Prediction Data Mining Technique and Administrative Efficiency of Universities in Rivers State, Nigeria

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Abstract

The study surveyed Prediction Data Mining Technique and Administrative Efficiency of Universities in Rivers State. The cross sectional survey design was adopted. The population of this study consist of (180) Management staff of the three universities in Rivers State, they includes, the Vice Chancellors, Registrars, Deans of Faculties and Head of departments of the universities. Taro Yamane formalar was used to determined a Sample Size of One Hundred and Twenty Four (124) Management staff of the universities that constituted the Unit of Analysis of the study. Research questions were used to determine to what extent Prediction Data Mining Technique enhanced Administrative Efficiency of Universities in Rivers State. The Null Hypotheses was therefore employed to predict the relationship between Prediction Data Mining Techniques and Administrative Efficiency of Universities in Rivers State. This was achieved using Linear Regression Analysis which indicated that there is a strong positive relationship between Prediction Data Mining Techniques and Administrative Efficiency of Universities in Rivers State. It is therefore concluded that Prediction Data Mining Techniques is an effective tool to improve Administrative Efficiency of universities in Rivers State. The research further, recommended that Prediction Data Mining Techniques should be properly implemented in the Database of the Universities in Rivers State to enhanced Administrative Efficiency of the Universities.

Keyword: Prediction Data Mining Technique, Database, Cost Effectiveness and Decision Quality

1. Introduction

Prediction Data Mining Technique is the process of discovering interesting pattern and knowledge from large amount of data, the source can includes database, data warehouse, the web, or other information repositories (Chien, & Chen, 2008). The population size of the universities today has becomes very difficult to carryout administrative function with the traditional method (Gibelt, 2017). There had been drastically increased in the students population and the number of programmes offered in our universities today. Prediction data mining techniques is a potential and logical techniques is an effective tool that enhanced organizational efficiency (Vandamme, Meskens, & Superby, 2007). It is able to handle large volume of information collected from different database of organization. It can also identify some activities that exist within the data in which the ordinary manual process cannot identify (Kusiak, 2001). Prediction data mining technique is a database tool that enables the identification of hidden element(s) or data in the database of an organization (Fitz-Gibbon, & Tymms, 2002). These data are mostly historical data or data from another organization like the students past academic record.

- Historical: History of staff and student "his/her identity, socio-family past, past academic, age, and gender".
- Staff and Student's involvement in work and studies "participation in optional activities, meeting".

- Staff and Student's perception "views on academic context, professors, interest in course offered, student perception about lecturers, lecturers influence on the students' performances in academics".

Prediction data mining techniques uses the existing data to find the facts or behavior of staff and students during their work or academic programme. It ensured that quality data entered into the information system that will enhance better decision in the organization (Chien & Chen, 2008). The information required in a university is one of the expensive information because failure to adhere to quality will affects the administrative process of the university (Ranjan, 2008). Organizations that did not have the available information for better decision taken will result to delayed services and poor decision taken and increased high cost of production Toboho, 2000). Decision taken can make or mar the organization, data is now an essential intellectual asset of organizational, data describe the entity, the staff or students or the university itself. The analysis of staff and students data represents the image of the university Toboho, 2000).. The university or organization can only be defined based on the type of staff and student they employed and the type of students they are graduating. Some universities are describe as the (10) top best university. The assessment of universities by the National University Commission (NUC) is based on the quality and number of staff available or engaged, the students admitted and the facilities put in place (Toboho, 2000. Prediction data mining techniques leverage on these deficiencies with an efficient and effective method in solving organizational problems (Ranjan, 2008). It is a tested algorithm or procedure that is implemented in the database of the organization to achieve administrative efficiency (Ranjan, 2008).. It is capable of presenting a user friendly console (monitor) of the user, it is accurate in processing data or information (Kusiak, 2001). The sequence or procedure can be represented over time without error unlike the human ability (Chien & Chen, 2008). Prediction data mining technique is used to determine the work-life of employees and the duration of programme for students, number of course to offer, relationship of students with other faculties, allocation of resource and possible students output or efficincy (Chien & Chen, 2008).

