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A Reengineering Process of Online Registration Services

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Abstract: In the past few years, in almost every semester, the University of Baghdad (UOB) has accepted thousands of students. All these years the registration procedures have been carried out through computerized systems, in a way students waste time through shifting the schedule book to decide which courses to register. Almost all students want to be registered virtually at the same time, which creates chaos. In order to overcome such matters, extra staff members are assigned to help in reducing the workload and time during the registration period. This solution still causes other problems such as higher costs for the additional expenses, wages, and time consumption for both students and employees. The project attempts to analyze, evaluate and reengineer the current e-Registration system at the University of Baghdad. This effort aims to identify weaknesses and difficulties in order to suggest and recommend solutions to improve the current process and strategically add services to the university's competitive advantage. In this study efforts were made to apply the business process reengineering practice (BPR) to this system. This process is used to automate many of the manual registration tasks such as admissions, early registrations, addition of chair process and the payment system to resolve some major problems that were faced by students during the registration process.

Keywords: Agent-based; Reengineering process; Online registration; Business modeling; Entity relationship diagram ERD; E-registration, Online registration system (ORS)

I. INTRODUCTION

Due to the incremental importance of the Internet in recent years, many private and governmental companies, organizations and institutions have adopted the idea of applying the online registration systems that are considered one of the most important Internet services. The online system allows users to electronically register at anytime and anywhere. The online registration system, gains the advantages of reducing costs, saving time, efforts and providing security for sensitive information. Moreover, it facilitates the complicated tasks that used to be done manually. Every semester, the University of Baghdad (UOB) accepts thousands of students. All these years' students were having hard time dealing with the partially computerized registration system as they were wasting their precious time in using the schedule book to make decisions on which courses they need to register. Once it was finalized, they again had to wait for the dates assigned for the 'add and drop' period. Majority of the students wanted to be registered virtually at the same time. In order to overcome such matters, extra staffs were assigned to help reduce the workload and time required during the registration period. But still this solution caused other problems such as higher cost for the additional expenses, wages and many other factors. Further, this was a time consuming practice for both students and employees. For these reasons, the University Of Baghdad has developed an Online Registration System that greatly helps in reducing the amount of input work needed at the stressful registration periods. The system provides the facilities that allow eligible students to register for classes or revise their roster using web-based system from any PC that is connected to the Internet and at any time. By using an ID number, password and an 8 characters course reference number, a student can use the online registration facility to register for the semester, add/drop courses to/from students roster, view and/or print a list of any courses already on student's roster, view and/or print student's transcript, and change students confidential passwords. Despite all the efforts made to provide these facilities, this new system is not resolving some of the previous difficulties. The system needs to be improved to resolve all difficulties which users are facing at present. To improve performance and eliminate existing problems, a Business Process Reengineering project has been proposed to be launched. The primary objective of the project is to 'Evaluate and to apply Business Process Reengineering on the current Online Registration System in the University Of Baghdad'. The project attempts to analyze, evaluate, and investigate the weak points of the current system and reengineer them for further improvements.



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In order to achieve the objectives, a detailed study was done on the online registration system in UOB to realize and overcome some of the weak points that are preventing the system from serving the students efficiently.

The main objectives of this research were to:

1. Analyse and evaluate the current e-Registration process at the University Of Baghdad, and identify the weaknesses, and difficulties.
2. Recommend some solutions to improve the current process and strategically add to the university's competitive advantage to improve their services.
3. Offer other universities the opportunity to make use of the results from this study.

The above objectives help in:

- 1 Analysing and interpreting the difficulties faced by students, academic staff and staff of the registration office with the existing registration process at UOB.
- 2 Determining the problems that the staff, academic staff, and registration office are facing during the process of the students registration cycle.
- 3 Mapping the current process, redesign and introduce a new process for the proposed registration system that will initiate an efficient e- Registration at UOB.
- 4 Maintaining current system to cope with the growing number of students.
- 5 Devising an e-Registration system that is capable of providing fast, valuable and useful items of information to its users.

The remaining of the paper is structured as follows: In section 2, materials related to online registration in general and university registration services in particular have been presented. In section 3, the scenario of the current online registration system is outlined. In section 4 the research methodology adopted in the reengineering process is described. In section 5, the business process reengineering is outlined with emphasis on modeling techniques used in conducting processes. In section 7, the business process viability is discussed and some results are outlined. Conclusions and future works are presented in section 8.

II. LITERATURE REVIEW

With the rapid growth of using the online registration systems in a number of directions, substantial bodies of theoretical and empirical articles have been published. The Online Registration System (ORS) has been described as a web-based service that allows hotel customers to do their registration booking electronically at anytime, anywhere through the World Wide Web [1]. Industry professionals have developed the system with absolute flexibility in the design and application that will be suitable to all people without loss of security. British Airways has developed and implemented a registration system that focuses on a number of important features including [2]:

2.1 Travel Booking

This feature is divided into 4 facilities:

- Flight booking, which enable customers to book seats on a particular date, time, and the traveling direction, etc.
- Hotel booking, which allows tourists to be sure that their residence places are booked and being confirmed.
- Car Rental Service which provides customers with the requested transportation once they arrived to the distant country, instead of wasting time searching for car rental agency.
- Review the booking service, which allows users to view all booking information.

