



# Simulation for Graduate Students Research Consultations to Measure Organization Performance

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*Abstract— Technology has helped in changing and facilitating the way services provide. It also has proven strong effective in e-education and others. Considering the current Covid-19 pandemic, the use of the Internet and communication technologies expanded in all fields, especially the consultation fields such as professional, academic, health, and psychological consulting. This research studies the organization's improvement in the Advisory and Research Services Unit's consultation process in the Deanship of Graduate Studies on the female campus at King Abdul-Aziz University. This research aim is to (1) developing and simulating a model to improve the consultation process. (2) improving the key performance indicators. This study focuses on increasing the served student, reducing the time waiting to get the service, and optimizing resource utilization. Also, the research introduces a model for the consultation process. Data are collected and conducted a case study on the advisory and research services unit. Simulations are performed to determine the effect of changing inputs on the key performance indicators. Based on the research results, the key performance indicators have improved, which led to improved performance. Also, the proposed model can eliminate manual processes.*

*Keywords- Simulation, Modelling, Higher Education Institutions, Online Research Consultation, Organization Performance*

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## I. INTRODUCTION

The availability of information and communication technology infrastructure plays an important role in the everyday life. In the current Covid-19 pandemic, with the sudden discontinuation of face-to-face communication, Internet services were the convenient solution to communicate with others to provide information especially in learning and working environment. Academic consulting is an important activity to support students in the Higher Education Institutions (HEI), whether through distance education or traditional education. The consultation process is part of the education process, thus HEI students require assistance and guidance, especially academic research.

Face-to-face communication has several benefits: subject knowledge, understand faster, verbal and visual cues exchange, observe how to analyse and solve the problem, and watch expressions and body language [1].

However, traditional consulting through face-to-face becomes less used, and online communication becomes more effective and more manageable. Information technology plays a significant role in the HEI consultation area. There is a global trend towards using communication technology as an alternative for face-to-face consultations where many channels for providing consultation services have experimented. Due to individuals' orientation to adopt technology in everyday activities, online consultation has become an effective alternative to face-to-face consultation where the spatial restrictions are no longer an obstacle.

## II. OBJECTIVES OF THE STUDY

This research aims to improve the Advisory and Research Services Unit (ARSU) performance at King Abdul-Aziz University (KAU) through an online consultation process.

The main objectives are:

- To develop an online consultation model to facilitates the process between students and consultants.
- To simulate the online consultation process.
- To improve the consultation performance by using several KPI.

The expected results are:

- An increase in the number of students served.
- A reduction in student waiting time for consultation appointments
- An increase in efficiency of the consultation processes.

## III. LITERATURE REVIEW

### A. Consultation

According to Jha [2], consultation is an interactive process between consultant and client to provide professional or scientific advice for a specific problem and propose solutions to address it. [3] defines the consultation as a process with specific goals and occurs at a specific time and place. It involves two parties: consultants and clients who seek to achieve specific goals. It often aims to help the client take some action or decision. This process depends on communication, resources, and a place to provide consultation. Consultation can be seen as a communication way between two parties to get information, advice, and a solution from a consultant who has knowledge, experience, and qualified in a particular field, for example, a doctor, architect, lawyer, and professor [4]. Consultation provides help and counselling to clients by a qualified person to solve their social, professional, educational, and personal problems and assist them in decision-making [5]. In conclusion, consultation is a communication process between consultant and client aims to provide help and advice by a qualified consultant to assist a client in decision making and problem-solving.

### B. Online Consultation

Online consultation is a consultation between consultants and clients through modern means of communication over the Internet such as telephone, teleconferencing, and email. It is used to transfer the consultant's knowledge and expertise to the client for addressing the specific problem through online sessions. It aims to assist clients and easily meet their social, professional, and educational needs [6]. A study by [7] defines online consultation as a meeting between the consultant and the client in a virtual environment using information and communication technology. In addition, a study by [8] describes it as a communication between the consultant and the client to provide help via Internet technologies without a meeting in person. With the current development of technology, online consultations have increased significantly in recent years. Its use became to enhance and improve performance in occupations and others [9], [10]. Online consultation is an effective way to reach others, help them, and advise them [11]. It is an alternative in cases of a client's emergency [10]. Online services are distinguished with easy access out of work hours and in any geographic region [12]. The advantages of online consultation are easy to get a service [10] and made the consultation process easy for consultants who have to meet clients at a specific time. Clients also get help without the need to go out and meet face-to-face [7]. Study by [8] clarified that consultants accept online consultation as an additional way for face-to-face consultations since consultations' demand increases. There is not enough working time because they have other works than consulting. One advantage of providing online consultation was that it made the consultant advise clients out of working hours. Consultation processes can use chat, text messaging, telephoning, and email to provide an online consultation [7].

