



Development of a Model to Measure Dependence level of Organizations on MIS

ABSTRACT

As a result of the current innovation and further development in management information system "MIS", a great demand has arisen for its acceptance and ease of use. MIS functionality assists the day-to-day operations and management of the institution and helps the institution make tactical and strategic decisions. Furthermore, it helps institutions thrive in competing favourably with their counterparts. Despite the increasing acceptance of the MIS, most institutions that have made significant investments in the infrastructure and have clearly agreed to accept the use of the infrastructure have left their day-to-day operations and controls to their MIS. However, it is difficult to measure their dependence on their MIS. This research sets out to develop a model to verify why a school is not dependent on her MIS by accepting a specific score for each module of the management information system that the school uses to fill the gaps, calculate and measure dependence for each of the 107 schools that participated in the study, and report dependence to the school. Analysis showed that of the 107 study participants, only 17% were dependent on MIS, 4% were averagely dependent, and a whopping 79% were not dependent on their MIS. To increase dependence and improve confidence in MIS, we recommend that institutions purchase efficient, easy-to-use and responsive MIS to maximize user satisfaction, consider deploying solar power solutions, invest in internet infrastructure, and effective IT policy needs to be implemented so that Technical and support staff can ensure effective management of MIS.

Keywords: *MIS, Model, Dependency, Management*

1 INTRODUCTION

In its most basic form, a management information system is a collection of different system components that organizational management uses to make operational, tactical, and strategic decisions. The primary goal and application of MIS throughout the early phases of its development was to increase the effectiveness of school office operations. The most concern was being focused on data entry and collation, rather than upon data transfer or analysis (Madiha Shah, 2014). The value of management information was recognized during its integration stages. (Madiha Shah, 2014) emphasized that the overall review of the literature revealed positive effects of MIS on school management and administration, including better information accessibility, more effective management, higher utilization of school resources, reduction in workload, improved time management, and improvement in the quality of reports. The research reveals a variety of barriers to the adoption of MIS, chief among them being a lack of time, confidence, or skills, a lack of training, a lack of senior management backing, and a lack of technical support. Due to its effectiveness and efficiency, MIS is now used more and more in educational management. MIS can give administrators and teachers the data they need to make informed decisions about planning, policy, and evaluation. With the massive development and breakthrough in recent times, MIS in

developed countries, the educational terrain in Nigeria is having difficulties in adopting and depending totally on management information system for their strategic and operational planning. (Salako, 2012). According to (Ajoye, 2014), in most recent times there has been scarcity of literature that examined the influence of IT self-efficacy on MIS evaluations. This is probably due to the weakness of IT self-efficacy in predicting MIS performance and measuring dependence level. Therefore, this study set out to develop a model that can be used for measuring the level of dependence on MIS by private institutions.

The objectives of the study are to develop a model that measures the dependent level of for private schools' on the use of management information systems. Implement the model using PHP and MySQL and evaluate the performance of the model using standard metrics. Schools across Nigeria were chosen and their dependent levels evaluated.

This research is asked the following research question.

1. Has the school accepted and adopted the management information system?
2. What is the extent and frequency to which the management information system is being used?

Many authors have attempted to measure successes of systems by various computer usage statistics (Zain et al., 2005), used time spent using computer systems, frequency of computer use, and number of tasks for which the system is used, but it has not been accurately proven to be exact. As a result, this study attempts to develop a model to measure the assess and dependence level on management information system by private schools. This model development will reveal the level to which private schools are either adopting, depending on their management information system (MIS) for effectiveness and efficiency in the administration, daily operational procedures and workforce management or adopting but not depending on the management information system. To achieve the set objectives of this study, we developed and evaluated a model for measuring dependence level of schools on MIS based on the Pillinger's dependency formula.

This study will be of benefit to the federal and state government, educational agencies and investors in the educational sector, in addition to research agencies on educational matters and the general public who are interested in educational data. To the federal and state government, this study will help them to plan, make tactical and strategic decisions, and formulate policies that will improve on both the welfare and administration of private schools in the country. To the investors, this study will help them to administer their educational affairs more efficiently and effectively, in order to provide good and qualitative educational platform and facilities that will enhance qualitative assimilation among the students.

2 REVIEWED LITERATURE

According to (Gehlawat, 2017), a school MIS could comprise of seven modules. The seven modules are Student Management Module, Examination Management Module, Attendance Management Module, Time-Table Management Module, Staff Management Module, Facility Management Module and Finance Management Module. They are depicted in figure 1.

