IMPROVING EDUCATIONAL CURRICULUM QUALITY: A DIGITAL TRANSFORMATION MODEL FOR LABOR MARKET READINESS USING SOFT SYSTEM METHODOLOGY (SSM)

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ABSTRACT

The labor market demands students to be prepared for efficient and effective work in this competitive world. To meet this requirement of the labor market, universities worldwide aim to provide study programs and plans that change rapidly according to the variations observed in the labor market. Universities should implement innovative systems that foster the development of competitive study plans and programs. In fact, these systems will enable college staff and students to develop and enhance the programs and study plans. This research paper adopts the theory of soft system methodology (SSM) to investigate and develop an electronic system that approves and manages the study programs and study plans within a university. The newly developed electronic system will be considered a pillar of the electronic services provided by KAU University. It is believed that the newly developed e-service will mechanize the procedures of selecting, analyzing, changing, and transferring study plans and programs, which will directly assist students in seeking reliable, quick, and high-quality services. The results of the study state that electronic services allow students to obtain the quality knowledge necessary for their employment. It also enables students to complete their education safely. It is, thus, able to resolve issues related to the curriculum and course development system at the university, which still follows the procedure of traditional paperwork. The newly developed electronic system or e-service can be employed in universities worldwide to ensure the quality and speed of the study plans and programs, eventually approving them in a unified work process.

Keywords: Universities; Electronic service; Soft system methodology; Study plans and programs; Innovative system.

INTRODUCTION

The "*Vision 2030*" of Saudi Arabia emphasizes the disciplines the country demands in order to improve the economy. One such discipline stressed by the KSA and that enhances the economy of the nation has been recognized as university education. It is widely discussed that Saudi universities should reconsider the quality of university education provided to their graduates, which will decide their fate and position in the labor market. In fact, universities should allow graduates to absorb greater opportunities in the market as soon as they complete their university graduation. With the aim of modernizing university disciplines, universities should build and develop advisor panels that include representatives from the labor market to understand the requirements of the market. It becomes the responsibility of universities to secure

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the future of university graduates by coordinating with the labor market and developing study plans as well as development plans as per the market's requirements (Allmnakrah et al., 2020).

Indeed, universities become an essential source of inspiration to the future students who desire to secure their future jobs and the country's aspirations. Henceforth, it is significant to review, analyze, and improve the university's curriculum for various disciplines in ways that cater to the requirements of the labor market.

Background to the Study

Universities aim to develop study plans and programs that are different from traditional disciplines through the consideration of labor market requirements. They also seek to pay more attention to scientific disciplines, programs, and study plans, as well as to build their technical and applied aspects. By these means, they seek to provide appropriate university education to graduates who will be able to apply this learned knowledge in real life. This will also enhance the employment opportunities of the younger generation in the labor market (Allmnakrah et al., 2020). Therefore, ministries in Saudi Arabia should coordinate with the concerned departments in order to understand the disciplines that are in high demand in the labor market, and then prioritize those disciplines and admit students to them to meet the needs of the market. Most importantly, this will reduce unemployment in the country, improve the economy of the country and decrease the number of the least selected and important disciplines in the universities.

Unfortunately, several study programs, plans, and disciplines are highly demanded in the labor market but do not seem to exist in Saudi universities (Abdelnabi et al., 2020). For instance, the Saudi market needs the use of alternative energies to develop electricity, gas, and oil, which will demand teaching energy sciences, which is different from the traditional disciplines. Keeping this in mind, universities should emphasize the adaptability of university graduates to the demands of the labor market and ensure that college graduates will have access to various employment opportunities and, at the same time, help realize the goals of the KSA's Vision 2030 through university education (Fakeeh, 2016).

Therefore, this study underlines the significance of securing students' academic futures and careers by developing study programs and curricula in consideration of the labor market. Although there are several obstacles, such as failing to produce effective employees suitable for the market, failing to meet the demands of the labor market, failing to incorporate updated content in the university curriculum and so forth, this study intends to overtake these aforementioned obstacles that defer the decision-making process. The best possible solution proposed is to establish an online electronic system and then develop a curriculum and study programs. The new online electronic system will propose solutions to all those problems faced in the path of development that includes conducting follow-up in the development process, examining the delay in the approval of modifications from higher authorities, providing updates with comments on the system, losing important documents, losing transactions, and redoing the procedure from the beginning (Yusuf, 2017).

The development of the online electronic system resolves the university's problems concerning the plurality of applications needed to modernize and develop study courses, programs, and curricula, thereby determining the performance of transactions among several departments. These observations make it extremely important to develop a unique, single electronic system that caters to the needs of universities such as updating the process of curriculum development, developing study plans, courses, and curricula pertaining to all entities

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within the university, conducting follow-ups, archiving procedures and, finally, updating the completion of programs in as safe and accurate a manner as possible. Most surprisingly, this system will resolve the issues that impede the path towards modernizing and developing traditional courses and study plans. Thus, the Kingdom of Saudi Arabia aims to build and establish an innovative electronic system that is designed according to the latest scientific methods and technical systems. KAU primarily aims to build such a system in the university, which is the chief objective of this research (Mitchell & Alfuraih, 2018).

As the university's administration is keen on providing exceptional educational service to their students, KAU desired to hitch up all its human intellectual as well as technical capabilities and build a new innovative educational environment with new e-services and e-guidance. Other e-services include document authentication, my document services, and several other e-services essential for students as well as the staff of the universities (Brdesee, 2021; Brdesee, 2018; Brdesee, 2019; Noaman et al., 2017; Alsaggaf et al., 2017; Brdesee et al., 2017; Assiri et al., 2020).

Undoubtedly, the most significant task of any university is to develop and build programs, study plans, and curricula in a periodic manner. Most importantly, curriculum development and study plans should comply with the latest technological and scientific developments. The reason behind this is that KAU has always wanted to be known at the international level in terms of academics, which would, thus, lead to accreditation. When strengthening the study plans and programs, the most important factor that should be considered is content. In order to keep pace with technological and scientific developments and the requirements of the labor market, universities' internal departments should periodically update and follow up on the requirements of the market. In addition, the study plans implemented or adopted in the university should be followed up on to understand if the standards are well-maintained. This will help the university authorities ensure the curriculum's specific outcomes, apart from the academic approval, academic structuring plan, and academic accreditation.

Moreover, the researchers look forward to gaining support from the university administration to implement the newly developed online electronic system, which allows the students and the staff to electronically build, develop, examine, and adopt courses relevant to the labor market. In fact, this new initiative aims to foster KAU's academic services through the use of automation. It can be argued that this system will act as the strengthening pillar of the automated electronic system, thus mechanizing all its procedures. This will help university graduates obtain high-quality academic services in as quick, different, and reliable a way as possible. This system will also enable university graduates to meet the market recruitment requirements by enhancing existing study plans, identifying the loopholes in the existing curriculum, updating the existing curriculum with the addition of new topic areas, providing extensive exposure to the students required for the current market and helping them complete their education quickly and safely. Thus, this system will contribute to resolving problems associated with the development of courses, study plans, and curricula in the traditional courses of the university. Indeed, this research is keen on developing the vision of implementing an online electronic service, which builds, develops, examines, and adopts various study plans, programs, courses, and curricula automatically, in alignment with the higher authorities of the university as well as representatives of the labor market, which will be considered an addition to KAU's academic services.

