

Internet Service Evaluation System: A Design Science Research

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Abstract

The Internet is extremely important to accomplish numerous items, from education to businesses and entertainment. Therefore, the quality of its performance must be efficient. Nowadays, there is a lack of information available for users to choose a suitable Internet service. What information is available might be insufficient, inaccurate, or regularly updated. Accordingly, there is a need to develop an electronic system that enables users to evaluate their current Internet service subscription. Several factors are used as evaluation criteria in the system that affect users' decisions. In this paper, a prototype of a design science research project is proposed to address a few objectives. First, it can help Internet service users in Saudi Arabia to make the best decision for themselves regarding Internet services subscriptions. Second, it can assist the Saudi government to seek one of the 2030 vision goals: the digital transformation that depends on having a good Internet connection. The proposed solution is a promising one that would help Internet service users to make the best decision for themselves and choose the best Internet service that fits their needs. A qualitative method has been used to evaluate the efficiency and the utility of the proposed system prototype. The results showed the extent of participants' acceptance of the Internet Service Evaluation System.

Keywords:

Internet service, Internet service providers, Users' reviews, Users' feedback, Internet service evaluation system.

1. Introduction

The Internet has gone through constant evolution throughout the years since its inception as a network of interconnecting networks. As a result, it has become a large-scale distributed network spanning the globe, intertwined with every aspect of our daily lives [1]. Thus, Internet usage has increased focus on several activities such as entertainment, business, education, etc. [2]. This universal trend of the rapid growth of Internet usage resulted in the rising demand for Internet Service Providers (ISPs) and information technology products [3]. An ISP is an organization that provides services for accessing and using the Internet [2]. Because there are several different ISPs, Internet users usually try to select the ISP which provides the best services. Studies show that Internet users tend to compare the aspects of several providers and search for various resources of information to help lower the perceived risks in their selection [3]. Also, studies show that customer selection and decision-making are affected by the reliability

of an organization's brand [3]. Since ISPs don't offer a tangible product, their service quality is often evaluated by measures of the service providers' relationship with customers [2]. Hence, ISPs must consider their staff skills and knowledge and consider customer demands such as providing efficient Internet services that will meet their needs [2].

Usually, users tend to try several Internet services to choose the best Internet service to which they will subscribe. However, there is a lack of information regarding the ISPs, and what information can be found may not be sufficient or even frequently updated. To evaluate the quality of Internet services, the users can subscribe to different ISPs and compare their performance based on users' geographical area to decide which one best fits their needs. This results in wasting the user's money, time, and effort. Additionally, users often use unofficial sources such as asking acquaintances, neighbors, and colleagues or searching in forums, social media sites, and applications to read other users' reviews and advice. This approach is generally impractical if the other users live in different geographic areas than the user.

The main objective of this research is to help the Internet service users in Saudi Arabia to make the right decision regarding which Internet service best fits their needs. Several evaluation criteria were considered, such as the user's geographical location, time period, ISP, technologies, Internet service speeds, performance and problems, technical support of the ISPs, and subscription prices. There are also some other sub-objectives which are: (1) saving the user's time, effort, and money, and (2) helping the Saudi government to seek one of the 2030 vision goals: a digital transformation that depends on having a good Internet connection [4].

This paper introduces an electronic system that enables the users to evaluate their current Internet service subscription in terms of Internet service speeds, performance, technical support, and subscription prices. The evaluation is based on the user's geographical location, time period, ISP, and used technologies. Thus, other users can benefit from the reviews to choose the best ISP that fits their needs and technologies according to their location. The

methodology used to achieve the objectives of this research paper is the design science research (DSR) [5], where the solution is designed based on the consumer behavior theory, specifically the consumer decision-making process [6], known as the Engel-Blackwell-Kollat (EBK) model.