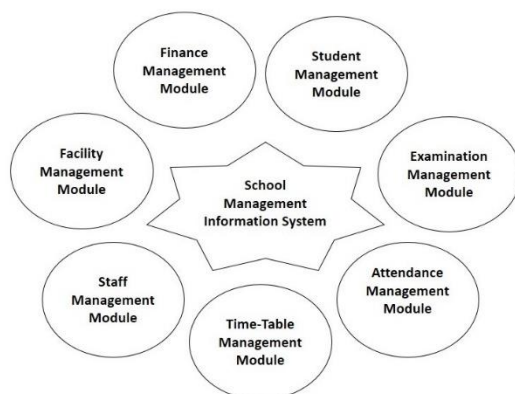


Figure 1: Features of a school management information system (Gehlawat, 2017)

In 2016, a research paper on a conceptual model of the impact of the use of management information systems on decision-support skills, the researchers found that decision-making skills are becoming more prevalent across all business areas (Abdulatef et al., 2016). They found that most companies aiming for future success are modernizing their traditional business practices as a result of technological advances over the last century. Today, a company's ability to run a successful business depends on more than just its ability to deliver what its customers want. It also depends on the company's stability and ability to make key decisions that affect its future success.

For this reason, most organizations rely on automated decision-making processes to ensure that decisions are reliable and relevant to their business objectives. It is especially important to note the frequency of use of management information systems. According to various reports, MIS is beneficial for business operations (Abdulatef et al., 2016).

In terms of participation in the decision-making process, MIS has many distinct advantages. Numerous studies examining the impact of MIS on his decision-making process have found positive associations. Decision-making ability is believed to be facilitated by management information systems. An analysis of previous literature shows evidence from numerous studies supporting information systems management as a factor in the functioning of decision-making skills. Both internal and external sources of information have been reported to be able to provide information for decision making (Livari, 2005). In this regard, most scholars are concerned about the quality of information access. According to Halawi (2008), the quality of information access is considered to be related to the quality of comparative information content. Marketing information systems can be used in conjunction with primary and secondary data sources to provide high-quality content information to MIS operations.

The Technical Systems Maintenance and Management Information Systems Model (Maric, 2018) reveals that technical systems used in production are becoming increasingly automated and must function effectively and reliably. Maintenance has typically been seen as a non-productive, ancillary role that doesn't add much value to the business. However, many manufacturing departments are adopting various techniques to increase the efficiency of maintenance. This study examines machine and industrial equipment maintenance issues along with maintenance tactics and maintenance management procedures. Development processes for traditional and modern maintenance management information systems are also provided. Finally, they e discuss the use of expert systems and decision support systems in developing maintenance management systems. The nature of the system maintenance procedures (for which the best maintenance model is chosen) are determined by the nature and content of the processes. Maintaining a system

cannot be successful without a solid strategy and working machinery at every step of the process. The development and implementation of ERP (Enterprise Resource Planning) systems has been heavily funded by many companies over the past decade. However, very few of these systems that are built or installed actually have maintenance strategies built into them.

Complex maintenance processes are initiated by equipment failure or deterioration detected by monitored parameters (unplanned or urgent maintenance), planned or scheduled routine repairs, or both. This process requires planning, scheduling, monitoring, quality control, and the use of necessary resources (workshops, labor, machinery, equipment, tools, spare parts, and materials). Effectively managing production planning and scheduling, analyzing maintenance history to perform cost analysis, and generating forecasts of future failure trends are made possible by proper maintenance management design and integration with ERP systems increase.

Stepanova in their research suggests that technology transfer is an important part of the development of any country, especially in an era of rapidly developing technology that has a major impact on business processes and overall quality of life (Stepanova and Erins, 2020), shows that it is doing its job towards a model for ICT business transfer. The Information and Communication Technology (ICT) market is growing primarily in the areas of software development and IT services. This saves companies valuable resources such as time and money. The selection and evaluation of ideas, decisions, and marketing activities go hand in hand with the development of new technologies. This ICT transfer model states that technology transfer includes knowledge of development methods, strategy choices, production patterns, quality assessment and commercialization processes, technology lifecycles, and the availability of technology to various end-users. This indicates that the specific goal of their research project was to create an ICT transfer model for real-world use by software developers and project managers by amalgamating various information technology standards and methods of commercializing innovation. That's it, to combine model compounds and elements into a single integrated system. The authors of this research paper used methods of independent component analysis and synthesis. But with the new opportunities comes a unique set of challenges that must be addressed in relation to the global ICT ecosystem. Decision-making processes such as strategy selection, production method selection, and quality assurance system selection are all asserted to be closely related to the development of new technologies. Project budgets, schedules, participant interactions, and collaborative networks that provide secure communication channels for information sharing and rapid access to new knowledge are all factors that influence the technology development process (Ponomarenko, 2017). Also, the transfer of information from suppliers to consumers can

