains to those user who's accountable and in charge in each office. They are the one who has full control and more functions within the system. Aside from the functions that was given to staff, the head had the ability to process and approved exchange of documents from and to his/her office. Moreover, they are given privilege to monitor documents changes and actions relative hereto.

Research Locale and Description of the Respondents

The study was conducted in the selected campuses of President Ramon Magsaysay State University in the province of Zambales emphasized in the illustration in Figure 6. Selected personnel from different offices of President Ramon Magsaysay State University will take part in this study. Through them the system will be evaluated and pretested. Purposive sampling was used in this study. Parahoo [10]) describes purposive sampling as "a method of sampling where the researcher deliberately chooses who to include in the study based on their ability to provide necessary data". The rationale for choosing this approach is that the researcher was seeking knowledge about the respondents' opinion on document and workflow management in which the participants provide by virtue of their experience.

The problem with taking participants is the number of respondents or the sample size. Although, there are many formulas to calculate sample size, the researcher has chosen the Slovin's formula:

Slovin's Formula:
$$n = \frac{N}{1 + NE^2}$$

Where: n = sample size

N = population

E = desired margin of error

Using the formula mentioned above, given a population size of 188 and a confidence of 95%, which gave a margin error of 0.05, the sample size and distribution was then computed and shown in Table 1.

Distribution of the Respondents

There was a total respondent of 188 taken from the population of 355 school heads and staff personnel respondents. Table 1 shows the distribution of the respondents.

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Table 1. Distribution of Respondents

Respondents	Sample Frame	Percentage
Head	56	29.79
Staff	132	70.21
TOTAL	**188**	**100.00**

Statistical Instruments

The questionnaire was utilized as the main instrument in data gathering. The survey instrument was prepared by the researcher in consultation with his Thesis adviser and the members of the Panel. The research adopted the ISO/EC 25010:2011 for the evaluation on the effectiveness of the system. Suggestions and recommendations to further improve the questionnaires was made and adapted by the researcher. Furthermore, some items or information not considered relevant to the study was discarded. The questionnaire survey questionnaire which was distributed among the respondents consisted of three parts. The first one is the respondents' evaluation on the software quality of the Quick Response Coder for on line document tracking in terms of (i) Functional Suitability; (ii) Performance Efficiency; (iii) Compatibility; (iv) Usability; (v) Reliability; (vi) Security; (vii) Maintainability; and (viii) Portability with a rating scale as follows:

3. RESULTS

1. Evaluation of the School Head and Staff on the Effectiveness of the Online Documents Tracking System using Quick Response Code at President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics

Table 1 shows the assessment of the school head and staff respondents on the effectiveness of the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics as to functional suitability.

Table 1. Assessment of the School Head and Staff Respondents on the Effectiveness   Enhanced Electronic Document Tracking System Using QR Code

Indicators	School Heads N=56		Staff N=132	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
Functional Suitability	4.27	Excellent	4.43	Excellent
Performance Efficiency	4.15	Good	4.39	Excellent
Compatibility	4.13	Good	4.32	Excellent
Usability	4.29	Excellent	4.36	Excellent
Reliability	4.08	Good	4.35	Excellent
Security	4.32	Excellent	4.38	Excellent
Maintainability	4.21	Excellent	4.29	Excellent
Portability	4.16	Good	4.27	Excellent
Mean				

The evaluation school head and staff respondents on the level of effectiveness the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics as to functional suitability was similar as manifested by the overall weighted mean of 4.27 and 4.43 with descriptive equivalent of "Excellent" respectively. The staff provided higher rating of 4.39 indicating that the system is excellent in effectiveness as measured in terms of efficiency. On the other hand the school heads gave a rating of 4.15 or good.   The ratings given by heads was lower by 0.24 than the rating provided by the staff .   In terms of individual indicator, the highest rating of excellent was provided by staff indicating that the system has a firm response, processing time and throughput rates. The results of Lee and Harapanahali (2015)[11] indicated that the activities for document tracking and specification check can be performed more efficiently using QR codes than without QR codes.

As to compatibility, the school head officials and staff respondents assessed the level of effectiveness the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC

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20510 metrics as to compatibility differently. With a weighted mean of 4.13 interpreted as Good, the heads had provided lower evaluation. On the hand, the staff respondents gave a rating of 4.32 with descriptive equivalent of Excellent. With a difference of 0.19 the staff had higher rating than the heads of the unit.

The school head and staff respondents assessed the level of effectiveness of the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics similarly as to usability. As manifested by the overall weighted mean of 4.29 and 4.36, the heads and staff rated the system as "Excellent".

The assessment of school head on the level of effectiveness the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics as to reliability was different. With the overall weighted mean of 4.08 the heads indicate that the system is "Good" but according to the staff respondents, a rating of 4.35 indicates that the system is "Excellent".

The school head and staff respondents' assessment on the level of effectiveness the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics as to security was similar. With high rating of 4.32 and 4.38, the heads and staff found that the system was excellent as to security. The result implies that the system can be easily hacked or opened by anybody who have no concern of the document.

The evaluation of the school head and staff respondents on the level of effectiveness the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics as to maintainability was similar as manifested by the overall weighted mean of 4.21 and 4.29. Although both the respondents with descriptive equivalent of "Excellent" respectively.

The evaluation of the school heads on the level of effectiveness the Online Documents Tracking System using Quick Response Code in President Ramon Magsaysay State University based on the ISO/IEC 20510 metrics as to portability was lower with a mean of 4.08 with descriptive equivalent of "Good" while a higher rating 4.35 interpreted as "Excellent" was provided by the staff respondents. A higher rating provided by the staff respondents can be attributed to their familiarity with the system that it can be installed easily and can be adapted to any other system.

3. Assessment of the School Head and Staff Respondents on the Level of Readiness in the Implementation of the Enhanced Electronic Document Tracking System Using QR Code

Table 2 shows the assessment of the school head and staff respondents on the level of readiness in the implementation of the enhanced electronic document tracking system using QR Code as to Information System Facility.

Table 2. **Assessment of the School Head and Staff Respondents on the Level of Readiness in the Implementation of the Enhanced Electronic Document Tracking System Using QR Code**

Indicators	School Head N=56		Staff N=132	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
Information System Facility	**4.13**	**Ready**	**4.20**	**Very Ready**
User/Technical Personnel	**4.11**	**Ready**	**4.29**	**Very Ready**
Mean				

The school head officials assessed the level of readiness in the implementation of the enhanced electronic document tracking system using QR Code as to Information System Facility differently. As manifested in the overall weighted mean of 4.13 with head respondents implies that they are ready for the implementation of the system. On the other hand, higher rating of 4.20 by the staff respondents implies that they "Very Ready" to use the system. .

School head respondents are more of cognitive, decision and human relation skills while staff respondents are more of the technical skills looking for suitable places and internet availability and connectivity.

The evaluation made by the school head and the staff on the level of readiness in the implementation of the enhanced electronic document tracking system using QR Code as to User/Technical Personnel was different as manifested by the overall weighted mean of 4.11 with descriptive equivalent of "Ready". On the other hand, a slightly higher rating of 4.29 from the staff respondents with descriptive equivalent of "Very Ready" was recorded.

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The data implies on the very readiness of the staff respondents and this could be ascribed on their age as millennial compared to adult school heads official. Staff respondents who are graduates of computer sciences understand the computer language and could make certain trouble shooting in case there is a malfunction on the system.

1. **Assessment of the School Head and Staff Respondents on the Level of Acceptability of the Quick Response Code for Tracking of On-line Documents**

    Table 3 shows the assessment of the school head and staff respondents on the level of acceptability of the quick response code for tracking of on-line documents as to functionality.

Table 3. Assessment of the School Head and Staff Respondents on the Level of Acceptability of the Quick Response Code for Tracking of On-line Documents

Indicators	School Heads N=56		Staff N=132	
	Weighted Mean	Descriptive Equivalent	Weighted Mean	Descriptive Equivalent
Functionality	4.30	Highly Accepted	4.30	Highly Accepted
Performance	4.13	Accepted	4.26	Highly Accepted
Usability	4.30	Highly Accepted	4.30	Highly Accepted
Mean				

The assessment of school heads and staff respondents on the level of acceptability of the quick response code for tracking of on-line documents as to functionality was not different. The school heads had a slightly lower rating of 4.30 and the staff had a slightly higher rating of 4.35 both with a descriptive rating of "Highly Accepted". Both the respondents agree that the system is highly acceptable in the academe.

According to both groups of respondents, they had seen, observed and experienced the functionality of the proposed quick response code for tracking of on-line documents. At a lesser time of searching, they can immediately trace and track the documents. It provides detail of the documents when it was issued, date received, and the nature of the documents.

The school head and staff respondents assessed the level of acceptability of the quick response code for tracking of on-line documents as to functionality differently. With a weighted mean of 4.13 interpreted the heads indicate that the system is Acceptable. A higher rating of 4.26 with descriptive equivalent of "Highly Accepted", the staff found that the system is highly acceptable.

The data implies on the divergence of assessment between the two groups towards performance of the Quick Response Code for Tracking of On-line Documents. The data further shows on the very much appreciate among staff respondents as the core recipient and beneficiary of the project that would make their functions and duties more efficient, and effective. Above all, it is considered very friendly compared to the existing where they are prone to allergies while scanning bulk of papers from the drawers and filing cabinets.

The evaluation of school head officials and staff respondents on the level of acceptability of the quick response code for tracking of on-line documents as to usability was the same. The overall equal weighted mean of 4.30 and 4.30 both the respondents indicate that the system is "Highly Accepted".

Both groups agree on the high acceptability of the quick response code for tracking of on-line documents as to usability. It is very useful in improving the management of documents and provide efficient transaction for clientele requesting for document like transcript of records, office and university memoranda, CMO's, letters from the Commission on Higher Education and other government agencies.

2. **Test of significant difference on the evaluation of head officials and staff respondents towards existing and proposed online Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University**

    Table 4 shows the significant differences on the evaluation of head and staff respondents towards existing and proposed online quick response code for tracking of on line documents for President Ramon Magsaysay State University.