DSR is a paradigm for problem-solving by creating a novel IT artifact to enhance human knowledge and making design knowledge (DK) through creative solutions for real-world problems [7, 8]. In this paper, the DSR project aims to design, develop, and evaluate the IT artifact for enabling the users to assess the Internet services in Saudi Arabia and make the best decision for themselves to subscribe to an Internet service. The artifact is developed to achieve the following two objectives:

- Design an artifact to evaluate the Internet services in a specific location and publish the reviews to other users.
- Evaluate the artifact by considering its ability to help its users to make decisions, as well as its ease of use.

To the best of our knowledge, no similar systems have been developed focusing on similar problems in Saudi Arabia. The rest of the paper is organized as follows: The literature review is discussed in Section 2. The design science research (DSR) methodology and its phases are discussed in Section 3. Section 4 discusses the Internet Service Evaluation System. Finally, the conclusion, which includes the results and future work, is presented in Section 5.

2. Literature review

2.1 Theoretical Background

The term “consumer behavior” refers to the processes involved in the choice or purchase of a product or service by an individual or group of individuals in response to needs and desires [9]. One of the most widely used consumer behavior models to describe the steps of the purchase decision is known as an Engel-Blackwell-Kollat (EBK) model [6]. The model includes seven consumer processes which are: need recognition, information search, pre-purchase evaluation of alternatives, purchase, consumption, post-consumption evaluation, and divestment. Need recognition is expected to happen when consumers recognize there is a gap between their desired situation and the real one, so they need to resolve this gap. Information search and processing mainly focuses on consumers and the usage of internal or external sources to search for the best solution. Pre-purchase evaluation of alternatives reflects the consumers' use of the gathered information from the search to make a comparison between several alternatives, where consumers' beliefs and attitudes are usually considered as factors that can affect the alternative evaluation. Purchase

and consumption are the processes where the consumer chooses the product that he/she wants then buys and consume it. This decision could be affected by environmental influences such as culture, social class, personal influences, family and situation, and by individual differences such as consumer resources, motivation and involvement, knowledge, attitudes, personality, values, and lifestyle. The post-consumption evaluation process focuses on the consumer assessing his/ her satisfaction regarding the purchase or the usage of the product. Typically, customer satisfaction with the purchase is influenced by consumers' expectations compared to the actual performance of the product or service. A satisfied consumer will probably share a positive review, and generally, information obtained from other customers' reviews is more credible than commercials. Divestment is the final process, which means the product or service is likely to reach an end at some point post-consumption [10, 11].

2.2 Factors Affecting Decision Making

Mostly, Internet service consumers compare the services provided by ISPs before the subscription. The topic of the factors that influence consumers' decisions has been widely addressed in different countries.

Madushanka et al. developed a model to investigate the factors impacting customers' intention to choose a specific Internet service provider in the Gampola area in Sri Lanka. The authors identified service quality, price, promotion, and brand image as factors that affect customer satisfaction when selecting Internet service providers, where the first four factors were identified as independent factors and the last factor was identified as a dependent factor. The researchers randomly selected 100 consumers who were using Internet services and asked them a set of questions to identify the relationship between independent and dependent factors. They found that the service quality and price had positive significant relationships with customer satisfaction, where the price was the more highly affecting factor on customer satisfaction. On the other hand, brand image and promotion did not have significant relationships with customer satisfaction for choosing an ISP [2]. Likewise, Buhajoti explored the factors affecting the customers' insights to select an ISP in Albania. The researchers set a survey questionnaire consisting of a set of questions about the approaches used for selecting an Internet service provider, experience with high-speed Internet, future intentions towards service providers, and demographics. The questions were about the customers' impressions and beliefs about their ISP, information received from reading, advice, or opinions about the ISP, and the risk perceived by consumers regarding their ISP subscriptions. They determined three factors from the questions: brand image, information, and perception of risk. 400 Internet users aged 16-55 with home-based Internet

connections from different regions in Albania were selected randomly to answer the questions. The results found that the brand image was the most critical factor to the consumer decision-making when choosing the ISP, followed by information and the risk associated with the ISP [3]. In South Korea, Lee presented the consumers' decisions regarding the factors affecting the selecting high-speed Internet service. The author considered firm reputation/brand image, price, access performance, additional benefits such as promotional gifts offered by ISPs to their subscribers, and support service as subscription factors for selecting an ISP, where each factor included a set of criteria. The author set up a questionnaire consisting of a set of questions comparing the criteria in each factor. 41 undergraduate students at the School of Business at the Chungbuk National University of Korea were selected to answer the questionnaire. The results showed that the Internet access performance was the most important criterion for ISP, followed by the Internet access performance, price, support services, additional benefits, and firm reputation [12].