be seen as a form of technology transfer. This process usually consists of several phases and he requires the cooperation of two or more people to transfer data, knowledge, techniques or experience (Ramachandra, 2012). Technology transfer also includes understanding development techniques, production standards, quality control, market introduction and distribution procedures to ensure technology development and access to a wide range of end users.

Despite all these significant impacts of MIS and other models, observed was that no work has addressed MIS dependency measurement. We therefore view this study as a tool to fill a gap in addressing the unmeasured dependence of users on these models or her MIS.

3 DEVELOPED MODEL

This work came up with explanations to help establish extent and frequency of MIS use across 107 private school. Modules of a standard MIS were captured, for example: student, attendance, examination, time table, staff, finance and facility modules. An interface was then developed with HTML and CSS to collect intended data. The interface has 2 sections. The first is to accept personal data like name of school, address of school and name of MIS while the second section accepts scores for the extent and frequency of use of the various modules. Exceptions had to be set to curb invalid data entry. Invalid entry are scores where various modules were assigned equal scores across the frequency and extent of use parameter. The model prompts when similar score is entered across all the modules for either extent or frequency of use parameters and informs the user that "it is impossible to have all the modules used exactly the same way". Rebecca Pillinger's dependency formula was programmed using PHP to process the data collected to reveal dependency levels of the institution.

$$\rho = \frac{\beta_e^2 + \beta_f^2}{\beta_e^2} \quad (1)$$

Where

$$\beta_e = \sum_i^n E \quad (2)$$

$i=1, n=7, e_2$ and f_2 are variance of extent and frequency of use respectively

$$\beta_f = \sum_i^n F \quad (3)$$

When calculated appropriately, ρ is likely to give us either of the three outcomes that will enable us understand the

level of dependence on the management information system. The possible outcomes are:

If ρ ranges from 3.5 and above, it entails the school is highly dependent on the MIS.

If ρ ranges from 3.0 to 3.49, it entails the school is averagely dependent on the MIS.

If ρ is < 3.0 , it entails the school is not dependent on the MIS.

MYSQL data base was used to store all relevant data. At this point, the user knows whether they are dependent, averagely dependent or not dependent on their MIS based on the scores entered into the model

To use the model the user is required to input the name of the school, address of the school and the name the school MIS as depicted in Figure 2. The user then input the scores for the extent of use for all the seven modules of the MIS. The model then checks for same score across the extent of use parameter, when it discovers that the scores for the extent of use for all the modules are not the same it will request entering score for the frequency of use as well but if the scores are the same it will ask the user to enter the scores appropriately. It will then also check if all the scores entered are the same across the modules of the MIS or not. As long as the scores are not the same across the extent and frequency of use, it will calculate the dependency level. If the dependency level is above 3.5 it will prompt “You are dependent on your MIS”. If the dependency level is between 3.0 and 3.49 it will prompt “You are averagely dependent on your MIS, else it will just prompt “You are not dependent on your MIS.