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LITERATURE REVIEW

Universities across the world have talked about study plans, courses, programs, and curricula and their quality standards. Implementing these quality standards while developing the various curricula and study plans will help the universities to establish new processes in consideration with labor market requirements. The University of Nottingham has set out a quality manual that explains the regulations, policies and the procedures that should be followed in the process of teaching-learning (Richmond, 2004). This quality manual is accepted across the United Kingdom, Malaysia and even Chinese colleges and universities (University of Nottingham). It is advised that students as well as the staff should comply with the policies and procedures proposed in the quality manual. According to the changes advocated in the Quality Manual 2021 the University of Nottingham came up with different types of forms such as those for requesting to register a research student for an additional period of study; requesting to transfer studies; requesting an extension to a thesis submission; requesting to interrupt studies; requesting to transfer from one course; and a notification of withdrawal from the university. If the students wish to transfer their studies, they can download a form online and then email it to student service centers. Similarly, if the students wish to withdraw from the university or withdraw from the course selected in between, they should download the specific form from the portal, fill in the details, and email it to their student service centers. Students who have opted for a doctoral degree are eligible for an extension to the pending thesis for a certain period. For this, the respective student should download the application form from the portal and follow the guidelines mentioned in the manual and send it to their student service centers. The above-mentioned changes will certainly raise the quality and standards of the university, along with meeting the requirements of the market. The University of Nottingham makes changes to their quality manual yearly so that its quality and content may attract the interest of students as well as staff across the world. It is ensured that content of the manual maintains its quality; therefore, it is primarily directed towards staff, followed by students (Richmond, 2004). The University of Nottingham provides a quality manual on the submission of new courses offered at their university. In order to approve new courses and study plans, the university should ensure it maintains quality as well as academic standards, which will offer the students an opportunity to secure their futures and meet the needs of the market. Since receiving approval from the Quality and Standards Committee is essential to develop and establish changes in the study plans and courses, universities should meet the university guideline specifications (Richmond, 2004; Walsh, 2003). It is also stated that students should be informed about the changes made to their studies either through an electronic system or notice boards.

Curriculum development is considered one of the most significant and broader aspects in the field of education (Adsit, 2016). The development of curricula in universities aims to focus on providing quality knowledge, skills, and values to the students. The study explained that curriculum development is a more difficult process than designing the syllabus, as curriculum development aims to meet the needs of a wide group of learners and to determine course structure, teaching materials, methods, and so forth. Likewise, another study discussed that the curriculum is the heart of the mission of all universities and colleges (Simmons, 2017; Curriculum Committee, 2016). The process of university curriculum development has been established in order to make sure that the needs of the students are met through designing a high-quality curriculum (Simmons, 2017; Curriculum Committee, 2016; Smith, 2019; Applin, 2019). Although there are several discrepancies with regard to the effectiveness and efficiency of

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traditional curriculum processes that exist in the universities, universities have made sure to develop a quality curriculum process that meets the expected standards. The authors were of the opinion that students are provided the best knowledge when the curriculum approval process seems to be efficient and effective by focusing on the quality of the content (Simmons, 2017; Curriculum Committee, 2016; Applin, 2019). It was also discussed that the local senates should review and analyze the curriculum approval processes in a periodic manner and then suggest necessary improvements to the process, which will be implemented when required.

Several other studies stated that the majority of colleges across the world seem to have implemented effective and efficient curricula for their courses along with effective curriculum approval processes, where the curriculum committee decides on the approval process (Khin-Htun et al., 2020; Richmond, 2004; Walsh, 2003; Adsit, 2016; Simmons, 2017; Curriculum Committee; 2016; Smith, 2019; Applin, 2019; Ruchala, 2015). It was found that curriculum committees are appointed to review the process of curriculum approval and later propose them for technical review. In fact, curriculum committees have been given the authority to propose recommendations about curriculum changes directly to governing bodies. Although some other colleges submitted their curriculum changes to the governing bodies within the colleges for review (Towson University Curriculum Committee, 2021), a few other colleges had aligned their common curricula or had them approved by district committees (Smith, 2019). From the above, it can be inferred that university curriculum approval processes require periodic review as well as the identification of areas for improvement so that curricula can be implemented during the next curriculum approval period. This traditional process of curriculum approval not only ensures the preservation of the institution's quality, but also improves the curriculum approval process. However, this traditional process is considered time-consuming and this research area demands an online electronic system that develops courses and curricula and approves them based on the requirements of the labor market (Brdesee, 2018).

The curriculum approval process is identified as six months or less, where the curriculum committee submits the changed curriculum to the governing body for further approval. This process can delay the availability of the new curriculum to the students due to the time consumed in their further approvals. Thus, it is advisable to strive hard and put an approval in process, which is less time-consuming and beneficial to the students. A lot of the past research suggested that the respective governing bodies should review the approval process, evaluate it, and identify the areas of concern before starting to implement any kind of improvements in the curriculum approval process (Smith, 2019). Before implementing changes in the curriculum approval process, the respective governing bodies should review and evaluate the effectiveness and efficiency of the existing process. The study suggested that in the reviewing stage, the curriculum committee should consider the time taken to approve a new study plan or course, to revise an existing study program, and to improve the timeline taken to approve the curriculum. This reviewing and evaluation process of the curriculum should include curriculum specialists, students, articulation officers and other faculties. In the second stage, the proposed changes from the governing bodies should be considered and the required changes to optimize the curriculum process should be made. Here, the respective individuals should be given a clear description of the changes as well as the timelines (Towson University Curriculum Committee, 2021). Effective practices such as creating a process flow chart or curriculum calendar representing the process from initiation to approval should be put into practice. Creating websites so that the resources can access the curriculum, creating handbooks that include all the policies and procedures about the creation of a high-quality curriculum and, finally, developing a curriculum

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approval process with the help of a curriculum management electronic system (Smith, 2019; Towson University Curriculum Committee, 2021).

For this reason, the technical review process must be effective as well as efficient. To make the technical review process more efficient, the curriculum should be screened with respect to completeness, and the curriculum developer should receive constructive input from technical reviewers prior to the official technical review. Moreover, individuals selected in the technical review committee should include an education expert, designee, curriculum chair, curriculum specialist, and a student learning outcome coordinator who will review the new curriculum (Yusuf, 2017). Along with these, the Curriculum Committee (2016) should come up with a set of criteria or a schedule that allows them to accept minor changes in the study courses, plans, programs, and curriculum for further technical review. Most importantly, the quality of content in the curriculum should be the focus since curriculum content is a matter of public concern (Yusuf, 2017). Soon after completing the technical review of a proposed new curriculum, the curriculum is then moved to a curriculum committee for further approval. The next step in the approval process is streamlining the approval process by increasing the frequency of curriculum approvals either weekly or biweekly. The typical duties of the curriculum chair of a university are identified as follows: they are held responsible for preparing agendas; conducting curriculum committee meetings; reviewing, evaluating and editing minutes; preparing the calendar for curriculum meetings; maintaining the standards of the curriculum for course approval; maintaining discipline in the curriculum development process; and reviewing the curriculum with the approved changes. Most of the universities and colleges follow the same procedure for the approval of curricula, courses, or study programs.