2.3 Customer Reviews Impact on Decision Making

The word-of-mouth (WOM) of consumers, as well as user reviews and experiences, have become important resources for consumer decision-making. Numerous studies have indicated that consumers often visit WOM websites while searching for high-involvement products [13]. Chevalier and Mayzlin presented the effect of consumer reviews on Amazon.com and Barnesandnoble.com on sales, as increased ratings of books resulted in greater sales for those books. However, the study found one-star reviews were more influential than five-star reviews in the process of purchase decision making [14]. Likewise, Limpong et al. studied the ability of customer reviews to affect other consumers' decision-making on purchase intention for Internet/telephone service providers in Manado City, Indonesia. They found that the clear review of product assessment supported the increase in purchase intention, and that the volume of the reviews determined the popularity and the value of the products [15].

2.4 Making Customer Reviews Analyzing Application

Recently, Internet applications and websites that provide users space to express their opinions about specific products or services have become some of the most important means used by companies to explore their customers' opinions and their satisfaction. It might also be a beneficial tool for potential customers who want to know more about other people's opinions about the product or the service.

Prichystal designed an application to analyze customers' reviews in commerce fields. The application

analyzes reviews about products and shows the most used words in all reviews by using a word cloud. The author collected the reviews from an available public resource called Heureka (website containing product information) in Czech and used an opinion mining approach to extract the words used in the reviews. Using the applications, the user scans the product's barcode; then, the application analyzes other customers' reviews about the product and displays the common words in a word cloud to the user. The application results were satisfying. Thus, displaying users' reviews about any product would assist the user to make the right decision [16]. Furthermore, Tian and Ye developed a social platform for rating articles called Motif. Motif is a rating system for online articles to help users decide and save time by finding high-quality articles. The platform allows the user to store, rate, and share the articles they liked. Thus, the other users of the platform can see the ratings and the reviews [17].

The studies on the literature showed that buyers' reviews have a significant impact on the level of sales. This indicates the customers' interest in reading reviews and their great reliance on them in the decision-making process. This encourages the assumption of people's high reliance on the current proposed solution before dealing with any ISP.

3. Design science research methodology

In this paper, an Internet Service Evaluation System (ISES) prototype that helps the users decide the best Internet service is proposed. This system allows the Internet users in Saudi Arabia to evaluate their service from different aspects and let the users see other users' Internet reviews in different locations.

3.1 Consumer decision-making process theory

To design the proposed system, the consumer decision-making process proposed by Blackwell et al. [6] known as the Engel-Blackwell-Kollat (EBK) model was applied. The model consists of four main parts: information input, information process, decision process, and variables influencing the decision process.

- Information input: The components of this part are: External Search and Stimuli. The Internet Service Evaluation (ISES) is considered an external source that the Internet service consumer can use to obtain information. The proposed system provides the consumer with information related to the Internet service subscription reviews. The consumer can search for this information by using the search function provided in the system. This information is displayed to the user on the system pages. The stimuli provide information about the Internet service performance obtained from the users' reviews, such as the

average download speeds of the fiber optics service in a particular location. This information can be obtained from the ISES and viewed by the consumer. It is considered the outcome that the consumer is exposed to and triggers their behavior.

- **Information Process:** The components of this part are: Exposure, Attention, Comprehension, Acceptance, Retention, and Memory. The Internet service consumer is exposed to stimuli and the information provided via this system; attention determines which of the stimuli' provided information that the user will focus upon; thereafter he/she would interpret and comprehend it, accept it in his/her short-term memory and retain it by transferring the input to long-term memory.