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On the existing system, the computed Significant or P value (2-tailed test) equivalent to 0.000 on (functional suitability); 0.000 on (performance efficiency); 0.000 (compatibility); 0.000 on (usability; 0.000 on (reliability); 0.000 on (security); 0.000 on sustainability) ; and 0.000 on (portability) which all are lower than 0.05 Alpha Level of Significance, hence there is significant difference on the assessment towards the existing document tracking between the school heads and staff respondents. The staff respondents had provided a higher rating in almost all the indicators provided.

Table 4. Test of significant difference on the evaluation of head officials and staff respondents towards existing and proposed online Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University

	Existing				Proposed Online			
Indicators	df	t Stat	Sig. (2-tailed)	Decision	df	t Stat	Sig. (2-tailed)	Decision
Functional Suitability	187	64.352	0.000	Reject Ho	187	150.224	0.000	Reject Ho
Performance Efficiency	187	59.258	0.000	Reject Ho	187	59.258	0.000	Reject Ho
Compatibility	187	59.442	0.000	Reject Ho	187	111.601	0.000	Reject Ho
Usabili1y	187	59.169	0.000	Reject Ho	187	117.019	0.000	Reject Ho
Reliability	187	58.922	0.000	Reject Ho	187	123.172	0.000	Reject Ho
Security	187	61.236	0.000	Reject Ho	187	124.371	0.000	Reject Ho
Maintainability	187	64.281	0.000	Reject Ho	187	116.347	0.000	Reject Ho
Portability	187	60.584	0.000	Reject Ho	187	116.799	0.000	Reject Ho

On the proposed online Quick Response Code for tracking of on line documents, the computed Significant or P value (2-tailed test) equivalent to 0.000 on (functional suitability); 0.000 on (performance efficiency); 0.000 (compatibility); 0.000 on (usability; 0.000 on (reliability); 0.000 on (security); 0.000 on sustainability) ; and 0.000 on (portability) which all are lower than (<) 0.05 Alpha Level of Significance, hence there is significant difference on the assessment towards the proposed online document tracking between the school heads and staff respondents.

The data indicates differences of the existing and proposed online quick response code for tracking of on line documents for President Ramon Magsaysay State University. The online tracking with the application of QR codes can search and trace documents without having to ask their peers or teachers. Hernández-Julián & Peters [12], in their study conducted to compare doing homework online with doing homework on paper, found that an electronic environment could make it easier to access an instructional material and that it did not significantly influence learning. Al-Khalifa [13]) developed a Mobile Snapshot Response system with QR Codes.

The existing old system would take much time in looking for the needed old documents from filing cabinets and tracks. It cannot adhere on the government advocacy to reply request of clientele within 3 days period because of tedious activity in searching. But the proposed new online Quick Response Code for tracking of on line documents makes the work efficient and effective.

According to Knowles and David [14] it is a primary object of the present invention to provide an improved method and apparatus for Surfing among information resources on the Internet while avoiding the Shortcomings and drawbacks of prior art Systems and methodologies. A further object of the present invention is to provide an Internet Scanning System which includes an bar code Symbol reader for reading URL-encoded bar code symbols printed on various types of print media which, when read thereby, automatically connects the Internet Scanning System to the Internet Server that contains the information resource Specified by the Scanned URL-encoded bar code symbol.

3. Test of significant difference between the head officials and staff respondents on the level of acceptability in the Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University

Table 5 shows the significant difference between the head officials and staff respondents on the level of acceptability in the Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University

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Table 5. Test of significant difference between the head officials and staff respondents on the level of acceptability in the Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University

Indicators	df	t Stat	Sig. (2-tailed)	Decision
Functionality	187	111.292	0.000	**Reject Ho**
Performance	187	110.974	0.000	**Reject Ho**
Usability	187	111.292	0.000	**Reject Ho**

The null hypothesis is rejected based on the computed Significant or P-values of 0.000 on (functionality); 0.000 on performance; 0.000 on usability which is lower than (<) 0.05 Alpha Level of Significance, hence there is significant difference on the assessment towards the level of acceptability on the Quick Responses Code for tracking of on online documents for the President Ramon Magsaysay State University between the school heads and staff respondents.

The computed data clearly manifest that the level of acceptability of the proposed online Quick Response Code for tracking of on line documents for the President Ramon Magsaysay State University was better compared to the existing method of tracking documents.

The Online Quick response Code for tracking documents are with application of mobile devices and QR code technology which can provide efficient and effective searching and tracking for documents. The QR codes can take m-learning to a new level, referred to as ubiquitous or u-learning, by providing exactly the right information, at the right time and place, challenging each u-learner through a unique, individualized, wireless learning environment [15].

Mobile devices and QR code symbols can offer an ideal method to provide students instant learning assistance using devices they already possess. Integrating digital and text information will bring opportunities for learners to comprehend print material by providing relevant, real-time background knowledge, while allowing students to learn at their own pace [16].

Multimedia digital content via audio/video clips provide students the ability to gather information from a variety of methods which explain concepts in greater detail. Supplementary materials in the form of QR codes give instantaneous availability to digital help via scaffolding questions to support students in the learning process [16].

4. **Test of significant difference between the head officials and staff respondents' evaluation on the level of readiness in the implementation of Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University.**

Table 25 shows the significant difference between the head officials and staff respondents' evaluation on the level of readiness in the implementation of Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University

The null hypothesis is rejected based on the computed Significant or P-values of 0.000 on (Information System Facility); and 0.000 on (User/Technical Personnel) which are lower than (<) 0.05 Alpha Level of Significance, hence there is significant difference on the assessment towards the level of readiness in the implementation of the Quick Responses Code for tracking of on online documents for the President Ramon Magsaysay State University between the school heads and staff respondents.

Table 6. Test of significant difference between the head officials and staff respondents' evaluation on the level of readiness in the implementation of Quick Response Code for tracking of on line documents for President Ramon Magsaysay State University

Indicators	df	t Stat	Sig. (2-tailed)	Decision
Information System Facility	187	99.448	0.000	**Reject Ho**
User/Technical Personnel	187	107.067	0.000	**Reject Ho**

This finding contradicts the study of Bachillar [17] where he found out that there was no significant difference toward level of readiness on electronic document management and processing system as perceived by school heads and staff respondents.

Advances in technology have transformed the world of work. AS the work environment has changed, individual worker see how their work connects not only to their particular workplace but to the entire value chain. Merging in the fast lane of the information super highways of the 21st century world of work. The technology explosion has transformed every level of business environment. Office technology focuses upon office information function such as word processing, data processing, graphics, desktop publishing and communication.

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CONCLUSION

Based on the findings of the study, the researcher concludes that:

1. The enhanced on line tracking of documents using Quick Response Code is Good except on reliability which is excellent.
2. The enhanced on line tracking of documents using QR code is highly accepted.
3. The school head respondents are ready while the staff are very ready to implement the enhanced on line tracking of documents using QR code.
4. There are significant differences on the assessment between school heads and staff respondents towards dimensions on the proposed online Quick Response Code for tracking of on line documents as to functionality, performance, efficiency, capability, usability, reliability, security, maintainability and portability.
5. There is significant difference on the assessment towards the level of acceptability on the Quick Responses Code for tracking of on online documents between the school heads and staff respondents.
6. There is significant difference on the assessment towards the level of readiness in the implementation of the Quick Responses Code for tracking of on online documents between the school heads and staff respondents.

Acknowledgment

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Coverage of Problems in the Ethnic History of the Population of Kashkadarya and Surkhandarya Oases in the Scientific Researches during the Years of Independence

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ABSTRACT: The article presents some studies reflecting the historiography of the ethnology of the southern regions in the first years of independence, including K.Sh. Shaniyozova, A.A. Askarova, B.A. Akhmedova, I. Jabborova, A.A. Ashirova, O.Burieva, F. Ochildieva and others. Kayumov, N. Tursunov, R. Radzhabov, M. Usmanov, O. Dzhurakulov, P. Ravshanov, local historian B. Pulatova and others.

To date, no special scientific works on the historiography of ethnology of the southern regions of Uzbekistan have been carried out and scientific literature on this topic has not been published. Basically, the study provides information about the main components that are actively involved in the formation of the Uzbek people. In addition, attempts have been made to show that the southern regions of Uzbekistan have been home to settlers since ancient times and that Uzbek tribes mingled with settlers who have lived in these regions since ancient times and are the heirs of their material and material values. spiritual culture.

KEYWORDS: ethnography, historiography, southern regions of Uzbekistan, Uzbeks, the process of self-awareness, independence.

1. INTRODUCTION

 The study of the history of the people of Central Asia, the collection of information about their past, in particular, their ethnology, has also been of interest and importance to researchers living in ancient times. Preliminary data on the history and ethnography of the ancestors of the Uzbek people also date back to ancient times. Especially after the formation of the Uzbek people as a single nation, we are witnessing the enrichment and increase of such information.

Due to the fact that our history was previously written under the influence of the dominant idea, a one-sided approach to the events that took place, many events and incidents were covered from a class point of view, and events related to the history of the Soviet period were distorted. In particular, all the achievements were said to be the product of a socialist system, sometimes exaggerated, and its negative consequences were partially reflected in Soviet-era research. Therefore, it is necessary to reconsider this page of our history conceptually and methodologically, to study it more deeply on the basis of sources. It is necessary to study and analyze various historical sources, critically evaluate, correctly interpret and reveal the true and complete picture of our history.

After the independence of Uzbekistan, historians were tasked to reveal the areas that were distorted or poorly studied during the Soviet era, and in the past, some progress has been made in this area. In the twentieth century, many different volumes of research on the ethnography of different ethnic groups and populations in the southern regions of Uzbekistan were published. Generalization, systematization, analysis of different approaches from the point of view of historiography is a topical issues in today's historiography, and this urgency requires special research in this area.

2. METHODS AND LEVEL OF STUDY

Analysis of relevant sources and literature shows that the first steps are being taken in Uzbekistan in the field of ethnological (ethnographic) historiography. It was noted that more effective research is needed in this area, and there are still many unresolved issues in this area. In particular, no special scientific work on the historiography of ethnology of the southern regions of Uzbekistan has been conducted or scientific literature on this topic has not been published.