2.2 Offers and Destinations

The British Airways has another online service, which allows the users to view the most recent offers and promotions provided by the British Airways. This feature is classified into two facilities:

- Special offers: The Company gives the customers an idea about the recent offers provided and also the coming offers with detailed description.
- British Airways holidays every season or occasion, the company arranges for holidays that will be at a reasonable price including the cost of the ticket, hotel, transportation and much more.



International Journal of Innovative Research in Computer and Communication Engineering

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Vol. 5, Issue 11, November 2017

2.3 Traveler's Information

The traveller's information feature contains seven services

- Timetables and routes. The British Airways complete e-timetable that can be downloaded to the users PCs that will help to view schedules and plan the user's trip itinerary.
- Arrivals and departures. Arrivals and Departures give the users up to the minute information on all flights today, tomorrow and yesterday.
- Flight connections. Flight Connections is designed to help the customers if they are catching a connecting flight at any airport in any country.
- E-ticket. With no paper ticket to collect or to lose, e-tickets keep things fast and simple.
- Health and well-being: The Health and Medical Information section provides valuable information to help the users prepare for their health needs before, during and after their flight.
- British airways duty free: Through a web site of the on-board retail experience from British Airways, they bring to the passengers a vast array of scents.

The Online Registration Service Provider Company (**SPORG**) has developed a Web Site [3]. It was observed that the website provides the service of online registration for any events or organizations such as recreational program providers, events, trade shows, lessons, investment groups and any other type of events. SPORG has developed a number of tools to facilitate their online registration using report building tools, Custom form building tools, contact tools and e-mail tools [4]. In the Cvent website, it was observed that this company has developed an online registration system. It has been used by a number of leading companies such as Star Wood Hotels and Resorts, Post-Newsweek, People Soft, McDonald's, NASDAQ, and the Electronic Retailing Association and others. NASDAQ (National Association of Securities Dealers Automated Quotation) is an American stock company that used Cvent's technology in applying the online registration service. The company [5] claimed that when it converted its registration system from manual into online it saved time and money. NASDAQ also claims that online registration provides more effective and efficient way to marketing and communicating with their traded companies.

The company gobooking [6] has developed an appointment system for health care practitioners. The system operates on a subscription based revenue revised model. Gobookings offers a large range of sophisticated options that allows a practice to truly customize the appointment system. The developer claims that the cost savings of online appointments is significant. Merging of the two is easy with the business able to offer their patients more efficient service 24 hours a day, through their fully customizable gobookings system.

III. THE SCENARIO OF THE CURRENT ONLINE REGISTRATION SYSTEM

Through observations on the online registration process at the University of Baghdad, it was found that the existing web-based system provides only partial online registration services. For example, students still need to get a printed/hard copy of their registration form from the registrar's office and later consult their advisers and ask for their signatures. Further, payment is totally done manually, that is the web-based system does not provide e-Payment. Further, there are many other examples, which readers can may find later from the DFD's, which are shown in the coming section.

3.1 Analysis of the Current Online Registration System

The Online Registration System (ORS) is performed in two phases; manual early registration phase and final registration add and drop phase.

3.1.1 The manual early registration phase

At UOB, the early registration for the coming semester starts usually in the last month of the current semester. During this period the Admission and Registration Deanship issues the student's course schedule either printed or published on the registration website. The course schedule contains list of courses, sections, timings, locations, instructors' name and final exams timing and dates. The registration office sends pre-registration forms to the advisors containing a list of advisees' numbers, and their names. The advisees select the required courses from the schedule booklet. Then the student records the courses in his/her advisor's registration forms. At the end of this period, all advisors should submit the pre-registration forms to the registration office. The registrar's employees will then try to register the required courses for the students, according to their priority. The highest priority goes for the students of the earliest batch. After

International Journal of Innovative Research in Computer and Communication Engineering

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Vol. 5, Issue 11, November 2017

issuing the students timetables, these forms will be sent back to the advisors. Students will then be allowed to collect their schedules from their advisors or by accessing the university’s online registration system.

3.1.2 Final registration (add-and-drop phase)

Depending on the University’s calendar for add and drop, the system allows the students to make changes in their schedule. Once the students enter the course and click the add command button, a set of rules should be checked. Examples of these rules are time clash, validation of course and section, prerequisite courses, already taken courses, and some specific courses that are related to a particular degree. If the request does not match the rules, a message will be displayed specifying the error and its reason. Changing the course numbers or sections by the student can solve some of these errors. If any difficulty occurs, then the students may be required to contact the registration office or the department to solve their problem such as in the case of ‘add chair’. If the request matches the rules, the student is registered successfully and is able to view his/her current schedule instantly.

