Management Information Systems for Supporting Educational Organizations: A Case Study through One Private University in Malaysia

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Abstract- Management Information System (MIS) is becoming one of the most important assets for an organization competing in the 21st century global economy. The MIS in a university includes important institutional activities such as relational database, applications for managing admissions, registration, financial aid, managing human resources, and for budgeting the fiscal controls. The university's ability to customize its MIS is critical to institutional competitiveness. The selected organization for this paper is a private university that offers online distance education for matured students at both undergraduate and postgraduate levels. The author obtained information about the MIS functions by analyzing written documents and a brief interview with the senior systems engineer and two students. The discussion of the paper includes: (a) the profile and structure of the organization, (b) management of the information system, (c) the IT structure and its effectiveness, (d) the information system required and its effective deployment.

Index Terms- Management Information System, MIS, Information Technology, IT, Institution of Higher Learning

I. INTRODUCTION

Education contributes to the advancement of society by providing individuals with the skills and knowledge to improve their capacity for productivity. Research studies support education as the key factor for sustainable growth of a nation [1], [2], [3]. However, maximizing student learning in an educational setting remains the main challenge for most institutions of higher learning [4], [5]. Management and monitoring of the learning system require frequent gathering of information and data for effective educational decision making [6].

PJU is the organization selected to identify and analyze how its management information system is developed to attain the goal of increased access, efficiency and effectiveness of quality education provided to adult learners through a blended pedagogy. The framework of the MIS in PJU is to collect, store, integrate, process and organize data for the task of decision making in the areas of resource allocation, budget planning, and policy analysis. A description of PJU as a distance education institution is discussed as follows: (a) a discussion of the organization, and (b) findings related to the management information system (MIS) of the organization.

Profile of Organization

The PJU is a local private university established in August 2001 by a consortium of local public universities. PJU was subsequently registered in May 2001 and launched in August 2002 as the premier university that provides education for the adult working population. The main aim of the university is to: (a) provide life-long learning to learners of all age groups focusing on matured students, (b) facilitate learning through a blended pedagogy of on-line learning and face-to-face interactions, (c) provide educational opportunities for learners who wish to enhance their knowledge and skills for career advancement or personal satisfaction, and (d) enable learners to set their own learning goals and learn at their own pace in their chosen environment.

Currently PJU has 5 faculties namely the Faculty of Applied Social Science, Faculty of Education and Languages, Faculty of Information Technology and Multimedia Communication, Faculty of Nursing and Allied Health Sciences and the PJU Business School. The university is also supported by 7 support centers namely the Center for Instructional Design and Technology, Center for Student Management, Learner Service Center, Institute for Teaching and Learning Advancement, Institute for Professional Development, Institute of Quality, Research and Innovation, Digital Library, and the International College. A total of 57,138 students have graduated from PJU from 2002-2015. This university has won the national Industry Excellence Award in 2014 and the international Award of Excellence for Institutional Achievement in Distance Education in 2010 from the Commonwealth of Learning.

Structure of the Organization

PJU was initially set up by a consortium of 11 public universities in 2001. The university is governed by a Board of Directors responsible for policy decisions and budget allocation. The management of PJU is the responsibility of the President, an Emeritus

Professor in Economics, who oversees the effective and efficient functioning of all departments. Next in line is the Senior Vice President (SVP), a Professor in Engineering, who oversees all faculties, the e-learning center, and all learning centers outside the main campus in Kuala Lumpur. The SVP works with the Vice President of Campus Development, a Professor in Engineering who is responsible for developing the infrastructure of PJU such as opening new learning centers and maintaining security.