Historiographical works devoted to the analysis of ethnographic research carried out before the independence of our country were one-sided, did not show the scientific-practical value and scientific significance of the studied problems, and often

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had a bibliographic description. However, it is impossible not to mention the path of ethnography in Uzbekistan and the scientific value of this work in the study of ethnology of the Uzbek people.

In the first years of independence, some works reflecting the historiography of the ethnology of the southern regions were created. In particular, information on the state of study of certain issues related to the historiography of ethnography of the Kashkadarya and Surkhandarya oases is given in In the scientific works of K.Sh. Shoniyozov, A.A. Asqarov, B.A. Ahmedov, I. Jabborov, A.A. Ashirov, O. Buriev, F. Ochildiev and A.R. Kayumov, as well as in the multi-volume book "Uzbeki" under the heading "Narody i kultury"

From the last quarter of the twentieth century, a new era began in the study of the ethnography of the southern oases. The dissertation is defended by a group of scientists working in the oases. In particular, O. Buriev, S. Davlatova, O. Ibragimov, M. Ibragimova, K. Kubakov, K. Nasriddinov, F. Rakhmonov, G. Tosheva, N. Tursunov, B. Khamrokulova, P. Norbutaev in the introductory part of the candidacy Kashkadarya and the study of the ethnic history, material and spiritual culture, customs and traditions of the population of the Surkhandarya region.

3. RESEARCH RESULTS

One of the most important problems in ethnology during the years of independence is, of course, the study of the ethnogenesis and ethnic history of the Uzbek people. The researches of the well-known scientists of the republic K. Shoniyozov [1], A.A. Askarov [2], B.A. Akhmedov [3] and I. Jabbarov [4] in this direction are of special interest. These studies provide information on the ethnic history and ethnic composition of the population of the southern regions of Uzbekistan.

For the first time, K. Shoniyozov developed a theoretical and methodological concept of the formation of the Uzbek people, based on the historical foundations of ethnic processes in Central Asia. He elaborated his new scientific conclusions on complex ethnic processes in such articles as "Some theoretical issues of ethnogenesis of the Uzbek people" and "Some issues of the process of formation of the Uzbek people" [5].

Relying on a large number of historical, anthropological, archaeological, numismatic and ethnographic sources of the 1990s, K. Shoniyozov's views on ethnic components that played an important role in the ethnogenesis and ethnic history of the Uzbek people are a direct source of coverage of the ethnic history of the region.

K. Shoniyazov's views on the formation of the Uzbek people are valuable as an important theoretical and methodological basis in the study of the formation and ethnic history of the population of the southern oases. The scientist notes that the Uzbek people, unlike other Turkic-speaking people in the region, was formed in the process of mixing of peoples of the two languages (Turkish and Iranian).

K. Shoniyazov conducts fundamental research, systematizing his many years of research on the ethnogenesis and ethnic history of the Uzbek people. His work "The process of formation of the Uzbek people" [6] is one of the fundamental researches in Uzbek ethnology. This monograph is an important guide that fills a certain gap in the coverage of the problems of ethnogenesis and ethnic history. In our opinion, this work is the first in history to cover many aspects of the subject, and the author states new scientific views on the ethnogenesis and ethnic history of the Uzbeks, a number of theoretical issues. In general, the author has been able to shed light on the problem of ethnogenesis and ethnic processes, as well as the process of formation of the Uzbek people, which has not yet been sufficiently developed. K. Shoniyazov also notes that during the study, some issues related to the history of the ethnos have not yet been resolved. Based on the scientific conclusions of the author's monograph, it is possible to obtain valuable information on the problems of population formation and ethnic history of the southern regions of Uzbekistan.

The views expressed in the works of Academician A.A. Askarov on the theoretical and methodological problems of ethnic history and ethnogenesis of the Uzbek people serve as a theoretical and methodological basis for covering the formation of the population of the southern oases and ethnic history [7]. K. Shoniyazov, A. Doniyorov and A. Ashirov commented on the scientific and practical significance of these articles in their work [8].

In 2015, a new, fundamental work by A. Askarov was published [9]. In this monographic study about the origin of the Uzbek people, that is, its long ethnogenesis and ethnic history, the process of its gradual formation into a tribal state and stages of reaching the level of a nation as a formed nation are described on the basis of a scientific analysis of the rich material culture and written sources.

The works of historian B. Ahmedov, published during the years of independence, also serve as an important source for researchers studying the ethnic history of the Uzbek people [10]. His book, Lessons from History, covers the medieval history of Uzbeks. The value of the book for our topic is that it provides an opinion on the manuscript sources on the ethnic history of the Uzbek people and their content.

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A number of works by I. Jabborov on the ethnology of the peoples of the world and the Uzbek people also address the problem of ethnic processes in Central Asia [11]. In the first years of independence, the scientist published a work on the ethnography of the Uzbek people. This book reflects the origins and ethnic history of the Uzbek people, their location. The information provided in it is a direct reference to the ethnic processes that took place in the Kashkadarya and Surkhandarya oases and the ethnic composition and location of the population.

Another work by I. Jabborov is called "Uzbeks: lifestyle and culture". This book is a revised and supplemented copy of the book of the scientist "Ethnography of the Uzbek people", which enriches the current ethnic and ethnocultural processes with new information. The author's information on the ethnic persecution and location of the Uzbek people helps to shed light on ethnic processes in the southern regions. The author notes that on the eve of the twentieth century, the Uzbek people consisted of three major ethnic groups (subethnos).

During the years of independence, the issues of ethnic processes in the southern oases of Uzbekistan and the ethnic composition and location of the population were reflected in the work of O. Buriev. O. Buriev's research is important because it is in them the only historical and ethnographic region in terms of territories, geographical location, nature, economy, origin (ethnogenesis) of the population and the eternal harmony of their historical destinies, in short, the commonality of material and spiritual cultures and ethnography of Kashkadarya and Surkhandarya regions, which are historical and ethnographic regions are always illuminated on the basis of a comparative analysis with each other.

Many of O. Buriev's works are directly devoted to the ethnic composition, ethnic history and location of the population of the southern regions. Among them, the ethnological dictionary co-authored by T. Khojamberdiev and his joint work with M. Usmanov [12] summarized this issue and achieved positive results in its study. In the book "Brief glossary of ethnological terms" the authors describe the ethnic history, number, location, ethnonym and ethnotoponym of Uzbek tribes and other nations living in the south of Uzbekistan on the basis of a large number of historical and ethnographic sources.

O. Buriev and M. Usmanov also work on the ethnic history and ethnocultural processes of Uzbeks, the most important sources on the ethnogenesis and ethnic history of the Uzbek people and a brief commentary on the ethnic history of the Uzbek people. The play also tries to cover the ethnocultural processes that took place in the past in some large regions of Uzbekistan (Samarkand, Kashkadarya and Surkhandarya oases) and the ethnic history of large Uzbek people on the basis of many historical and ethnographic sources.

In recent years in the researches of historians and ethnologists A. Kayumov, N. Tursunov, R. Rajabov, M. Usmanov and historian F. Ochildiev Ethnic processes in the Kashkadarya and Surkhandarya oases, the problems of ethnic history and ethnic composition of the population of the oases are reflected.

The research of A. Kayumov, the author of articles on the ethnic composition and location of the population of the southern regions of Uzbekistan (especially the Surkhandarya oasis), revealing ethnic processes, is also noteworthy. In an article on the ethnic composition of the Sherabad oasis in the XIX - early XX centuries, A. Kayumov provides information about the location of ethnic groups living in the oasis - Chigatoys, bells, blacksmiths and others.

In the article co-authored by A. Kayumov and A. Ashirov, the ethnic characteristics of the population Uzbeks living in Surkhandarya's Sariosiyo, Avlod, Bibishirin, Rabot, Kofrun, Shayit, Gaza, Poygaboshi - Turks, Kungrad, Chigatay and Tajiks living in Darband, Sayrob, Machay, Boysun villages are described [13].

In studying the ethnic history and ethnic composition of the population of the southern oases, it is worth noting the work of N.N. Tursunov, who studied the ethnic characteristics of the Surkhan oasis [14]. The researcher studied the ethnic composition of the South Surkhandarya oasis and tried to shed light on this issue based on the data of B.Kh. Karmisheva and the materials of the 1926 zoning commission. It should be noted that the author has enriched the materials of B. Kh. Karmisheva about the ethnoses in the oasis with new information.

In the multi-volume book "Uzbeks" in the section "Narody i kultury" the authors dwell on the ethnic history of the Uzbek people, as well as information on the ethnic history of the population living in the south of Uzbekistan [15].

R.A. Rajabov's monograph "History and ethnography of the Arabs in Uzbekistan" is a historical and ethnographic study of the Arabs who have lived in the southern regions of Uzbekistan for centuries. It describes the settlement of the Arabs in Central Asia as a result of the invasions of the Arab historical state and in the following centuries in the lands of Movarounnahr. The issues of participation of Arabs in the socio-economic and ethnocultural processes in our country in different historical periods are also described. There is also valuable information about the ethnic history and location of Arabs and other ethnic groups living in the region, based on sources and scientific research created by historians, ethnographers and linguists [16].

Researcher M. Usmanov's work on the ethnic history of Uzbek bells living in the southern oases is also noteworthy [17]. We have already mentioned his work with ethnologist O. Buriev, so the researcher's special monograph on the ethnic history of

the Uzbek bells explains the ethnic history and genealogy of the Uzbek bells, which make up the majority of the population of the southern regions. Information on the history of the bell seed is also given in the books of researchers K. Berdikulov, T. Batyrov [18]. Researchers 5 who want to study the ethnic history of the bells and their location across the southern regions can, of course, obtain relevant information for themselves from these studies.

F. Ochildiev's monograph, which explains the socio-political and economic changes in the principalities of the Surkhandarya oasis in the second half of the XIX - early XX centuries, also addresses the issue of settlement and ethnic composition of the oasis principalities [19].

Historians O. Jurakulov [20], P. Ravshanov [21], local historian B. Pulatova [22] also provide information on the ethnic history and location of the population of the region.