3.1.3 Print transcript

The current online registration system allows the students to view their academic transcript for all the semesters or a particular semester. They can also get a hard copy.

3.1.4 GPA simulator

The online registration system has an extra facility to allow students to simulate the expected grades of the current courses to predict the current semester GPA. To get this, the student should just click on the GPA simulator button on the student's main menu. A screen appears showing the student’s records of the current cumulative GPA, the current cumulative credit and the current cumulative pass credit. It also shows the current registered courses, the credit of each course and the expected grades.

3.1.5 Change password

The current online registration system provides the students the chance to change their ‘log-in’ password. For better security, the size of the key should be 10 alphanumeric characters. From analysis of the current online registration system discussed above, the processes of the Online Add and Drop Registration System are illustrated in Figure 1.

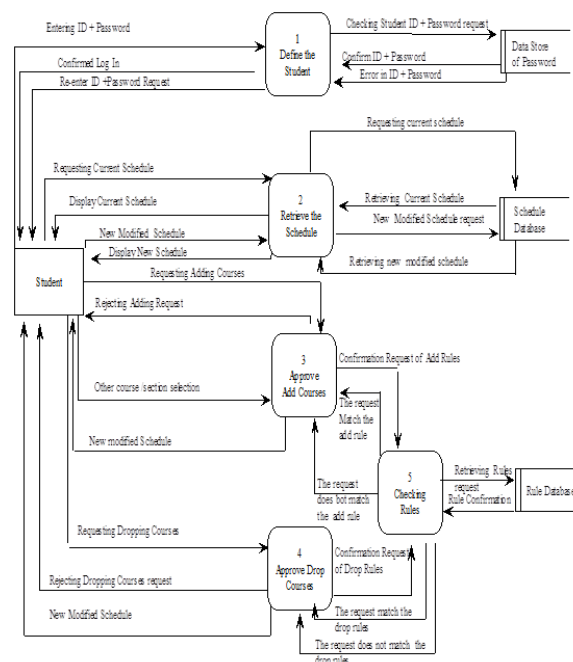


Figure 1: The DFD of the current online add-and-drop registration system.

Description of the online transcript, change password and GPA simulator System processes are shown in Figure 2.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

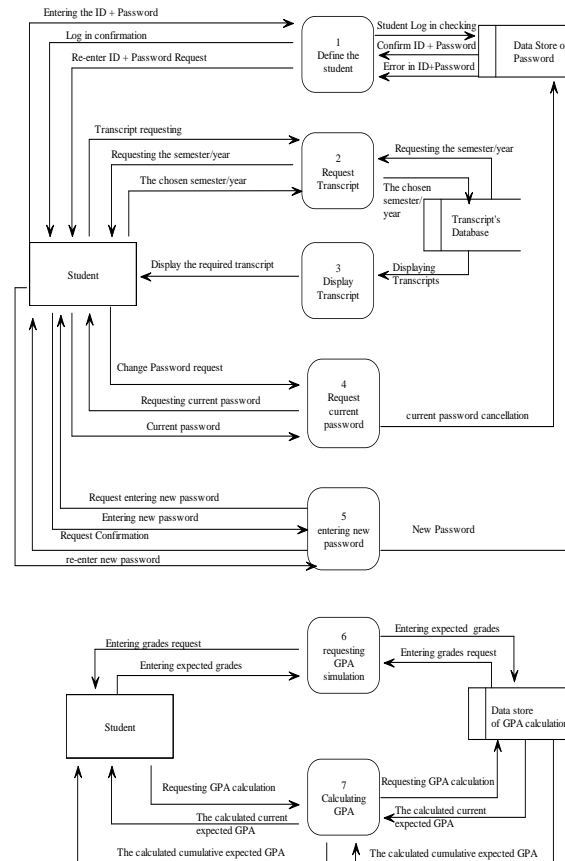


Figure 2: The DFD of the current online transcript change password and GPA simulator System.

By having the first-hand experience of using the facilities from the current online registration system as advisors, and receiving comments from advisees and colleagues, it has been decided to launch a research project to do BPR of the current online registration system. In the following sections we categorized the research objectives into two groups; the main and the primary objectives.

IV. RESEARCH METHODOLOGY

In this research both quantitative and qualitative approaches have been conducted. The quantitative method is used to answer questions about relationships among measured variables, with the purpose of explaining, producing and controlling phenomena. The qualitative method is used to answer questions about the complex nature of phenomena with the purpose of describing and understanding the phenomena from participant's point of view. Three types of data collection methods have been applied, as shown below:

- Questionnaire administered to the students.
- Face-to-face interviews with the dean of admission and registration, senior analysts of the current online registration system, website developers, and the database administrators.
- On- site visits and observations.

