Examination Management Systems: A Survey of User Acceptance Level in UiTM Cawangan Pulau Pinang

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Received Date: 2 April 2018
Accepted Date: 4 October 2018

ABSTRACT

Examination Management Systems (EMS) is a comprehensive system developed using JAVA programming language for data processing and Microsoft Access for reporting purposes. This system has been used and implemented at several campuses including Universiti Teknologi MARA Cawangan Pulau Pinang, Permatang Pauh Campus. The core objective of this system is to improve the efficiency and reducing the operational risks. A survey has been conducted to examine the user acceptance level of UiTM Cawangan Pulau Pinang since implemented in 2014. Questionnaires have been distributed to chief invigilators at every session of examination for 10 semesters and results of analysis are reported and concluded.

Keywords: Examination Management Systems (EMS), Examination Placement, Invigilators, DBMS

INTRODUCTION

Examination operations are the main crucial task in any education institutions. In the Quality Manual Report of UiTM Cawangan Pulau Pinang, ISO 9001:2008 (Quality, 2008) and Examination Procedures Manual 2016 (UiTM, 2016), the operations of examination are considered as serious matter either at the phase of preparation of examination question papers, handling of printing and packaging of question papers, marks management operation or invigilation managements. The problem of question paper leakages is the highest credibility of an education institution if there is no proper division to control the secrecy and integrity of the examination operations. Academic Assessment Division at the main campus was created to manage the operations of examination in all campuses and faculties. Each faculties and campuses formed an examination unit to make sure that the operations are running according to the rules and procedures as stated in the Examination Procedures Manual. As cited in a paper by Xu, Guo, & Zhou (2013), they have stated that Lai (2012) has mentioned examination as an effective indicator to measure and assess the students’ quality and their ability to foster critical answers. The quality is refers to the preparation of question papers, the secrecy and security aspects in printing and packaging of question papers, the integrity of evaluation and marking methods and the standardization of examination operations. Failures to enforce and sustain the quality, procedures and policies of examination will give some negative impacts and perceptions on examination management.

Examination process involves several entities such as academic affairs for enrolments, facilities for preparation of examination venues, bursary for payment status of students’ university fees and printing department for printing and packaging of question papers. Examination Management Systems (EMS) has been developed to integrate all management levels and consolidate all important processes using the same platform. Formerly, the staffs at Examination Unit had to face complicated process such as manual calculation of total enrolment for each paper, manual placement of examination venues and manual
assignment of invigilators list. EMS helps to automate the previous manual tasks and these reduced the stressful in data processing.

EXAMINATION MANAGEMENT SYSTEMS (EMS)

This section discusses the development of EMS that described about the procedures taken since the beginning until the end of system development. In the first subsection, the methodology conducted in this study is discussed based on the Prototyping Software Development Methodology model. Next, the procedures taken in developing prototype are discussed in detail. The Incremental Prototyping approach is applied in developing the prototype which consists of four main processes, which are examination placement, examination seating number, printing and packaging of question paper; and assignment of invigilators.

Methodology

The system has been developed based on the Prototyping Software Development Methodology model. The stepwise involves the identification of basic requirements, develop the initial prototype, review, revise, enhance the prototype, and these continues and repeated until all requirements of the system are fulfilled. The Incremental Prototyping approach is applied in the software development because the system consists of multiple modules or functionality of various sub-systems and integrates all prototypes to form a complete system (Griesel, 1988).

The Development of Examination Management Systems (EMS)

Examination Management Systems (EMS) historically developed in 2006 after the developer found the constraints and problems faced by the supporting staffs and examination members committee amongst lecturers during the preparation of examination placement venue and assigning of invigilators. Both processes took 3 consecutive weeks to be completed. In some cases, the lecturers have to sacrifice some of their classes such as class cancellation, unpunctuality and extended the class over midnight to precede with the examination affairs. These become so stressful to all staffs whenever the examination season arises. As mentioned by Zhang, Liu, & Zang (2014), efficient and standardize examination management systems is the important element to ensure that the examination runs smoothly. With this point, the examination members committee should have positive enthusiastic and highly motivated to arrange the best examination placement and assigning appropriate invigilators to meet the objective of Examination Unit. Otherwise, the Examination Unit will be blamed because of the failure to give better services or satisfaction amongst students or invigilators.