O. Jurakulov's book dedicated to the Turkmen of Chandir village of Kashkadarya tells about the ethnic history of Chandir Turkmens, their interaction with Samarkand, Bukhara, Khorezm regions and Chandir tribes living in Chorjoi and Dashovuz regions of Turkmenistan. Scholars have tried to prove that the ethnogenesis of the Chandir Turkmen dates back to the ancient Turkic tribe Oguz, based on the works of medieval scholars Mahmud Kashgari (XI), Rashid-id-Din (XIII - XIV centuries), Abulgazi Bahodirkhan (XVII) and Soviet and Turkmen scholars.

O. Jurakulov's monograph "Kashkadarya mangitlari" is dedicated to the history of mangits, one of the Uzbek tribes that made up the majority of the population of the Bukhara khanate. The book provides information about the ethnic history, number and location of the Mangits living in the village of Mangit in Kashkadarya region.

In her work, B. Pulatova tried to cover the history of the village of Denov, located in Kasbi district of Kashkadarya region. The author also refers to the ethnic history of the inhabitants of the village of Denau. Based on the words of the villagers, he records the names of more than a hundred tribes who live there. Especially noteworthy is the list of the genealogy of the Denau Sayyids.

4. CONCLUSIONS

In conclusion, it can be said that from the first years of independence of Uzbekistan, significant research has been conducted to study the problems of ethnogenesis and ethnic history of the Uzbek people. In the course of studying this problem, our researchers have gained some insights into the participation of ethnic groups living in the south in ethnic processes due to the increase in the amount of information on the ethnic history, ethnic composition, formation and location of the population in the southern regions of Uzbekistan. Research on the ethnic history of the oasis population is still ongoing.

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Motivational Strategies of Teachers in Relation To Learners' Academic Performance

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ABSTRACT: Motivating learners is one of the most critical and challenging parts of teaching. As such, they differ in how they motivate students and their motivational strategies. This quantitative inquiry determined the motivational strategies of teachers and students' academic performance according to age, civil status, teaching experience, highest educational attainment, and average monthly income. To answer the descriptive and inferential questions, a researcher-made questionnaire was utilized. It was revealed that the level of motivational strategies of teachers in the areas of (1) introduction of the lesson, (2) discussion of the lesson, and (3) assessment of lesson we're all on a high level. However, the results indicated that the respondents least prefer helping learners prepare for the discussion using a pre-formed questionnaire, informal classroom debates, and a strategy that allows learners to assess their peers and classmates' writing abilities and comprehension skills.

Consequently, the level of learners' academic performance was very satisfactory. Likewise, no significant differences in the level of teachers' motivational strategies in the first and second areas when grouped according to age, civil status, teaching experience, and highest educational attainment. Additionally, no significant difference showed when teachers were grouped according to average monthly income in the first and third areas. It can conclude that most teachers are proceeding directly to lesson discussion and skipping the introduction to maximize class hours. Also, teachers have different motivational strategy preferences in engaging their learners. Likewise, they have a different mindset in motivating the lesson. As such, different strategies will positively influence academic performance. It is recommended that teachers be regularly subjected to seminars and training in pedagogical and instructional methods and other classroom management skill training to improve teaching practices and to help improve students' academic performance.

KEYWORDS: Education, Motivational Strategies, Teachers and Learners, Academic Performance, Quantitative, Philippines

INTRODUCTION

Shaping the learning environment and motivating students to learn is the main task of the teacher (Hornstra et al., 2015). They can differ in motivating students to learn, and their motivational strategies may vary (Hornstra et al., 2015). Additionally, motivating learners is one of the most important and the most challenging parts of being a teacher. Some teachers are often confused about how to help learners meet the required academic goals and objectives because motivation must come from within. Since teachers have a significant influence in nurturing the minds and hearts of every individual, improving their motivational strategies will have a significant impact on learners' academic and behavioral success.

Teachers' motivation is considered a critical factor that influences their performance effectiveness. It catalyzes big or small-scale academic successes. With motivated teachers, the success rate for schools to achieve collective goals and objectives is way higher. Hence, motivation at work is essential because this ensures that every work is done right within a limited time frame, and the quality of work rendered is not compromised (Gichure, 2014). As such, the researcher encountered massive issues in addressing various learning needs of adolescent learners. It is then recognized the need to think outside of the box to provide a strong motivational force to keep the learners going. Hence, a quantitative inquiry was a medium to understand the shared motivational strength of teachers in keeping learners on the right track. It determined the critical learning factors affecting learners' academic performance.

METHODS

This study utilized the descriptive- correlational research design to determine teachers' motivational strategies to learners' academic performance of a secondary high school to observe and describe the behavior of a subject without influencing it in any

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way using the quantitative information (Ward & Cole, 2016). Hence, a total population of forty-nine teachers who are officially employed and teaching in a public secondary high school was utilized as respondents.

A two-part constructive survey questionnaire was administered to the 41 respondents. The first part was the demographic profile, including age, civil status, teaching experience, highest educational attainment, and average monthly income. Consequently, the second part consists of the 30-line items. The questions were categorized in three areas (introduction of the lesson, lesson discussion, and lesson assessment). The questions were referred to the Philippine Professional Standards for Teachers (PPST) to be conceptualized since it captures teacher quality requirements in the K to 12 basic education programs. It was then subjected to content validation of experts in the field. They provided scientific suggestions to develop an improved questionnaire that would heighten the level of validity of the instrument. Thus, the validity index utilized the criteria set forth by Carter Good and Douglas Scates with a mean score of 4.85. Hence, it is valid. Moreover, a reliability test was then conducted (Santos, 2016) with the value of 0.962 interpreted as with a high degree of reliability.

The researcher administered the survey to raise questions or clarify issues, gather essential information and subject the data to statistical treatment. The frequency count and percentage for profiling are age, civil status, teaching experience, highest educational attainment, and average family monthly income. Additionally, the mean was used to determine the level of motivational strategies in the different areas and variables and students' academic performance. Consequently, the Mann-Whitney U test determined the significant difference in teachers' motivational strategies when grouped and compared according to variables. Likewise, Spearman's rank-order correlation was used to determine the significant relationship between teachers' level of motivational strategies and students' academic performance.

RESULTS AND DISCUSSION

Table 1. Profile of the Respondents According of Age, Civil Status, Teaching Experience, Highest Educational Attainment and Average Monthly Income

Variables	Category	Frequency	Percentage
Age	Younger (below 37 years old)	22	53.7
	Older (37 years old and above)	19	46.3
Civil Status	Single	16	39.0
	Married	25	61.0
Teaching Experience	Shorter (below 10 years)	25	61.0
	Longer (10 years and above)	16	39.0
Highest Educational Attainment	Bachelor	27	65.9
	Masters	14	34.1
Average Monthly Income	Lower (below 26,500)	24	58.5
	Higher (26,500 and above)	17	41.5
	Total	**41**	**100.0**

It shows the profile of the respondents according to age, civil status, teaching experience, highest educational attainment, and average monthly income.

Table 2. Level of Motivational Strategies of Teachers in the areas of Introduction of the Lesson, Discussion of Lesson and Assessment of the Lesson

Area	Mean	Interpretation
Introduction of the Lesson	4.43	High Level
Discussion of the Lesson	4.40	High Level
Assessment of the Lesson	4.48	High Level

Results showed that in the area, the lesson's introduction, the level of motivational strategies was high. According to Wilcox and Lawson (2018), if we are going to inspire and motivate all of our students truly, we should know them personally. Knowing their interests and hobbies, who they hang out with, their family situations, and what gets them excited. Each student will require different motivational strategies, and we have to know them to predict what strategies might work. Consequently, in the area (discussion of the lesson), the level of the motivational strategy was also high. As Haj-Broussard (2018) states, teachers' practice of enhancing student motivation in learning requires motivational strategies that provide instructional interventions applied by

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the teacher to elicit and stimulate student motivation. They also proposed various motivational strategies to promote students' motivation in classroom learning. However, these strategies are not theoretically grounded. Likewise, the level of motivational strategy of teachers in the area of assessment of the lesson was also high. It means that most teachers recognize that motivating their learners is part of their job, though it is more important for some than for others. In specific educational contexts, learners may or may be expected to bring high initial levels of motivation. Hence, the teacher's focus is on maximizing the efficiency of the learning processes. At the other extreme, there are pedagogic contexts where learners are compelled to attend, and the teacher's main task seems to be persuaded to engage in learning tasks (Lamb & Arisandy, 2020).

Table 3. Level of Motivational Strategies of in the areas (Introduction of the Lesson) and according to variables (Age, Civil Status, Teaching Experience, Highest Educational Attainment and Average Monthly Income)

Variables/Area	Introduction of the Lesson	
	Mean	**Interpretation**
Age (Younger)	4.36	High Level
(Older)	4.51	Very High Level
Civil Status (Single)	4.36	High Level
(Married)	4.47	High Level
Teaching Experience		
(Shorter)	4.40	High Level
(Longer)	4.48	High Level
Highest Educational Attainment		
(Bachelor)	4.40	High Level
(Masters)	4.48	High Level
Average Monthly Income		
(Lower)	4.30	High Level
(Higher)	4.62	Very High Level

The table reveals that the younger groups are least likely to provide positive feedback to learners. At the same time, the older respondents are less likely to help learners get engaged in discussions by providing pre-discussion questions. Teachers' positive feedback easily persuades the latter to be more motivated to join discussions. However, feedbacking could not be mandatory for teachers as it may take substantial time from their teaching load. Regarding the distribution of pre-discussion questions to help engage learners, there is no guarantee that learners' engagement is easy to achieve learners' engagement quickly. Learners can be given proper motivation in various practical ways because motivating students is one of the most significant teachers' challenges. It is true that as teachers, we have little, if any, control over external factors that influence our learners' behavior and engagement. We do play a vital role in shaping what occurs in our classroom. Our instructional choices can positively impact student motivation (BONGABONG-BAGUIO).

Additionally, research revealed that unmarried respondents are less likely to provide constructive or positive feedback to learners to help motivate them to learn new subjects. Positive feedbacking may be given to learners to acknowledge their exemplary works and good deeds. But married respondents are less likely to motivate learners by helping them with pre-discussion questions. It is essential to provide learners with a heads-up on what is coming with new subject discussions because this will help prepare them better for the discussion. As such, an inspiring teacher can affect students profoundly by stimulating their interest in learning. It is equally valid that most students have encountered uninspiring teachers who performed poorly. But effective and ineffective teachers have no readily discernable personality differences. Some of the best teachers are affable, but many ineffective instructors can be personable and caring (BONGABONG-BAGUIO).

