

Impact of Electronic Governance on Speed of Service Delivery in Some Selected Public Institution in Ebonyi State, Nigeria

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ABSTRACT

A cursory look at the Nigerian Public Institutions indicates poor performance and inadequate service delivery. To illustrate this point, the first identified problem is lack of speed of service delivery in the performance of Ebonyi State public institutions. It is against this background that the study examined the impact of e-governance on speed of service delivery in some selected public institution in Ebonyi State, Nigeria. The study raised two research questions, two hypotheses and adopted a descriptive survey research design. The population for the study consisted of 1516 management and non-management staff in the 6 selected public institutions in Ebonyi State, Nigeria. Taro Yamani's formula was used to determine the sample size which is 303. Data were collected from 303 staff and management using a well structured questionnaire. 291 out of 303 copies of the instrument were retrieved. Cronbach Alpha reliability estimate was used to ascertain the internal consistency of the entire instrument. Data collected was used to analyze the two research questions using real limit of numbers and the null hypotheses was tested using t-test statistic at 0.05 level of confidence. The findings showed that e-governance affects the speed of service delivery in some selected public institution in Ebonyi State, Nigeria to a great extent with some notable e-service challenges. The study recommended that quality e-service should be extended to all the public institutions in South East, Nigeria to avoid the problem of generalization

Keywords: E-Governance, Speed, Service Delivery and Public Institutions

INTRODUCTION

The zeal to reposition the public institution for effective and efficient service delivery has been the preoccupation of many nations in the world. Public institutions represent an indispensable machinery designed to create a dynamic structure for the implementation of government policies and programmes into public service delivery that promotes growth and sustainability of development, [1]. Instances of such services include provision and maintenance of primary, adult and vocational education institutions, health care services, security/protection, electricity, pipe borne water and others for the welfare of the citizenry and continuity in governance, [2]. However, these services have variously been described as epileptic and unsatisfactory due to the traditional

public administration that characterize the Nigerian public institutions such as insensitivity towards public complaints, bureaucratic delay, inefficiency, general lackadaisical attitude to work etc, [2].

Prior to the advent of e-governance practice in Nigeria in early 1980s, most public institutions in Ebonyi State which was created in October 1996 from the old Abakaliki division of Enugu State and old Afikpo division of Abia State made use of analogue system in recruitment, selection, filling and promotion of personnel. This system was incompetent, time consuming and unproductive due to the traditional administrative system [3]. [4], also states that mismanagement, favouritism, nepotism and widespread corruption were the features of public administrative machineries. These debilitating features no doubt discredited

the performance, stunted the growth and development of the Nigerian Public Institutions and in Ebonyi State in particular. [5] in [6] states that administration in public institutions was a mystery and hard like rocket science because finance officials and their colleagues inflate the workforce with ghost workers who are paid through their ministries cashiers instead of functioning accounts in the banks. The amount oozing to pocket of these fraudsters ran into millions more than the real government salary bills. Successive governments battled with this menace through setting up special staff audit committees and what they called "TABLE PAYMENT" and physical appearance of staff without getting to the root of the matter. To this end, it became so obvious that the traditional government structures and system could no longer meet the demands of growing citizens' desires and challenges of complex domestic and global economies [7]. The recognition of these afore-mentioned problems informed government advocacy for reforms like servicom and e-governance practice. Out of these, e-governance became a reform that is remarkably visible in Ebonyi State, Nigeria to cope with new skills, attitudes and abilities required to improve organizational performance, [8]. This is because the effectiveness and efficiency of the Nigerian public institutions is the bedrock for optimal service delivery which became possible through the use of e-governance.

E-government means electronic-governance and the word „electronic“ denotes the use of technology in the system of governance. Therefore, e-governance is the application of Information Communication Technology (ICT) for effective and efficient service delivery, exchange of information, communication transactions, integration of various stand-alone systems and services between government-to-citizen (G2C), government to-business (G2B), government-to-government (G2G), government-to-employees (G2E) as well as back office processes and interactions within the entire government framework.