EMS makes sure the process of major processes such as placement of examination venues and invigilation will be taken within 4 to 6 days. Previously it took almost 3 weeks to complete both processes. Formerly almost 10 staffs are needed to complete the tasks, but EMS only require not more than 5 peoples which comprises of an Executive Officer, 2 representatives of examination members committee and 2 technical persons.

Vasupongayya, Noodam, & Kongyong (2013) has dictate the major modules of any Examination Management Systems are to arrange the examination rooms for each course and assignment of proctors or invigilators in each room. EMS at UiTM Cawangan Pulau Pinang not only covers the arrangement of examination rooms and invigilations, but it also organized the printing and packaging of the question papers, examination operations and generating seating numbers arrangement in each room. These 5 modules are the main functions of EMS which each module are integrated with every single entities such as students, admin staffs, invigilators or examination committee member levels.
EMS requires data from multiple sources such as the enrolments records, examination schedules, examination venues, list of invigilators and list of constraints. The examination schedules are assigned by the Academic Assessment Division. The students’ enrolments are downloaded from Academic Affairs Division through Student Information Management Systems (SIMS). The other data such as the examination venues, list of invigilators and respective constraints are provided by the Executive Officer at faculties or campuses level. The following figure shows the overall procedures and flows of EMS.

![Figure 1: Details flow of Examination Management Systems (EMS)](image)

Assignment of invigilators or proctors will be the final task of EMS. EMS pumps all records which have been processed into text file formatting before generating all required reports using Microsoft Access Database Management Systems (DBMS). Executive Officer of Examination Unit will generate each report individually as PDF file and will send those reports to the photocopier machine or invigilation reports will be emailed to the invigilators. The following figure illustrates samples of reports generated by EMS Database.
Basically the reports are organized accordingly to several phases, starting from the first phase which will be concentrated on examination placement reports. The next phase will be focused on producing reports for seating numbers arrangement. The printing and packaging reports come after the seating numbers arrangement have been verified by the Academic Assistant Registrar. The final phase is generating the invigilation reports and others reports which related to the operational and handling of examination by the respective admin clerks. All reports are integrated in a single database. The following figure shows the list of EMS reports that can be generated from Microsoft Access.
EVALUATION PROCEDURE

This section explains the procedure taken to evaluate the prototype. In this section, the procedure taken in designing questionnaire, collecting data procedure, analyzing the collected data and discussion of the result are presented. The objective of this study is to examine the user acceptance level of the EMS and to prove that the system is effective to improve the efficiency and able to reduce the operational risks. We choose a survey method in this study and; a set of questionnaires is prepared adapted from Technology Acceptance Model (TAM) (Davis, 1985, 1989; Venkatesh & Davis, 2000).

EMS has been implemented in March 2014 at UiTM Cawangan Pulau Pinang, Permatang Pauh Campus. A survey of user acceptance level among staff is conducted after one year of system implementation. Apart from studying the user acceptance, this survey also measures the quality of service and operation of examination specifically at Permatang Pauh Campus. Scope of the survey is limited to the main campus of UiTM Cawangan Pulau Pinang, excluding the Bertam Campus. The survey focuses towards the new format of examination report, invigilation management and handover process of question paper packs to the chief invigilators.