- **Decision process:** The components of this part are: Need recognition, Search, Pre-purchase evaluation of alternatives, Purchase, Consumption, Post-consumption evaluation which contain two sub-components; Dissatisfaction and Satisfaction, and Divestment. After the Internet service consumer processes the information obtained from the system, such as the information about the average download speeds of the fiber optics service in a particular location, and saves it in his/her memory, the consumer enters the decision process part of the model. This part focuses on six decision-making stages. The consumer may do this after processing the information about the average download speeds of the fiber optics service notice or after recognizing a problem with his/her current Internet service's download speed. Therefore, the consumer is now in the need recognition stage. After the need is recognized, then the consumer moves to the next stage which is the search stage. In this stage, the consumer needs to search for information about solutions to the problem or the need that was recognized. This search done by the consumer may be an internal search based on his/her memory (i.e., past experiences...etc.), or an external search by using this ISES to find information about the current Internet technologies (i.e. 5G, and Fiber optic) and their performances. The search for information is also affected by environmental influences such as family or situation. Afterward, the consumer evaluates the various alternatives he/she found using the system such as different Internet service performance options. After the consumer is done evaluating the alternatives, he/she then enters the next stage which is the purchase stage. This stage is affected by individual differences such as consumer lifestyle or/and values. In this stage, the consumer subscribes to the best Internet service option he/she notices after the evaluation is done. Next is the consumption stage, in which the consumer uses and consumes the Internet service he/she subscribed to in the purchase stage. Afterward, in the post-consumption evaluation stage, the consumer evaluates the Internet service he/she subscribed to in the purchase stage in the

form of satisfaction or dissatisfaction. The final stage is divestment, which means the service the consumer subscribed to is likely to reach an end at some point post-consumption.

- **Variables influencing the decision process:** The components of this part are: Environmental Influences and Individual Differences. The model states that environmental influences such as social class may directly and indirectly influence the stages that the Internet service consumer will go through as indicated in the above model. Additionally, Individual differences such as lifestyle may influence need recognition, purchase, and consumption stages. This means that the Internet consumer decision-making is affected by other variables alongside the information obtained from the system.

3.2 Conceptualizing the Internet service evaluation system

This system is intended exclusively to help users in Saudi Arabia. Therefore, the system interfaces mainly will be presented in the Arabic language. Also, it can be changed to the English language for non-Arabic users. The system has two main actors: the registered user and the visitor's user.

- **The registered user:** this is who wants to post and share the Internet service subscription reviews. This user is required to set up an account by signing up first.

- **The visitor's user:** this is who uses the system to find information regarding the Internet service subscription reviews at a specific location. This type of user doesn't need to sign up. Users can directly use the system review map to select a particular location, then use the search features to get the needed information.

Figure 1 depicts the main page of the ISES. This page contains the reviews map (خريطة التقييمات). All types of users (the visitor's user and the registered user) can use this review map directly – there is no need to sign in/sign up. The user must first specify the desired geographical location area in which he/she wants to find Internet service subscriptions reviews. The user can achieve this by selecting the desired location area on the map either by dragging on it directly using the mouse or by using the search reviews' map (البحث في خريطة التقييمات) box feature then clicking on the "search options" (خيارات البحث) button. This will result in another page. This page contains the search options available to the user such as the time range (الفترة الزمنية), ISP company (شركة موفر خدمة الإنترنت), Internet service subscription type (نوع اشتراك خدمة الإنترنت), Internet service technology (تقنية خدمة الإنترنت), number of subscribers to the Internet service (أعداد المشتركين في خدمة الإنترنت), Internet service performance speeds (سرعات أداء خدمة الإنترنت),

Internet service performance problems (مشاكل أداء خدمة الإنترنت), technical support of the ISP (الدعم الفني لشركة موفر), (خدمة الإنترنت), and prices of Internet service subscription packages (تكلفة باقات اشتراكات خدمة الإنترنت). The user chooses the required search options and then presses the “reviews search” (بحث التقييمات) button. Afterward, the system will display the results in the form of statistics. Also, the main page contains the “take a tour” (إجراء جولة) feature that offers a guided tour for the users to go through to learn about this system's functions and features and how best to use it.