According to the Daily news (August 2, 2013), e-governance is the application of Information and Communication Technology (ICT) to assist the government for efficient and meaningful delivery of government services. Notwithstanding, in the year 2006, most ministries, departments and agencies in Nigeria embraced the use of computer to facilitate their functions. The use of computer is an offshoot of e-governance innovations, [9]. As from 2008 to 2010, a good number of ministries, departments and agencies in Ebonyi State deployed e-governance facilities to their day-to-day functions. E-Governance refers to the application of information and communication technology to transact government activities for optimal performance, transparency, efficiency and all round development of the public institutions. [10], opine that the advent of e-government in the 21st century is a conscious effort to cause a paradigm shift in modern public administration and governance.

Despite the importance of public services to individuals and countries, the World Bank's World Development Report released in 2004 discovered large disparities in the quality and quantity of public goods and services across developing countries and within countries [11]. In most African countries, including Nigeria, providing public services constitute a huge challenge, which is conventionally perceived as exclusively government responsibility to offer the needed services [12]. In reality, the challenges and difficulties of service delivery are widening given scarce resources and management challenges; thus, government alone often cannot offer these services at levels that match speedy population growth, and urbanization in Nigeria. In Nigeria, citizen's perception of the government is that the institutionalized systems of service delivery of public services is poor, hence, its lacks required structures, and capability to deliver services that meets and exceed citizens expectations. In particular, running of governments in Nigeria costs too much to delivers what is

far below citizens' expectation and increasingly perceived as unresponsive or accountable. More worrisome is the fact that many public bureaucracies were seen as bloated, incompetent and self-centered, motivated essentially by underlying rent seeking tendency which is promoted by traditional administration bureaucracy [13].

For instance, statistics released by the United Nations E-Governance Survey Report in 2014 ranked Nigeria 162 out of 193 countries in terms of its e-governance status [14]. The survey also reported that Nigeria had 0.2929 as its e-governance development index figure. Feasibly, governments' establishments in Ebonyi State, Nigeria are yet to transcend beyond the billboard or partial service-delivery to claim e-governance adoption. Furthermore, an unfortunate experience of e-governance initiatives in the Nigerian public sector is that e-governance project which were designed to promote the ideals of the government, its service provider, funding groups and donors, and not essentially configured based on the values, needs, and expectations of the citizens served by the government. This is poised to change the narrative and interrogate the efficacy of traditional public administrative structure to a technology and knowledge base society and to eradicate all forms of bureaucratic bottleneck to achieving optimal service delivery.

The above signify that service delivery in the Nigerian public service has for decades been battered with myriads of criticism due to the display of indiscipline, insensitivity, incompetence, rudeness, corruption, laziness, absenteeism, lackadaisical approach to work and many other vices by public servants [15]. It was the attempt to correct this anomaly that gave birth to the various public service/civil service reforms. A survey indicates that the Nigerian public expectations from the public service in terms of speed of service delivery are in shambles. This is why there is the need for a comprehensive and holistic reform of the public service so as to enhance human capital development

for enhancing employees productivity in the areas of welfare, education, agriculture, health and development of the enterprise) in Ebonyi State, Nigeria.

E-governance is a political device adopted to ensure good governance at any level through which government and citizen's relationships are facilitated to ensure effectively and efficiency service deliver [16]. Records from most Ministries of Communication and Technology from Ebonyi State, Nigeria reveal that mobile subscriptions increased from 95million in 2011 to 134.5million as at September 2014. Tele density also increased from 68 percent in 2011 to 96 percent during the same period, while mobile internet subscriptions increased from 45million in 2011 to 73.8million as at September 2014. Internet penetration increased from about 26.5 percent in September, 2011 to about 52 percent in September 2014, [17]. This move presented the view that the popularity that smart phones such as black berry, androids and tablets had gained also meant that people could access the internet more easily to gain information and services from the government without even owning a computer or visit to any government office. Because of this massive growth in communication and the virginity of the market in Ebonyi State, Nigeria. E-governance has become a necessary political mechanism in evaluating government performance in all parts of Ebonyi State because it enhances citizen's ability to have access to the basic programmes of government while it brings about openness in performing public functions.

