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ENHANCING EFFICIENCY THROUGH RE-ENGINEERING OF THE EXAMINATION SYSTEM AT TRIBHUVAN UNIVERSITY

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ABSTRACT

This paper attempts to analyze the examinations administration system of the Office of the Controller of Examinations (OCoE) of Tribhuvan University. This body of the university is responsible for the evaluation of students. It also prepares and announces in advance the calendar of examinations, arranges for the printing of question papers, scheduling exams, declaration of results, distribution of transcripts and certificates, and conducts convocation to award academic success (Patil et al, 2021). The main objectives of this study are to explore the framework of re-engineering for examination management information system and identifying major challenges in the existing examination system. Purposeful sampling method was used to gather information about the university examination and results processing system. Qualitative response was collected by visiting 20 concerned authorities related to information technology (IT). Key Informant Interviews (KII) and group discussion were conducted with 20 individuals from among the members of higher steering committees of IT, OCoE staffs and software developers to collect comparative opinions regarding experiences and practices of existing and newly initiated examination software. Different examination softwares such as DBS and TUEMIS are being used separately. So, there is a need of an integrated system for the effective, efficient, and reliable IT solution in OCoE. The study has explored four major problems at the OCoE, TU, including IT, administration, decentralization, and human resource management, and also has presented their solutions. As a solution to IT issues, the supply development, commissioning, and re-engineering of the examination management information system (EMIS) has

recently been initiated. A total of 22 modules are designed along with other 10 supporting modules that will remain milestone to establish the OCoE as a paperless and complete automated examination administration system. The decentralization of OCoE regional offices strengthens, empowers, and activates decentralized examination processing functions. This will foster participatory leadership, and inter-disciplinary collaborations, and promote ownership as well (Fekadu *et al.,* 2021). The OCoE is less administrative and more technical. So, its examination and results processing functions should be led by IT experts and professionals carried out by IT technicians.

Keywords: Tribhuvan University, examination system, re-engineering, decentralization, information technology

INTRODUCTION

Tribhuvan University (TU) is a state-owned, autonomous university which is a pioneer institution in higher education in Nepal. It is the oldest and the largest university in the country established in 1959 A.D. The university offers graduate and postgraduate programs in different discipline through 63 constituent campuses and 1,055 affiliated colleges (around 550-600 public and the remaining private) across the country (Planning Dept, 2024). It holds approximately 80 percent of the students from all over the country and abroad. Since it is government-funded, the university comparatively less expensive than other universities. TU has been running five technical institutes and four non-technical faculties. Currently, the university offers a variety of courses of study to meet the country's requirements. The courses include M.Phil. and Ph. D. programs in different faculties and disciplines. Before 1980, TU was confined to its constituent campuses only. From 1980 onwards, it started to accord affiliation to private colleges to meet the growing demand for higher education at TU. Because of lower fees and easy access, the number of students on constituent campuses is very high. The OCoE is responsible mainly for the administration of examinations especially of annual programs of the university. Students' academic progress is evaluated by the use of written final examinations. This body of the university is responsible for preparing and announcing the calendar for examinations, arranging for the printing of question papers, scheduling exams, publishing results, distributing transcripts and certificates, and conducting convocations to award academic success of the students.

STATEMENT OF THE PROBLEMS

The leakage of question papers before the scheduled examination, wrong question papers (out of syllabus, from the old syllabus, different

subject, or wrongly coded), the duplication of the previous questions, replacing answer sheets at the center or the transit, delay in answer sheet collection, dispatch and re-collection, the loss and damage of answer sheets due to negligence or human error of exam staff (manual system) and to some extent, due to centralized system, delayed results, errors in the results are some of the frequently observed or faced issues at TU regarding examinations. The issues are almost the same in the examinations conducted even by other bodies at the mass level. Even in the entrance examinations of different faculties and disciplines, question papers are found leaked and the process is often disputed no matter which the university is. Examinations are rescheduled putting undue burden on students and paying no compensation to the examinees. To pin-point the weaknesses, search committees are formed; reports are prepared but never publicly released, and the issues are forgotten till the next such issue arises. Likewise, post-examinations activities are crucial, sensitive, and time-bound to publish results within a stipulated timeframe. Despite the hard work, dedication, and strong co-ordination among different sections of the OCoE, it has been facing many challenges in publishing examination results. The office is less administrative but more technical. So, its examinations and results processing functions should be led by IT experts and professionals and carried out by IT technicians.