After the user signs in, the user can view and use his/her account via the profile (الملف الشخصي) page. In the user's profile (الملف الشخصي) page, the main menu contains three headers: Account Info & Settings (معلومات وإعدادات الحساب), Your Internet Service Subscription Reviews (تقييمات اشتراكات خدمة الإنترنت الخاصة بك), and Internet Service Preferences (تفضيلات خدمة الإنترنت), as shown in Figure 2.

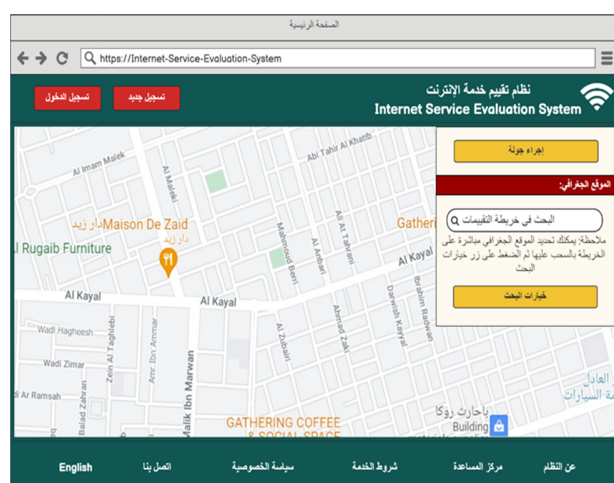


Fig 1. Main page and reviews map.

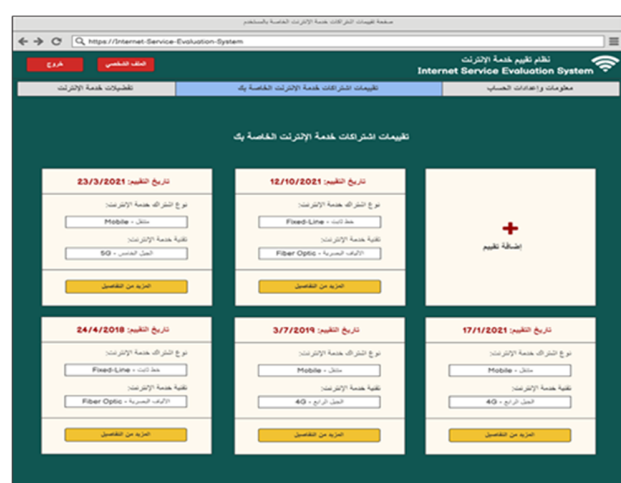


Fig 2. User Internet service subscription reviews.

1. Account Info & Settings/معلومات وإعدادات الحساب:

The registered user can view, edit his/her personal and contact information, or change password via this menu's header pages.

2. Your Internet Service Subscription Reviews/تقييمات اشتراكات خدمة الإنترنت الخاصة بك:

The registered user can add, view, edit, or delete Internet service subscription reviews under this menu's header pages.

A. Add new review/إضافة تقييم:

To add a new review, the registered user clicks on the “add review” (إضافة تقييم) option. Then, the user adds the geographical location (الموقع الجغرافي) of the Internet service subscription that is reviewed by clicking on the “get it” (احصل عليه) button. As it is important for the location data to be correct and accurate because other users' decisions rely on it, the system will receive it automatically, where the system obtains the location data based on the location of the device that is being used to fill the review form.

After filling the location, the user clicks on the “next” (التالي) button to move to the next window. This window is about the details of the Internet service subscription being reviewed as seen in Figure 3. The user should fill in Information such as the ISP company (شركة موفر خدمة الإنترنت), Internet service number/line number (رقم خدمة الإنترنت), Internet service subscription type (نوع خدمة الإنترنت/رقم الخط), Internet service technology (تقنية خدمة الإنترنت), Internet service subscription period (فترة اشتراك خدمة الإنترنت), Internet service subscription package (باقة خدمة الإنترنت), Internet service subscription package price (تكلفة باقة اشتراك خدمة الإنترنت), and Internet service subscription package (اشترك خدمة الإنترنت), (شركة موفر خدمة الإنترنت) and Internet service technology (تقنية خدمة الإنترنت) can be obtained automatically using “get it” (احصل عليه) buttons, whereas the subscription's Internet service number/line number should be entered by the user. For reliability and security reasons, this number should not be shared with other users.