Upon analyzing the existing literature, this research study has identified a gap in the research; namely, there needs to be more focus on developing and establishing an online electronic service for approving study plans, courses, programs and curricula, and at the same time, maintaining quality content in the curricula to meet the requirements of the labor market. This will secure the future of university graduates in as safe, quick and reliable a way as possible.

Problem Identification and Motivation

Past research observed the curriculum approval processes and electronic services provided by the universities across the world and understood that electronic systems supported the universities in dealing with the issues in the curriculum and enhancing their present curriculum in line with market demands (Simmons, 2017; Curriculum Committee; 2016; Smith, 2019; Applin, 2019; Balyer et al., 2018). Similarly, multiple studies investigated the impact of digital transformation-that is, transforming the field of education by implementing new electronic services and so forth-on the economy of Saudi Arabia (Sandkuhl, 2017; Marks et al., 2021; Mahlow, 2019). However, this research aims to identify gaps that are, analyzing the need for implementing a new electronic service within the universities to make the students equipped with the right knowledge, skills and attitudes (which have been untouched thus far) required for the market. Moreover, past studies tried to analyze the relationships between digital transformation, digitization, and the economy. Few of the studies explored the efficiency differentials in Saudi education (Safiullin & Akhmetshin, 2019; Checkland & Poulter, 2020). Indeed, no study so far has tried to develop an electronic system that approves and manages the

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study programs and plans within the university, with a special focus on KAU University, Saudi Arabia.

In fact, this study aims to develop an innovative electronic system which will be considered a pillar of the university and at the same time, will be considered the research gap of this study. This study is motivated by the objectives to develop a new e-service, which will mechanize the procedures of selecting, recreating, and updating study plans and programs, which will directly assist students in seeking reliable, quick, and high-quality services. Indeed, the electronic service allows students to obtain quality knowledge. It also enables the students to compete their education in a safe manner, thus being able to resolve issues related to the curriculum as well as the course development system at the university, which continues to follow the procedure of traditional paperwork. The newly developed electronic system or e-service can be employed in universities across the world to ensure the quality and speed of the study plans and programs, eventually approving them as a unified base.

To approve programs and other study plans, universities should strengthen the content in their curricula. KAU is interested in restructuring the curriculum and other study plans and establishing an integrated center named the Center for Curriculum. The main task of this center is to develop specific curricula for various departments in the university, update the various developments in the field of education in line with the requirements proposed by the labor market, follow up on the development of standards and ensure the realization of specific outcomes.

The Proposed Application Objectives

The objectives of the proposed system in this study are:

1. To study and develop an electronic system that approves and manages the study programs and plans within the university;
2. To develop and design an automatic system that develops and modernizes existing curricula;
3. To create an online electronic system that brings academics, curriculum specialists and study plans together to share experiences;
4. To review and academically adopt the curricula in the database;
5. To search study plans and curricula in the university database;
6. To facilitate the adoption of study plans and programs;
7. To encourage and support digital transformation that is in line with Saudi Vision 2030;
8. To enhance the effectiveness and efficiency of universities' study programs, courses, plans, and programs;
9. To develop a model and build a reliable electronic system that can be used by universities; and
10. To develop curricula and study plans in line with the strategic plan and in consideration of scientific and technical developments.

Theoretical Background

This research adopts the theory of soft systems methodology (SSM) to develop and establish an electronic system to automatically manage the processes of approving study plans and programs. This newly developed electronic system will be considered a pillar of the electronic services provided by the university.

Most of the past research considered soft system methodology, abbreviated as SSM, to be a long-term approach employed in any area of research to tackle any kind of problematic situation. The model of SSM was developed by Checkland (1981) to tackle complex problems

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with an action-oriented approach (Al-Harrasi, 2015). This model is predominantly used to understand, learn, investigate, analyze, and achieve required changes for any kind of inquiry. This theory allows researchers to deal with different points-of-view from across the world, and successfully deal with problematic situations in the everyday world (Al-Kharousi et al., 2018). In short, employing this methodology in any research will help the researcher take necessary actions against the identified problems to improve them. Here, the researcher will explore the real situation, where he/she builds models to deal with the stated problems (Kotiadis, 2007).

Using this model, the researchers can set up a process to systematically review a real problem by incorporating different elements of analysis and later provide a deeper understanding of the problematic situation. SSM is prominently used by researchers to understand the issues through human viewpoints, by implementing different techniques such as continuous interaction to examine the research objectives of the study. The adherents of SSM believe that social beings can deal with social issues by engaging in the development of the change as per the requirements of the society. It is important to note that SSM is flexible in its nature and, thus, can be applied in various fields. The specific characteristic of this methodology is that this method adopts qualitative techniques in the process of thinking and learning and, thereby, use different ways to produce information from individuals based on their attitudes, opinions, as well as expectations.

Soft systems methodology is regarded as action-oriented, which means that it systematizes the thought-process of human beings about problematic situations and then comes up with actions that build improvements in the system. This theory is basically utilized across the world, which shifts its paradigm from hard thinking to soft systems. A soft system is the method of inquiry developed as a learning mechanism (Schultz, 2011). It is believed that this inquiry challenges the problematic situation with the help of different behavior models and develops views that can be proclaimed all over the world. Moreover, this soft system does not recognize the human situation as a system. Using this technique, the researcher will dive into chaotic circumstances and find out their own ways to learn and understand the situation, thus taking action to deal with the issues. Here, learning takes place in a structured form where models of purposeful action are employed to examine the problematic situations and then suggest improvements (Schultz, 2011).

Figure 1 shows the stages in SSM adopted in the study. To resolve the soft issues identified, this research employs the SSM approach that consists of seven stages. In the first stage, the researcher defines and identifies the nature of the problem along with its present condition. Rich pictures or images of the existing problem are used in the second stage to express the problem. In the third step, the researcher will interpret the situation and create root definitions from different viewpoints. As the fourth step, the identified root concepts are addressed, followed by the construction of theoretical forms of the system's needs. In the fifth stage, the developed models are compared with the existing one. In the sixth stage, the situations will be enhanced by recognizing the benefits of the model developed. In the last stage, suggestions are accepted to enhance the situation of the issue identified. By implementing SSM methodology, this study offers a mechanism of solutions to deal with problematic situations along with their considerable social effects.