The above results show that the short-tenured respondents are less likely to give positive feedback to learners. It does not mean that the shorter-tenured teachers are less–motivating learners. Rather their option to engage learners into discussion may be through a different activity. And the more-tenured respondents indicated that they are less inclined to assist learners at the onset of new subject matter discussion by helping them with pre-set questions. Tenured teachers may have a different way of helping learners engage with classroom discussions. Styles may individually vary, according to individual teachers, although the result indicated that these low-scored line items were least preferred. Typically, some best teachers appear as stern taskmasters, but whose influence is enormous in motivating students to accomplish things they never thought possible. However, the finest teachers display enthusiasm and excitement for the subjects they teach. They are proficient in the technical competencies of teaching: instructional delivery, formative assessment, and classroom management (Lamb & Arisandy, 2020).

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Results also revealed that Bachelor's Degree Holder respondents see constructive criticism as the least motivation strategy in engaging learners in group or class discussions. In contrast, the Masters/Doctoral degree holders believed that selecting a format to aid learners in achieving the desired output in terms of being motivated is lesser than other possible activities (Balchin et al., 2019).

Accordingly, the lower-income group believed that providing positive criticism to challenge learners will always motivate learners. On the other hand, respondents belonging to higher income groups believed that setting discussion formats in the delivery of lesson content may not always be the best option to motivate the learners into actively participating in classroom discussions. It can be attributed to the unique differences of teachers in analyzing what's effective and what's not. Students' self-belief is essential, but teachers also have a significant role. Teachers can help give students the confidence to build on their skills. One way to do this is by promoting a growth mindset. It is the theory that they can develop ability and performance through fostering a positive environment. The opposite of a fixed mindset is a person's talents are already fixed from birth. Developing a growth mindset is essential because it positively encourages us to see new challenges. It involves praising effort rather than just focusing on outcomes (Balchin et al., 2019).

The study showed that the younger respondents are least likely to provide initial pair-off questions at the onset of the discussion. They also believed that there is a need for a deeper student-teacher discussion to help engage learners. Meanwhile, the older respondents believed that integrating ICT-based matters may not always engage learners in discussions. As it appeared, the younger and older respondents have a different outlook in defining motivational strategies to help engage learners.

The school and students' success in terms of learning progress lies in the awareness and leadership of the teacher in delivering the programs. The teacher then is expected to initiate techniques and strategies that create a meaningful and favorable atmosphere in which the educational process is successfully taking place (Ramos et al., 2021).

Table 4. Level of Motivational Strategies of in the areas (Discussion of the Lesson) and according to variables (Civil Status, Teaching Experience, Highest Educational Attainment and Average Monthly Income)

Variables/Area	Discussion of the Lesson	
	Mean	Interpretation
Age (Younger)	4.42	High Level
(Older)	4.40	High Level
Teaching Experience		
(Shorter)	4.40	High Level
(Longer)	4.42	High Level
Highest Educational Attainment		
(Bachelor)	4.41	High Level
(Masters)	4.39	High Level
Average Monthly Income		
(Lower)	4.27	High Level
(Higher)	4.60	Very High Level

The table reveals that unmarried or single respondents are less likely to discuss new lessons with a question-and-answer activity. In contrast, those married respondents believed that having ICT matters involved in discussions is not an excellent, motivating strategy for learners. It is related to the idea that the classroom process begins with a lengthy lecture, and the question-and-answer portion comes at the end. Furthermore, it is also a fact that learners considered digital natives might not be interested in hearing their teacher with ICT matters while they already know it. Another teacher's responsibility is his role in improving meaningful instruction and learning. He should see what goes on in the classroom to find how students can learn effectively. Towards improving students' performance, he has to assist students in making plans about the choice of methods, materials, and evaluation procedures. Moreover, he has to relate well with students to communicate clear learning goals (Ramos et al., 2021).

The shorter tenured group, presumably composed of younger teachers, believed that starting with a pair of questions for learners to answer will not necessarily improve the percentage of learners' participation and engagement in classroom discussions. Less-tenured respondents are dominantly eager to kick off classes with a discussion and throw questions at the later part of the class. The longer-tenured respondents believed that it is not always wise to involve ICT matters in every class

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discussion as longer-tenured respondents are mostly those who belong to the older group, which means that their competence in discussing ICT matters will be too taxing for them. Balacuit & Inabangan (2019) believed that motivation is either intrinsic or extrinsic, a positive force that drives an individual to pursue achievement. It has been exhaustedly believed that students' motivation is relevant in attaining high academic performance. Meanwhile, students' motivation has a high positive significant correlation in their academic performance or achievement.

Also, the results showed that the Bachelors' Degree Group (lower) was less likely to discuss integrated ICT matters to motivate learners to get involved in discussions. At the same time, the Masters and the Doctorate group (higher) are less likely to initiate an informal classroom debate to motivate learners into getting involved in classroom discussions. These lowest mean scores do not indicate the teacher's low motivating abilities; instead, these show that teachers may have different motivating strategies. They played a significant role in the learners' cognitive development. Tongson & Eslit (2018) explored the relations between teachers' teaching style and students' perceived self-efficacy, readiness for schoolwork, and their learning performance in mathematics. Results showed that authoritarian teachers expressed lower self-efficacy and readiness for schoolwork. Students taught by the permissive teacher achieved the lowest performance level. There were no significant performance differences between authoritarian teachers.

Likewise, the table revealed that the low-income group preferred not to have an informal debate about specific issues and topics in the classroom. In contrast, the higher income group preferred to use motivational strategies other than integrating ICT matters in class discussions. Since the respondents, regardless of their income level, have different strategies in motivating learners. The lowest scored line items do not indicate the respondents' weaknesses in motivating learners. Maintaining quality instruction is the goal of every school to meet the challenges and demands of globalization. However, education nowadays faces many challenges, specifically in language teaching. The risk of producing "instructional competent learners" who know the language but cannot use it communicatively is a persistent and existing problem that has challenged every competent language teacher.

Table 5. Level of Motivational Strategies of in the areas (Assessment of the Lesson) and according to variables (Age, Civil Status, Teaching Experience, Highest Educational Attainment and Average Monthly Income)

Variables/Area	Assessment of the Lesson	
	Mean	Interpretation
Age (Younger)	4.43	High Level
(Older)	4.54	Very High Level
Civil Status (Single)	4.47	High Level
(Married)	4.48	High Level
Teaching Experience		
(Shorter)	4.46	High Level
(Longer)	4.51	Very High Level
Highest Educational Attainment		
(Bachelor)	4.45	High Level
(Masters)	4.54	Very High Level
Average Monthly Income		
(Lower)	4.31	High Level
(Higher)	4.72	Very High Level

The result showed that the younger respondents are less likely to ask learners to give reflective statements about the subject matter and this could be due to the fact that younger teachers have a different way of motivating the learners. The Older group indicated that they are less likely to allow learners to assess each other's writing ability and reading comprehension level because learners may not be capable of doing so. As cited by Kazakova et al. (2020), teachers believe motivation is important to student learning. As such, methods they employ to address student motivation may prove ineffective. Foreign students have higher values and educational motives at the initial stages of education during their first two years of study.

Also, it indicates that the unmarried group are less likely to ask learners to provide post-discussion statements reflective of what was discussed as this may shy learners away instead of being motivated. Meanwhile, the married group believed that integrating ICT in discussion may not necessarily be an excellent motivating strategy to ensure that learners' assessment is high. This could be attributed to the fact that those married respondents are mostly older and their competence

in dealing with ICT related matters may not be that strong. In short, they would prefer a different strategy. According to Moore et al. (2017) there currently is an abundant knowledge-base to inform us that in school teachers play the critical role in student learning achievement. Research reveals that how teachers instruct and these interactions with students are the cornerstone around which to build effective schools.

Likewise, it was revealed that the less tenured respondents are less like to engage in letting learners provide reflective statements after the class discussion. This can be attributed to the fact that these less tenured respondents who were mostly younger have dynamic ideas on how to motivate learners. The tenure respondents on the other hand believed that allowing learning to assess each other's writing abilities and comprehension level may be out of hand. Young learners don't have the capabilities to assess comprehension level as this is way too technical for them. This means that both groups have a different idea on how to properly motivate learners into getting good assessment results. McWhorter et al. (2019), believes that skills enhancement is an important part of teaching and learning. The moment a teacher stops being a student, the teaching process becomes ineffective. Each time a lesson is taught, a formula is given or an experiment is performed, teacher has to learn along and live it a fresh. Teachers can recall those memories of their classrooms when they might have dozed off, not because the topics were boring or they were tired. It happened due to the absence of presentation skills in the teacher. The question is not about the knowledge, which is of course the assured possession with a teacher.

Consequently, the Bachelors' group (lower) do not adhere to the idea that asking learners to provide reflective sentences may help motivate them, they would instead opt for a different strategy. With regard to the Masters and Doctorate group (higher), they believed that allowing learners to assess each other's comprehension level would improve the latter's motivation level. The study of Shousha (2018), indicated that motivation is essential to language learning achievement and attainment. It is more important than good teaching, abilities or curriculum in learning a language and maintaining it. It helps students to overcome any undesirable learning conditions they face in learning the language. Motivating learners is a long- term development. To motivate learners, teachers use variety of motivational strategies. Motivated teachers are "enthusiastic, resourceful, creative and strict".

Additionally, it was revealed that the lower income group do not adhere to the idea of requiring learners to provide reflective statements that would expound their own grasp of the discussed subject matter, and instead, they would opt for a different strategy. Meanwhile, the higher income group believed that allowing learners to assess each other's ability to write or comprehend things may not be a good motivation strategy due to the fact that this requires technical skills and as such, only the teachers may be able to do so. Cheung (2018), conducted a study in Hungary and found that the teacher's motivation has significant bearings on students' motivational disposition and, more generally, on their learning achievement. They conducted a theoretically grounded, evidence-based research that investigated teachers' motivational practice on student motivation. The research, conducted in South Korea, indicated that teachers' motivational practice has a positive impact on exhibited English-as-a-foreign-language student motivation in language classrooms.