2. Historical Background of Prediction Data Mining Techniques and Administrative Efficiency of Universities in Rivers State.

Prediction Data Mining Techniques a structured programme used to solve various problems that exist in the database of an organization (Berry &Linoff, 2000). It is applicable in different organizations, therefore to organization to be implemented must be properly studied to know the mission and goal of the organization. In the case of a university, its aim, its aim is to reduce cost and enhanced quality decision taken in the university. It is able to identify the determinant factors for staff performance, and student's success and failure rate in the university (Berry &Linoff, 2000). Prediction data mining technique is an analytical add-in programme that identified the activities that exist within the database, such factors like; gender, enrolment status, faculty of student, campus residence, financial assistance, health condition, communication, lecturer's quality, management style, family background etc, (Berry &Linoff, 2000). Most of these hidden detailed may be unknown to management of the organization in the traditional approach except with advanced technology. Prediction data mining technique is able to access past record of staff and students in the university, in most cases they can only be accessed based on their previous place of work or past educational record like in the case of relational database (Berry &Linoff, 2000).

Prediction data mining technique exploits the potential applicability of hidden details in a database of an organization to enhanced the administrative efficiency of the management of the organization. Many experts has developed a models that can predict students success factor, discover patterns, identify major determinant factors on students' slow destruction at universities, so as to possibly reduce the failure rate (Dekker, Pechenizkiy & Vleeshouwers, 2009). Predictive data mining technique is able to follow-up the activities of staff and students throughout their work-life or academic programmes and proffer corrective measure to guide against students failure rate (Dekker, Pechenizkiy & Vleeshouwers, 2009).

Administration in higher institutions includes the implementation of policies, maintenance of equipment, programme structure, integration and coordination of support services that will aid the core value of teaching and learning, carrying out research and publication (Luan, 2002). Administration is not considered as merely subservient to academic activities, it plays a primarily supporting role that secures and enables accomplishment of the institution's core functions (Luan, 2002). It is as important as the acknowledge itself (Luan, 2002). These include (but are not limited to) institutional research and planning, student services, general administration, study administration, human resource management, financial administration, legal advisory services, research and innovation services, as well as more entrepreneurial activities such as alumni affairs, marketing and public relations and business development. In addition, supporting services such as library, ICT, capital and property administration, operations and maintenance can equally be considered as elements of administration (Luan, 2002). Administration in the university system involve both academic and non-academic staff who have a deep understanding of core functions of higher education, they are relevance to the service or management-support roles.. Administrators need to develop a practical orientation knowledge that will enable them to deal directly with research group, these includes quality officers, developers or international office specialists (Luan, 2002). Quality administrators are required to predict the outcome of staff and students' performance in the organization. Prediction Data Mining Technique reduces the human error that may result from the manual process, it is accurate, time saving and cost effective (Berry &Linoff, 2000).

The cost of operation has been one of the major concerned of organizations today, especially in the university system that is a complex system. The state government is the major funder of higher education in Rivers State. Funding allocations at the university level have been higher than at other levels of education due to the expansion in the academic programmes of the universities. However, the growth in expenditure has been inconsistent over the years. The funding pattern has not reflected inflation rates and the growing enrollment (Toboho, 2000). In addition, students are charged low fees and thus contribute an insignificant proportion of the total income of the institutions. The funding allocations to universities have been inadequate and the government has been unwilling to increase the fees charged to students to make up for the short fall (Toboho, 2000). The cost of operating universities, with very few exceptions, is reflected in the number of students seeking admission into the universities in Rivers State. Understanding the administrative expense in the context of the key goals of universities is essential in other to determine the accessibility, cost/benefit, and achieving academic excellence (Teboho, 2000). While some trends suggest that the rate of increase in university tuition has slowed in recent years, its growth in nominal dollars continues to outpace inflation, and, as such, the rising cost of universities has a real impact on the administrative efficiency of the universities (Teboho, 2000).