However, that notwithstanding, e-governance is still at its rudimentary stage in the selected public institutions in Ebonyi State, Nigeria. This is due to the inability of the public institutions to establish adequate support to manage a citizen-centered service delivery strategy, which will strengthen public institutions to improve performance and improve information and communication literacy rate to a maximum level. It is against this background that the study examined the impact of electronic governance on speed

of service delivery in some selected public institution in Ebonyi State, Nigeria.

Statement of the Problem

The essence of government lies on effective performance to deliver its mandate to the citizens. This centres on adequate service delivery such as good road network, supply of electricity, education, health care services, portable drinking water and others to improve general quality of life of the citizens for national growth and development. However, a cursory look at the Nigerian Public Institutions indicates poor performance and inadequate service delivery. The performance of the Nigerian Public Institutions is poor resulting from the practice of analogue form of governance to lack of efficient management of public institutions. This has always been a mirage over the years due to the policy and structure that upholds and tolerate the system. The implementation of e-governance for optimal performance of the public institutions has relatively been on low ebb due to traditional administrative apparatus that characterize the Nigerian public institutions and in Ebonyi State in particular. To illustrate this point, the first identified problem is lack of speed of

METHODOLOGY

The study adopted a descriptive survey design. The area of the study was in Ebonyi State, Nigeria. The state shares borders with Abia State and Imo State to the south, Ebonyi State to the east, Benue State to the northeast, Kogi State to the northwest. The population for the study consisted of 1516 management and non-management staff in the 6 selected public institutions in Ebonyi State, Nigeria. Simple random and purposive sampling techniques was used to quickly zero in on those ministries and people that possess the required information. Taro Yamani's formula was used to determine the sample size which is 303. The instrument used for data collection was a 10 item questionnaire called Impact of Electronic Governance on Speed of Service Delivery in public Institutions Scales (IOE-GOSO-SDI-PIS). The instrument had a 4-point response scale with response category of

service delivery in the performance of Ebonyi State public institutions. This is in the area of delay and unresponsiveness to the needs of the masses. The bureaucratic bottleneck or delay experienced in the administration of the public institutions in Ebonyi State, Nigeria in particular constitutes a clog on their effective performance. Public service delivery has been inconsistent with public preferences and considered inadequate in Ebonyi State because the speed at which public are served is not commendable. This is due to lack of accessibility to timely information, redress to public complaints and grievances. For instance, in a situation where an individual or group of people spent the whole day in a particular ministry for an information or services to be rendered to which ordinarily will not take ample time is a worrisome development. To this effect, most people in Ebonyi State public institutions consider their performance generally unsatisfactorily due to delay in speed of service delivery. It is against this background that the study the impact of electronic governance on speed of service delivery in some selected public institution in Ebonyi State, Nigeria.

Very Great Extent (VGE)-4 points; Great Extent (GE)--3 points; Little Extent (LE)--2 points and Very Little Extent (LE)-1 point. The instrument was validated by experts from Public Administration Department and one from measurement and evaluation, all from Faculty of Management Sciences, Enugu State university of Science and Technology (ESUT), Enugu. The internal consistency of the instrument was determined using Cronbach Alpha reliability estimate and it yielded a reliability coefficient of .71 for cluster 1 and .67 for cluster 2. The coefficient for the entire instrument stood at .73. The study was carried out among the staff and Management of some selected public institutions in Ebonyi State. 303 copies of the questionnaire were distributed but 291 copies were retrieved from the respondents representing 96.04 percent return rate.

Data collected were analyzed using mean, standard deviation and grand mean. The decision rule was determine using real limit of numbers as stated below for answering the research questions.

3.50	-	4.00	VGE
2.50	-	3.49	GE
1.50	-	2.49	LE
0.00	-	1.49	VLE

For all the null research hypotheses, the decision rule was that if the critical t-value was greater or equal to t-table value at a given degree of freedom ($n_1 + n_2 - 2$) the null hypothesis of no significant different was rejected, if on the other hand the calculated t-value was less than the value of the t-critical from the table, then the null hypothesis was not rejected.