In addition, the SVP is also supported by the Vice President of Corporate Planning and Financial Services who is responsible for budgetary matters, staffing and educational program planning. The position of the Senior General Manager for Learner Experience is equivalent to the registrar of most universities and the Senior General Manager for Group Business Development and Technology takes care of the technological needs of the university. The detailed structure of PJU is provided in Figure 1 below:
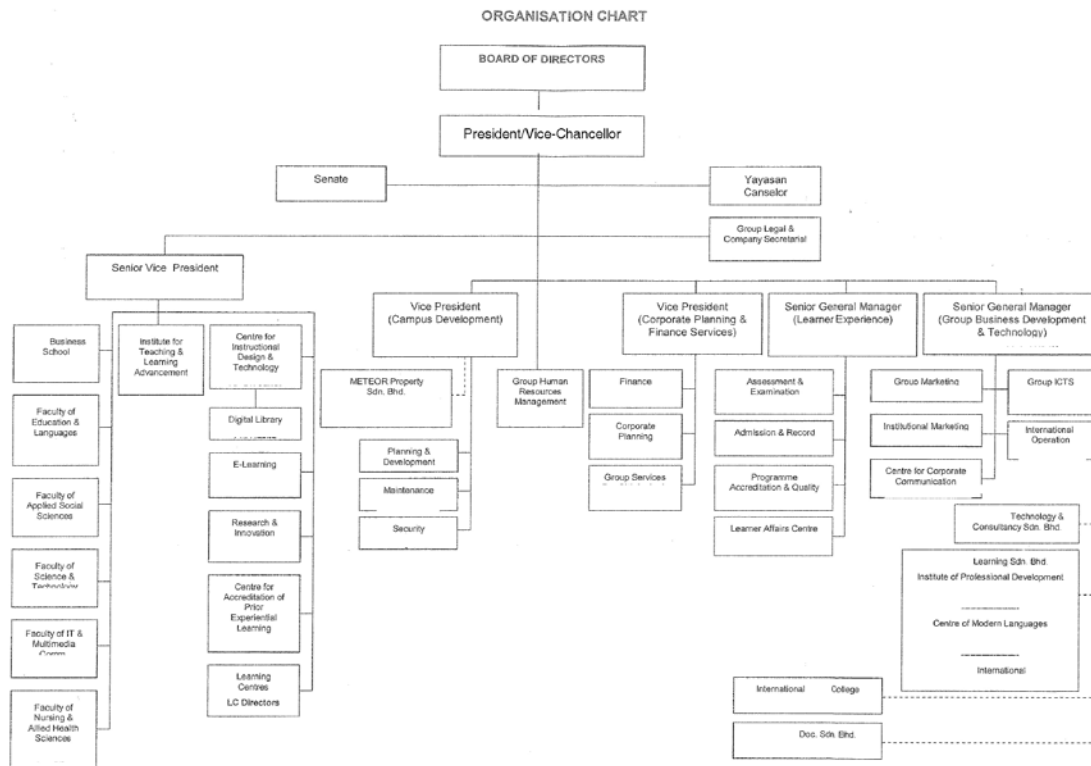

Figure 1: Structure of PJU

II. EDUCATION, MANAGEMENT, BUSINESS PROCESSES, PRODUCTS AND SERVICES

PJU as an institution of higher education is devoted to providing excellent and quality education to both local and international students. The university strives to provide educational programs that serve the needs of a diverse population of students. Both the undergraduate and postgraduate programs are approved by the Malaysian Qualifying Agency (MQA) and offered at the main campus and the 62 learning centers spread around the country.

Table 1 illustrates the progress of PJU from 2001 to 2015. The details indicate the tremendous progress achieved by the university in the last 15 years. The student population has increased along with the introduction of new faculties and learning centers. The popularity of PJU is attributed to the following factors: (a) weekend tutorials for students who are employed full-time, (b) experienced and knowledgeable teaching staff, (c) a flexible blended learning mode which combines on-line learning with classroom face-to-face interaction, and (d) its reasonable course fees which is payable on an installment basis.

Table 1: Student Enrollment (2001-2015)

Statistics	August 2001	January 2015
Cumulative Intake	753	143,727 Undergraduates: 133,747 Postgraduates: 9,980
Programs	4	52

Modules	29	1,463 (Tutorial and Lecture Modules)
Learning Centers	2	33 (Local Centers)
		10 (International Centers)
Staff	87	579
Tutors (Part Time)		11,352 (Active in Data Base)
		2,566 (Active per Semester)

PJU offers courses at the diploma, bachelors, master and doctoral levels in various fields and specialization. Diploma courses are offered for 1 year, bachelors from 3 to 4 years, masters for 2 years and the doctorate from 4 to 8 years. Table 2 illustrates the programs available at PJU.