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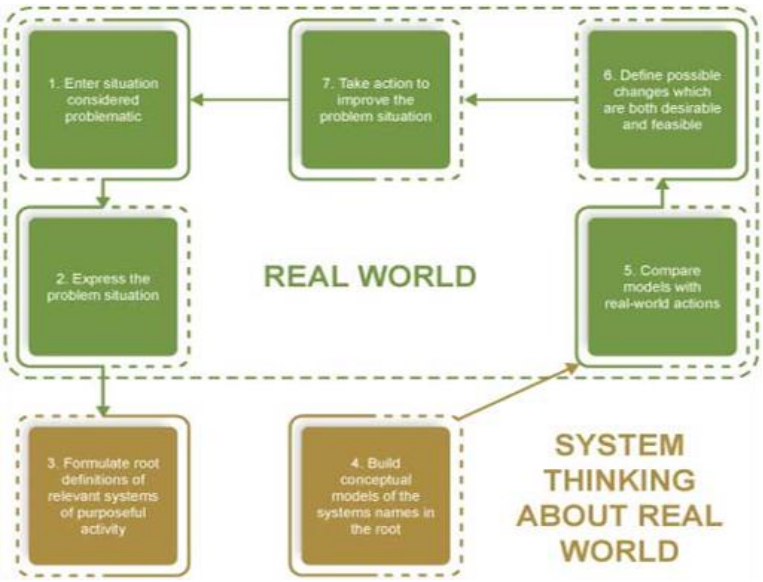

FIGURE 1

STAGES IN THE SOFT SYSTEMS METHODOLOGY ADOPTED IN THIS STUDY

Best Practices and Contributions to the Existing System

This section identifies and reviews the best practices or experiences of implementing an online electronic system at various colleges or universities. Various universities, with multi-campus districts have implemented electronic software applications to enhance the development and approval of curricula. These online electronic software systems are implemented in the colleges or universities to develop courses, curricula, programs, and so forth online and, thus, avoid traditional paperwork.

CurricUNET

One of the best searches for the most important competitors of the best electronic services was conducted globally. In fact, the CurricUNET Study and their team members tried to find out the best competitors who proposed electronic systems and aimed to better their existing systems. CurricUNET is a web-based software program developed to enhance and simplify the process of curriculum approval and other study plans. It is also noted that CurricUNET is a web-based curriculum management system with numerous manually prepared forms, reviews and approval processes conducted by college employees, which offers a more precise and expedient entry, processing, analysis, and approval of data. This program is used to produce, design and create courses online, through simple menus and texts. Few colleges approach the team to replace their existing approval system with a web-based curriculum management system (Mahlow, 2019).

The college staff will conduct the process of review and approval, as it offers the precise entry, processing, analysis, and approval of data. The special characteristics of this system include the following: it reduces paperwork; reduces time spent on preparing curricula; streamlines the process of curriculum creation and approval; the entry and processing of data seem to be active as well as interactive; and the data is maintained in a table format which will

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reduce the mistakes made. Moreover, the system provides access to numerous courses in the global curriculum database, upgrades and monitors curricula through the database, and shares knowledge with other universities and colleges as well. Most importantly, all reports, entries, reviews, and approvals are conducted through web pages accessible via the internet. This system allows users to carry out approvals in specific periods. The system provides the different web pages with intelligent access, offering sequenced navigation. Not only can a user randomly select different web pages, but the user can also adopt a sequence system control for web pages that offers the usual workflow steps of a given activity.

In short, CurricUNET is used by universities worldwide to monitor the method of program analysis, since the new edition of CurricUNET includes a (.NET) layout and provides setup and modification capabilities for non-technical users. This online software offers administrative users with configurable dashboard widgets to highlight real-time statistics. Other special features of this online electronic system include the following: it reduces the time spent on curriculum processing by an average of 75%; it encourages efficient multi-campus collaboration and monitors proposals; it fosters the centralized scanning, upgrading, and monitoring of curricula through a thorough electronic database; it helps create faculty catalogs; it automates the curriculum assessment process for accreditation; and so forth.

The CurricUNET electronic system framework is fully web-based. All entries, reviews, reports, and approvals are carried out via web pages accessible through the World Wide Web. Although it is simple to collect and import data from a variety of Office programs (such as MS Word), CurricUNET holds the data exclusively. Old manual types that are tedious are discarded. The entry and processing of data are active and interactive. They are immediately treated as web pages and uploaded to the system, and pertinent source information is also updated. In real time, error conditions are registered. Data entry is table-guided; that is, unique codes, selections and conditions are selected from the search tables that are kept in the system. This decreases the risk of mistakes being made. It also provides the user with a ready list of choices. In a state-of-the-art relational database, all data elements are maintained. This enables easy access and processing, particularly in the context of report creation and processing. Databases remove superfluous information and provide a higher degree of precision. The framework provides the different web pages with intelligent access, offering sequenced navigation. Not only can a user randomly select different web pages, but the user can also adopt a sequence system control for a web page that offers the usual workflow steps of a given activity.

The system offers instructions for interactive support. If a user needs support, it is possible to click on an icon on the screen or via a special field and to view a pop-up screen with relevant instructions. These guidelines are created and retained by college staff and may include text, diagrams, screens of incidents, and hyperlinks to other sources of support such as reference manuals. All the procedures of review and acceptance are carried out within unique approval periods. This means that only approval steps for a particular purpose may be carried out within a given window or time period. If a previously specified approval step is completed, the role of the next step must trigger approval within a fixed number of working days. This window is managed by the system and can be altered only by the appointed administrator of the system. Automatic alerts are emailed to suitable recipients when different acts are taken via an approval workflow. It is possible to assemble or transmit these messages in real time according to the wishes of the recipient. The progress of suggestions for course and program changes can be monitored; that is, when a proposal progresses through a defined sequence of review and approval steps, the different steps it has taken, and the actions taken can be viewed on a web-based workflow

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diagram displaying all the steps of the process. Curriculum version control is provided by the system. When recommendations for course and program improvements are accepted, they become active as approved in the required term year and, if substituted, become history. All course or software versions (active, history or awaiting approval) are retained. And if a course number is modified for a specific course, the opportunity to track the course's history is preserved. Field checks are performed as data is entered. Not only do data fields have to conform with unique data criteria, the type of error check that is performed may be swayed by other fields linked to the input field. A transaction log is maintained by the system. Relevant fields are monitored and, in the system, the date/time and user who made the change are retained. This monitoring is used to warn the system of adjustments that have been made after various approval steps have been taken, as well as being used to inform the update.

Kuali Curriculum Management System

Likewise, the second best curriculum management software monitors and evaluates the suggested curriculum changes and adapts the changes in a positive manner. The peculiarity of this system is that it allows the fixing and removal of any kind of problem associated with study plans and curricula such as following the old curriculum, candidates dropping out, and so forth, or can even reject them. The Kuali Curriculum Management system eliminates paper forms and consolidates over 80 departments' curricular workflows and approval processes. The significant benefits of using Kuali Curriculum Management system include:

1. The elimination of error-prone PDF types that require extensive manual resources for data entry;
2. The addition of criteria provides a better understanding of the impact of curricular changes to other courses and programs;
3. It allows faculty to participate by understanding processes and maintaining data correctly;
4. It connects courses and programs with their respective learning outcomes and, at the same time, ensures that students are prepared for graduation and beyond;
5. It assists the organization by improving curriculum choices;
6. It helps users gain insights into every step of the curriculum process;
7. It reduces the overall expenses;
8. It has the ability to interpret curricular data substantively;
9. It can help us think about the approval processes of curricula and understand the ways to improve them;
10. It reduces paperwork.