To solve the main complication, the situation was handled in more detail by decomposing problems by considering:

- By what extent the current online registration system overcomes the problems of the manual registration system.
- The benefits of applying the online registration system on the University's staff and students.
- The weak points of the online registration system.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

d) Evaluating the current online system and the technology used for improving the system.

4.1 Data Collection Methods

4.1.1 Questionnaire

A sample of two hundred and fifty questionnaires was given randomly to the students of UOB. The purpose was to know up to what extent the online registration system had overcome the problems of the manual registration process. The main concept that was investigated in the questionnaire was to study the students' satisfaction the in online registration system over the manual registration system. Results and findings of the questionnaire are summarized as follows:

- Out of the 250 respondents, 63% of which were females and the remaining 37% were males.
- Majority of the students at UOB, i.e., 69% are always using the online registration system for completing their registrations process. 12% of the students use the system sometimes, while the rest 19% never used the system at all. Reasons as explained by the students were that they prefer to perform the registration manually, face to face with the registration employees, as they don't trust the electronic services. They feel happier if they submit the registration applications hand-to-hand to their advisors and employees (Figure 3). Among those students who are applying the online registration, only 69% agreed that the system helped in reducing their problems with the manual registration system. 25% of them are neutral about it and the remaining 6% disagree (Figure 4).

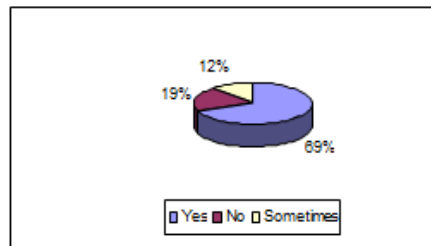


Figure 3: The extent of using the online registration system.

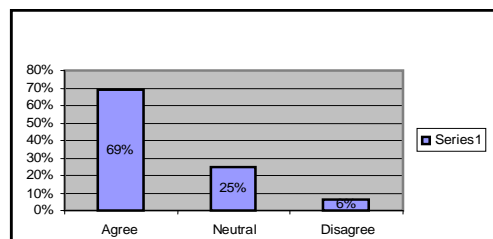


Figure 4: Opinions about whether the online system reduces the problems of the manual system.

- Results shown in Figure 5 reveal that the majority of students are not fully satisfied with the current online registration services; 22% of respondents think that the online registration system is very good. 9% said it is bad while 69% said that it needs more improvements.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

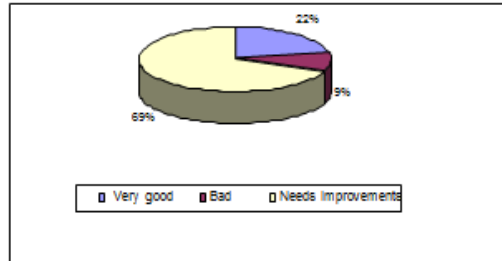


Figure 5: Opinions about the online registration system.

- The students' opinions about whether they have faced problems with the online registration system are depicted in Figure 6. It shows that 31% of the sample is having problems dealing with the online registration system, 17% of them are not facing any difficulties, while the remaining 52% are sometimes having problems dealing with the system.

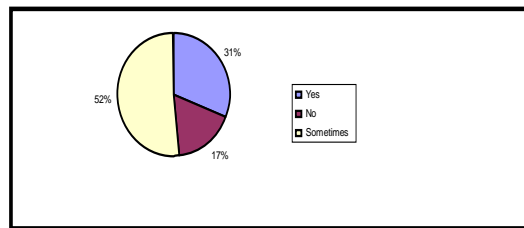


Figure 6: Problems the students are facing during the online registration system.

- Results have clarified that time is the main factor behind the need of the online registration system; 51% of the respondents have reported that they are suffering from the time required for the manual registration system. Distance, comes as a second main factor behind the need for the online registration system as 11% of the respondents cannot travel to the University because of distance and transportation difficulties. Other reasons for preferring the online service, as reported by the students, is the registration timing period which is limited within few days only, and the rare presence of the advisors during the registration period (Figure 7).

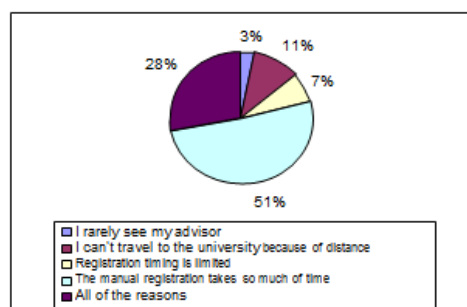


Figure 7: The reasons of recommending the online registration system.

- To spot the light on the main problems of the current online registration system, 16% of the students have reported that it's very slow, 17% have reported the problem that the server is down frequently. 11% have reported that there are still many tasks that have to be done manually. While the rest 56% specified that they have faced all the mentioned problems (Figure 8).