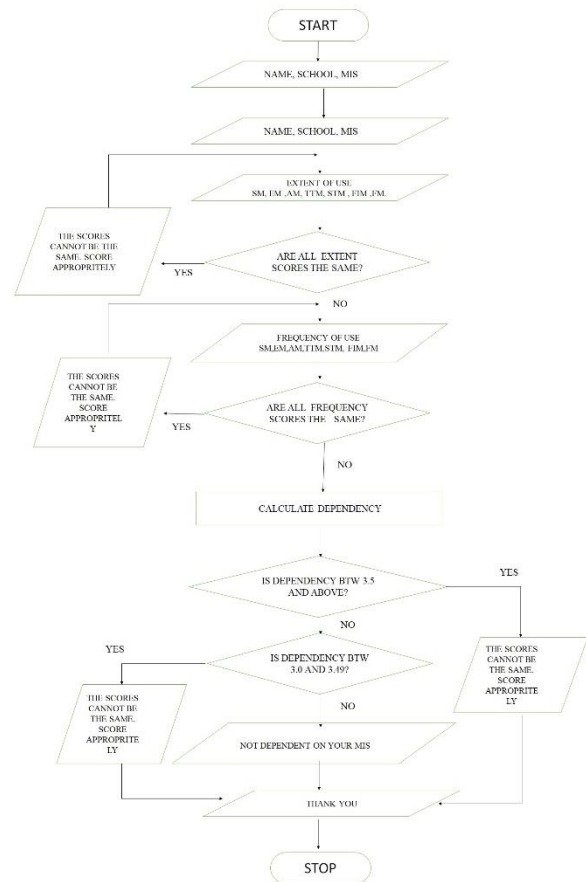


Figure 2: Flowchart for measuring dependence model

4 RESULTS AND DISCUSSION

Analysis from the result revealed that significant investments have been made by private schools on management information systems, however also observed are the following key facts: Firstly, most schools barely make use of their MIS for their day-to-day administration and operation. Secondly, the vast majority, about 79% of these schools were uninterested in deploying technology for such purpose. They were more comfortable with manual system of administration. Thirdly, about 4% of the schools deployed MIS, yet also used manual means as well. Fourthly, only 17% had completely embraced MIS for their day to day operations. Lastly, only 79% of the schools that have invested in procuring MIS early use the available modules. On investigating, the following reasons were responsible for the statistics above.

1. Administrators and teachers found it difficult to use some of the MIS. Inadequate training resulted in such staff abandoning their MIS once they encountered any



challenges. Others were not computer literate and unwilling to learn.

2. Some Administrators were unwilling to change the status quo and more comfortable with the manual methods. Also, frequent change in administrators negatively impacted consistent MIS use.

3. The unstable nature of electricity to power these systems also led to abandonment of the MIS in most cases as the use of alternative power implied additional overhead cost. Associated to this was also the additional cost of internet connectivity for schools that deployed online MIS.

4. Most school who deployed MIS on their local area network also needed experienced IT personnel's to manage and maintain their networks. This also implied additional overhead cost.

5 CONCLUSION

Generally, observed was a low adoption level of MIS across the area of study. Various reasons are responsible for this. Conversely, most schools that did deploy MIS were not taking advantage of the MIS, there by not optimizing their decision process and management. This was established through the deployment and evaluation of a model this study developed for measuring dependence level on MIS based on the Pillinger's dependency formula.

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REFERENCE

Abdulatef, A., Aina, M., Hu, W., Ahmed, A. N., & Mohammed, M. (2016). Use of Management Information Systems Impact on Decision Support Capabilities : A Conceptual Model. 1(4), 27–31.
<https://doi.org/10.18775/jibrm.1849-8558.2015.14.3004>

Ajoye, M. B. (2014). Information Systems User Satisfaction : A Survey Of The Postgraduate School Portal. December.

Gehlawat, M. (2017). School Management Information System : An Effective Tool for Augmenting the School Practices. June 2014.

Halawi, A., Mccarthy, P. L., & Aronson, E. J. (2008). An Empirical Investigation of Knowledge Management System's Success. *Journal of Computer Information Systems*, 48 (2), 121-135

Livari, J. (2005). An empirical test of the DeLone-McLean model of information system success. *ACM SIGMIS Database*, 36 (2), 8-27.

Maric, B. (2018). A Model Of Management Information System For Technical. July.

V. Ponomarenko and I. Novickis, "A review of information technology transfer process, its topicality, and related models," *Rezekne Academy of Technologies*, 2017.

Ramachandra, C.G., Srinivas, T.R., Shruthi, T.S., A Study on Development and Implementation of a Computerized Maintenance Management Information System for a Process Industry, *International Journal of Engineering and Innovative Technology*, Vol. 2, Iss 5, 2012

Salako, C. T. (2012). Educational Management Information System in Nigeria : Challenges and the way forward. *Journal of Research in Education and Society*, 3(2), 106–110.

Shah, M. (2014). Impact of Management Information Systems (MIS) on School Administration: What the Literature Says. *Procedia - Social and Behavioral Sciences*, 116, 2799–2804.
<https://doi.org/10.1016/j.sbspro.2014.01.659>

Stepanova, V., & Erins, I. (2020). ICT Transfer Business Model Development. *International Journal of Machine Learning and Computing*, 10(1), 170–175.
<https://doi.org/10.18178/ijmlc.2020.10.1.915>

Zain, M., Rose, R. C., Abdullah, I., & Masrom, M. (2005). The relationship between information technology acceptance and organizational agility in Malaysia. *Information and Management*, 42(6), 829–839.
<https://doi.org/10.1016/j.im.2004.09.001>



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