Contributions to the Existing System

This research paper intended to find out the latest developments related to the development of electronic systems. This paper also aims to review, update, develop and adopt courses automatically in regional and international universities. In addition, the paper aims to develop a clear vision of the design of the proposed system at the university. The available data were examined to identify the strengths and weaknesses of the systems for the automatic updating and development of the courses available in the comparative study, and to put forward development ideas that distinguish the proposed KAU system. CurricUNET has a streamlined review and approval process for academic programs in Ohio's public and private colleges and universities. The system allows relevant program information such as course syllabi, assessment procedures and faculty credentials to be submitted electronically, eliminating what is currently a paper-intensive process. Although this system has provided institutions with greater

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opportunities and flexibility to meet and respond to student, industry and state needs, it needs a few upgrades. After analyzing the systems, the researcher has suggested the following contributions: learning should be made available for everyone in a safe space; an overview of the visioning effort, faculty survey results, and discussions with campus experts should be proposed online; there should be more focus on providing instructions on how classes should be more inclusive and equitable; human resources who will confidently work on developing the framework that should be created; and there should be the creation of a Curriculum Committee that thinks about how to continue to shape and evolve the conceptual idea and how to apply it to reality. With the new electronic systems, the curriculum approval process has become easy; however, it is customized differently for different institutions. Changes in terminology, how the final forms are generated, and the location for storing data, workflow tracking, curriculum information and so forth can be selected differently by the universities to meet their demands.

Application of SSM

As per the steps of SSM, the researcher identifies and defines the condition of the problems with the existing electronic system, and then comes up with a new electronic system to deal with the loopholes identified. The Centre of Curriculum, the unit of curricula at KAU, has set up a standard to review the study plans, since it has become significant in the approval of study plans and curricula (kau.edu.sa). The standards for reviewing study plans and curricula include the following:

1. The curriculum should match the objectives proposed by the college or university, which are in line with the educational policies of Saudi Arabia;
2. The objective of the presented curriculum should match and be clear in three dimensions, namely, skills, emotions, and knowledge;
3. The description of any study program should include the course objectives along with other specifications and references such as textbooks;
4. The maximum and minimum number of university study units should commit to the study plan;
5. Courses should be numbered as per the unified code system proposed by the various departments within the college;
6. The curriculum for the study plans should be distributed based on their levels;
7. It should be ensured that any kind of duplication either in colleges or universities, with a special focus on scientific departments, is avoided;
8. The study plans of the university should meet the requirements of the society as well as the labor market;
9. Study plans or programs should contain summer training for all the departments so that the students as well as the staff are able to experience them;
10. Lastly, applications for the approval of study plans, programs, and curricula should be obtained from the authorities within the university. Figure 2 below gives a clear picture of the research problem with respect to the approval of study plans and designs.

Although the Centre of Curriculum came up with a standard to build and develop various study plans and curricula, in meeting the requirements of the labor market and passing through the approval process by the university, departments within the college or university fall prey to several mistakes, thereby leading them to re-apply for the study plans and take approval for the curricula, which incurs transaction costs. The most common mistakes identified in universities or colleges while preparing the study plans, programs, and curricula include the following:

a) Courses are not arranged in an appropriate order, which causes confusion;

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b) Learning outcomes of the courses are not put in the correct order;
c) The study plan seems to have multiple titles, codes, and numbers at various places;
d) The presence of courses and their previous requirements come up in the same semester;
e) previous requirements do not seem to be available in the course schedule;
f) The interchanged usage of words (e.g., using 'level' instead of 'semester'), leading to a lot of confusion;
g) The absence of scheduling theory and practical sessions for weeks in a semester;
h) The details of supporting references or textbooks seem to be incomplete, such as the name of the author, title of the book, year of publication and so forth;
i) The lack of clarity concerning the type of track followed in colleges such as humanitarian, administrative, or scientific tracks;
j) The failure to include an operational plan in the university or college plan; and so forth.

The above-listed challenges seem to exist in the traditional curriculum approval method using paperwork. Thus, herein lays the significance of this research: the study proposes building an online electronic system, which will ensure the avoidance of mistakes, thereby saving both time and effort of individuals. The new electronic system will adopt the programs and curricula by analyzing the needs of the labor market with the help of qualified human resources. Innovative computerized technologies will validate and verify the data as soon as they are entered and then send them to the respective entities for further approval. This study follows the seven-stage model, as provided in Figure 2.

FIGURE 2

ACCREDITATION FLOW OF THE STUDY PLAN WITHIN THE UNIVERSITY

In the first stage, the problem is recognized and defined, and is considered to be unstructured. The problem identified is termed the 'web of problems', which requires a careful understanding of the situation. The researcher admits that there is no definite agreement on how human beings define and identify the problem. In stage one, the problem seems to be either unknown or there seems to be little understanding of the problems of other individuals. There evolves a disagreement on identifying the best solution for the course of action taken against the identified problem. In the second stage, the problem is expressed using a diagram, which helps to broaden the understanding of the problem. The understanding of the problem is also shared with

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other individuals in the stage. In the third stage, the researcher enters the world of system thinking from the real world, as shown in Figure 3. The tools used in this stage are root definitions and conceptual models, which will determine the activities of the organization. The main idea behind the use of tools is that the researcher will be able to fulfill the objectives of the research and discuss what exactly an ideal organization along with the required activities is.