Table 6. Level of Learners' Academic Performance

Variable	Mean	Interpretation
Learners' Academic Performance	88.78	Very Satisfactory

Although the overall learners' performance is very satisfactory, there is still more room to improve. It means that with a bit of motivational push, learners' academic performance may even move a bit higher. Positive education facilitates crucial learning outcomes. The emergence of this paradigm has led to empirical investigations which focused on positive psychological constructs that serve as antecedents of adaptive academic functioning. One notable psychological variable that has been linked to a wide range of academic outcomes was positive affect. Positive affect pertains to individuals' experience desirable emotional states at various points in time. Previous literature has revealed that positive effect plays an essential role in fostering student success. Positive effect has been linked to greater academic engagement, meaning in life, and intrinsic motivation. Positive affect was also weakly associated with academic achievement. Yet, the positive effect has not been substantially associated with academic ability in undergraduate students (Datu et al., 2017).

Table 7. Difference in the Level of Motivational Strategies of Teachers in the Area of Introduction of the Lesson according to Variables

Variable	Category	Mean	Mann Whitney U test	*p*-value	Sig level	Interpretation
Age	Younger	4.36	165.5	0.252	0.05	Not Significant

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	Older	4.51				
Civil Status	Single	4.36	170.0	0.419		Not Significant
	Married	4.47				
Teaching Experience	Shorter	4.40	180.0	0.590		Not Significant
	Longer	4.48				
Highest Educational Attainment	Bachelor	4.40	168.0	0.561		Not Significant
	Masters	4.48				
Average Monthly Income	Lower	4.30	128.5	0.044		Significant
	Higher	4.62				

The result of the study implies that age, civil status, teaching experience, and highest educational attainment do not significantly affect teachers' motivational strategies in terms of the introduction of the lesson. The result of the study further verified that regardless of whether they are younger or older, single or married, tenured or not, the teachers believed that there are better strategies that could help motivate learners. And that shared belief is commonly agreed to by all groups within the variables above. The study of Alufohai & Ibhafidon (2015) agrees with the results of this study. In his study on the influence of age, marital status, and gender on teachers' motivation, the results showed that these three variables have no significant impact on the level of teachers' motivation. Also, Uddin (2016) agrees with the result of this study stating that teachers' income levels may cause differing opinions on teachers' motivation. In his study on factors affecting teachers' motivation, the result showed that teachers who belong to the lower-income group are more frustrated and less motivated. In contrast, the opposite is true for the higher income group.

Table 8. Difference in the Level of Motivational Strategies of Teachers in the Area of Discussion of the Lesson according to Variables

Variable	Category	Mean	Mann Whitney U test	*p*-value	Sig level	Interpretation
Age	Younger	4.38	205.5	0.926		Not Significant
	Older	4.43				
Civil Status	Single	4.42	195.5	0.903		Not Significant
	Married	4.40				
Teaching Experience	Shorter	4.40	197.0	0.935		Not Significant
	Longer	4.42			0.05	
Highest Educational Attainment	Bachelor	4.41	181.5	0.834		Not Significant
	Masters	4.39				
Average Monthly Income	Lower	4.27	133.0	0.057		Not Significant
	Higher	4.60				

The study of Can (2015) on the factors affecting teachers' motivation contradicted the results of this study. In his study, the factor level is high, and age and educational status significantly affect motivational factors, yet, gender, marital status, and Income are not influential on motivational factors. Moreover, younger teachers and those holding a master's degree were more affected by motivational factors than the others.

Table 9. Difference in the Level of Motivational Strategies of Teachers in the Area of Assessment of the Lesson according to Variables

Variable	Category	Mean	Mann Whitney U test	*p*-value	Sig level	Interpretation
Age	Younger	4.43	189.5	0.607	0.05	Not Significant

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	Older	4.54				
Civil Status	Single	4.47	196.5	0.925		Not Significant
	Married	4.48				
Teaching Experience	Shorter	4.46	190.5	0.798		Not Significant
	Longer	4.51				
Highest Educational Attainment	Bachelor	4.45	172.5	0.647		Not Significant
	Masters	4.54				
Average Monthly Income	Lower	4.31	112.0	0.014		Significant
	Higher	4.72				

The study of Mura & Vlacseková (2018) agreed with the results of this study. The findings showed that compensation packages and financial incentives are important factors for employees in the competitive market environment of the higher education sector. The research has also explored various issues teachers face in public sector HEIs related to the factors mentioned above. Likewise, the study of Nawaz (2015) agreed with the study's results on the effect of Income on teachers' motivation level. The regression coefficients between motivation and independent variables revealed that employees are motivated by unbiased appraisals, students' positive behavior, friendly environment, availability of learning resources, small class size, less distance from the school, selecting upper class as target market, and autonomy is given school teachers.

Table 10.Relationship Between the Level of Motivational Strategies of Teachers and the Level of Learners' Academic Performance

Variables	rho	Sig Level	*p*-value	Interpretation
Motivational Strategies Learners' Academic Performance	0.157	0.05	0.326	Not Significant

It shows that learners are capable of performing or attaining high academic ratings regardless of the ability of teachers to motivate themselves or their learners. Ibok (2020) contradicts the result of this study that examined the influence of teacher motivation on students' performance in mathematics in Calabar Municipality of Cross River State. The results obtained from the analysis revealed the relationship between the conditions of service and students' academic performance in Biology, the relationship between regular promotion, regular payment of salary, and student's academic performance in Biology.

SUMMARY OF FINDINGS

There was a total of 41 teachers who served as respondents for this study. The results showed that in terms of age, majority of Forty-one teachers served as respondents for this study. The results showed that in terms of age, the majority of them belong to the younger age group. Most of them were married but had a shorter teaching experience. Bachelor's Degree holders dominate the total number of respondents, and the majority of them belong to a lower monthly income. Likewise, the level of teachers' motivational strategies in the areas of the lesson's introduction, discussion of lesson, and assessment of lesson we're all on a high level. However, the results indicated that in the area of introduction of the lesson, the respondents least prefer helping learners prepare for the discussion using a preformed questionnaire. In the lesson's discussion area, respondents least prefer informal classroom debates. In assessing lessons, the respondents indicated that they prefer the strategy that allows learners to assess their peers and classmates' writing abilities and comprehension skills.

Additionally, when grouped according to variables, the result of the study indicated a high to a very high level of motivational strategies. Furthermore, the result showed that younger, single respondents with lower educational attainment and lower-income bracket indicated that their least preferred strategy in introducing lessons is providing constructive criticism. Meanwhile, the older respondents, mainly married, with higher educational attainment and higher income bracket, indicated that their least preferred strategy is the questionnaire before lesson discussion.

The level of learners' academic performance showed that the mean percentage score of students was very satisfactory. Additionally, there were no significant differences in the level of teachers' motivational strategies in the introduction of the lesson and discussion of the lesson when grouped according to age, civil status, teaching experience, and highest educational attainment; except when grouped according to average monthly income in the area of introduction of lesson and assessment of

the lesson. Likewise, there was no significant relationship between teachers' level of motivational strategies and learners' academic performance.

CONCLUSIONS

The teachers' motivational strategies were all at a high level. Still, the finding showed in the introduction of a lesson. The respondents are not keen on motivating learners by assisting them with pre-formed questions being distributed at the onset of the lecture. It is concluded that most of the respondents are not giving proper heads-up to learners on what will be discussed. It also indicates that teachers mostly skip lesson introduction and proceed to discussion. Depending on learners' responses, this could be beneficial because this will help maximize class hours; questions are placed at the end of the discussions. The study's findings showed that teachers are least likely to allow learners to have a friendly and informal classroom debate in the discussion of lessons. Most teachers have a different preference for their motivational strategy in engaging learners. Classroom debates primarily result in learners' behavior turning unruly inside the class. There are several strategies to enhance learners' engagement during subject discussion. In the area of assessment of lessons, the result of the study showed that respondents are least likely to allow their learners to assess each other's writing abilities and comprehension levels. As such, learners may not have the technical skills to assess their peers' writing ability or comprehension level. It is too technical for them, and there are other ways of motivating learners apart from this.

When grouped and compared according to the variables above, the study's finding revealed that in the area of introduction of the lesson, teachers have other means of motivating learners to study but not in assisting them with pre-discussion questions about the subject matter. In the area of discussion of the lesson, the results showed that classroom debate is not their preferred motivational strategy, and lastly, in the area of assessment of the lesson, the finding of the study revealed that they are less likely to allow learners to assess their peers writing abilities and reading comprehension level. It can conclude based on these results that most of the teachers have a different mindset in providing learners with proper motivation. But to put things into proper perspective, some teachers may advocate the mentioned less-preferred strategies. Still, the majority of the respondents have a different take on this. Asking them to provide pre-discussion questions may not encourage them to participate as some may not have studied the lesson in advance. Also, informal classroom debates may only give the dominant and loud learners opportunities to silence the weaker ones, and besides, this may invite unruly behaviors. In the area assessment of lessons, the teachers are correct in refusing to allow learners to assess their peer's writing and reading comprehension skills because these require higher technical skills, which only the teachers could use.

The learners' Academic Performance was above-average, which means there is still plenty of room for motivational strategies to influence academic results positively. Excellence is not too far away. Also, the opinion of teachers in their level of motivational strategies differs according to income level. As shown in the result, teachers who belong to the lower-income bracket appeared to have a lower opinion of their strategy. At the same time, the higher income respondents were more confident that they were giving the right strategy. Lower-income respondents may have similar circumstances with most learners, and they too understand what it takes to be motivated from a socially disadvantaged standpoint.

Lastly, learners are unaffected by their teachers' motivational strategies. It shows that many of the respondents have an independent mindset regarding how they perform in school as learners. This kind of independence among learners can be attributed to their affinity to digital platforms where they can freely access bodies of knowledge without mainly waiting for their teachers.