Table1: Mean ($\bar{x}$) Rating with Standard Deviation of Electronic Governance Impact on Speed of Service Delivery in some selected Public Institution in Ebonyi State, Nigeria

S/N	Items	Mgt Staff N=171		Non-Mgt Staff N=120		Overall		Decision
		X_1	SD_1	X_2	SD_2	X_3	SD_3	
1.	E-governance eliminates over-crowding in public sector	3.65	0.97	3.92	0.40	3.79	0.66	VGE
2.	E-governance enhances higher levels of processes in public sector	2.99	0.15	3.78	0.79	3.39	0.47	GE
3.	E-governance enhances better communication among public sectors for efficient services	3.28	1.14	2.99	0.09	3.14	0.62	GE
4.	C E-governance increases the quality of public services as online transactions are made online to avoid delay.	3.71	0.75	3.82	0.58	3.77	0.67	VGE
5.	E-governance improves the use of information in the decision-making processes	2.96	0.19	1.06	0.24	2.01	0.22	LE
Grand Mean		3.32	0.64	3.11	0.42	3.22	0.53	GE

Data in Table 1 indicates that of the 5 items on the extent to which Electronic Governance impact on speed of service delivery in some selected public institution in Ebonyi State, Nigeria, the respondents agreed that 2 of the items (1 and 4) with recorded mean scores of (3.79

Presentation of Results

This section presents the results of the study according to the research question that guided the study.

Analysis of Data

This section presented the results of the study according to the research questions and hypotheses that guided the study. The data analyzed were presented in Tables 1- 4

Research Question 1:

To what extent does Electronic Governance impact on speed of service delivery in some selected public institution in Ebonyi State, Nigeria?

and 3.77) indicated to a very great extent, 2 of the items (2 and 3) to a great extent with mean scores of (3.39 and 3.14) .The standard deviation for all the items raised is 0.53 which is small signifying that the responses are closely clustered around the mean. The Table also shows that the

respondents grand mean score for the overall items raised is (3.22). Following the guideline for the interpretation of the respondents data, the answers to research question one is that Electronic Governance impact on speed of service delivery in some selected public

institution in Ebonyi State, Nigeria to a great extent.

Research Question 2:

To what extent does the challenges of Electronic Governance affects the speed of service delivery in some selected public institution in Ebonyi State, Nigeria?

Table2: Mean (X̄) Rating with Standard Deviation of the Challenges of Electronic Governance on the Speed of Service Delivery in some selected Public Institution in Ebonyi State, Nigeria

S/N	Items	Mgt Staff N=171		Non-Mgt Staff N=120		Overall		Decision
		X ₁	SD ₁	X ₂	SD ₂	X ₃	SD ₃	
6.	E-governance eliminates over-crowding in public sector	3.87	0.34	3.94	0.27	3.91	0.31	VGE
7.	E-governance enhances higher levels of processes in public sector	2.99	0.15	2.93	0.27	2.96	0.21	GE
8.	E-governance enhances better communication among public sectors for efficient services	2.84	0.37	1.05	0.31	1.95	0.34	LE
9.	C E-governance increases the quality of public services as online transactions are made online to avoid delay.	3.79	0.62	3.98	0.18	3.89	0.36	VGE
10.	E-governance improves the use of information in the decision-making processes	3.49	0.26	2.91	0.29	3.44	0.28	GE
Grand Mean		3.49	0.35	2.96	0.26	3.23	0.30	GE

Data in Table 2 indicates that of the 5 items on the extent to which the challenges of Electronic Governance affects the speed of service delivery in some selected public institution in Ebonyi State, Nigeria, the respondents agreed that 2 of the items (6 and 9) with recorded mean scores of (3.91 and 3.89) indicated to a very great extent, 2 of the items (7 and 10) to a great extent with mean scores of (2.96 and 3.44) .The standard deviation for all the items raised is 0.30 which is small signifying that the responses are closely clustered around the mean. The Table also shows that the

respondents grand mean score for the overall items raised is (3.23). Following the guideline for the interpretation of the respondents data, the answers to research question two revealed that the challenges of Electronic Governance affects the speed of service delivery in some selected public institution in Ebonyi State, Nigeria to a great extent.

Hypothesis 1

E-governance practice has no significant impact on the speed of service delivery in some selected public institutions in Ebonyi, State, Nigeria.