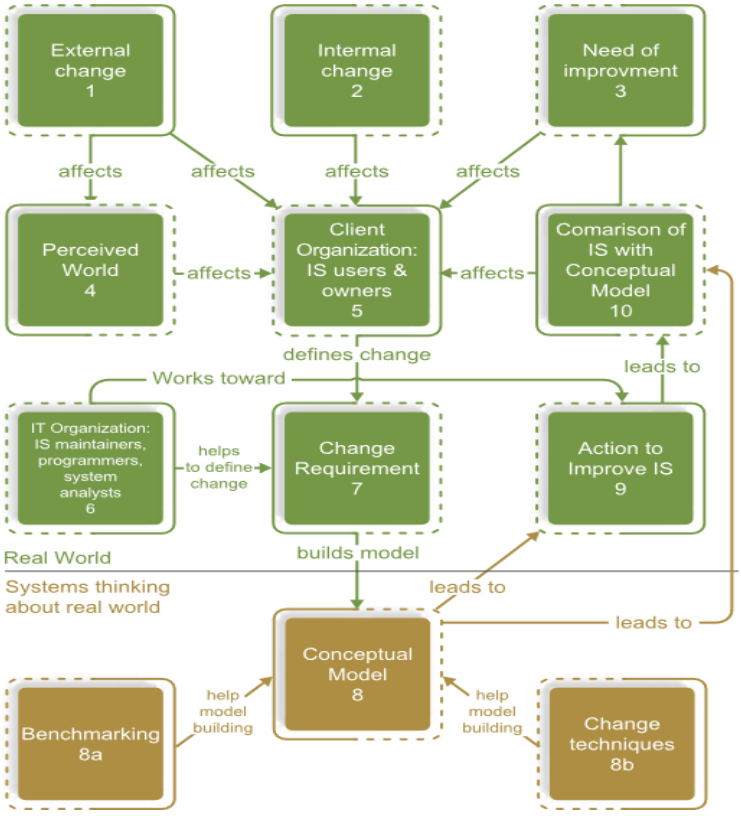

FIGURE 3

REAL WORLD *VS.* SYSTEM WORLD

The conceptual models are nothing but a set of activities essential to transforming the existing system into a new system. Here, the operational activities of the newly developed system will be monitored and controlled, thereby defining the effectiveness, efficacy, and efficiency of the system, as shown in Figure 4. In fact, the evaluation of the new system and its performance will be examined in this stage.

With respect to the designing and implementation of the proposed system, the latest developments and updates related to the development of electronic systems will review, update, develop and adopt courses automatically in regional and international universities and, thereby, develop a clear vision of the design of the proposed system at the university. For this, the available data was examined to identify the strengths and weaknesses of the systems for the automatic updating and development of courses that distinguish the KAU system. Later, the required modifications were implemented and the final version of the system was launched in consideration of the obstacles, problems as well as the quality of the system. The researchers

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started to develop the online electronic system that develops reviews and adopts courses automatically in cooperation with the university's Curriculum Center, the Deanship of Information Technology, the Deanship of Admission and Registration and colleges utilizing their services. This proved to be a distinct addition to educational and academic services at King Abdulaziz University. Finally, KAU decided to create a new study plan and develop or review an existing study plan based on the university's strategic plan, which is in line with labor market requirements.

Upon evaluating the available ready-made systems, it became understood that there are several advantages and disadvantages. The advantages of the ready-made system include the following: it is ready to use; turns out to be a global solution; produces a global curriculum library; is easy to use; integrates banners; increases productivity; and saves time. As for the drawbacks, electronic systems have challenges in testing, the cost of running, cloud hosting, local distribution, the Arabic language, and customization. Upon analyzing the shortcomings of the existing system, the researcher proposes a new design by following the life cycle of information system design by starting to develop the special and proposed perception of an online electronic system that develops, reviews and adopts courses automatically in cooperation with the university's Curriculum Center, the Deanship of Information Technology, the Deanship of Admission and Registration and colleges under its services. This system proved to be a distinct addition to the educational and academic services at King Abdulaziz University.

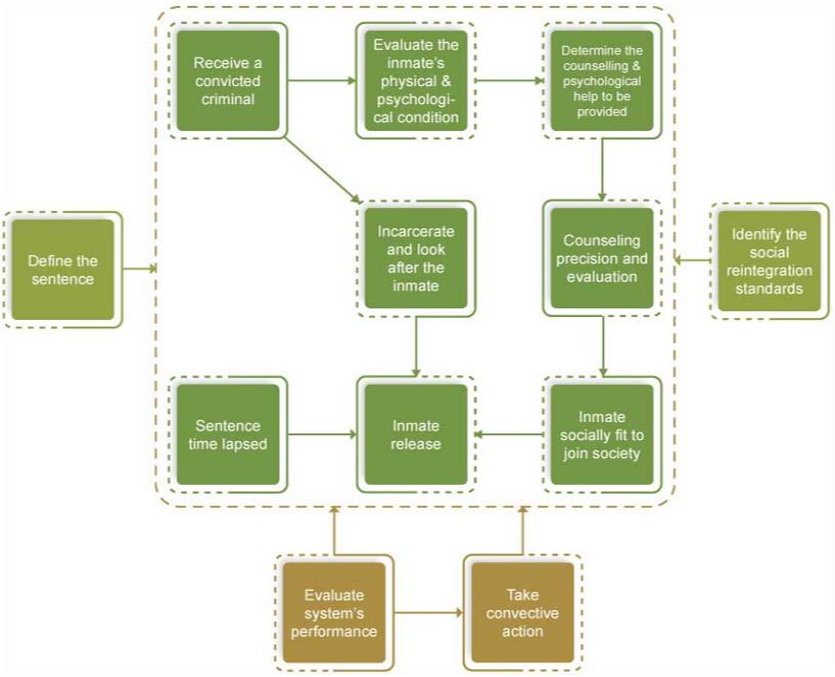

FIGURE 4

PROCESS OF DEVELOPING CONCEPTUAL MODELS

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Development of the System

Based on the university's strategic plan, the study programs developed for the bachelor's degree are reviewed every four to six years, and every two to three years for diploma programs, depending on the duration of the study program. Understanding the existing research gaps, the researcher has proposed a framework to develop and design a study plan, as given below in Figure 5, which can be implemented in the new electronic system.

It has been agreed that developing a study plan should begin with the initial design of the system screens and the initial visualization of the system. The idea was that the system could add new workflows so that all levels of the study plan's content would be considered, namely, the preparatory year plan, the freshman plan, the department plan and, finally, the track plan. The newly proposed system will add the role of the Deanship of Quality and Academic Accreditation as a user of the system with the objective of enhancing the approval process. The course of the system has also been modified by attaching a DQAA box before that of the external auditors in order to understand the changes in the courses. The sequence of the transaction within the colleges has been clarified and the way in which external auditors will enter has been agreed upon for easy access. In addition, Arabic and English have been adopted for the system so that the users will be able to have a clear understanding of the programs chosen. It has also been agreed that images of the ministry and university administration's approval decision must be attached to approve the establishment of a new department. The requirement for approving the department code is that it should contain four letters and it should not have been used before the beginning of the actual phase of programming the system after the completion of the necessary data collection. It was also agreed that NCAAA profiling forms would be placed as downloadable and re-uploadable files (Figure 6 and Figure 7).