RECOMMENDATIONS

It is recommended that grade level coordinators and subject teachers have uniformity of the primary motivational strategy employed by teachers. It can be planned during a Grade Level Meeting and must be documented. The strategy must be agreed upon by all teachers but without restriction. The teacher may opt to use additional strategies if the situation requires. Suggested motivational strategies during the lesson's introduction may include setting expectations. The subject teacher herself can do it before delivering each subject content. It allows Learners to make suggestions on what activity to perform to keep them engaged. Subject teachers can do it at least once a month to break the ice and involve learners' planning. Also, it would be nice to give learners a heads-up that they can be creative as much as they want during the class. It comes with strict teacher supervision to ensure that the objective of such activity is achieved. It can be done twice a week or at least four times a month to ensure that learners are given genuine freedom to be productive and many others.

Also, as part of the yearly INSET schedule, the school head must include training on how to use effective pedagogical and instructional methods like role-playing. It can be done with the teacher's guidance and may be used at least once a month to improve learners' absorption of the lesson. Use of differentiated instructions whenever needed. Not everyone in the class can

cope. The teacher must keenly observe learners' performance to determine who and when to use differentiated instruction. Another activity is group competition within the class. Dividing the class into groups and the subject teacher shall act as the moderator. Groups shall be given tasks, and the output must be graded to teach learners the importance of the so-called "Responsibility."Also, it would be helpful to allow learners to suggest discussion topics and how they want the class to proceed. Perhaps they want to sit in a circular-arranged chair with the teacher at the center or suggest preparing visuals (per group) on the topic to be discussed. And many others. The primary purpose of making learners feel empowered is to keep them engaged. The School Head must take the lead in identifying other effective motivational strategies that will share with all teachers.

Likewise, subject teachers should employ other strategies to encourage and engage learners in getting good assessment results. Activities may include feedbacking with positive scripting on assessment results. It will be done every after the assessment. Allow students to exchange papers after assessments; this can be done with the supervision of teachers at least twice a month to make them feel empowered.

Lastly, teachers are recommended to do some teaching strategies to keep learners motivated. (1) Begin the day with a success-oriented activity that is likely to be enjoyable for students. (2) Make the first experience with the subject matter as positive as possible. (3) Provide active instruction. (4) Keep lessons interesting. Use humor, examples, analogies, stories, and questions to facilitate the active participation of learners in your lectures and demonstrations. (5) Arrange learning activities that encourage students to move freely around the room while completing a task. (6) Set aside time each day for this to occur. It promotes self-exploration of the room and its resources while allowing the students to feel more independent. Hence, a good teacher can inspire hope, ignite the imagination and instil a love for learning.

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Validity of Student Worksheet in Chapter Dynamic Electricity Based on Virtual Laboratory

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ABSTRACT: This study aims to determine the validity of student worksheet for Junior High School (JHS) in chapter dynamic electricity based on virtual laboratory as a companion for science learning during the Covid-19 pandemic in Indonesia. Worksheet is designed to enhance the critical thinking skills of students. It is validated by 3 expert validators from 3 leading universities in Indonesia. The instrument used to assess the format, language, content, and effectiveness of student worksheets in an effort to improve students' critical thinking skills. The data analysed by descriptive and quantitative. The results of the expert validator's assessment showed that the percentage of agreement of the student worksheet in the Format, Language and Content category also critical thinking assessment was "Valid". These means that student worksheet in chapter dynamic electricity based on virtual laboratory can be used with minor revision. The level of originality of the student worksheet is very high with parameter no penalty (NP). The conclusion from the research, the dynamic electricity worksheets developed have a high percentage of agreement and originality so that they can be used to accompany science learning during the pandemic to enhance students' critical thinking skills.

KEYWORDS: Student Worksheet, Dynamic Electricity, Virtual Laboratory

I. INTRODUCTION

The results of a survey conducted by the research team found that in schools in Indonesia, learning has been carried out online during covid-19 pandemic. asked on the research team's observations, this raises new problems in students' mastery of the material through online learning so that it requires new breakthroughs in these problems (Rhim, Hye Chang & Han, Heeyoung, 2020), (Barry, C. & Gerstman, J., 2015), (Martin, Florence & Polly, Drew & Ritzhaupt, Albert, 2020). In science learning material, the concept of dynamic electricity, many students do not understand the concepts explained by the teacher online. One of the factors that causes students to not understand the concept is that they cannot carry out a dynamic electricity practicum directly in a pandemic situation. This is also reinforced by the results of the online dynamic electricity quiz assessment where the average value of junior high school students on dynamic electricity material is below the minimum standard. Based on these facts, the research team developed a draft of dynamic electricity worksheets based on virtual laboratories.

Researchers think with the help of this worksheet, the teaching and learning process will be assisted and the critical thinking skills of junior high school students will improve even in the midst of limited circumstances. The virtual laboratory chosen is PhET (Physics Education Technology), which is one of the virtual laboratories developed by the University of Colorado Boulder. PhET is a virtual laboratory that contains learning simulations of physics, biology, and chemistry for classroom teaching or individual learning. PhET simulations emphasize the relationship between real-life phenomena and the underlying science, support interactive and constructivist approaches, provide feedback, and provide a creative workplace (Finkelstein, N., W. adams, C. Keller, K. Perkins & C. Wieman, 2006). Based on several studies that refer to the PhET virtual laboratory, including the results of Sugiyono's research (2011) on the use of PhET, the conclusion is that the teaching and learning process using physics learning tools developed with the help of PhET multimedia and simple KIT for high school in the subject of optical tools is effective, where when the activities take place student activities are dominated by activities characterized by process skills and cooperative learning. It also strengthened by the results of research by Cicyn (2019). The other results of study concluded that learning using the PhET virtual laboratory could improve students' conceptual understanding (Athaillah, Ibn Khaldun, Mursal, 2017). The results of research concluded that the PhET Simulation contains learning materials for physics, biology and chemistry.

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PhET makes it easier for teachers and students in the learning process, so that it can foster motivation for students and increase student understanding of concepts (Khairunnisak, 2018). PhET simulation is appropriate to be applied in schools that do not have laboratory facilities so that they can help teachers in teaching. The results of other research state that learning using PhET simulations can provide more benefits than disadvantages, learning using PhET simulations not only provides alternative activities but can replace various activities in the physics laboratory but can also increase the ability of students to achieve learning outcomes (Fencl, J., 2013). In another research also concluded that the use of the PhET virtual lab had a positive effect on students' conceptual mastery of the photoelectric effect material (Habibbulloh M., 2019).

II. METHOD

The scheme of developing student worksheet follows the 4D model developed by Thiagarajan (Thiagarajan S, Semmel DS, dan Semmel MI, 1974) consist of 4 steps: define, design, develop, and disseminate. In the *define* phase, a concept and needs analysis is carried out in the learning process. Then entering the *design* phase, a virtual laboratory-based dynamic electrical worksheet was compiled to improve critical thinking skills, hereinafter referred to as draft 1. In this phase, expert validation was carried out. The validation results and input obtained are then used to perfect draft 1 so that limited trials can be carried out. the results of the limited trial were then reformulated to improve the existing draft. then draft 1 enters the *develop* phase, namely developing draft 1 and completing the draft based on the results of limited testing, validation, and input from experts. the results of the develop phase become draft 2. the next phase is *disseminated*, which draft 2 is well packaged so that it is feasible to be distributed and used in the online science learning process.
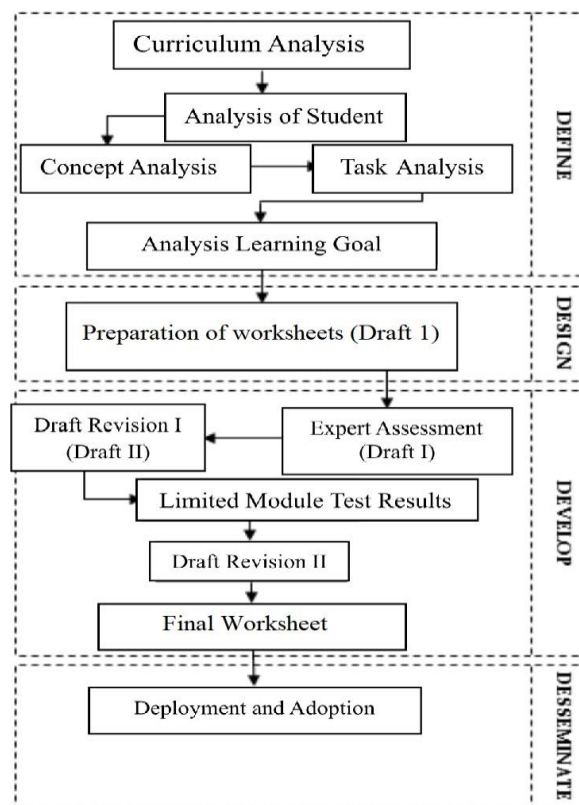

Figure 1. Thiagarajan 4-D Development Model Diagram

After draft of Student Worksheet in Chapter Dynamic Electricity Based on Virtual Laboratory has been formed (phase design) the research team made an assessment / validation instrument from the worksheets which included validation of format, language and content as well as validation of critical thinking skills taught in the worksheets including reasoning indicators, hypothesis testing, argumentation analysis, Likelihood and uncertainty analysis, and indicators of solving problems and making decisions. These are in accordance with the indicators of critical thinking proposed by Halpern (2014). Furthermore, the validation and adjustment of the validation results of the Dynamic Electrical Worksheet based on the Virtual Laboratory were carried out and adjusted. The result of validity data was analyzed using quantitative descriptive by calculating average value given by validator. The criteria interpreted according to table 1 adapted from Ratumanan and Laurens (2011).