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

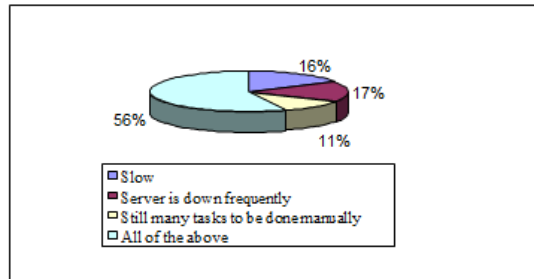


Figure 8: The problems of the current online registration systems.

- Although there are some problems with the current online registration system, the majority of the respondents (78%) think it is necessary to automate all the other manual registration tasks such as getting a printed/hard copy of various required forms from registration office, consult their advisors, getting signature from concerned officials, payment is done manually, etc. into electronic tasks because of its importance to save time and effort and to avoid rush during the registration period. On the other hand, 22% of the respondents disagreed with the automation process, because they have an IT phobia fear of not being able to cope with it (Figure 9).

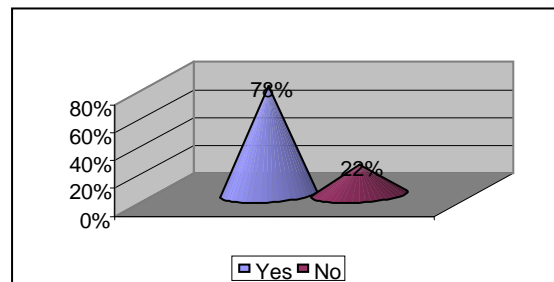


Figure 9: Converting the remained manual registration tasks into electronic tasks.

- Respondents have suggested new tasks to be added to the online registration system, such as, on line Payment (59%), E-advisor signature (66%), E – Stamp (44%), and Add-chair procedure (85%).

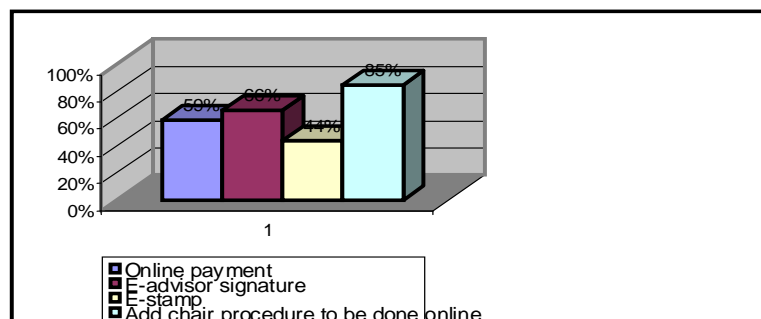


Figure 10: Shows improvement on the current system.

4.1.2 Face-to-face interview

An interview was conducted to collect the first hand information from the dean of admission and registration in the UOB. Following is the summary of the interview:

- The University Of Baghdad has achieved the distinction of being among the first universities in the Arab world to establish an online registration system.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

- b) The date of replacing the manual registration process with the online registration system started on February 2002 [7].
- c) IT College and the IT center in UOB are responsible for the implementation of the online registration system.
- d) the idea of implementing an online registration system was to overcome the problems faced on the manual system, by reducing cost and saving time by reducing the amount of paper/manual work, having the facility of 'round the o'clock' registration services, having lesser staff required during registration days, i.e., having a faster and convenient system for both students and staff.

Later, the senior analysts, database administrators and web developers in the IT center in UOB were interviewed. Following is the summary of the interviews; due to privacy, the technical details are omitted:

- a) The infrastructure of the online system is divided into internal and external parts.
- b) The internal part of the online registration infrastructure consists of three servers i.e. (1) the database server which runs on oracle 8i. (2) The application server which runs on Internet Application Server 9i (IAS9i), (3) the Application server 2 which runs on oracle 8i.
- c) These servers operate on Windows NT environment.
- d) The external part of the infrastructure contains information about both students and Internet users.
- e) The firewall of the infrastructure is between the internal networking and the external networking and it is divided into two zones; one protects the internal part from the external users, while the other zone protects the application server2 (Figure 11). The students' request for a course will be passed through the firewall zones. In order to approve the user's request; a set of rules are checked in the application server.
- f) Requests are passed from the application server to the database server which also contains rules that must be approved in order to validate a request.
- g) Finally, request is sent to the second application server by passing through the second zone that is basically used to protect the intranet from the hackers and it will help to prevent the intranet from being negatively affected in the case of server overloading.

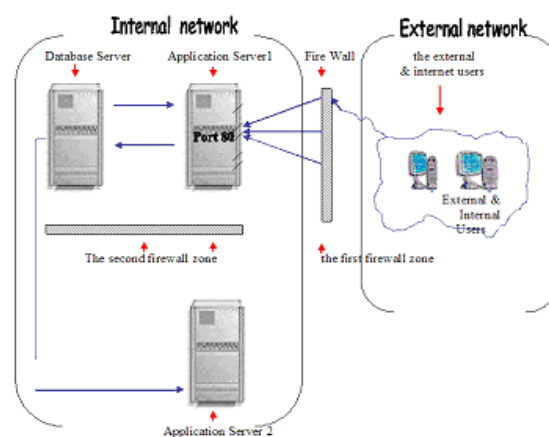


Figure 11: The infrastructure of the online registration system.