Questionnaires Design

The questionnaires design approach follows the same approach that was used in this study (Abu-Dalbouh, 2013; Alharbi & Drew, 2014; Wallace & Sheetz, 2014). As stated by (Wallace & Sheetz, 2014), the TAM has been successful in helping to evaluate the user acceptance of new technology. There are seven questions need to be answered. The following table is the list of selected questions which are relevant to the scope of the study.

| Question number | Question descriptions |
|-----------------|----------------------|
| Q1              | Overall operational of examination management at UiTM Cawangan Pulau Pinang is satisfactorily. |
| Q2              | Handling of examination at the venue with high capacity of students is easy. |
| Q3              | The new format of reports generated by EMS has eased the invigilation operations. |
| Q4              | The seating number arrangement has eased the |
The Likert-scale 1 to 5 is used for the measurement level of users’ satisfactions. 1 is representing strongly disagree, 2 is disagree, 3 is representing mildly agree, followed by 4 as agree and finally 5 is strongly agree.

Data Collection

The survey started since April 2015 examination session for pre/diploma program and ended in June 2017 examination session for degree program. The Examination Unit managed to conduct this survey for 10 consecutive sessions of final examinations from the year 2015 to 2017. The questionnaires have been distributed to all chief invigilators only and the forms were collected immediately after the duty of invigilation was completed. A total of 451 chief invigilators responded the survey.

Result and Finding

Based on the survey distributed to the invigilators, the researchers found that some of the questions were not answered because it is not relevant to their job scope as chief invigilators. Example, for those proctors invigilated at the small room with capacity less than 40 students, they will ignore question number (Q2). The chief invigilators had made assumption that the Q2 were referring to invigilation that take place at Dewan Besar (capacity = 650), Laman Perdana (capacity = 339), Laman Siswa (capacity = 232), Dewan Delima (capacity = 230) or Dewan Kristal (capacity = 258). The following table shows the summary of analysis for each question by determining the mean and median values.

| Question Number | Total respondents | Mean ($\bar{x})$ | Median ($\tilde{x}$) |
|-----------------|------------------|-----------------|---------------------|
| Q1              | 451              | 4.3272          | 4                   |
| Q2              | 438              | 4.2060          | 4                   |
| Q3              | 451              | 4.5337          | 5                   |
| Q4              | 451              | 4.7771          | 5                   |
| Q5              | 451              | 4.4268          | 4                   |
| Q6              | 451              | 4.2716          | 4                   |
| Q7              | 451              | 4.3776          | 4                   |

The above table shows that the users’ satisfaction level for each question is very encouraging. The mean or average obtained is more than 4.0000 ($\bar{x} > 4.0000$). These portray that all respondents agreed and are satisfied with the implementation of EMS. Most of the invigilators are happy with the duty of invigilation assigned to them. According to Ong, Liew, & Sim (2009) has stated that the Invigilation Information System (IIS) has improved the users’ satisfaction especially on duty of invigilation. The invigilators or proctors are given opportunity to inform the day that they can’t invigilate. The constraints date or session
will be set in the system and duty of invigilation prevents those constraint dates. The invigilators are still
given a space for invigilation exchange amongst invigilators if their duty of invigilation coincidently
clashed with other important task or responsibility. The invigilation duty will be emailed to each
invigilator after the EMS generates the schedule and double examined by the examination committee.
This process took less than 2 days. Previously it took almost one week to assign properly the invigilation
duty to each invigilator. Ozturk, Ozturk, & Sagir (2010) has mentioned that the invigilation system is seen
that the required time for the assignments is dropped from a few days to seconds and reaches optimum
results in a few seconds. This has shown that the EMS improves the efficiency of invigilation preparation,
equally distributed total invigilation amongst invigilators and reduces the erroneous of invigilators or
proctors assignment. Nevertheless, the human touch factors are also considered so that the invigilation
schedules received by the proctors are agreeable. Amongst the human touch factors that will be
considered are giving flexibility to the proctors who are pregnant, having health issues or Muslim male
proctors on Fridays. In consideration of those pregnant proctors, they will be invigilating in a small room
and the number of invigilation is reduced. For the case of invigilators who have health issues such as
suffering from heart and knee problems, they will be invigilating at the ground level or nearby to
examination unit. With respect to the Muslim male obligatory on Friday prayers, we provide more female
invigilators on Friday afternoon session so that the male invigilators can perform the Friday prayers
without rushing. Others minor human touch factor is the mutual agreement between the examination
committee and invigilators. This process of manual adjustment requires less than 2 hours for final
verification before the invigilation schedule are distributed to all invigilators.