Efficiency, as a concept, has its origin in economics. It is the optimal relation between inputs and outputs. The internally efficient educational cycle/system is one which turns out graduates without wasting any student-year or without dropouts or repeaters. The system may be externally quite inefficient if the graduate turned out is not what the society, economy or higher level of education wants (Abdulkareem, Akinubi & Oyeniram, 2018). Internal efficiency refers to the number of students who pass from one grade to the other and complete that cycle within the stipulated period of time (Abdulkareem, Akinubi & Oyeniram, 2018). It shows the relationship between input and output at a given educational level. The question of administrative efficiency is also linked to the issue of resources allocation and utilization Gupta (2001).

Decision quality is a "position, opinion, or judgment" reached base on the available information or evidence or data at management disposal. It is a understanding of the input compare with the outcome of a complex process of deliberation. This includes an assessment of the certainty of the probability outcome. Decision involves thinking, judgment, and deliberate action to assign irrevocable allocation of resources with the aim of achieving the desired objective of the organization. The basic elements of any decision process are information seeking, interpretation, decision criteria, and subsequent implementation of action (Enticott, Boyne, & Walker, 2009.).

Decision theory has its root in economic theory(Enticott, Boyne, & Walker, 2009.).. The assumption is that people make decisions to maximize utility on the basis of self-interest and rationality. This, however, does not consider the possibilities or effects of moderating or intervening factors that make decisions reference-dependent. Nonetheless, expected utility theory has been applied in the construction industry with some success and has been the predominant model for normative decision making. Technical people in the construction industry have been observed to exhibit a tendency for a normative approach to decision making, thereby weakening their ability to deal with uncertainty. Program management is dominated by technical staff and probably more than a few are struggling with tendencies toward this normative thinking phenomenon. An alternative approach is the descriptive decision theory (Enticott, Boyne, & Walker, 2009.)..

3. Problems
The university as an institution of learning require a sensitive algorithm to actually address the various problems that exist within the database of the university system. Most universities are only been concern with the query method and normal data collection from the database. This has made decision in the university system very complex and difficult to take the right decisions. In some cases various errors exist that cannot be discover throughout the process. There is the need to introduce a subprogram or an intelligent machine that can actually help management in the administrative efficiency of the universities in Rivers State.

Often time, delay in decision taken because everybody is waiting for one centre to supply the result (Information Communication Technology Centre). Inspite of the implementation of the Database, they lack policies and procedure that incorporate university activities that enhanced effective forecasting of university capability in most cases resulting to over or even under admission in the University? Lack of resource allocation and also in the area of adequate student mentorship programmes. Management has neglected some of these processes because there is no effective tool that will aid the successful driving of the process.. Cost of managing the university keep on increasing because of the economic system but there is no corresponding assessment of the need

to improve the quality of our educational system. The number of courses and students in our universities today is not what the manual or traditional method can handle. Even though there is an IT centre, the service becomes so complex because of the population size.

Lastly, university has failed to established electronically digital network with other universities or organizations, there is still problem of interacting with other database, must of the students past record cannot be access by the universities, in most cases problem of result falsification and other related cases like inter university transfer, request from JAMB and other organizations. Most data collected from these organizations do not conformed to the receiving university database format result to manual input which is time consuming and introduction of new errors and increase the cost of operation. It is now necessary at this point in time to introduce an appropriate data mining method that can easily solve the numerous problems of universities in Rivers State.

4. Aim and objectives of the Study

The major aim of this study is to survey Prediction Data Mining Technique and Administrative Efficiency of Universities in Rivers State. This study aimed at maximizing the objective of implementing Prediction Data Mining Technique in the database of the Universities in Rivers and to enhanced Administrative Efficiency of the Universities.

5. Research questions

The research was properly guided by the use of research question as;
- To what extent does Prediction Data Mining Technique enhances Administrative Efficiency of Universities in Rivers State?

6. Hypotheses

The following Null hypothesis was tentatively used to proffers solution to Prediction Data Mining Technique and Administrative Efficiency of Universities in Rivers State, Nigeria.

H_{01}: Prediction Data Mining Technique does not enhance cost effectiveness of Universities in Rivers State, Nigeria.

H_{02}: Prediction Data Mining Technique does not enhance decision quality of Universities in Rivers State, Nigeria.