4.1.3 On-site visit and observation

The on-site visit was aimed to assess the features provided by the online registration system in order to give recommendations of new tasks to be added. During the visit to the IT center, attempts were done to find the reasons of applying the online system and investigate the common problems, which are faced during the online registration. Further, efforts were made to evaluate to what extent the online registration system could overcome the problems of the manual registration system, and dig out the future plans the registration office is intending to make. Further, from the



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

discussions with the senior analysts, database administrator and web developers in the IT center in UOB, an overview of the online system infrastructure was achieved. Due to the confidential information and security issues, it was not possible to disclose further information about infrastructure.

The observations made during the site visits are summarized as follows:

- a) The online registration system interface is opened within a main screen, which is linked to other screens.
- b) The human computer interaction has the all good qualities such as simplicity, understandability, easy to learn, and easy to switch between the online registration systems' screens.
- c) The infrastructure of the online registration system is not yet suitable for the requirements.

V. THE REGISTRATION PROCESS REENGINEERING

Business Process Reengineering (BPR) is a relatively new term; most people lack the awareness of its concept. They generally misunderstand BPR or consider it synonym of other business improvement process such as the Continuous Process Improvement (CPI). Some people think BPR is equal to restructuring. Reengineering is not restructuring, reorganizing or quality improvement. According to Hammer and Champy [7] reengineering is the fundamental re-thinking and radical redesign of business process to achieve dramatic improvements in critical, contemporary measures of performance, such as quality, service and speed. Further, Hammer (1990) also considers information technology as the key enabler of BPR, which he considers as 'radical change' [8]. BPR is an improvement philosophy, it aims to achieve step improvements in performance by redesigning the process through which an organization operates, and maximizing their value added content and minimizing everything else [9,10]. Whitten et al. called Business Process Reengineering as Business Process Redesign. He defines it as "the application of systems analysis methods to the goal of dramatically changing and improving the fundamental business processes of an organization, independent of information technology.

5.1 Application of BPR Modeling Techniques

Since last several years, UOB tried to do continuous improvement efforts, but this resulted in limited effects in registration process; because of this it was decided that BPR is needed to make an effort to have a radical innovation in the registration's structure, IT infrastructure, human dimensions, and the way the registration business must be carried out. It is believed that BPR is a managerial and technical problem solving approach that recommends methods, techniques for re-designing, and operational process so that they better reflect core business and customer oriented issues. On the basis of the results given above, in section 5.1, the Business Process Reengineering activities were performed by analyzing the current online registration system. To understand the working of this system in detail, one of the most effective techniques called process modeling was chosen to be used. This technique was developed by Demarco [11] and Yourdon and Constantine [12]. Process modeling, is a technique for organizing and documenting the structure and flow of data through system's processes, logic, policies and procedures to be implemented. There are various types of process modeling tools such as: structure chart, event diagram, decision table, and data flow diagram (DFD). As the interest in DFD has been expanded simply because of their role in BPR [13], it was decided to focus on DFD as a technique to model the BPR.

5.2 Reengineering the Current Online Registration System

During the analysis, it was found that the current online registration system is suffering from many weak points that prevent it from reaching the targeted objectives. The main reason behind applying the online registration system was to reduce the time consumed by students and the registration staff. This objective was not sufficiently achieved by the online registration system, i.e., many tasks are still done manually which consumes the student's and the registration's staff time. For example, the early registration processes, payments, add chair processes, advisors signatures, registration stamps and the issuing of schedules are yet done manually [14].

Due to some official procedures; of issuing the schedules and the registration stamps, these procedures are most preferred to be done manually to confirm the registration, and protecting it from hackers. The early registration process, payment procedures and the add chair process are the tasks that are planned to be re-engineered in the plan.

Automating the early registration process should help students to register conveniently from their homes. Moreover, this electronic procedure may save the student's, advisors and registration staff's time in addition to effort. Further, the

International Journal of Innovative Research in Computer and Communication Engineering

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Vol. 5, Issue 11, November 2017

reengineering of the payment procedure should allow the students to pay electronically, by entering their credit card number or their bank account number in the assigned field in the electronic payment screen [15]. It was felt that it is essential to develop an integrated database that links all curriculum plans for all colleges of UOB. This may help in facilitating and providing the add chair facility electronically. Moreover, the proposed integrated database should provide each student with a ready schedule, according to his/her curriculum plans. The student then will have the choice whether to accept or modify it. Regarding the requirement of advisor's signature, the dean of admission and registration reported that it would be abolished soon. The second weakness is the limited bandwidth (2 MB), which is provided by the regional Internet service provider (Batelco) to UOB, to perform the internal and the external tasks. In order to overcome this problem, it is suggested that the bandwidth capacity should be increased by 6 MB or more. The third weakness is the limitation period of 'add and drop'. During the analysis process, it was felt that the limited registration period must be opened for a longer time to reduce the extra load on the server. This change will provide more chance to register, the sections enrolment status will appear instantly, and new sections will be opened automatically when the section enrolment status is full.