Fig 3. Internet service subscription review page.

After filling in the details of the Internet service subscription, the user clicks on the “next” (التالي) button to move to the next window. This window is about the details of the Internet service subscription performance being reviewed, as seen in Figure 4. The user should fill in information such as download speed (سرعة التحميل), upload speed (سرعة الرفع), and ping by clicking on the “get it” (احصل عليه) buttons to make the system obtain these data automatically. This can be achieved by using existing readily built blocks of codes that can obtain the speed performance of the user’s Internet service. There are many reasons for making the system receive this data automatically, mainly because it is important for the speed data to be correct and accurate as other users’ decisions depend on it.

Fig 4. Internet service subscription performance review page.

This window is about the Internet service subscription performance problems. In this window, the user answers the

question regarding if he/she encountered problems with the performance of Internet service subscription, along with selecting these problems such as Internet service interruption (انقطاع خدمة الإنترنت), slow Internet speed (بطء), Internet speed fluctuation (تذبذب سرعة), and/or other problems (مشاكل أخرى), as seen in Figure 5.

Fig 5. Internet service subscription performance problems review page.

The next window is shown in Figure 6. In this window, the user answers some questions regarding the technical support of the ISP such as whether he/she contacted the technical support of the ISP to solve the problem of the Internet service performance, the ease of contacting the ISP, satisfaction with the speed of response of the ISP, if the problem was solved or not, and satisfaction with the time taken to resolve an Internet service problem by ISP using checkbox tool.

Fig 6. Technical support of the ISP review page.

The next window is about the tracking feature (خاصية التتبع). In this window, the user answers some questions regarding the tracking feature such as if he/she wants to allow the system to track his/her location and his/her Internet service subscription performance, and for how long. Finally, the user can click on the “post review” (نشر التقييم) button to post the review, as seen in Figure 7.

Fig 7. Tracking feature review page.

B. View/edit/delete review:

Moreover, the user can view all the Internet service evaluation reviews he/she posted in the system. The reviews presented to the user are arranged according to the review dates chronologically from newest to oldest. If the user wants to view a specific review in detail, he/she can click on its “more details” (المزيد من التفاصيل) button. Also, the user can edit/delete any of his/her posted reviews at any time. Note for accuracy and technical reasons the user is not allowed to edit some information in his/her previously posted reviews such as the geographical location (الموقع), ISP company (شركة موفر خدمة الإنترنت), Internet service number/line number (رقم خدمة الإنترنت/رقم الخط), Internet service subscription type (نوع اشتراك خدمة الإنترنت), Internet service technology (تقنية خدمة الإنترنت), download speed (سرعة التحميل), upload speed (سرعة الرفع), and ping.

4. Evaluation

4.1 Evaluation Setup

To ensure the feasibility of the website, a high-fidelity prototype of the evaluation system was designed to demonstrate the functionalities of the system. The IT artifact was evaluated using a qualitative method. Thus, a semi-structured interview was used to qualitatively evaluate the prototype by assessing the following metrics: efficiency and utility. All Adegoke and Ang developed questions were

used [18], except the 3rd question that measures connectivity was eliminated since this study did not have the full system. Other questions were also added. The used questions are:

1. “What are your positive impressions and expectations regarding the establishment of this system?”
2. “How will user ratings in the system affect your decision to sign up for a particular service?”
3. “Do you have any perceptions about the possible limitations of the system?”

Furthermore, the participants were shown the initial prototype of the system and were asked additional questions. The asked questions are:

4. “Based on the system prototype presented to you, what are your personal comments?”
5. “Do you have any problem with sharing your location?”