Table 2: List of Courses at PJU

Level	Courses
Diploma	Management
	Human Resource Management
	Information Technology
	Early Childhood Education
	Islamic Studies with Education
	Advanced Diploma in Teaching Methodology
Bachelor	Management
	Business Administration
	Human Resource Management
	Accounting
	Marketing
	Information Technology
	Information Technology and Network Computing
	Information Technology and Management
	Computer Science
	Education (Educational Administration)
	Education (TESL)
	English Studies
	Early Childhood Education
	Technology Management
	Tourism Management

	Manufacturing Management
	Occupational Health and Safety Management
	Islamic Studies (Islamic Management)
	Psychology
	Communication
	Political Science
	Nursing
	Science in Project and Family Management
	Malay Studies
Post Graduate Diploma	Post Graduate Diploma in Teaching
Masters	Management
	Business Administration
	Human Resource Management
	Information Technology
	Education
	Instructional Design and Technology
	Project Management
	Nursing
	Islamic Studies
	English Studies
	Occupational Safety and Health Risk Management
	Counseling
Doctorate	Business Administration
	Education
	Nursing
Doctor of Philosophy	Business Administration
	Information Technology
	Education
	Science
	Engineering

The courses listed in Table 2 are all offered on a part-time basis on weekends. Tutorials in classroom are provided on Saturdays and Sundays for 5 meetings per semester. Tutorials are not compulsory but students located in nearby learning centers are encouraged to attend. Students who are unable to travel can fulfill the requirements of the courses through a fully on-line learning mode. Courses are either assignment-based or exam-based depending on the course structure and requirements.

The staff members in PJU are either academics or administrators. However, many academics are also administrators responsible for the coordination of specific programs. The number of staff members has also increased as new programs are introduced into the university. Table 3 illustrates the full time staff population of PJU as of January 2015. The table does not include 3,300 part-time tutors who support the university by teaching courses and marking examination scripts.

Table 3: List of Staff Members in PJU

Level	Number
Top Management	8
Academic	120
Administration	451
Total	579

Both local and international students are enrolled in PJU. The highest international student population is located in the university's learning center in Maldives and the smallest number in Zambia. The most demanded courses among international students are for teacher training and business management. Table 4 illustrates the student enrollment in international learning centers as per January 2015.

Table 4: International Student Enrollment

Country	Student Population
Maldives	3,088
Vietnam	1,323
Yemen	1,299
Ghana	1,184
Bahrain	854
Sri Lanka	299
Somalia	268
Zambia	36

The highest number of students enrolled in PJU is at the bachelor's degree level. Most of the students are currently employed and require a tertiary education for career enhancement and promotional prospects. A unique aspect of PJU is that its own staff is also enrolled as students in various programs for free. Table 5 illustrates the student enrollment in local learning centers according to programs as per January 2015.

Table 5: Local Student Enrollment

Level	Student Population
Diploma	2,781
Bachelor	34,375

Masters	3,7770
PhD	344
Total	49,652

III.   MANAGEMENT INFORMATION SYSTEM IN PJU

Information systems are essential for every organization to access its information. Management Information System (MIS) has been developed as a system which provides information support for decision making in the organization. MIS is a system based on the database of the organization evolved for the purpose of providing information to the people in the organization [7]. The selection of PJU as a premier organization for tertiary education is based on its unique experiences in providing non-traditional on-line programs to promote educational opportunities for adult learners. The purpose of this section is to study and analyze the management information system (MIS) associated with PJU as an institution of higher learning based on the following aspects: (a) identifying PJU's IT infrastructure and information systems and the business processes performed, (b) appraising the effectiveness of PJU's information system and how it improves business performance, (c) other information systems required by PJU to improve its current situation, and (d) complementary assets that support the successful deployment of PJU's information systems.

Methodology
In order to study, analyze, and report the findings concerning the MIS of PJU, a semi-structure interview was used in addition to data and information collected from readings about the organization. Participant A is the Senior Systems Engineer who provided the details and functions of the MIS, Participant B is an undergraduate student in Business Management and Participant C is a Masters student in Education, both of whom responded to questions related to the effectiveness of the information technology services at the university.
The 2 student participants for this semi-structured interview were purposefully selected from non-traditional students completing their on-line degree program at PJU. As on-line degree seekers, they were fully aware of the technological requirements and commitment needed to complete the degree successfully. The 2 students were considered non-traditional as they were employed full-time, and they selected the on-line degree programs due to their work and family commitments. Participant B is male and participant C is female. The interview was to assess the participants' general education experiences in the on-line program.