5.3 Reengineering of Early Registration, Add-chair and Payment Processes

In this project, it was planned to automate the manual early registration, add-chair, and the payment processes. This change will improve the current status by reducing cost, time and efforts. The processes for early registration, add-chair, and electronic payment are show below in DFDs Figures12-14.

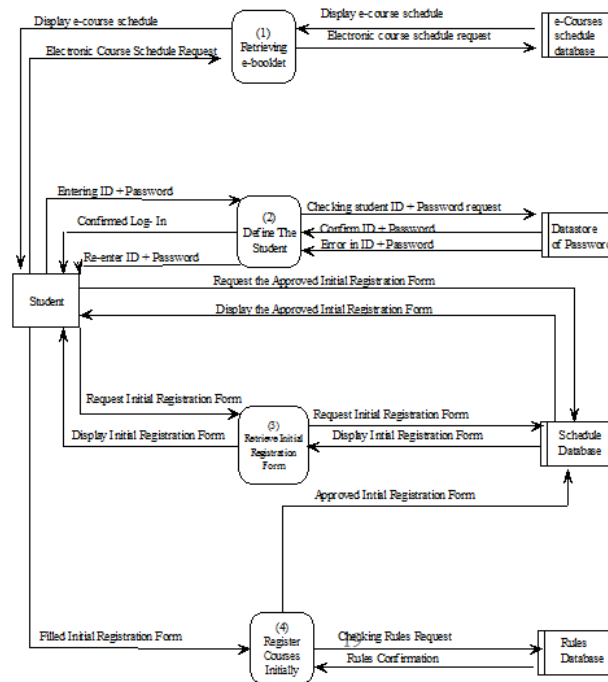


Figure 12: The DFD of the early registration online system.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

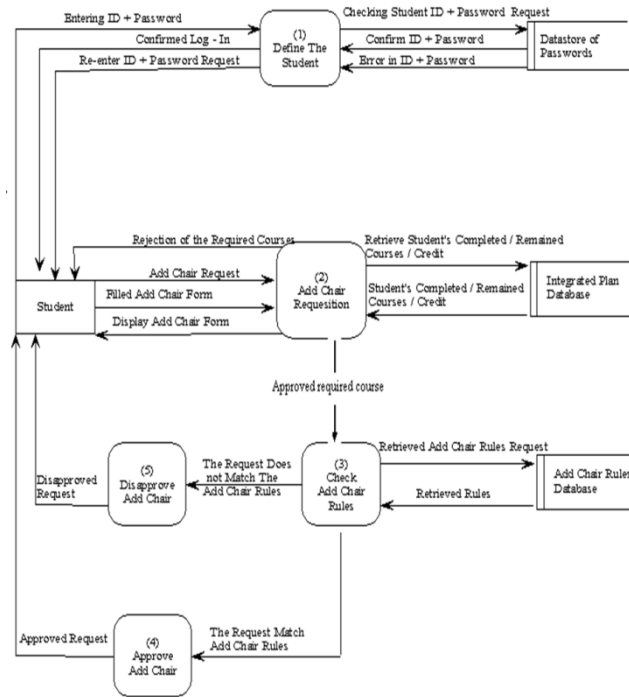


Figure 13: The DFD of the add chair online system.

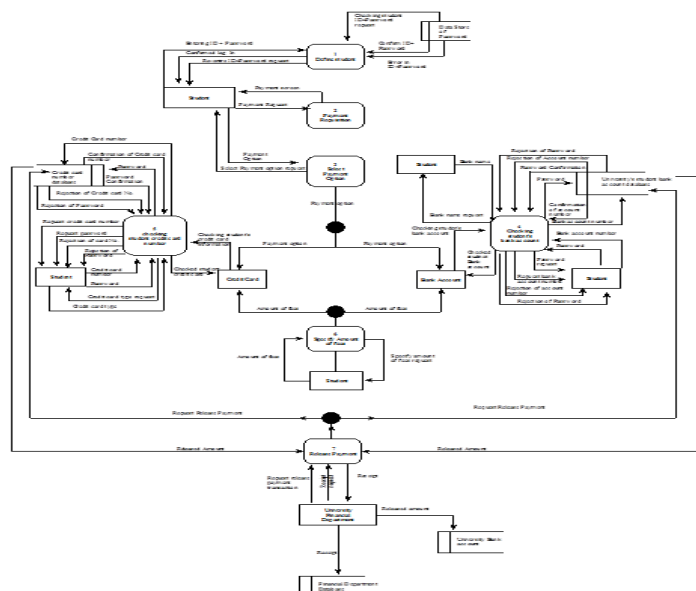


Figure 14: The DFD of the electronic payment system.