The OCoE is an integral component of TU and it functions as a governing body for various examinations administered by the university. The main functions of the OCoE include:

- to conduct the examinations
- to maintain the standard of examinations
- to publish the results
- to distribute mark sheets, transcripts, and academic certificates
- to organize the convocation to confer the certificates on graduates
- to maintain the academic calendar
- to keep the records of all the examinations systematically
- Playing a pivotal role in ensuring academic standards.

Result processing is the key to a student's academic journey. There is a growing need to replace the existing inefficient and complex system with a fully automated and digitized system for effective and efficient results processing and delivery. The digitized process further offers advantages like centralized storage, management, and distribution of result data to concerned stakeholders (Ojo & Akhigbe, 2020).

After the successful completion of an academic session by the students, the academic institutions are bound to provide the final results of students, transcripts, and certificates. In the formal education system, measuring students' academic performance is vital and is done through result processing and transcripts. Processing the results and transcripts of a large number of students under the current system is laborious and time-consuming, resulting in complications, and errors (Akaiso, Ekwonwune & Mkpandiok, 2019).

In Nigerian Universities, the performance of students is based on session-end examinations. So, conducting examinations is a crucial and complex job for the University. With the increasing student intake, it is very difficult to manage examination processing within the given timeframe resulting in delays in the results publication. Computerization could be the best possible solution to enhance efficiency (Ukaoha & Amadin, 2014).

The paper outlines key reforms to revitalize examination system / process of TU and addressing identified challenges. It emphasizes transparency, accountability, and excellence to restore trust ensuring a reliable system that serves students and stakeholders effectively. The examination system faces significant challenges due to favoritism linked to political interference, where certain teachers benefit from preferential treatment affecting fairness in assessments. This issue is compounded by lengthy result publication delays, with students waiting sometimes up to 19 months, hindering their academic and professional progress.

Additionally, the reliance on outdated manual processes leads to inefficiencies, increased risks of errors, and biases, further eroding the credibility and reliability of the evaluation system, ultimately damaging trust in academic standards. Centralization in examination processes at TU causes delays in service delivery due to decision-making bottlenecks. This structure hampers responsiveness and innovation. In addition, weak

security measures increase risks of fraud and malpractice, undermining the integrity of academic assessments. Inadequate infrastructures including overcrowded examination centers and limited technology, further complicate fair evaluations. Addressing these issues, comprehensive reforms in policy, technology, and administration are a mandatory. The recent appointment of a capable leadership team has generated optimism for positive change (Adhikary, 2024). Computer- based software applications contributed a great deal to streamline result processing and prevent graduation delays (Erere, 2017).

In Nigerian Universities, the performance of students is based almost entirely on end-of-academic session examinations. Conducting of examination is a crucial and complex job for the University Administration. Absolute confidentiality has to be ensured. The admission of students into various departments of the University has been increasing at an accelerated rate and has now reached a position where it is very difficult for the available manpower to cope with the magnitude of examination work, in the given time span thereby leading to delay in the declaration of session results. An effective measure which can improve the efficiency of the result processing system is the introduction of computerization. This project provides the design and implementation of an Undergraduate Registration and Examination Processing System (UREPS) that processes student's results. As examination is the determinant for progressive evaluation of performance of students in Nigeria, this paper critically examines the existing examination processing system as practiced in public schools in Nigeria, and comes up with an automated examination processing system for result processing in public schools (Ibe, Undeshi & Adie, 2020).

