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Data Protection and Information Management Success of Tertiary Institutions in Rivers State, Nigeria

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Abstract: *This paper examined how data protection impacts information management success of tertiary institutions in rivers state, Nigeria. In line with the purpose of this paper as stated, our population comprises of 5 selected tertiary institutions in River State. The Taro-Yamene sample size determination formula was used to determine the sample size. The objective of this study is to assess the relationship between data protection and information management success of tertiary institutions in rivers state, Nigeria. Questionnaires were the major instruments used in gathering primary data which were analyzed using regression analyses. The study found that tertiary institutions can achieve improvement along the terms of information management success if the they are able to protect their data effectively and efficiently, and that the outputs of these institutions will be improved by the adoption of various data protection methods.*

Key words: *Data, Protection, Availability, Reliability, Information, Management.*

1. INTRODUCTION

Information systems (IS) are formal, sociotechnical, organizational systems designed to collect, process, store, and distribute information (Piccoli and Pigni, 2018). In a sociotechnical perspective Information Systems are composed by four components: technology, process, people and organizational structure (Hara, Watson and Cavan, 1999).A computer information system is a system that as a branch of Science composed of people and computers that processes or interprets information (Vladimir, 2016). The term is also sometimes used in more restricted senses to refer to the software used to run a computerized database or to refer to only a computer system. Information Systems is an academic study of systems with a specific reference to information and the complementary networks of hardware and software that people and organizations use to collect, filter, process, create and also distribute data. An emphasis is placed on an information system having a definitive boundary, users, processors, storage, inputs, outputs and the aforementioned communication networks (Jessup & Joseph, 2008). Any specific information system aims to support operations, management and decision-making. Bulgacs,

(2013) says that an information system is the information and communication technology (ICT) that an organization uses, and also the way in which people interact with this technology in support of business processes (Kroenke, 2008).Some authors make a clear distinction between information systems, computer systems, and business processes. Information systems typically include an ICT component but are not purely concerned with ICT, focusing instead on the end use of information technology. Information systems are also different from business processes. Information systems help to control the performance of business processes (O'Brien, 2003). Alter (2013) argues for advantages of viewing an information system as a special type of work system. A work system is a system in which humans or machines perform processes and activities using resources to produce specific products or services for customers. An information system is a work system whose activities are devoted to capturing, transmitting, storing, retrieving, manipulating and displaying information (Alter, 2006). The managing of Information is not restricted to a single department in an organization or a particular group of employees. Information today encompasses both electronic and physical (or paper stored) information. It cuts across all areas of the organization. In this study, we will be looking at the handling of electronic materials (data and information) generated and used by tertiary institutions in Rivers State.

Cloud computing is the delivery of computing services - software, storage, analytics, networking, servers, databases and more – over the internet´ (Gonzalez & *et al.*, 2012). It is in the pursuit of efficiency and effectiveness in the handling of information successfully that Cloud Computing has had a revolutionary impact on businesses today. Cloud computing and technology has pervaded the activities relating to information handling in organizations and tertiary institutions around the world, including Nigeria. Cloud Computing is the term assigned to the recent trend in computing service deployment (and by deployment, we mean the method of its use). This trend has seen the cultural and technological shift of computing service deployment from being provided locally to being provided remotely and en masse, by third-party service providers (Hayes, 2008). Cloud computing, in theory, promises users a relatively cheap way of managing resources, a high quality standard, and high availability of their information/data.

Obviously, lots of organizations are enjoying great value from using cloud computing; however, the service comes with special responsibilities – one of them being security. Security is a constant concern in IT-related projects. Unlike many other traits in technological contexts, security is especially hard to measure or even compare qualitatively. Hence, the issue that have prompted this study include: lack of proper protection of physical hardware from attacks like fire accidents and even theft; security issues when deploying software as a service and platform; activities of malicious users on the internet looking to attack businesses and capture customer and poor training of staff on the usage of the systems. The purpose of this study is to show the association between cloud security concerns and information management success in tertiary institutions in Rivers State. The objectives are to determine:

i. Data Protection and its implication on Information Management Success
ii. Network Availability and its implication on Information Management Success
iii. User Authentication and its implication on Information Management Success
iv. The moderating effect of Leadership on Information Management Success.

Four research questions were raised, they include:

i. To what extent does data protection impact information management success of tertiary institutions in Rivers State?
ii. To what extent does network availability impact information management success of tertiary institutions in Rivers State?
iii. To what extent does user authentication impact information management success of tertiary institutions in Rivers State?
iv. To what extent does Leadership as a moderator impact cloud security concerns and information management success of tertiary institutions in Rivers State?