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Vol. 5, Issue 11, November 2017

VI. DISCUSSION

During the process of BPR, it was observed that the current online registration system overcomes many problems of the manual registration system, but still this does not mean that the system is free from problems. For example, during the process of reengineering, it was found that the current online registration system is not able to satisfy its main requirements to reduce effectively the registration time consumed by students and the registration staff.

Further to the system weaknesses discussed above, we found that many tasks of the current online system are still done manually and are time consuming. For example, the early registration process, add chair, payment, advisor signature, registration stamp and issuing the schedules are manual tasks. These tasks are very difficult to automate. These are due to limitations of the official procedures, which have to be done manually. For example the registration stamp on official documents is the most preferred task to be done manually to confirm the registration and protect it from hackers; of course there are some other tasks of this nature. The early registration process, add-chair, and payment procedure are the tasks that are required to be re-engineered. Converting the early registration process into an electronic procedure will help students to register conveniently from their homes. Moreover, this electronic procedure may save the student's, advisors and registration staff time in addition to effort. The reengineering of the payment procedure may allow the students to pay electronically, by entering their credit cards numbers or their bank accounts numbers in the assigned field in the electronic payment screen. Developing an integrated database that links all curriculum plans for all colleges may help in providing the add-chair facility electronically. This integrated database will allow the registration system to determine the courses that students need to register according to their degree plan. Moreover, the proposed integrated database is planned to deliver students' next academic schedule according to their degree plans. The students will have the choice whether to accept or modify it.

Regarding the advisor's signature before sending to registration office, the dean of admission and registration informed officially that it would be abolished very soon.

The major problems reported by the users of the current online registration system are slowness, unreliability and higher time between failures of the server. During the process of reengineering the system, it was observed that the second major weakness of the current registration system is that the University has only one server provided by the regional Internet Service Provider of the country. This server has a limited bandwidth (2MB). Further, the server has to perform both, the internal and the external tasks of the University. Hence, in order to improve the performance, it is essential to increase the bandwidth capacity.

The last most important weakness that has been reported is that the period of 'add and drop' is limited. It is therefore, recommended to increase the period in order to reduce the heavy load, especially during the peak hours. This suggestion will reduce the slowness of the server and will also provide more chance to the students to register promptly. Also in a situation when a course is bottlenecked, that is, all its sections are full and students desperately needs to register a course, the online registration system should automatically send a message to the chairman of the department to open a new section.

As part of BPR activities, an information technology strategy plan is recommended that can easily be implemented, by considering the roots of the academic environment, the demand from students, and staffs of the registration's office. In this strategy the main focus is how the registration authority can improve data acquisition from remote users and how the information can be disseminated promptly. During BPR it was felt that the university registration policy maybe changed in an un-predictable way. An evolutionary change might also happen due to rapid increase in number of school graduates and the number of private universities in the Kingdom of Baghdad. Therefore, it felt important to consider students online registration system strategy and university's IT strategy in parallel. In other words, both strategies must be aligned together to reflect online registration performance.

It was recognized that the current online registration systems reengineering should begin with IT needs, assessments when deans, chairmen start to provide into their own critical needs, objectives, and priorities.

Further, it has been recommended to have the online registration systems strategy in parallel to the possible changes of IT technology which may happen during the next 3 to 4 years along with the current problems. The project members are trying to ensure that the university's registration office stays ahead, of the changes or competition with new academic institutes in the region. Moreover, it is also suggested that the IT strategy must be developed in line with the expectations of, sponsors, students and staff. It is critical that IT environment brings real values to universities stakeholders, which are real assets to UOB.

History of information systems development processes shows that even the soundest strategy can fail with in-effective implementation. A consistent and focused program of innovation can make almost any strategy a big success, while a



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simplest un-complicated strategy may fail if processes, plans and organizational behaviour are not consistent. The dream of implementation can quickly turn into a nightmare.

VII. CONCLUSION AND FURTHER RECOMMENDATION

The outcome of this research is the recommended architecture, which is showing future student's online registration system, mainly to be used at the UOB. However, this model can be applied in any teaching environment by incorporating local requirement. Further, in this research the authors felt that the importance of management issues and strategies has not been covered, of course it was out of the listed objectives. In future BPR exercises, it is recommended to consider other systems development tools such as SWOT analysis to find the strength, weakness, opportunities and threats from internal and external aspects of any online registration system for a teaching environment. It is also recommended to consider and incorporate the concept of data-warehousing and data-mining for the future Business Process Reengineering project. This concept has vital importance to be considered for future planning of an online student's registration system. As far as communication through the internet is concerned, a higher bandwidth will open the way for an efficient online registrations system by supporting the current and future hardware and software requirements.

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