Respondents were agreed that there is a great improvement of examination operation since the
implementation of EMS whereby it automates most of the manual tasks such as the handover of the
question paper, the returning of the examination script and submission of restemplate hardcopy and
softcopy to Examination Unit. Simulation has been conducted to determine the duration taken for the
handover process of question paper packs to the chief invigilator. The time taken was not more than 10
seconds, which is the chief invigilators just need to confirm the particulars of question paper packs
received and subsequently signed the form. In the previous method, the chief invigilator must fill in the
form and all processes took more than 1 minute. Similarly, the submission of restemplet hardcopy and
softcopy are smoother because the lecturers are only required to sign the form with all particulars is
already printed and this process took less than 1 minute.

The examination table number system was implemented since EMS is introduced at UiTM Cawangan
Pulau Pinang. Before the implementation of EMS, the chief invigilator has to call the students by course
group and this took longer time to arrange the students seating arrangement in the examination hall. The
chief invigilator even has to repeatedly call the students who arrived late at the examination hall and this
required additional time. Consequently, in some cases, the examination did not start or finishes
punctually. The examination table number system helps the invigilators on student seating arrangement in
the examination hall. The student will refer the seating number arrangement and halls plan at the notice
board outside the examination hall and the students find the table as numbered accordingly. The chief
invigilator does not need to call repeatedly the students by course group to enter the examination hall. The
examination starts and finishes timely. The examination table number system is also implemented at
several other campuses and faculties such as UiTM Arau, Bertam, Melaka, Pasir Gudang, Seremban 3
and at Faculty of Computer & Mathematical Sciences, Shah Alam. The examination table number system
is effectively implemented in the bigger examination halls which can accommodate more than 100
students.

Most of the chief invigilators have agreed and responds positively that the new format of forms which
generated by EMS has eased the invigilation operation. Previously, the chief invigilator has to manually
fill-in many forms and this requires almost 30 to 45 minutes for the task to be completed. With EMS, all forms have been auto fill-in and the chief invigilators need to only verify the particulars. This process requires less than 15 minutes. Since the implementation of EMS, the chief invigilators are confident to handle the examination operation at the hall. Previously, the lecturers are reluctant or not confidence to be as chief invigilators because they know that many tasks and responsibility has to be taken into account. They are high risks if any misconduct by any invigilators will affect the credibility of chief invigilator. With EMS, the erroneous in examination operation can be minimized and most of the errors are minor and can be recovered easily.

Overall feedbacks are very encouraging and all chief invigilators having positively agreed that EMS has improved the operation of examination at UiTM Cawangan Pulau Pinang. The positive impact of EMS evaluation is due to the implementation of examination table number system and automated fill in of all examination forms. These two factors are the catalyzer of why EMS successfully implemented in UiTM Cawangan Pulau Pinang. As informal verbal views expressed by one of the invigilator was saying, EMS has solved several major issues especially on the approved students’ lists, lack of question paper packaging and operation of invigilation management at the bigger halls.

**CONCLUSION**

As mentioned by Bhardwaj & Singh (2011), Examination Management Systems improves the efficiency and effectiveness of examination administration. Although there is no research being conducted to figure out the cost effective before and after the implementation of EMS, roughly the examination unit has reduced the duty of examination preparation amongst staffs during weekends. This has reduced a lot of the overtime cost amongst their staffs. Indirectly EMS improves the quality time with their family because no interruption of examination responsibility during weekends.

Enhancement of EMS is never stopped and there are a lot of suggestions or positive comments given by the chief invigilators and through benchmarking platforms by UiTM campuses, faculties and local universities. Thus, for the improvement of EMS, the Examination Unit will continuously support the operation of EMS and sustained the good rapport. However, without full supports from the executive level of higher management, the EMS will not be implementable, expandable and sustainable.

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