In carrying out the study, three research hypotheses were raised, they include:

H01: There is no significant relationship between Data Protection and Information Availability.

H02: There is no significant relationship between Data Protection and Information Reliability.

H03: There is no significant relationship between Leadership, Cloud Security Concerns and Information Management Success

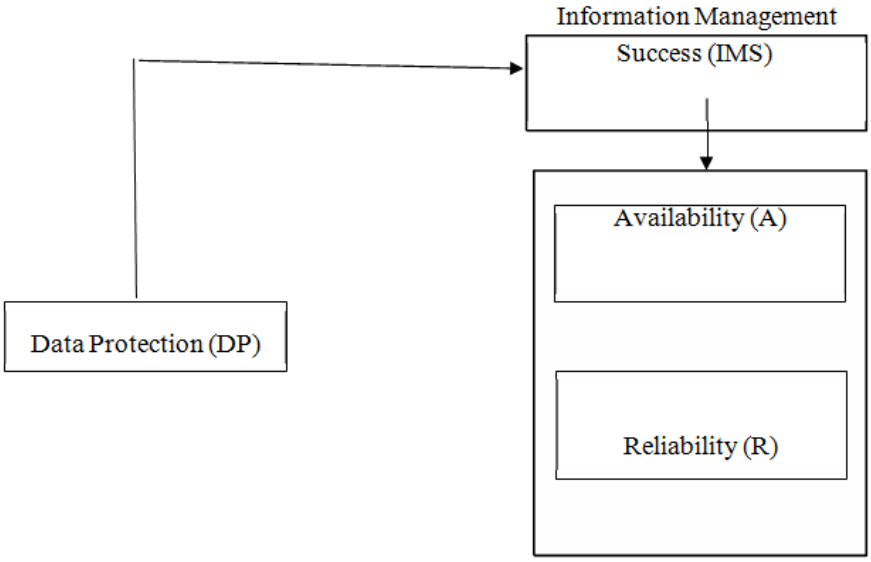

Figure 1.1: conceptual frameworks on data protection and information management success of tertiary institutions in rivers state, Nigeria.

2. THEORETICAL FOUNDATIONS

The study use Social exchange and systems theory as both of them are applicable to firms. The social exchange (SET) is among the most influential conceptual paradigms for understanding workplace behavior. Its venerable roots can be traced back to at least the 1920s (e.g., Malinowski, 1922; Mauss, 1925), bridging such disciplines as anthropology (e.g., Firth, 1967; Sahlins, 1972), social psychology (e.g., Gouldner, 1960; Homans, 1958; Thibault & Kelley, 1959), and sociology (e.g., Blau, 1964). Although different views of social exchange have emerged, theorists agree that social exchange involves a series of interactions that generate obligations (Emerson, 1976). Within SET, these interactions are usually seen as interdependent and contingent on the actions of another person (Blau, 1964). Systems theory is a science which has the comparative study of systems as

its object. There are different types of systems: organisms (animals, humans, particularly cognitive mechanisms in organisms), machines (particularly computers), physicochemical systems, psychic systems and social systems. Such a comparative research program for heterogeneous types of systems presupposes a highly general concept of systems, for which numerous features have been proposed: the interdependency of the parts of a system; the reference of any structure and process in a system to the environments of the system; equilibrium and continuous re-adaptations to environmental demands as core elements of the understanding of a system; self-organization of a system as the principal way it responds to external intervention; complexity as trigger mechanism for system-formation and as the form which describes the internal network structures of connectedness among system elements.

3. INFORMATION MANAGEMENT

Information can be defined as "data converted into something valuable and usable for certain users"(Baumgartner, 1978).The term Information Management covers the entire scheme of data collection, organization, presentation and processing. All these are closely associated with the computers today. It includes all the uses and processing of information within an organization. For example, clerical staff could process orders by a computer or in the case of an exceptionally large contract, by managers personally. Information management have both formal and informal elements. The formal elements are where information is processed on a routine basis using predefined procedures. The informal element consists of where data is processed on a more ad-hoc basis and where the processing involves, to a large extent, judgment and even intuition. The information management is concerned with all forms of information ranging from facts to predications or even feelings. The advent of computers is regarded as the key element of the information management. The introduction of computers necessitates a rigorous definition of a company's information needs. Computers have caused companies to investigate their information management techniques at one time or the other. Hence, the growth in awareness of information management has gone hand in hand with the growth of the use of the computers. In this age of electronics and information technology, (IT), some would equate information management with data processing using a computer. Whereas, computer based information system is by far faster than manual ones and desirable if a manager can afford it, having a computer can easily become part of the problem of information management. In short, an organization orders the flow of information within it, from the operation level to top management and back, as well as with its environment. It can be all done manually, but modern organizations have developed their management information systems around computer hardware and software.