Online consultations have two forms, which are synchronous and asynchronous. Synchronous means happen and answer at the same time, such as online chat. Asynchronous, which occurs at any time, can respond after a while, such as text messages and email [7]. A study by [10] indicates that consultations via email are the most used, but consultation through teleconferencing is the best way. Teleconferencing is like face-to-face consultations, which can communicate to clients with image and voice [7].

Online consultation is no less important than face-to-face consultation, and it has been adopted to a large extent [9]. It has the same effect as a face-to-face consultation, equivalent to it [13], [12]. For effective an online consultation, some points must be considered such as security of the website, consultants' and clients'

knowledge of how to use technology and the availability of consultant at all virtual sessions times [13]. Due to the individuals' orientation to adopt technology in life activities, an online consultation will grow and become more prevalent [8], [9]. Hence, [6] recommends encouraging the government to allocate part of the annual funds to activate online consultation more, provide facilities and training for consultants, and increase online services and virtual activities.

### C. Related Studies on Online Consultation

Several recent studies have examined online consultation in different domains. In the UK, they had studied the possibility of providing consultation services through communication technologies such as telephone, email and Internet video to relieve pressure on the consultants [14]. This study aims to provide consultation services in different ways to patients who lack time and live-in remote areas to improve the provided services level. The result was that patients preferred these ways, and they felt relief with them when applied. At the same time, physicians and patients agreed that sometimes need to face-to-face consultation. In 2014, the UK government proposed the implementation of providing consultations via email and Skype [14]. In USA [14], there are many options for giving consultations in the health sector, such as online patient portals and telephone consultations to communicate with physicians. In Finland [14], the consultations through email between physicians and patients have been common for a long time. Most European countries [14] aim to develop online health and care. Online medical consultations can be in the initial evaluation of symptoms, chronic diseases and follow them up. There are many technologies which patient can use them to consult a doctor without having to meet face-to-face, such as telephone, email, text messages, and video. Patients may feel more comfortable disclosing critical information in online consultation than in face-to-face consultation. However, online consultation does not serve older and less educated patients because they do not know how to use it.

The study by [15], focuses on providing consultation to students for colleges admission. The consultation process was done manually. The process took a long time in the admission process and a lot of manual paperwork. Therefore, they aim to convert entire manual processes into online processes. They built a web-based admission consultation system to provide online consultations to students and information about the colleges they want to join. This system aims to reduce pressure and workload on employees, speed up the admission process, simplify the consultation process, and reduce manual and paperwork [15].

The study by [6] searches on online consultation implementation during Covid-19 pandemic in Nigeria when schools were closed, and the suggested ways for online consultations that serve learners in rural and urban areas. School closures because of the pandemic led to a negative effect on learners worldwide. This study was keen to motivate teachers to explore alternative ways for remote education and consultations. They used these platforms as e-consultations: SMS message, emails, WhatsApp, television, radio, and the Internet. Consultation in secondary schools in Nigeria has been widespread for a long time. However, after the pandemic, they were interested in providing it in different ways and keen to supply schools with facilities for providing consultation and services. Schools provide consultation and guidance to students via the Internet in curricular difficulties, inquiries about exams, study difficulties, inquiries about post-secondary changes and concerns about the transition to college. They also provide psychological help for parents. This study showed us the importance of information and communication technology in continuing life during the Covid-19 pandemic and reconsidering in providing face-to-face consultations. Finally, they propose to integrate information and communication technology with face-to-face consultations.

## IV. METHODOLOGY

We interviewed with the head of ARSU at the DGS KAU to understand the current system and procedures and obtain the data. The interviews and data collection took six weeks. The data was documented by written transcript, audio recordings, and communication via email. The ARSU provide consultation services to postgraduate students. It aims to help students in their scientific papers to upgrade the quality and efficiency of their research. Some of the provided consultation services are academic writing, research methods, and statistical method. There are three primary stakeholders in ARSU, i.e., admin, consultant, and student.