IT Infrastructure and Information Systems
The MIS in PJU is a set of formalized and integrated operational processes and procedures by which information such as graduate and post graduate programs, learning facilities, student evaluation, policy changes and staff recruitment are regularly shared, integrated, analyzed and disseminated for educational decision making at each level of the organization's hierarchy. The university's MIS attempts to perpetuate an institutional culture that advocates the use of data and information for organizational sustainability. The 3 key successes of the MIS is dependent on: (a) timely and reliable production of data and information, (b) data integration and data sharing among the various departments, and (c) the effective use of data and information for educational policy decisions.

The timely and reliable production of data and information must meet the needs of the producers, users and clients. In addition, both must also meet the needs of the educational planning and services, budgetary requirements, policy research and international collaboration. Collaborative effort at all administrative and managerial levels is required for timeliness of meeting the needs and disposing obsolete data to increase trust in the organization. Data and information produced must be reliable and reflects the current status of the organization and future trends for meaningful change. The database application in the MIS is carefully designed to ensure the users' confidence and trust in the data. According to participant A, challenges do exist with the university's MIS:

We constantly upgrade our system to save money and time but at times minor problems appear like disruptive hacking, e-mail spam….. but to me that's just nuisance activities. I am more concern with vulnerable information that can be fabricated.

Data integration and sharing in all departments is the most important component of the MIS. Data from different departments such as human resources, faculties, the learning centers, IT support services and research development can be linked, integrated or merged for the purpose of educational planning or analysis. Large data can be collected to describe the elements of each department for example the payroll, supply of modules and textbooks, examination evaluation and student enrollment. A coordinated MIS facilitates answering important questions for educational planning and policy for example how the resource allocation facilitates student learning, what programs are demanded by international students, and what educational project increase student achievement. The impact of multilevel data which is integrated and organized lies in its value for educational policy research and management [3].

The effective use of data and information contributes to effective making of policy decisions [8], [9]. The university's users of data and information are the stakeholders who as policy makers and policy analysts create an institutional culture of constantly improving the organization's productivity and business benefits. The MIS on its own does not bring about organizational change unless the organization itself has a culture of using data and information for organizational change there [10], [2], [6]. MIS helps to manage data in a more effective and consistent manner for a useful policy-oriented analysis, planning and monitoring of PJU.

Effectiveness of the Information Systems

In the early stages of its development, PJU faced challenges related to the implementation of the MIS. Among the "teething" problems were: (a) low motivation among staff to use computer data applications, (b) lack of data integration and quantitative analysis skills, (c) lack of system and program monitoring and evaluation, (c) lack of policy research and analysis, (d) lack of optimal way to allocate resources, and (e) decisions made that lack data evidence. Fortunately as PJU continues to expand its local and international borders, the IT challenges were identified and resolved. Today the MIS uses Google as its IT support and reliable and timely data are now available through computer technology and office network connectivity for policy decisions.

Timely and reliable data are especially critical for the students as part users of the MIS. Participant B relates his experience when he was first admitted to PJU:

I was overwhelmed by the tasks at hand. I felt isolated without a learning community. But in a way, I was lucky. The MyVLE has forum discussions so I can communicate with friends even though I don't see them. The learning materials are also available for revision before exams. I like the flexibility of learning at my own rate.

PJU today, has a culture of communication and information sharing which are steps in the direction of information thinking. This gradual paradigm shift in realizing the importance of data and information is brought about by training PJU staff to see the interrelationships of their interactions within the university. This paradigm shift increases the staff understanding of the value of communication and the free flow of information between departments as parts of the organization rather than seeing the department as an isolated unit of the organization. The MIS of PJU is now a shared vision attributed to the effort of the Vice Chancellor who is a strong leader and manager who is able to identify individual visions of the staff and embrace them as a shared vision of the organization.

It is essential for the staff to be able to communicate information to students with the flexible access to the information on the MIS. Participant C spoke about her relationship with the staff:

I find my tutors helpful. They reply to all my e-mails rather quickly. My supervisor is in constant communication with me. I feel so lonely when doing my research but the frequent communication with my supervisor helps a lot. I am able to do good work…plus access to the digital library was great.