4. MEASURES OF INFORMATION MANAGEMENT

4.1 Availability

Availability in the context of information technology is the ability of a user to access information or resources in a specified location and in the right format. Availability means that users are able to gain on-line access to organizational resources 24/7. A variety of factors can result in system failure thereby taking the system off-line, some of such factors range from planned downtime for maintenance to catastrophic failure. The goals of high network availability solutions are to minimize this downtime and or to minimize the time needed to recover from an outage. Exactly how much downtime can be tolerated will dictate the comprehensiveness, complexity and cost of the solution. High network availability is a convenient label, but its meaning is often misunderstood. High availability is neither a specific technology nor a quantifiable attribute. Rather, it is a goal to be reached by any organization with worldwide presence and one that intends

to do business round the clock. At one end of the spectrum, high availability might simply mean a disaster recovery plan that will put an organization back on its feet within 24 hours. For small systems, this could mean something as simple as an uninterruptible power supply and a rigorous backup plan. At the other end of the spectrum is the pinnacle of continuous availability, exemplified by robust workload-sharing solutions spread across multiple locations.

4.2 Reliability

According to (Sterbenz, 2010) reliability is defined as the continuous availability of service, or the probability that a system or service remains operable for a specific period of time, or the ability of a system to perform its required functions under stated conditions for a specific period of time. Network Availability is the connection and communication of various computer systems and components to allow a user to access information or resources over the internet. The challenge here is that Nigeria is a country known for poor internet network capabilities (Uduchukwu, 2018). Such poor availability of internet network could cause issues such as; access granted too late could lead to the user making a wrong decision based on not accurate (delayed) information leading to a potential loss. Or, a transaction is not closed/sealed on time; such a situation can also lead to a potential (financial) loss (Czarnowski, 2014).

4.3 Concept of Cloud Security Concerns

Cloud computing is the delivery of computing services - software, storage, analytics, networking, servers, databases and more – over the internet´ (Gonzalez & et al, 2012). According to Hayes (2008), Cloud Computing is the term assigned to the recent trend in computing service deployment. This trend has seen the cultural and technological shift of computing service deployment from being provided locally to being provided remotely and en masse, by third-party service providers. The different benefits include; Speed – since it is on demand and a self-service technology, huge amounts of computer resources can be provided in minutes; thus removing impact on capacity planning and enabling businesses to have flexibility; Cost – The business does not have to worry about expending huge capital on purchasing hardware and software or setting up round the clock electricity (to deal with on-site data centers); Global Scale – Being able to scale elastically is another nice benefit of Cloud computing. The right amount of IT resources is assigned to the business; this included bandwidth, storage, computer power and this is done from the right geographic location; Reliability –Less downtime is always great for the business. Cloud computing makes disaster recovery, data backup a less expensive issue because data can be retrieved from multiple sites from the cloud service provider´s network; productivity – Maintaining data centers on-site, typically, require time-consuming IT management and maintenance; software patching, hardware setup, just to name a few. With cloud computing, these tasks are simply eliminated thereby ensuring the business spends time on more relevant business goals and Performance – Some of the largest Cloud computing services operate on worldwide network of data centers that are constantly updated to their current versions. This offers good benefits like reduced network latency and greater economies of scale. Obviously, lots of organizations are enjoying great value from using cloud computing; however, the service comes with special responsibilities – one of them being security. This section aims to explore and classify the security challenges that come with Cloud computing services. According to the Virginia Technology Institute, Cloud describes the use of a collection of services, information, applications, and infrastructure comprised of pools of computer, network, information and storage resources. These components can be rapidly implemented and decommissioned, and scaled up or down providing for an on-demand utility-like model of allocations and use.