## V. SIMULATION

We developed two models, i.e., As-Is Model and To-Be Model. We simulated the models for one week/30 working hours by using ProModel's process simulator program [16]. Firstly, we draw the flowchart process. Secondly, we built the model by Microsoft Visio. We ran the simulation model to test and validate it with the data from the data collection phase. Finally, we studied several scenarios for simulation, document and discussed the results.

### A. The AS-IS Model

The As-Is model, as shown in Fig. 1, represents the current situation simulation with no improvements and modifications. The current situation is face-to-face consultation at the ARSU. We test and validate the As-Is

model by running different simulations with several scenarios. The input variables for the simulation model are student request arrivals, consultant, and admin. The simulation model's defined output variables are the number of reservations; the number student served; total time in the system; the number student not complete; the number of students cancelled; the number of student requests, and time waiting. When the student arrived at the ARSU and request consultation service, the admin set an appointment. The student then decides either the appointment is not suitable and not complete the process, or the student will wait. After that, there is a possibility of the student to attend the session or cancel it. Table I shows that the number of students served is 20 students.

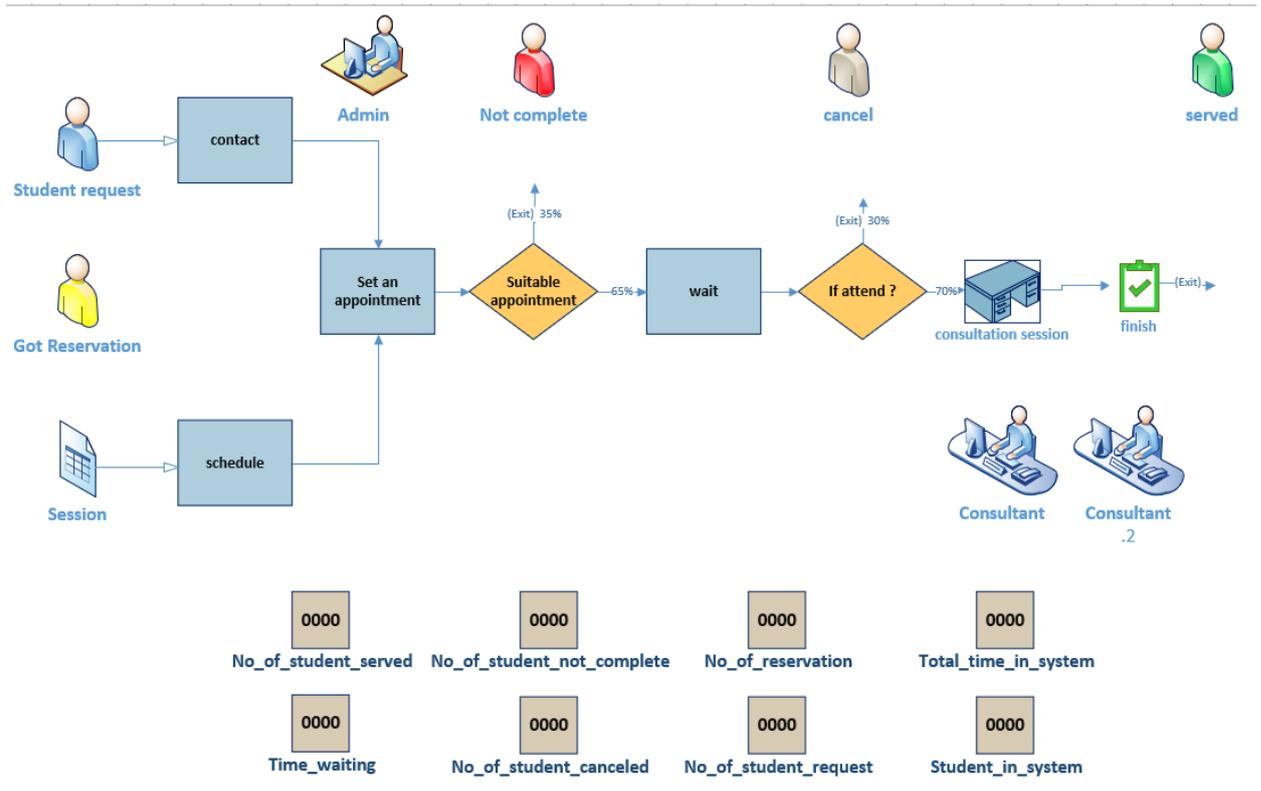


Fig. 1: Simulation for As-Is Model

TABLE I  
THE OUTPUT FOR SIMULATION OF THE AS-IS MODEL

Replication	Name	Total Exits
Avg	Served	20

**B. The To-Be Model**

The To-BE model is an online consultation. When the student enters the system, the student either finds an available consultant and enters the virtual session or is busy, and the student can wait for the turn or exit from the system. Table II shows that the number of students served is 29 students.