The data were collected from semi-structured interviews, in which open-ended questions were asked. The interviews were conducted in 2021 with 14 participants whose native language was Arabic, as nine of the participants were interviewed face-to-face with a duration of 20 minutes, and five of them were interviewed using synchronous online interviews via voice chat. All the interviews were recorded. The participants were chosen randomly using the convenience sampling technique. The participants worked and studied in different organizations. To protect the participants' privacy, a random identifier was assigned to each one, such as P1, P2, ...etc.

4.2 Evaluation Results

The interviews were analyzed using thematic analysis. Three (21.43%) of the participants are males and eleven (78.57%) are females. Six (42.86%) of the participants' age ranged from 21 to 25, and four (28.57%) ranged from 26 to 30, while participants with ages ranged from 15-20, 31-35, 46-50, and 56-60 are only one (7.14%). Almost one-third of the participants are students (35.71%), while two (14.29%) of the participants work in the education field. It shows that the retired participants and participants working in the healthcare field represent one (7.14%), independently. On the other hand, three (21.43%) of the participants have no job, while anyone outside of these occupations represents two (14.29%).

1. Interview Question 1 (Positive expectations of using ISES):

According to Adegoke and Ang's first developed questions [18], the participants agreed that ISES will offer positive results. Also, it is important to mention that the presented responses are English translations of the Arabic responses.

- P4: "That is cool, I feel like this will increase the rate of expectation of each service like it will give me a big picture of what to use and what to subscribe to. That is cool. I think this is going to be a big step."

- P5: "Maybe this will help the companies in improving their products, and it will help me in the decision-making as well."

- P14: "Since I have no idea about the best Internet service or the best companies that offer these services, I think this system might help me to make a better decision."

2. Interview Question 2 (ISES and Decision-making process):

All the respondents agreed that ISES will highly affect their decision-making process. Two (14.29%) of the participants also emphasized that the effect of ISES on their decision-making process depended on the percentage of the positive/negative reviews. All the presented responses are participants' responses after translation.

- P2: "Yes, absolutely, I am extremely sure it will. I will consider it like if I noticed any bad reviews about a specific product I am sure that I am going to exclude it from my list and never buy it."

- P6: "Yes, of course. I care about other people's reviews, if the majority of people's evaluation was positive, I would subscribe."

- P9: "Personally, I feel that consumers' evaluations are important, and I need to consider it because this will save the time and cost needed to try these services."

3. Interview Question 3 (ISES limitations)

Participants were asked about their perceptions of the possible limitations of the ISES, so they can be considered while developing the system or be considered as possible future improvements. Six (42.86%) of the participants did not find any possible limitations for the system, while the rest (57.14%) viewed different aspects of limitations including dishonest evaluation, lack of reviews, and some other limitations. The shown responses are the English translations of their responses.

- P1: "Companies may set high ratings in their favor."

- P2: "This system will need to take some time... I don't know how much it will take but maybe it will take like 2, 3, or 5 years to generate enough information that is ready to be used as a good reference for people."

- P9: "Rating information might be manipulated based on the user's bias towards a particular company."

- P11: "I think people -in our society- aren't ready to provide reviews; I mean, the number of reviews will be few as you can see in Google Maps comments section, people do not give enough reviews."

4. Interview Question 4 (ISES prototype evaluation):

Almost all the participants provided positive responses about the prototype. All the presented responses are participants' responses after translation.

- P3: "I like how the users need to sign up with their phone number instead of relying only on their email addresses, in that way people will reconsider before making any bad evaluation to harm a particular company."

- P14: "I love the idea that the website is able to get the upload speed and the ping automatically based on the location since I don't know how to get them by myself. From what I see, the location idea is brilliant."

However, P7 had a different opinion about the initial system prototype, as he pointed to the incoherence of the evaluation requirements.

- P7: "I feel like there are too many details, like the network device category (5G, 4G routers), many people do not really understand these things. Normal people won't be able to fill in this information."