Cloud Computing has three (3) service delivery models. Due to the pay-per-use economy model that is involved in Cloud delivery models, the extent of information security is directed towards cohering to industry standards and legislations among cloud shareholders. The architecture of Cloud computing can be grouped according to the three types of delivery models, and they are: Infrastructure as a service (IaaS), Software as a service (SaaS) and Platform as a service (PaaS): Infrastructure as a service which is a single tenant cloud layer where the Cloud computing provider's dedicated resources are only shared with clients who are contracted on a pay-per-use fee. This greatly reduces the need for large initial investment in computing hardware such as networking devices, servers and processing capability.

In providing a secure Cloud computing solution, a major decision is to be made on the type of cloud to be implemented. There are currently three types of cloud deployment models offered, and they are, a public, private and hybrid cloud: Public Cloud: This is a cloud computing infrastructure that is made available to the general public. It is owned and managed by an organization selling cloud services. Users generally access the public cloud through the use of Web Browsers. It is based on a pay-per-use model, similar to a pre-paid electricity billing format and is flexible enough to provide for increase or decrease in demand for cloud facilities; Private Cloud: This is a cloud computing infrastructure that is designed for a single business organization specifically. It may be managed and controlled by the organization or by a 3rd party organization on or off premise. On this deployment model, it is relatively easier to align its deployment with security and regulatory requirements, and to provide more enterprise control over its use and Hybrid Cloud: This deployment module is a combination of both Private cloud and Public cloud deployment modules. It provides virtual IT capabilities through the mix of both public and private clouds, thus, provides a more secure control of data and information and still allows various parties to have access to information online. It also has an architecture that enables other management systems to interface with each other.

4.4 Data Protection

Data, which is the building block of information, needs to be protected from threats. Data is very valuable and so, it is a major concern that has to be secured and handled properly, that is, data has to be protected. Data loss or manipulation is a serious concern for users because users have a huge number of user files. This is because, cloud providers also provide Storage as a Service (SaaS). These files can be accessed every day or sometimes rarely. Therefore, there is a strong need to keep them correct. This need is caused by the nature of cloud computing since the data is outsourced to a remote cloud, which is unsecured and unreliable. Since the cloud is untrustworthy, the data might be lost or modified by unauthorized users. In many cases, data could be altered intentional or accidentally. Also, there are many administrative errors that could cause losing data such as getting or restoring incorrect backups. There are many possibilities of losing data due to a malicious attack and sometimes due to server crashes or unintentional deletion by the provider without having backups. Catastrophic events such as fires, floods or earthquakes could be the causes of loss. Also, any event that leads to harming the encryption keys could also lead to data loss.

5. METHODOLOGY

The research design adopted is the cross-sectional survey approach, this is necessary because the respondents will be require to complete the questionnaire given to them based on the current trend in Cloud Security Concerns and Information Management Success . Descriptive statistics will also be used to classify the categories of respondents based on the population size. the information

collected from the questionnaire was summarized in their groups and percentage were used to analyses the data, also inferential statistical tool of regression analyses was used to test the level of significance among variables and finally the analysis was aided with SPSS version 21.0. Y =F[X1, X2, X3…….XN] Where Y =dependent variable X1, x2, x3….xn=independent variable F=Functional relationship among variables. The sample size of the study is 76 a total of seventy six questionnaire will be administered to the categories of staff are Management staff, and Information Technology staff of the various tertiary institutions.

5.1 Reliability and Validity of Research Instrument

The instrument used was subjected to face/content validity; this was done to ascertain the validity of the questionnaires to be administered. A complete copy of the questionnaire was given to the supervisor for vetting and correction. The researcher will collect the questionnaire from the supervisor after vetting and correction, effect the corrections and the restructured questions were then used to administered the questions on the respondents. Reliability according to Parson (2007), refers to the extent to which a measuring instrument is consistent in providing same output when used in another context for generation. The scale to use for this study had been previously adjudged reliable. However, we will verify reliability outcomes through confirmatory test of internal consistency on the instrument with our sample using Cronbach alpha. This calculates the average of all possible Split-half Reliability Coefficient and the threshold level, 0.7 which is generally accepted by the rule of thumb (Nunnally, 1978) will be considered adequate.

Table 1: Reliability Statistics for the Instruments

Variable	Cronbach alpha	No. of items
Data protection	0.987	4
Reliability	0.900	3
Availability	0.927	3

6. FINDINGS

6.1 Results and Frequency Analysis

In this section, the output of the primary data is presented. Analysis was carried out on individual variables and measures. Mean scores and standard deviations are also illustrated. The presentation begins with the independent variable which is data protection. It then proceeds to the dependent variable- information management success, whose measures are reliability and availability. These are all scaled on the five (5) point Likert scale (ranging from 1: SD=strongly disagree, 2: D=disagree, 3: N=neutral, 4: A=agree and 5: SA= strongly agree).