Table 3: Mean ($\bar{x}$) Rating with Standard Deviation of Electronic Governance Practice has no Significant Impact on Speed of Service Delivery in some selected Public Institution in Ebonyi State, Nigeria

Staff	N	$\bar{x}$	SD	df	t-cal	t-crit	Decision
Management Staff	171	3.32	0.64	291	3.50	± 1.96	Reject H_{01}
NS							
Non- Management Staff	120	3.11	0.42				

Significant at $P < .05$, $df = 289$, critical t-value = ± 1.96

The t-test analysis of the data in Table 3 revealed that the t-calculated value (3.50) is more than the critical t-value of ± 1.96 at degree of freedom (df) 289 and at 0.5 level of confidence. This implies that the calculated t-value is more than the critical t-value. Thus, the null hypothesis is rejected as e-governance practices have

significant impact on the speed of service delivery in some selected public institutions in Ebonyi, State, Nigeria.

Hypothesis 2

E-governance challenges have no significant effect on the speed of service delivery in some selected public institutions in Ebonyi, State, Nigeria.

Table 4: Mean ($\bar{x}$) Rating with Standard Deviation of E-Governance challenges have no Significant Impact on Speed of Service Delivery in some selected Public Institution in Ebonyi State, Nigeria

Staff	N	$\bar{x}$	SD	df	t-cal	t-crit	Decision
Management Staff	171	3.49	0.35	291	8.67	± 1.96	Reject H_{02}
NS							
Non- Management Staff	120	3.23	0.26				

Significant at $P < .05$, $df = 289$, critical t-value = ± 1.96

The t-test analysis of the data in Table 4 revealed that the t-calculated value (8.67) is more than the critical t-value of ± 1.96 at degree of freedom (df) 289 and at 0.5 level of confidence. This implies that the calculated t-value is more than the critical

t-value. Thus, the null hypothesis is rejected as e-governance challenges have significant impact on the speed of service delivery in some selected public institutions in Ebonyi, State, Nigeria.

DISCUSSION OF THE FINDINGS

For the discussion of the findings inherent in this study, research questions and research hypotheses that are related were treated together.

The first research question sought ascertains the extent to which electronic Governance impact on speed of service

delivery in some selected public institution in Ebonyi State, Nigeria. The result in Table 1 showed that e-governance impact on speed of service delivery in some selected public institution in Ebonyi State, Nigeria to a great extent. The first research hypothesis

ascertained if e-governance practice has no significant impact on the speed of service delivery in some selected public institutions in Ebonyi State, Nigeria. The analysis of the t-test comparison according to Table 3 showed that e-governance practices have significant impact on the speed of service delivery in some selected public institutions in Ebonyi State, Nigeria. The finding is in consonance with [18], who held that e-governance practice makes it easier for a staff to serve limited number of citizens. Having easy access to records and information reduced the time spent in archives in search of materials or files due to analogue system for other responsibilities. This enhanced maximum productivity and effectiveness because most services provided by the government offices such as payment of bills, NEPA bills, health care services, agricultural services and others are availed online. The finding corroborates with [19], who states that some forms are made available on line for the public to download such as business registration forms, JAMB registration and other educational/vocational institutional forms for registration with a simple pressing of a computer button. The findings is in support with [20], who remarked that e-government enhances service delivery as organizational goals are achieved, work related activities are conducted without delays and mistakes on the part of the

CONCLUSION

The analysis and interpretations done and the information from related literature indicated that e-governance impact on speed of service delivery in some selected public institution in Ebonyi State, Nigeria to a great extent with some challenges. Regrettably, it is sad to mention that most

RECOMMENDATIONS

To achieve this mission the following recommendations were made based on the findings of this study.

1. This study strongly advocates the study should be extended to all the public institutions in South East,

selected institutions in the daily discharge of their duties.