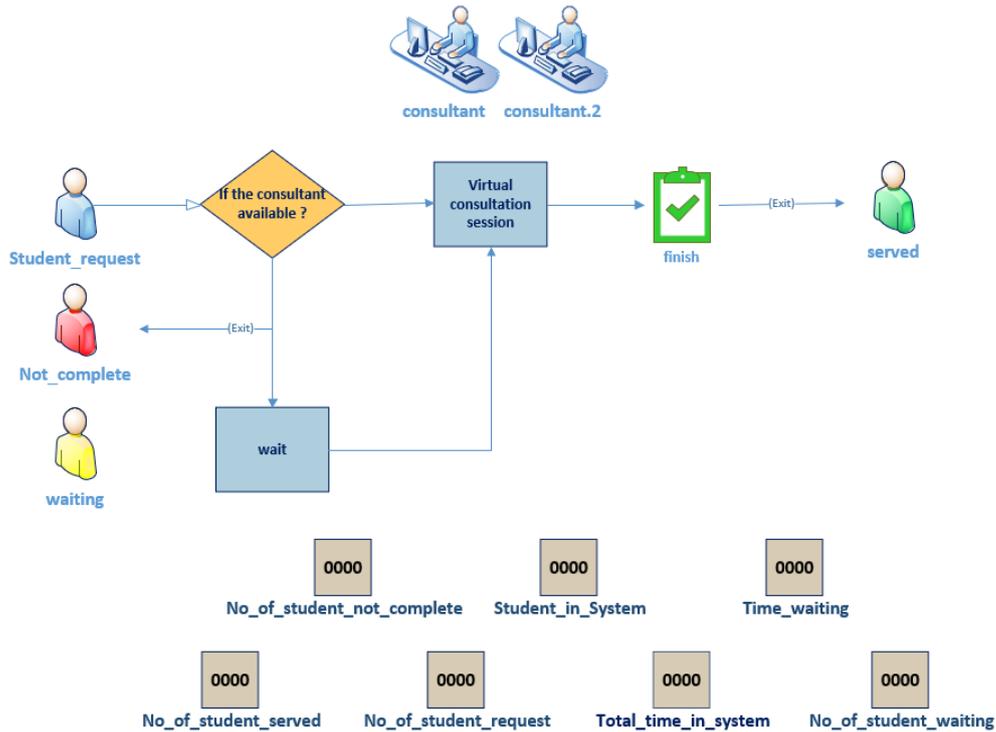


Fig. 2: Simulation for To-Be Model

TABLE III  
THE OUTPUT FOR SIMULATION OF THE TO-BE MODEL

Replication	Name	Total Exits
Avg	Served	29

## VI. RESULTS AND DISCUSSION

Table 1 and II present the comparison results between the As-Is model and To-Be model. The inputs for the As-Is model are student request, consultant, and admin. The To-Be model inputs are student request and consultant while we removed the admin because it does not affect the online system. In the To-Be model, the total number of served students is 29, while the As-Is model is 20, which is less than the To-Be model. The online consultation will eliminate the cancellation problem because it is conducted anywhere and without reservation. Even if the student leaves or cancels the session, the consultant will be available, and another student can join the session. There are no limitations like As-Is, for example, room, reservation, and appointment. We conclude from the results shown in Table III that the To-Be model is better than the As-Is model because the number of served students has increased.

We conclude that the To-Be model is the best case and achieves the best key performance indicators: optimizing the utilization of consultant and maximizing the total number of served students. Therefore, the To-Be model can improve the organization by eliminating the manual processes and cancellation problem and optimizing consultant resource utilization.

## VII. CONCLUSION

This research aims to improve organization performance through the development of the consultation services process. The improvement was converting the current situation to the online consultation services model. The current phase is to enhance process performance by increasing the served student. The next phase of the research will be finding the students' waiting time.

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