6.2 Analysis on Data Protection

For the purpose this study, we adopted 5point Likert scale in our questionnaire, having response categories in the order of SA =5, A=4, U=3, D=2 and SD=1. Going by this, the interpretation of our mean is according to Asawo's (2009) categorization where all responses with mean value (x) between 1-2 as being low, 2.5-3.5 as being moderate, 3.5 – 4.5 as high and 4.5 above as very high.

Table 2: Response Rates for data protection.

	N	Sum	Mean	Std. Deviation
	65	212	3.26	1.241
Data/Information.				
The source of Data that is use is secure in cloud technology	65	236	3.63	1.126
Data and Information from unsecure/unverified source is readily available.	65	236	3.63	1.024
Data protected is easily accessed (after user is authorized).	65	225	3.46	1.160
Valid N (listwise)	65			

Source: Research survey, 2019.

Table 2 shows the rate at which the respondents supported Data Protection to be effective in Information Management in Tertiary Institutions. Question one shows that Data protection is a key factor in the reliability of Data Information with a total mean of 3.26. Question two shows that the source of Data that is use is secure in cloud platform with a mean of 3.63. Question three shows that Data and Information from unsecure/unverified source is readily available with a mean of 3.63 and lastly Data protected is easily access (after user is authorized) with a mean of 3.46. All the questions analysed has an average mean greater than the criterion mean of 3.00 for a five point Likert scale. This shows that Cloud Security Concerns is effective in Information Management Success in Higher Institution especially in Rivers State.

Table 3: Availability and Information Management Success

	N	Sum	Mean	Std. Deviation
	65	249	3.83	1.069
users) is seen as a big problem in this institution				
Cloud service provider has a big part to play in availability of information	65	258	3.97	.901
Valid N (listwise)	65			

Source: Research survey, 2019

Table 3 shows the extent to which Availability enhances Information Management Success in tertiary institution. Question one shows that Lack of access to information from the cloud platform (to end users) is seen as a big problem in this institution with a mean of 3.83, and question two shows that Cloud service provider has a big part to play in availability of information with a mean of 3.97. This show that availability of information in the institutions is taken seriously.

Table 4: Cloud Security and Information Management

	N	Sum	Mean	Std. Deviation
This institution believes in investing in infrastructure & staff training will lead to increased ability in handling information	65	232	3.57	1.262
Trust that information on the platform cannot be tampered with is a key ingredient to the use of the Cloud platform	65	226	3.48	1.276
Valid N (listwise)	65			

Source: Research survey, 2019

Table 4. shows the extent to which Cloud Security Concerns enhances Information Management Success. Question one shows that the respondent supported that the institution believes in investing in infrastructure and staff training will lead to increased ability in handling information with a mean of 3.57. Question two shows that Trust that information on the platform cannot be tempered with is a key ingredient to the use of the Cloud platform with a mean of 3.48.

6.2 Bivariate Relationship

This uses the Spearman's Correlation to compare the relationship between Cloud Security Concerns and Information Management Success in Tertiary Institution in Rives State as shown below.

Table 5: Relationship between Data Protection and Availability of Information

			Data Protection	Availability
Spearman's rho	Data Protection	Correlation Coefficient	1.000	.786**
		Sig. (2-tailed)	.	.000
		N	65	65
	Availability	Correlation Coefficient	.786**	1.000
		Sig. (2-tailed)	.000	.
		N	65	65

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

Source: Research survey, 2019

Table 5 shows that the Spearman's correlation coefficient; r = 0.786**. The probability Value (PV) = 0.000 < 0.05 at 95% level of significance. This shows that there is a positive relationship between Data Protection and Availability of Information in Tertiary Institution in Rivers State which implies that increasing the level of Data Protection will also increase the level of Reliability of Information in Tertiary Institution in Rivers State.

Table 6: Relationship between Data Protection and Reliability of Information

			Data Protection	Reliability
Spearman's rho	Data Protection	Correlation Coefficient	1.000	.891**
		Sig. (2-tailed)	.	.000
		N	65	65
	Reliability	Correlation Coefficient	.891**	1.000
		Sig. (2-tailed)	.000	.
		N	65	65

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

Source: Research survey, 2019

This uses the Spearman's Correlation to compare the relationship between Cloud Security Concerns and Information Management Success in Tertiary Institution in Rives State as shown below.