The second research question sought to identify the extent to which the challenges of Electronic governance affects the speed of service delivery in some selected public institution in Ebonyi State, Nigeria. The result in Table 1 showed that the challenges of Electronic Governance affects the speed of service delivery in some selected public institution in Ebonyi State, Nigeria to a great extent. The second research hypothesis identify the extent to which e-governance challenges affect the speed of service delivery in some selected public institutions in Ebonyi State, Nigeria. The analysis of the t-test comparison according to Table 4 showed that e-governance challenges have significant impact on the speed of service delivery in some selected public institutions in Ebonyi State, Nigeria. The finding is in consonance with [21], who held that there is dysfunction in the public service delivery in Nigeria leading to failures in e-governance service delivery, a lack of accountability and poor performance of the machinery of government. The finding corroborates with [22], who states that corruption and weaknesses in the machinery of government are some of the challenges of Electronic governance affects the speed of service delivery in some selected public institution.

public institutions mentioned are mere shadow of themselves as effective and efficient performance has largely been unrealized due to poor e-governance practice.

Nigeria to avoid the problem of generalization.

2. Policy makers should be endowed with the responsibility of punishing defaulters of e-governance to enable them handle issues of corrupt practices, accountability etc.

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POPULATION DISTRIBUTION TABLE

SELECTED PUBLIC INSTITUTIONS IN EBNYI STATE, NIGERIA.	Population	Percentage (%)
EBONYI STATE:		
Ministry of Finance and Economic Development.	174	12
Ministry of Works and Transport	107	8
Ministry of Agriculture and Natural Resources	195	13
Ministry of Education	175	12
Ministry of Health	190	13
Ministry of Information and State orientation	158	11
Non-Staff/Public	454	30
TOTAL	1516	100

Source: Field Study 2021.

Sample Size Determination:

In determining the sample size of this study, the researcher applied Taro Yamani's statistical formula (1960:180) in Onodugo, Ugwuonhah and Ebinne (2010). The formula states as follows:

$$n = \frac{N}{\dots}$$

$$1 + N (e)^2$$

Where n = Sample size
N = Total Population
e = Level of significance or error allowable (5%)
1 = Constant

The Researcher chose (5%) one percent as level of significance or margin of error allowable. This level of significance was chosen to increase the sample size, because the larger the sample size, the wider coverage or representative of the population the study will have and as well more reliable and valid the result will become. The translation of the formulation is stated below:

$$\begin{aligned} N &= 1516 \\ e &= 5\% \\ n &= ? \\ n &= \frac{1516}{5 + 1516 (0.05)^2} \\ N &= \frac{1516}{1 + 1516 (0.05)^2} \\ N &= \frac{1516}{1 + 1516 (0.0025)} \\ &= \frac{1516}{1 + 3.79} \\ &= \frac{1516}{4.79} \\ &= \frac{1516}{5} \\ n &= 303 \end{aligned}$$

Therefore, the sample size is 303 people.

TABLE WORK SHOWING THE QUESTIONNAIRE

s/n		
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		Response Option						SD	Decision
		VGE 4	GE 3	LE 2	VLE 1	$\bar{X}$			
1	E-governance eliminates over-crowding in public sector								
2	E-governance enhances higher levels of processes in public sector								
3	E-governance enhances better communication among public sectors for efficient services								
4	E-governance increases the quality of public services as online transactions are made online to avoid delay.								
5	E-governance improves the use of information in the decision-making processes								
	Grand Mean								
	ITEMS								
6	Staff involvement in corrupt practices disrupt e-governance process in any public sector								
7	Lack of concrete sustainable anti-corruption programming								
8	Failure to locate the anticorruption struggle within a broader struggle to transform society								
9	Lack of social re-orientation on accountability in public sector								
10	Lack of good network services reduces the efficiency of e-governance practice.								
	Grand Mean								

TABLE WORK SHOWING THE ANALYSIS

TABLE 1: Impact

		Staff Mgt n-171							Non-Staff Mgt n= 120							Overall		
	ITE MS	VGE	GE	L E	VLE	X ₁	SD ₁	DEC	VGE	GE	LE	VLE	X ₂	SD ₂	DEC	X ₃	SD ₃	Decisi
1		151	-	-	20	3.65	0.97	VGE	115	-	05	-	3.92	0.40	VGE	3.79	0.66	VGE
2		-	170	-	1	2.99	0.15	GE	111	-	-	09	3.78	0.79	VGE	3.39	0.47	GE
3		120	-	30	21	3.28	1.14	GE	-	119	01	-	2.99	0.09	GE	3.14	0.62	GE
4		141	20	-	10	3.71	0.75	VGE	109	-	11	-	3.82	0.58	VGE	3.77	0.67	VGE
5		-	164	07	-	2.96	0.19	GE	-	07	113	-	1.06	0.24	VLE	2.01	0.22	LE
Grand Mean						3.32	0.64	GE					3.11	0.42	GE	3.22	0.53	GE