7. Methodology

The study is a cross sectional survey. The population of the study comprises of 180 Management staff from the three universities in Rivers State. To determine the sample size of the study, Taro Yamane formula was adopted which yield a sample size of 124 respondents. In analysing the research question, descriptive statistics of a 4-Point Likert Scale was used to answer the research questions, why Linear Regression Analysis was use to predict the extent to which Prediction Data Mining Technique enhanced Administrative Efficiency of Universities in Rivers State, Nigeria.

8. Analysis

Table 1: Prediction data mining technique

	N	Sum	Mean	Std. Deviation
To what extent can you predict students' performance through their identity, socio-family past, academic past, age and gender	120	311	2.59	.815
To what extent can you predict students' performance through their involvement in studies (Participation in optional activities ,meetings and other activities	120	314	2.62	.842
To what extent can you evaluate Student perception (view on academic context, lecturer, courses, environment, management etc.	120	306	2.55	.818
To what extent did you study how a particular students has been slowly destroy at your university(your courses and others)	120	304	2.53	.798
Valid N (listwise)	120		Average = 2.57	

Source: Research survey, 2018

Table 1 shows that all the items scores where slightly above the criterion mean of 2.50 on a four point likart scale. This shows that the universities are slight above average to the extent of how prediction data mining techniques are applied in solving students' problems the universities. The grand mean for all the items is 2.57.

Table 2:   Cost effectiveness

Questionnaire items	N	Sum	Mean	Std. Deviation
To what extent are you able to allocate cost to different cost centre of your university	120	291	2.43	.694
How effective are you able to managed the cost of your university compare to other university in Nigeria	120	291	2.43	.774
How are students willing to seek admission in your university as a result of cost effectiveness	120	287	2.39	.737
How effective is your university able to balance to cost of operation without affecting the quality of output.	120	301	2.51	.722
Valid N (listwise)	120		Average = 2.37	

Source: Research survey, 2018

Table 2 shoves that all the items scores where just above the criterion mean of 2.50 on a four point likart scale. This shows that the universities are little above average on cost effectiveness because of the low application of Prediction Data Mining Technique in the university administration.

Table 3: Decision quality of Universities in Rivers State

	N	Sum	Mean	Std. Deviation
To what extent are the judgement of management in your university right and without bias	120	304	2.53	.721
To what extent did your students take the decision of management seriously	120	311	2.59	.761
How precisely are information used for decision making are made available for the management of your university	120	300	2.50	.722
In your own view, how will you assess the various decisions that has been taken by the management to be accurate and precise over the last ten years	120	315	2.63	.779
Valid N (listwise)	120		Average = 2.52	

Source: Research survey, 2018

Table 3 shoves that all the items scores where slightly above the criterion mean of 2.50 on a four point Likert scale. This shows that the universities are slight above average to the extent of how decision quality is carried out in the universities. The grand mean for all the items just on the average of 2.52

9. Hypotheses Testing

H_{01}: Prediction Data Mining Techniques does not enhance administrative efficiency of universities in Rivers State.

Table 4a: Model Summary of Prediction and Cost Effectiveness

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.822[a]	.676	.673	1.399	.676	246.020	1	118	.000

a. Predictors: (Constant), Prediction

b. Dependent Variable: Academic_Quality

Source: Research survey, 2018

Table 4b: ANOVA showing the fitness of Prediction on Cost Effectiveness

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	481.537	1	481.537	246.020	.000[b]
	Residual	230.963	118	1.957		
	Total	712.500	119			

a. Dependent Variable: Academic_Quality
b. Predictors: (Constant), Prediction

Source: Research survey, 2018

Table 4c: Regression Coefficient showing the effect of Prediction on Cost Effectiveness

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.893	.455		6.352	.000	1.991	3.795
	Prediction	.666	.042	.822	15.685	.000	.582	.750
a. Dependent Variable: Academic_Quality								

Source: Research survey, 2018

The Model Summary in Table 4a shows the effect of Prediction on Cost Effectiveness of Universities in Rivers State with Pearson's correlation coefficient (R = 0.822[a]) and $R^2 = 0.67.6$ indicating 67.6% contribution of Prediction Data Mining Technique to Cost Effectiveness of the Universities. The ANOVA Table 4b shows that Prediction Data Mining Technique is fit for predicting Cost Effectiveness of the Universities in Rivers State., (*P = 0.000)* less than 95% Degree of Freedom (0.05). The Coefficient Table 4c, B = 0.666 and (*P* = 0.00) Less than 95% Degree (0.05). This shows that there significant relationship between Prediction Data Mining Technique and Cost Effectiveness of Universities in Rivers State, Nigeria.