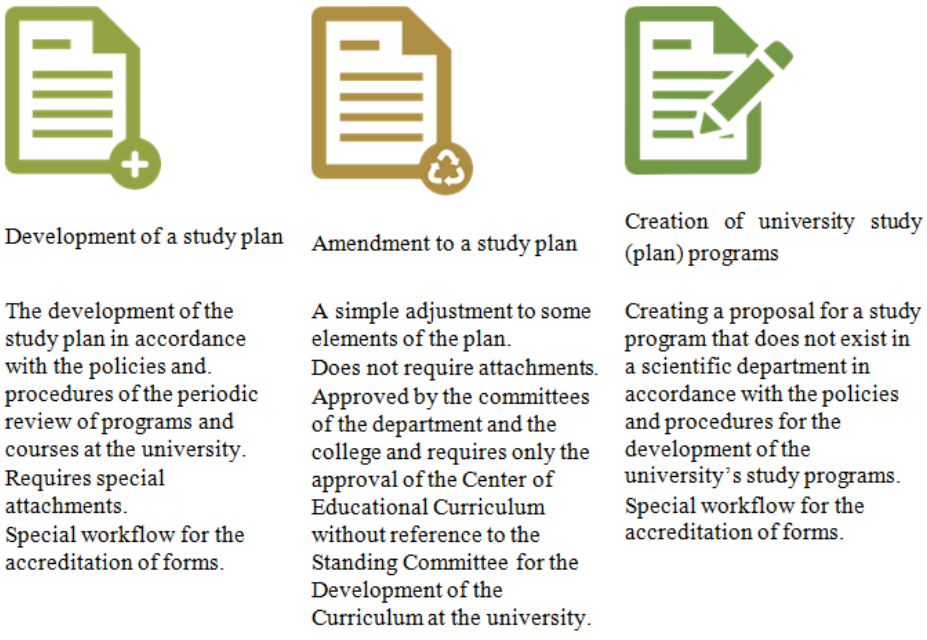

FIGURE 5

PROCESS OF DEVELOPING A STUDY PLAN

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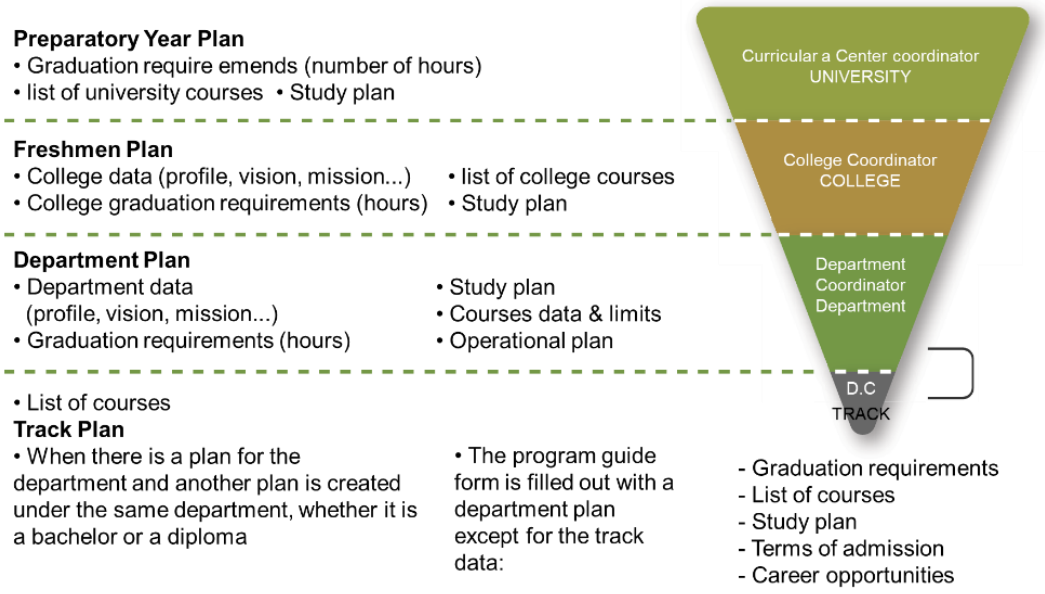

FIGURE 6

PROCESS OF DEVELOPING THE STUDY PLAN

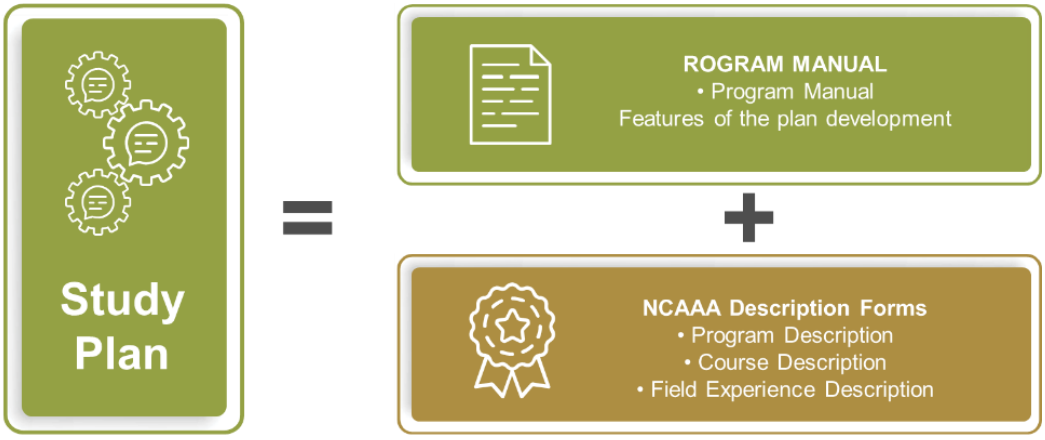

FIGURE 7

THE COMPONENTS OF THE STUDY PLAN

This system also proposed the components of a study plan as given below in Figure 8. The power to create a list of courses will also be provided in the proposed system as given below:

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FIGURE 8

PROCESS OF DEVELOPING THE ELECTRONIC SYSTEM

The online electronic system screens have been displayed and programmed in both Arabic and English. It has also been agreed that the new system will give colleges the power to grant free hours with an option for the college to change them. Additionally, the new system will insert an option for the college to add a term or a standardized year for all departments within the college for a newly accommodated student, and the official of the diploma and bridging programs can delete the preparatory year. Furthermore, the new system will add an option for the college coordinator to create a plan such as a diploma which does not need accreditation, as well as to add an option to copy a plan's courses from a department without access to the college letter and with the requirement of having a different code. Members have explained that changing a university-required course necessitates that the rest of the departments are informed in order to update their plans. When updating the hours decided by the establishing department, the rest of the departments using the course must be notified after the change has been approved, and the lower levels are not entitled to change a course established by a higher level. The newly designed system distributes the powers in the system, in the form of a pyramid, to give the powers to each party according to its specialty (Figure 9). For example, the Curriculum Unit is responsible for the university plan for preparatory year subjects and compulsory subjects (Islamic culture and Arabic language). The coordinator of the college is responsible for the

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preparatory year in the college and the distribution of free hours. Moreover, the coordinator of the department is divided into two sections: the coordinator of the department who sets the plan according to his/her department and the coordinator of the track who develops the materials for his/her track.