TABLE 2: Challenges

		Staff Mgt n=171							Non-Staff Mgt n= 120							Overall			
	ITEMS	VGE	GE	LE	VL E	X ₁	SD ₁	DEC	VGE	GE	LE	VLE	X ₂	SD ₂	DEC	X ₃	SD ₃	Decisi	
6		149	-	22	-	3.87	0.34	VGE	114	05	01	-	3.94	0.27	VGE	3.91	0.31	VGE	
7		-	170	-	1	2.99	0.15	GE	-	111	09	-	2.93	0.27	GE	2.96	0.21	GE	
8			143	-	28	2.84	0.37	GE	-	03	-	117	1.05	0.31	VLE	1.95	0.34	LE	
9		153	-	18	-	3.79	0.62	VGE	119	-	01	-	3.98	0.18	VGE	3.89	0.36	VGE	
10		168	-	03	-	3.97	0.26	GE	-	109	11	-	2.91	0.29	VLE	3.44	0.28	GE	
	Grand Mean					3.49	0.35	GE						2.96	0.26	GE	3.23	0.30	GE

t-test ANALYSES

There are hypothetical statement that could be tested for the purpose of this research work, they are test of hypothesis. The hypotheses are to be tested using the test for correction of data.

$$\text{Formula: } t = \frac{X_1 - X_2}{\sqrt{\frac{N_1 S_1^2 + N_2 S_2^2}{N_1 + N_2 - 2}}}$$

Where:

- t = test statistics
- X₁ = mean of sample 1
- X₂ = mean of sample 2
- n₁ = sample size for sample 1

$$\begin{aligned} n_2 &= \text{sample size for sample 2} \\ S_1^2 &= \text{standard deviation for sample 1} \\ S_2^2 &= \text{standard deviation for sample 2} \end{aligned}$$

Hypothesis 1

By substitution

$$\bar{X}_1 = 3.32; S_1 = 0.64; N_1 = 171$$

$$\bar{X}_2 = 3.11; S_2 = 0.42; N_2 = 120$$

$$t = \frac{3.32 - 3.11}{\sqrt{\frac{171(0.64)^2 + 120(0.42)^2}{171 + 120 - 2}}} \quad \begin{matrix} 171+120 \\ 171 \times 120 \end{matrix}$$

$$t = \frac{0.21}{\sqrt{\frac{171(0.41) + 120(0.18)}{289}}} \quad \begin{matrix} \frac{291}{20520} \\ = 0.01 \end{matrix}$$

$$t = \frac{0.21}{\sqrt{\frac{70.11 + 21.60}{289}}}$$

$$t = \frac{0.21}{\sqrt{\frac{91.71}{289}}}$$

$$t = \frac{0.21}{\sqrt{0.32 \times 0.01}}$$

$$= \frac{0.21}{0.06}$$

$$= 3.50$$

Hypothesis 2

By substitution

$$\bar{X}_1 = 3.49; S_1 = 0.35; N_1 = 171$$

$$\bar{X}_2 = 3.23; S_2 = 0.26; N_2 = 120$$

$$t = \frac{3.49 - 3.23}{\sqrt{\frac{171(0.35)^2 + 120(0.26)^2}{171 + 120 - 2}}} \quad \begin{matrix} 171+120 \\ 171 \times 120 \end{matrix}$$

$$t = \frac{0.26}{\sqrt{\frac{171(0.12) + 120(0.07)}{289}}} \quad \begin{matrix} \frac{291}{20520} \\ = 0.01 \end{matrix}$$

$$t = \frac{0.26}{\sqrt{\frac{20.52 + 8.40}{289}}}$$

$$\begin{aligned}t &= \frac{0.26}{\sqrt{\frac{28.92}{289}}} \\t &= \frac{0.26}{\sqrt{0.10 \times 0.01}} \\&= \frac{0.26}{0.03} \\&= \mathbf{8.67}\end{aligned}$$