Table 5a: Model Summary of Prediction and Decision Quality

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.908[a]	.824	.823	1.101	.824	552.723	1	118	.000
a. Predictors: (Constant), Prediction									
b. Dependent Variable: Decision_Quality									

Source: Research survey, 2018

Table 5b: ANOVA Prediction and Decision Quality

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	669.557	1	669.557	552.723	.000[b]
	Residual	142.943	118	1.211		
	Total	812.500	119			
a. Dependent Variable: Decision_Quality						
b. Predictors: (Constant), Prediction						

Source: Research survey, 2018

Table 5c: Coefficient of Prediction and Decision Quality

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	2.165	.358		6.041	.000	1.455	2.874
	Prediction	.786	.033	.908	23.510	.000	.719	.852
a. Dependent Variable: Decision_Quality								

Source: Research survey, 2018

The Model Summary in Table 5a shows the effect of Prediction Data Mining Technique on Decision quality of Universities in Rivers State with Pearson's correlation coefficient (R = 0.908[a]) and R^2 = 0.824 indicating 82.4% contribution of Prediction Data Mining Technique to Decision Quality. The ANOVA Table 5b shows that Prediction Data Mining Technique is fit for predicting Decision Quality of Universities in Rivers State, *P = 0.000* less than 95% Degree of Freedom (0.05). The Coefficient Table 5c, B = 0.786 and (*P* = 0.00) Less than 95% Degree (0.05). This shows that there significant relationship between Prediction Data Mining Technique and Decision Qualities of Universities in Rivers State, Nigeria.

10. Discussion of findings

Although the output of the research questions shows a little above the average of 2.50 on a 4-Point Likert scale, this means that that Prediction Data Mining Techniques is not maximally utilized in the universities. This is one of the concern in our university system, technology is not properly utilized therefore cost is ineffective and poor decision quality. In testing the hypotheses, the results showed that there is a strong positive relationship between Prediction Data Mining Technique and Administrative Efficiency of Universities in Rivers State. The regression analysis showed that Prediction Data Mining Techniques is an effective tool to predict staff and students performance, to identify the duration of service, task performance, identify student identity and problems before they finally dropout of school. The result supported the work of Toboho, that it is accurate in distributing cost to their various cost centre. The result also showed that, it is effective in improving students' performance and contributed high percentage to cost effectiveness and Decision quality in Universities. This research is in line with the research of Fitz-Gibbon & Tymms (2002) on the Technical and ethical issues in indicator systems, doing the right thing at the right time. Predicting staff and student academic performance will assist the management administrative efficiency of universities in Rivers State.

11. Conclusion

Prediction Data Mining Technique is an effective tool that improve administrative efficiency of universities in Rivers State. The university system is a complex system with increased number of employees, students and academic programmes. Management requires at effective tool like Data Mining Technique to maximally utilize the available resource especially in time of the difficult economic system with affective the quality of our university system. The study identify the various internal cost that exist within the university, and the effect of high cost in this prevailing economic where the government is not meeting up to their responsibilities. The study also concluded that

decision quality will improve is prediction data mining technique is properly implemented in database of the universities in Rivers State.

12. Recommendation

It is quite clear that Prediction Data Mining Technique is an effective and efficient tool that enhanced the administrative efficiency of universities in Rivers State. We therefore recommended that proper study of the system (university) should be done to actually know those elements that will be built into the system. After this has been carried out Prediction Data Mining Technique should be implemented in the database of the universities in Rivers State to improve the Administrative Efficiency of the Universities. Management staff of the universities should have this technique accessible on their computers and for effective utilization of the tool, training programme should organization for all management staff of the universities.

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