As a solution to existing results processing, a new system, the Student Result Management System, a Python-based desktop application that utilizes an SQLite database, was proposed. The system efficiently manages and organizes student data in educational institutions. Its user-friendly interface enables easy navigation and management of student information, including personal details, course details, and examination results. The system offers various functions, such as adding and deleting student and course records, updating examination results, and generating student results. To ensure student data privacy, the system incorporates

security features like password protection. The Student Result Management System can significantly improve educational institutions' performance and student data management (Singh & Dev, 2023).

The purpose of this study is to ensure effective management of computerized student result processing system in 'Enugu State Polytechnic' with the aim of reducing staff workload; streamlining the process of secure, efficient archiving and retrieval of student academic records; and reduce the results processing time. This study adopts a systematic strategy to achieve the goal of creating a platform that uses programming knowledge and design to create an interface. PHP, HTML, Java Script, and MYSQL are some of the programming languages that can be used in the database structure. It shows that the goals and objectives of the system were achieved at the end of the development and the problems of the previous system were reduced. It is a great and rewarding endeavor because of how fast it works, how efficiently it works, and how well it does its job of computing student results. Finally, the system has been found to have produced accurate documentation, reduced the possibility of mistakes and calculation errors, sorted each record of students according to certain criteria, and reduced the time needed to calculate results. The authors have recommended to the academic institutions in Nigeria to adopt electronic processing system for the calculation of student results to increase the productivity of results processing (Oliokwe, Mba, Ezeaku-Ezeme & Okwueze, 2022).

The article explores various technologies useful in the results processing system. Based on key performance indicators (KPIs) such as security, ease of use, speed of access, data quality, and time consumption, the existing system is found to be weak. As a result, an improved online result processing system was proposed and developed. The evaluation of the new improved network system is considered to be theoretically, technically, and economically more efficient than the current system. The identified KPIs play an important role in defining an efficient and effective results processing system. Developing countries and especially public universities in Nigeria should adopt the proposed system which includes all the performance indicators described in this paper for effective and efficient processing and verification of results (Anyiam, Anyiam & Okengwu, 2020).

Results processing is a continuous process of converting data including qualifications, grades, and credits into clear and meaningful

information such as calculation of results and transcripts, etc. These results are used to monitor the performance of each student in different course areas. The current method of processing results of students has been found to be laborious and time-consuming, especially when applied to a large number of students. This makes the whole process cumbersome and error prone. Computer software was developed to facilitate automatic processing of the results. HTML5, CSS8, client-side Java Script, server-side programming language PHP (Hypertext Pre-Processor), and related database MySql (My Structural Query Language Improved) were used in the development of the software. This language was chosen for its flexibility and features for developing web-based applications. A WAMP server (Window Apache MySql and PHP) was used for local hosting and testing. The developed software has been tested and found to work well and delivers the expected results after completion. This allowed the calculation of the result of each student based on entered or downloaded exam results. The new system offers a number of features such as reduced data costs, reduced time spent on GPA calculations and transcript production, increased accuracy and efficiency, and elimination of redundancies (Matemilayo *et. al,* 2017).

This study is conducted to verify all the manual processes involved in creating student transcripts, summary of results, performance statistics and to find a way to automate the system for efficient operation. Because constant changes to technological development increased labor productivity and freed people from more economical tasks associated with machines. The computer and its values have become important tools in the economic, industrial, and social development of the advanced resources of the world. This system is designed to efficiently handle processes such as entering grades, recording grades, classifying automatically calculated grade points, and interpreting aggregate student grade data. The existing process has now reached a level difficulty for the available manpower to handle the volume in a given period of time. The balance between the availability of manpower and the volume of research results in delays in the publication of results (Sadiq, Murtala & Usman, 2021).