IV.   INFORMATION SYSTEMS REQUIRED

The MIS is the campus core management system. The purpose of the MIS is to inform the stakeholders about the state of the organizational efficiency, the performance of the organization, the shortcomings and the future needs. MIS provides the raw statistical data but the stakeholders need to interpret the data into meaningful and comprehensible information on which to base their policy decisions. Participant A agrees that the present MIS needs improvement:

The present system must be upgraded…both hardware and computer applications. Need to enhance access to any device, faster speed and target user experience….like the apps. Example a higher bandwidth for e-mail…

An enhanced MIS required will be an effective system that has the capacity to create a strong demand for using MIS data and information specifically for budgeting, planning, monitoring, evaluating as well as for policy research, analysis and formulation (Moore, 2014). The MIS must accomplish the following functions in a timely and reliable manner: (a) define, collect, and process educational data and statistics, (b) systematically store and retrieve relevant data when required, (c) produce report and statistics for all education information users, and (d) respond and support activities for analysis, budgeting, enrolment, and monitoring educational effectiveness. As commented by participant A:

We are in the business of providing education. So our system must be able to provide data and information on demand without using too much time. We are rapidly expanding so our system must expand in accordance to our needs….otherwise we are no longer competitive with the other private universities out there.

V.   SUCCESSFUL DEPLOYMENT OF INFORMATION SYSTEMS

According to participant A, the successful deployment of the MIS is due to three factors of accountability, budget and staffing. Accountability was established by creating an MIS structure that clearly defined the responsibilities and policies of each department such as the level of data to be collected, shared and disseminated at specific managerial level. Accountability is important when there is a demand for PJU's products and services. Internal accountability is established by work-related procedures and policies and external accountability by marketing the information and departmental collaboration. Participant A emphasized the fact that:

We have so much data to handle but our MIS is efficient but we also need efficient staff to be responsible. MIS is just technology, we need to trust our staff to decide what data they can use, share and transfer to other people.

The MIS of PJU is funded by the consortium of public universities at the initial stage of its development. Currently, the university is self-supportive and able to sustain the MIS as part of its annual budget. The budget also includes on-going training for its staff and maintenance services. The MIS is now secured in its role in the management of the education system of the university.

The university's MIS is successful largely due to the qualified and willing staff members. Participant A highlighted the following:

Our university makes sure that the staff members we select stay with us. If we train them, then they leave, it is a waste for us. You know it is not easy to get qualified staff.

Qualified and skilled staff is employed to manage the MIS and most of them extend their services beyond 5 years due to the appeal of the employment benefits for technical staff at PJU. The attractive salary package is able to decrease the possibility of staff turn-over for a higher salary elsewhere. Many IT positions in PJU are considered "cutting-edge" and their roles and responsibilities put them on a career path with future prospects for promotion. Staff attrition in the past especially after training has been an immediate concern with PJU especially when considering its long term organizational needs. Staff motivation is now enhanced by incentive programs such as overtime work, professional training, study benefits and subsidized overseas trips.

The MIS of PJU need to be secure in terms of confidentiality, integrity, and availability of the information. As the number of student increases, in both undergraduate and graduate programs, maintainability of the university's MIS becomes critical for its business continuity. Participant A indicated the solution as follows:

Information security is our magical solution so we have a security audit of the system. We develop, define and prioritize the risks faced by our MIS. Our security management system is developed to assess the vulnerability of our system and securing our information becomes our top priority.
and understand all the provided review comments thoroughly. Now make the required amendments in your paper. If you are not confident about any review comment, then don't forget to get clarity about that comment. And in some cases there could be chances where your paper receives number of critical remarks. In that cases don't get disheartened and try to improvise the maximum.

VI.   CONCLUSION

   The development of MIS in any institution of higher learning is important for a modern management of the education systems. Computer applications, technology and the data base assist in data and information gathering, use and dissemination [11], [12]. However, the creation of an efficient and effective MIS requires a clear vision of what products to use and which departments to be involved [13]. The development of MIS is not limited to creating a data and information system but more importantly, the development of a new management culture of information sharing [1], [14], [15]. As seen from the case study of PJU, policy decisions are related to business profits for the organization. Policy decisions reflect on the success of the business enterprise and its capacity to expand its operations. As a parting comment, the organization's investment in MIS must be coupled with a clear sense of a business strategy [16].

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