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Table 1. Criteria of Score Interval

Score Interval	Category	Description
$3.60 \le V \ge 4.00$	Very Valid	Can be used without revision
$2.60 \le V \ge 3.59$	Valid	Can be used with minor revision
$1.60 \le V \ge 2.59$	Less Valid	Can be used with major revision
$1.00 \le V \ge 1.59$	Invalid	Not yet in use and requires consultation

The aspects assessed in the virtual laboratory-based dynamic electrical worksheets expert validation with adaptation are as follows (Ratumanan, G.T. & Laurens, T., 2011):

Table 2. Aspects assessed in general (Format, Language and Content)

Rated Aspect	Indicators
Format	1. Clarity of material distribution 2. Have charm 3. The numbering system is clear 4. Room / layout arrangement 5. Type and font size accordingly 6. Suitability of the physical size of the worksheets with students
Language	1. Grammatical correctness 2. Suitability of sentences with the level of thinking and reading ability and age of students 3. Encourage interest in work 4. Simplicity of sentence structure 5. The sentence does not have a double meaning 6. Clarity of instructions 7. The communicative nature of the language used
Content	1. The truth of the content / material 2. It's an essential material 3. Grouped in logical sections 4. Practicing critical thinking skills according to the Halpern indicator 5. Suitability of the task with the order of the material 6. It be able to encourage students to find concepts 7. Feasibility as a learning tool

The following aspects are assessed based on the criterion of critical thinking indicators according to Halpern with adaptation (Tiruneh, 2016):

Table 3. Critical thinking indicator criteria according to Halpern with adaptation

Rated Aspect	Indicators
Reasoning	1. Evaluating the validity of the data 2. Interpret experimental results
Hypothesis testing	1. Interpret the relationship between variables. 2. Knowing the need for more information in making conclusions.
Argument analysis	1. Identify important parts of the argument 2. Summarize the appropriate statement from the data obtained
Likelihood and uncertainty analysis	1. Use possible judgments to make decisions 2. Understand the information that may be in decision making
Problem solving and decision-making	1. Identify the best alternative in problem solving 2. Evaluating the solution to a problem and making decisions based on evidence or facts

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The valuation agreement is calculated based on similarity of values given by experts with the formula (Ibrahim,2005), (Hayes, John & Hatch, Jill. 1999), (Lewin, Lewis & Wakefield, James. (1979):

$$R = \left(1 - \frac{A-B}{A+B}\right) \times 100\% \qquad (1)$$

Descriptions:
R = Percentage of Agreement
A = the aspect frequency which gives the high frequency
B = the aspect frequency which gives the low frequency
the lower limit of the reliability coefficient / percentage of agreement for a good performance or observation is more than 0.7 or 70% (Linn, 2020).

Furthermore, to determine the originality of the work created, the virtual laboratory-based dynamic electrical worksheets that have been created and validated are tested with Turnitin (Villar-Mayuntupa, 2020), (Sinaga, 2018), (Li Jinrong, 2018). The following is scheme for different similarity index by Turnitin (Halgamuge, 2017):

Table 4. Penalty scheme for different similarity index

Parameter	Notation	Value
Similarity index (Si) for maximum penalty	Pmax	75–100%
Similarity index (Si) for average penalty	Pavg	50–74%
Similarity index (Si) for minimum penalty	Pmin	25–49%
Similarity index (Si) for no penalty	NP	0–24%
Exclusion of consecutive word count (consecutive words)	Cw	3

III. RESULT AND DISCUSSION

The data result of this research including: (1) validation from experts about the virtual laboratory-based Dynamic Electricity Worksheets, (2) originality of creation using Turnitin. Percentage of agreement (PA) is obtained based on the level of compatibility of the value between expert validators (Ibrahim, 2005). The following are the results of the expert validator's assessment:

Table 5. Expert Validator Result Value Tabulation for General Indicators

	General Indicators	V_1	V_2	V_3
Format				
1	Clarity of material distribution	3	4	4
2	Interesting for student	4	4	3
3	The numbering system is clear	4	3	3
4	Room / layout arrangement	3	3	4
5	Type and font size accordingly	3	4	4
6	Suitability of the physical size of the worksheets with students	4	3	4
Language				
1	Grammatical correctness	3	4	3
2	Suitability of sentences with the level of thinking and reading ability and age of students	4	3	3
3	Encourage interest in work	4	4	4
4	Simplicity of sentence structure	4	4	3
5	The sentence does not have a double meaning	3	4	4
6	Clarity of instructions	3	4	4
7	The communicative nature of the language used	3	4	3
Content				
1	The truth of the content / material	4	4	4
2	It's an essential material	4	4	4

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	General Indicators	V₁	V₂	V₃
3	Grouped in logical sections	3	4	4
4	Practicing critical thinking skills according to the Halpern indicator	3	4	4
5	Suitability of the task with the order of the material	4	4	4
6	It is able to encourage students to find concepts	3	4	3
7	Feasibility as a learning tool	4	4	4

Table 6. Expert Validator Result Value Tabulation for Critical Thinking Skill's Indicators

	Indicators of Critical Thinking Skill	V₁	V₂	V₃
Reasoning				
1	Evaluating the validity of the data	4	4	3
2	Interpret experimental results	4	3	3
Hypothesis testing				
1	Interpret the relationship between variables.	3	4	3
2	Knowing the need for more information in making conclusions.	3	4	4
Argument analysis				
1	Identify important parts of the argument	4	3	4
2	Summarize the appropriate statement from the data obtained	4	4	4
Likelihood and uncertainty analysis				
1	Use possible judgments to make decisions	3	3	4
2	Understand the information that may be in decision making	3	4	3
Problem solving and decision-making				
1	Identify the best alternative in problem solving	4	3	4
2	Evaluating the solution to a problem and making decisions based on evidence or facts	3	3	4

Table 7. Average Value from Experts and Percentage of Agreement every Aspects

Aspect by Indicator	Avg. value	Percentage of Agreement (%)
Format	3.56	88.89
Language	3.57	85.71
Content	3.57	85.71
Critical Thinking Skill	3.53	93.33
Total	**3.56**	**88.41**

Based on the data in table 5 and table 6, the percentage of agreement (PA) for the format, language and content indicators aspects was 88.89%; 85.71%; 85.71% while the critical thinking indicator got a percentage of agreement of 93.33% so that the overall percentage of agreement for Dynamic Electricity Worksheets based on Virtual Laboratories was 88.41% (Table 7). This means that the reliability coefficient / percentage of agreement is above the lower limit (Linn, 2020). So, it can be categorized as good performance. Meanwhile, the average score for the indicators of format, language, content, and critical thinking indicators was 3.56, 3.57, 3.57, and 3.53, respectively. The total score for the virtual laboratory-based Dynamic Electricity Worksheets is 3.56 which means it is in the **"Valid"** category **(can be used with minor revisions)**. The suggestions / input obtained by the research team from expert validators can be summarized in table 8:

Table 8. The initial state of dynamic electrical worksheets based on virtual laboratories Expert validators advice and final condition

Initial Condition	Final Condition
There is no information link about Java or PhET that should be used by worksheet users	an explanation of the Java and PhET links is given so that the user knows the application used is appropriate and the same as what the worksheet maker wants
There are no introductions at the beginning of the Dynamic Electricity Worksheets material	given a foreword / a little introduction about the material that the students will try out through the Dynamic Electricity

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Initial Condition	Final Condition
	Worksheets
There is no instruction sheet for the use of dynamic electric worksheets	add an instruction sheet for using worksheets to make it easier for teachers and students
The space for pasting the screenshot is quite narrow	enlarge the space for students to paste the results of the screenshots in activity 1
There are already contextual examples	Very good at activity 2 there is real life **NB**. **"NB"** can be replaced with "**Note"**, and the part is neatly packaged in a shape format and decorated. this is an emphasis on students so that it is made striking so that it becomes a concern
initial writing "pararel"	"Pararel" writing → "Parallel" (Standard)
There has been no detailed strengthening in activity 5.	In activity 5, provide reinforcement until the discovery of how to calculate grid arranged in series and resistance arranged in parallel

After analysing the student worksheet based on expert assessment, the next step is testing the originality of the work through the Turnitin test to find out the plagiarism level of the worksheet. Figure 2 show that the results of the plagiarism check of Worksheet Dynamic Electricity based on Virtual Laboratory with Turnitin. Based on the results of the Turnitin test in Figure 2, it can be stated that the level of plagiarism for the dynamic electricity worksheets based on virtual laboratories is very low, only 5%. Similarity index of 5% consists of internet sources that are accidentally copied and detected by Turnitin servers. Based on table 4, the penalty scheme for different similarity indexes shows that the level of plagiarism is included in the parameter category of Similarity index (Si) for no penalty (NP). This shows that in addition to the virtual laboratory-based Dynamic Electricity Worksheets which are categorized as valid and can be used with minor revisions, the originality of this work is also very high.

The following is the sample of layout the virtual laboratory-based Dynamic Electricity Worksheet that has been developed by the research team:

Figure 2. The Sample of Layout Worksheet

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Draft final of Student Worksheet consists of cover, table of contents, instructions for using worksheets, five activities through a virtual laboratory for dynamic electricity materials for junior high school to enhance critical thinking skills and include all 22 pages. All of the activities using virtual laboratory PhET. The 1st activity about Investigation of conductor and insulator materials, 2nd activity about Evaluation of Series Electrical Circuit Characteristics, 3rd activity about Evaluation of Parallel Circuit Characteristics, 4th activity about Comparing Series and Parallel Circuits, and 5th activity or the last one about Analyse the resistance in series and parallel resistance circuits (Moro, 2013), (Nisa, 2018), (Hendri, 2020).

CONCLUSIONS

Based on the results of the research and discussion previously described, it can be concluded that the student worksheet in chapter dynamic electricity based on virtual laboratory that were developed to improve the critical thinking skills of junior high school students as a companion to online science learning are categorized as valid and can be used with minor revisions. This worksheet also can be categorized good performance based on high reliability/percentage of agreement. The level of originality of the work of dynamic electricity worksheets produced is very high and is in the category of Similarity index (Si) for no penalty (NP). Henceforth, development research can be continued to make critical thinking skills assessment instruments so that the expected improvement can be tested statistically.

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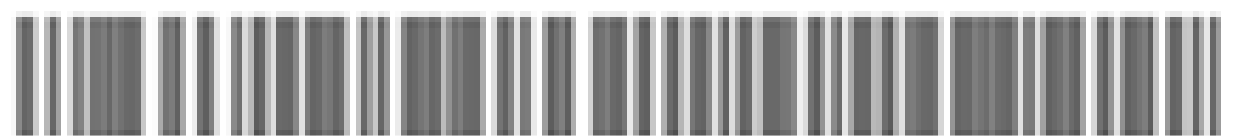
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