The study identified that a computerized information management system makes information management much more convenient and efficient, it enables a more accurate information management system in academic institutions and ensures easy flow of information. The existing

method is stressful, time-consuming and error-prone due to over-reliance on the human element especially for a large number of students. To ensure smooth implementation of the new system, the staffs need to be properly trained. Computerization must ensure that the entire system is connected to one central network and secured with high security measures. This study focuses on creating an automated student performance management system using an Oracle database, forms, and reports. It is a computerized examination result management. The author has proposed a system designed to register students after they make payments to the educational institutions. The system provides a single platform used to manage all records within an institution. The empirical evaluation of the system shows that the system speeds up the processing and reporting of the examination results student (James, 2014).

The student results management system is the central tool of educational institutions for effective and efficient management of student data. The system has various functions including student registration, assessment and evaluation, attendance, reporting and analysis, communication and integration with other systems, and can help simplify administrative processes, and provide valuable information on the student's performance data. The system is an invaluable tool for educational institutions that want to optimize their operations. The empirical results from experiments and testing ensure that the system is effective and usable. Compared with the existing methods, this centralized Software Production project facilitates the administration and management of work and provides users with required information with one click. An educational institution can be offered easy-to-use software focused on the user interface, where all services related to the educational institution can communicate with each other and share information. Since it is AWS Cloud Hosted ReST API, the user can access the resources from remote locations. Because the application is developed with a micro services architecture and agile methodology, services can be added in the future without changing the existing code (Rainy, Sharma & Singh, 2023).

OBJECTIVES

- To explore the framework for re-engineering of the examination management information system.
- To analyze the major challenges in the existing examination system

METHODS AND MATERIALS

The researcher has employed a qualitative research method that involves in-depth exploration and understanding of various issues underlying the examination and result processing system at TU. The researcher has applied own experience, knowledge, and understanding of the issues to draw empirical results comprehensively.

Tools and Techniques

The research used purposeful sampling to gather information about the university examination and results processing system. Qualitative response was collected by visiting 20 concerned authorities related to IT. Group discussion and Key Informant Interviews (KII) or In-Depth Interviews (IDI) were conducted along with additional 20 from among the members of higher steering committees of IT, OCoE staff and software developers to collect comparative opinions regarding experiences and practices of existing and newly initiated system.

RESULTS AND DISCUSSION

The results of the analysis show existing problems of the OCoE, TU and it also present possible solutions. The results include specific, structural, procedural, and technical problems of the OCoE and various short-term, medium-term, and long-term strategies have been suggested. The findings can be instrumental to improve operational efficiency, resource optimization, and decision-making processes so as to promote overall effectiveness and competitive advantage of organization that ultimately enhance the performance of the OCoE. Re-Engineering is the software development for complete automation process of exam system at the Office of Controller of Examinations (OCoE) and integration of Dean Office Examination.

Four Major Problems in OCoE, TU and Their Solutions

IT Problems: As a solution to IT issue, Supply Development, Commissioning and Re-Engineering Exam Management Information System (EMIS), Balkhu has initiated. It ensures successful implementation of secure, reliable, user-friendly and effective IT solution through data transfer from existing system. At present, different software is functioning which is creating problems and, it is again difficult to provide solutions through D-base, Fox-pro, Excell, SQL, and Web etc. to an integrated data

management system to develop the OCoE as Paperless with complete automation.

Project Name: Re-engineering of the Examination Management Information System

Objective: Complete automation process of exam system at Office of Controller of Examinations (OCoE) and integration of Dean Office Examination.

Project Duration: 18 Months but modular phase wise delivery and implementation

Number of Modules: Total 22 module and other 10 supporting modules, modules are divided into four groups.