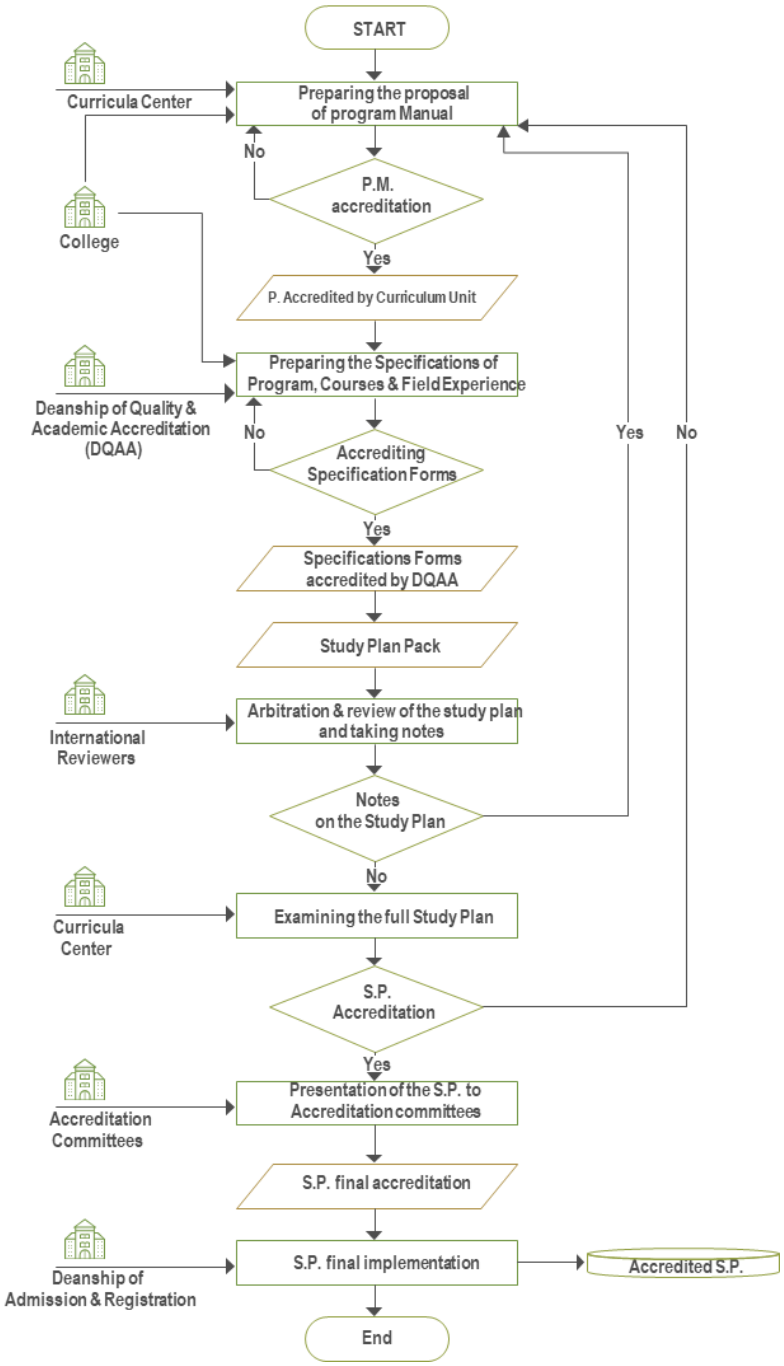

FIGURE 9

CURRICULUM APPROVAL FLOWCHART

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RESULTS AND DISCUSSION

From the analysis, it can be understood that CurricUNET META offers a specific program for all the curriculum management requirements-course and program management, evaluation, program analysis, and cataloging-and serves the higher education community, especially at KAU. It is also discussed that the curriculum is the institution's heart and soul and guides all of the events that take place. Undoubtedly, one of the most important tasks of the educational process is that the university and educational institutions develop and improve curricula and study plans periodically, in accordance with their strategic plans and in line with the latest scientific developments in the field. This is in order to keep up with the needs of the labor market, which needs academically qualified human resources that are able to take responsibility. Moreover, it is so that the university can progress to become an internationally classified and academically accredited educational institution. There is no doubt that the study plans and systematic content provided in the educational process are among the most important criteria that are measured and considered when applying for any academic accreditation. It is necessary to develop the study plans for the scientific departments of the colleges and update them periodically so that they live up to scientific developments as well. There is a need to follow up on the implementation of these plans after their adoption and to develop the necessary standards and models to ensure that the study plan, curriculum specifications and outcomes are applied. It is equally necessary to meet the requirements of academic accreditation, academic structure plans, and update the study plan for any program so that it is very flexible in terms of submitting the new request and following up on an automated system. Indeed, there are challenges and difficulties facing any college in updating any program or study plan. Therefore, any college had to provide a transaction and formal letters to more than one entity to offer the update and then present it to the Unit of Plans and Curricula for adoption after the decision was made in a University Council meeting. Hence, it was necessary to find a radical solution to those obstacles. Henceforth, the new system design distributes the powers in the system in the form of a pyramid to give the power to each party according to its specialty. For example, the Curriculum Unit is responsible for the university plan of preparatory year subjects and compulsory subjects (Islamic culture and Arabic language). The coordinator of the college is responsible for the preparatory year in the college and the distribution of free hours. Moreover, the coordinator of the department is divided into two sections: the coordinator of the department who sets the plan according to his/her department and the coordinator of the track who develops the materials for his/her track.

An integrated system has been established and developed that links all relevant entities to programs and plans including the following: the Deanship of Admission and Registration, the Deanship of Quality and Academic Accreditation, the Unit of Plans and Curricula, scientific and theoretical colleges, and the University Council. These have been linked in an integrated system starting from where the request of a college is submitted until the final adoption is decided by the University Council. There were a lot of studies and research that were carried out before the establishment of this system. The system provided by CurricUNET, as mentioned earlier, was studied and the system did not comply with the needs of the university as required, which led to the completion of requests to update the study plans smoothly, flexibly and quickly through a unified platform for all beneficiaries. It is worth mentioning that the system serves the objective of digital transformation into electronic transactions in government agencies in line with the Kingdom's Vision 2030. The system is designed to dispense with all paper transactions and

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periodic letters between the entities, which saves time and effort and, thus, leads to faster completion.

CONCLUSION

This study aimed to review the best practices in the use of online electronic systems, understand the drawbacks of the system, and later design a new online electronic system that approves and manages the study programs and plans within the university. In fact, the newly developed electronic system has become the pillar of the electronic services provided by the university. It is believed that the newly developed e-service will mechanize the procedures of selecting study plans and programs, which directly assists the students in seeking reliable, quick, and high-quality services. Indeed, the electronic service allows the students to obtain quality knowledge that is demanded of their employment. It also enables the students to compete their education in a safe manner, thus being able to resolve issues related to the curriculum as well as course development system at the university, which still follows the procedure of traditional paperwork. The newly developed electronic system or e-service can be employed in universities across the world to ensure the quality and speed of the study plans and programs, eventually approving them as a unified base.

RECOMMENDATION AND FUTURE SCOPE

This study recommends implementing the newly designed electronic service in universities across the world to ensure the quality and speed of the study plans and programs, eventually approving them as a unified base. The study also suggests that this system will enable students to complete their education in a safe manner, thus meeting the requirements of the labor market. Therefore, this research proposes a new system design to address the drawbacks of the system in an easy, quick and reliable way. This research will open a discussion for future researchers to explore this research area at an international level and in various other directions. As for the limitations of this study, the implementation of this newly developed system was limited to Saudi Arabia alone. Hence, future researchers can conduct their research by extending to various other countries such as UK, Canada, and so forth.

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