Table 7: Relationship between Data Protection and Availability of Information

			Data Protection	Availability
Spearman's rho	Data Protection	Correlation Coefficient	1.000	.786**
		Sig. (2-tailed)	.	.000
		N	65	65
	Availability	Correlation Coefficient	.786**	1.000
		Sig. (2-tailed)	.000	.
		N	65	65

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

Source: Research survey, 2019

Table 5 shows that the Spearman's correlation coefficient; r = 0.786**.

The probability Value (PV) = 0.000 < 0.05 at 95% level of significance. This shows that there is a positive relationship between Data Protection and Availability of Information in Tertiary Institution in Rivers State which implies that increasing the level of Data Protection will also increase the level of Reliability of Information in Tertiary Institution in Rivers State.

Table 8: Relationship between Data Protection and Reliability of Information

			Data Protection	Reliability
Spearman's rho	Data Protection	Correlation Coefficient	1.000	.891**
		Sig. (2-tailed)	.	.000
		N	65	65
	Reliability	Correlation Coefficient	.891**	1.000
		Sig. (2-tailed)	.000	.
		N	65	65

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

Source: Research survey, 2019

Table 6 shows that the Spearman's correlation coefficient; r = 0.891**. The probability Value (PV) = 0.000 < 0.05 at 95% level of significance. This shows that there is a positive relationship between Data Protection and Reliability of Information in Tertiary Institution in Rivers State which implies that increasing the level of Data Protection will also increase the level of Reliability of Information in Tertiary Institution in Rivers State.

Presentation of Results on the Analysis of Data on Research Questions and Testing of Hypotheses We had proposed three hypotheses in the introduction one and two of this study to seek explanation between differentiation strategy and performance of deposit banks in Port Harcourt. The Spearman rank order Correlation coefficient is calculated using the SPSS 21.0 version to establish the relationship among the empirical referents of the predictor variable and the measures of the criterion variable. We used this to answer research questions one to six. Correlation coefficient can range from -1.00 to +1.00. The value of -1.00 represents a perfect negative correlation while the value of +1.00 represents a perfect positive correlation. A value of 0.00 represents a lack of correlation. In testing hypotheses one to three, the following rules were upheld in accepting or rejecting our alternate hypotheses: all the coefficient values that indicate levels of significance (or) as calculated using SPSS were accepted and therefore our alternate hypotheses rejected; when no significance is indicated in the coefficient r value, we reject our alternate hypotheses. Our confidence interval was set at the 0.05 (two tailed) level of significance to test the statistical significance of the data in this study.

Table 9: data protection and Information Management in Tertiary Institution in Rivers State

Control Variables			Data protection	Information Management Success	
-none-[a]	Data protection	Correlation	1.000	1.000	.979
		Significance (2-tailed)	.	.000	.000
		Df	0	63	63
	Information Management Seccess	Correlation	1.000	1.000	.979
		Significance (2-tailed)	.000	.	.000
		Df	63	0	63

a. Cells contain zero-order (Pearson) correlations.

Source: Research survey, 2019

Hypothesis one; there is no significant relationship differentiation strategy and effectiveness (r = 0.926, p = 0.000 < 0.01), hypothesis two; There is no significant relationship between differentiation strategy and efficiency (r = 0.969, p = 0.000 < 0.01), hypothesis three; There is no significant relationship between differentiation strategy and Profitability (r = 0.828, p =0.000 < 0.01). Therefore, based on the results illustrated, all previous bivariate null hypothetical statements are hereby rejected as the study finds that:

- There is a significant relationship between data protection and reliability.
- There is a significant relationship between data protection and availability.

7. CONCLUSION/RECOMMENDATIONS

Referring back to our finding where data protection affect availability, reliability is an indication of why institutions of learning should be conscious of their various clouding security to achieve their ultimate goal. Conclusively, we call on the tertiary institutions in Rivers State to apply various data protection security measures to survive in this continuous dynamic words. And that they should be conscious of her operating environment to know the right time for protecting its data.

Table 8 shows that Leadership has a moderating effect on Cloud Security Concerns and Information Management Success in Tertiary Institution in Rivers State. The coefficient of Cloud Security Concerns and Leadership ($r = 0.979$, $PV = 0.000 < 0.05$) while Leadership and Information Management Success ($r = 0.979$, $PV = 0.000 < 0.05$) respectively. This shows that Leadership positive moderates Cloud Security Concerns and Information Management Success.

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