Work in Progress –First Modular Group

Campus Profiling	Student Registration / Profiling	Migration
Transcript	Examination Form	Data Migration
Old Student Service Model		

Other Modules – (Second, Third, and Fourth Modular Group)

Teacher (Examiner) Roster Management	Question Bank Management
Center Management	Exam Copy Collection Management
Copy Packaging, Dispatch and collection	Scrutiny Management
Result Processing and Publication	Certificate Management

Transcript and Provisional Certificate Management

Convocation Management	Finance Management
Store Management	Administration Management
Integration with Dean Office Exam System	Transport Management
Notice Board and Chatbot	Mobile Apps
Online Certificate Verification System	Business Intelligence

Table 1

Hardware Proposed by Consultant: Need to Purchase through E-bidding Process

S.N.	Items	Quantity
1	Computer Server (Up to two 3rd Generation Intel Xeon)	4
2	Hypervisor (VMware)	6
3	Storage (Minimum 22 TB)	2
4	Switches (Core switch, Distribution Switch, PoE Access Switch)	3
5	Next Gen Firewall	2
6	Power Backup System	1

Source: Tender Document, 2024

System and Data Backup: One company of system will be backup in TU Data Center and data back up in Cloud services.

Administrative Problems: Specific task-based administration is urgently needed to run smart office system.

***Decentralized Functionalities*:** The empowerment of regional OCoE and activate them with decentralized examination processing functions. Regional offices, led by Deputy Controllers, need to be fully functional by developing them as center for the Region. In Regional Level:

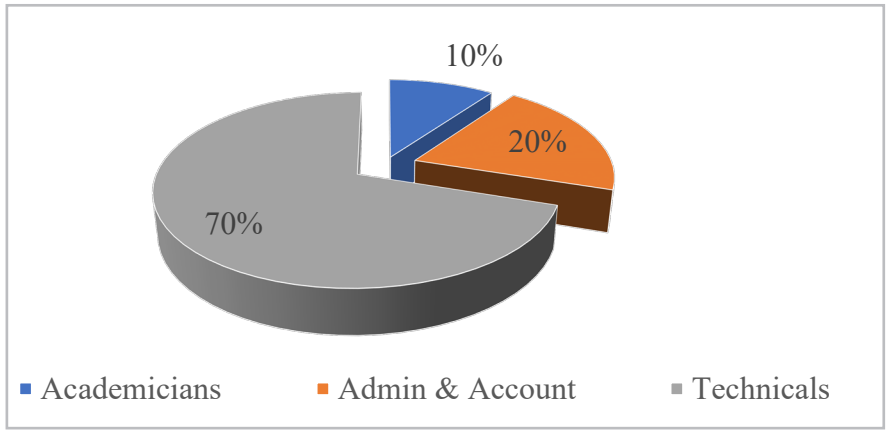
Exam Conduct → Copy Collection → Packaging and Dispatch → Receive → Scrutiny → Marks Entry → Central Processing → Publishing Results

Doing so can reduce cost, decentralize examination administration, reduce time significantly required to answer sheets collection, dispatch and re-collection would be less time consuming, enhance efficiency, and add convenience to service delivery.

Human Resource Management: The TU Service Commission is responsible for recruiting required human resource. The OCoE is less administrative and more technical in nature. So, its examination and results processing functions should be led by IT experts and professional and carried out by IT technicians. So, human resource should be managed accordingly, 10% Academicians, 20% admin-account-based and 70% technical staffs.

Figure 1

Composition of Human Resource



Source: Primary survey, 2024

Limitations

The study is confined to TU with special focus on the OCoE in the processes of the student evaluation which reflects the examination of university and results processing system and academic standard of students.

CONCLUSION AND RECOMMENDATIONS

The success of the OCoE is evaluated by its service delivery which can be achieved through integrated IT system. The proposed EMIS project seeks to re-engineer the system, with complete automation and integration of the examination process. The project will involve progressive accomplishment in the perspective of student registration, result processing, certificate management and verification systems that results to the total automation of examination processes, strengthening of IT infrastructure, modular implementation, enhanced security measures, capacity building and training, decentralization of examination management mechanisms and integration with Dean Offices.

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