5. Interview Question 5 (ISES security issues)

Since sharing location could be considered a security issue in ISES, participants were asked if they have any problems with sharing their locations with the system. The interviews showed a variety of responses, as four (28.6%) of the participants expressed their disapproval of sharing their location to protect their personal information, while the other 10 (71.4%) participants expressed their approval in using their locations as long as ISES wouldn't present their exact location to other users or track their location continuously. The shown responses are the English translations of their responses.

- P2: "To be honest, I will only use this website as a visitor. I am not ready to share my location or any information including my evaluation. I am not going to do it. These days browsers can track the location, but for me... I always make sure to turn my location settings off."

- P12: "No, I have no problem. Because all the websites ask for location nowadays, your phone is already tracking your location, so it is ok for me."

- P9: "The system should only track the user's location temporarily. Otherwise, this would be uncomfortable for the user."

• P10: "No, I do not have any problem with sharing my location. As you can see, most of the websites and the applications use our location information so they can offer a better service. So yeah... I have no problem with that."

5. Discussion

This paper presents a novel and simple solution for Internet users and ISPs by developing an Internet Service Evaluation System that can help users decide the appropriate Internet service for them regarding their location by presenting other users' reviews that focus on different aspects such as the Internet service technology, performance, and problems, ISP, technical support and subscription price. This also allows the ISPs to improve their services. To the best of our knowledge, this solution is the only innovative solution since similar Internet service evaluation systems were not found.

While the ISES was designed and developed, the Engel-Blackwell-Kollat (EBK) theory was applied and fulfilled. The authors found that applying this theory provided a strong foundation for understanding and providing a solution that is robust and that offers a good value to Internet service users. The findings that are similar to this theory's components are as follows. Exposing the user to review information using different means was found to be the best way to get the user's attention. Also, presenting the information of the reviews in simple and brief forms such as statistics help the user to view and understand this information faster than using text reviews. Moreover, it was noticed that after viewing these Internet service reviews, the user might recognize a problem in his/her Internet service subscription. As a result, the user will need to search for alternative solutions and then evaluate these alternatives.

Furthermore, the study's findings of what kind of information related to the Internet services the users want the ISES to provide can help them in decision making. This study found that information about Internet service quality, speed, performance, price, and technical support of ISPs is mostly what the users want to know. Thus, these findings are very similar to the factors that influenced the users' decision-making as presented in the following previous studies [2, 3, 12].

Finally, as an evaluation of the system prototype, interviews with Internet users were conducted. All the interviewer's participants had a positive expectation about the system, and all of them agreed that other users' reviews would influence their decision-making process. This finding is similar to what was mentioned in the following previous studies [14, 15, 19]. However, there was some inconsistency in opinions about sharing locations with ISES,

and it is important to mention that participants provided helpful personal points of view about possible system limitations. Participants' responses had a significant impact on broadening this study's view of how to better develop the system.

6. Conclusion and future work

This research used DSR methodology following customer behavior theory. The developed artifact is novel, while the complete working system was recommended as a future work, as well as providing multiple languages other than Arabic as a feature for users with different nationalities. Furthermore, this study's researchers are planning to add additional Internet service preferences features, such as allowing the user to receive recommendations, reports, promotions, or to get contacted by ISPs through this system and WhatsApp messages, along with enabling the user to manage these received preferences on this system. Accordingly, the user can add these preferences to his/her favorite list, delete, add comments, send suggestions, rate the content, and share them through other platforms. More importantly, this study's researchers are planning to build admin accounts, especially for each ISP. Through this admin account, the ISP can manage and send its promotions to the users who want to receive them. Additionally, the ISP can view and manage the users' contact information and preferences, and the ways of contacting the users.

Conducting and evaluating the Internet Service Evaluation System prototype broadened the researchers' views of the best way to develop and design the system. ISES can aid the users in deciding the appropriate Internet service based on their locations. Along with these, ISPs will be able to improve their Internet services based on other users' reviews in the system as well. The development of this system will serve as an excellent reference in the coming years for all Internet users in Saudi Arabia.

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