**Innovative Computing Review (ICR)**
**Volume 3 Issue 2, Fall 2023**
ISSN$_{(P)}$: 2791-0024, ISSN$_{(E)}$: 2791-0032
Homepage: https://journals.umt.edu.pk/index.php/ICR

**Article QR**


| | |
|---|---|
| **Title:** | **E-Satisfaction of Pakistani e-NADRA Website Using System Usability Scale (SUS) Evaluation** |
| **Author (s):** | Hafiz Muhammad Ashja Khan, Abdul Hafeez Muhammad |
| **Affiliation (s):** | Bahria University Lahore Campus, Pakistan |
| **DOI:** | https://doi.org/10.32350/icr.32.03 |
| **History:** | Received: September 27, 2023, Revised: October 28, 2023, Accepted: November 15, 2023, Published: December 2, 2023 |
| **Citation:** | H. M. A. Khan and A. H. Muhammad, "E-Satisfaction of Pakistani e-NADRA website using system usability scale (SUS) evaluation," *Innov. Comput. Rev.*, vol. 3, no. 2, pp. 00–00, Dec. 2023, doi: https://doi.org/10.32350/icr.32.03 |
| **Copyright:** | © The Authors |
| **Licensing:** | This article is open access and is distributed under the terms of Creative Commons Attribution 4.0 International License |
| **Conflict of Interest:** | Author(s) declared no conflict of interest |

A publication of
School of Systems and Technology
University of Management and Technology, Lahore, Pakistan

# E-Satisfaction of Pakistani e-NADRA Website Using System Usability Scale (SUS) Evaluation

Hafiz Muhammad Ashja Khan*, and Abdul Hafeez Muhammad

Department of Computer Science, Bahria University Lahore Campus, Pakistan

**ABSTRACT** The current study attempted to evaluate how customers perceive and interact with the 'Pak identity service' offered by the "National Database and Registration Authority" (NADRA). The study specifically aimed to assess the citizens' opinions about the lately introduced e-government service, Pak-identity, in terms of its user-friendliness, adaptation, and artistry. A quantitative approach was employed by using a questionnaire-based survey in order to identify the factors that influence customer e-loyalty. This approach helps to gain insights into how citizens perceive and behave towards this service. The study collected responses from a sample of 25 individuals through random sampling technique to ensure that it aligns with the study's objectives. Additionally, certain measures were taken to ensure the credibility and validity of the scale used in this research. The current study holds a unique position in the context of evaluating e-services in the country. It focused on the attributes related to the quality of web services provided to citizens, with the ultimate goal of enhancing their adoption and acceptance within society.

**INDEX TERMS** adaptation, e-service, NADRA, Pakistan, Pak-identity, website design

## I. INTRODUCTION

The quick move towards the adoption of Information Communication and Technologies (ICT) with the purpose of delivering services has created a broad spectrum of opportunities for both service providers and consumers [1]. It is now essential for organizations in both, public and private sectors to improve their internal and external relationships by embracing innovation, reducing costs, and employing distinctive methods to retain their customers [2]. For instance, the head margin is intentionally proportionally larger than the customary measurements. These specifications are intentional and have been set up to envision your paper as an integral part of the entire proceedings, rather than as an independent document. Kindly abstain from making any adjustments to the current designations. Many researchers have emphasized e-services as endeavors strongly reliant on information technology including websites, kiosks, and mobile devices [3]. Within the realm of communication, websites serve as sturdy bridges that strengthen the relationships between stakeholders. The study focused on the examination of vital components to define a mature website, namely, navigation, personalization, and design.

Navigation is a critical feature that aims to facilitate customers. Moreover, it also provides them with easy access to information during website browsing, ultimately enhancing their experience and purposeful engagement [4]. Some researchers have noted that effective navigation acts as a reliable link for delivering information to customers [5].

The initial impression of a website plays a pivotal role in shaping users' intentions to engage with it. Factors, such as color scheme, information layout, visuals,

*Corresponding Author: 03-243222-005@student.bahria.edu.pk

descriptions, and downloading speed have a direct impact on users' willingness to return to the website. It is important to note that a negative user perception can result in an unsatisfactory user experience, leading to reduced retention, loyalty, and trust in website's reliability. Therefore, the initial user engagement should feature an eye-catching design to establish a favorable impression of the website. The website's layout must be intuitive, providing users with the support and information they seek, personalized according to their preferences [6].

### *A. NATIONAL DATABASE AND REGISTRATION AUTHORITY (NADRA)*

In the year 2000, as part of a state-led initiative to implement ICT-based infrastructure for e-government services, a slew of government-funded projects was set in motion. Nevertheless, only a handful of these projects reached maturity over time. Similarly, the adoption of ICT for e-government in other developing countries encounters numerous challenges, with the success of such projects being rather uncertain.

During the first quarter of 2000, Pakistan embarked on an endeavor to issue Computerized National Identity Cards (CNICs) to its citizens, heralding a shift towards digitalization. This endeavor led to the establishment of National Database and Registration Authority in Pakistan (NADRA). Initially, NADRA's primary mission was to overcome the longstanding documented system for issuing NICs, which had been in operation since 1973, with a more advanced computerized national identity system [7].

In a relatively short span, NADRA successfully standardized its services and achieved a remarkable milestone by introducing a Multi-Biometric National Identity Card system that aligns with international standards. Presently, NADRA has extended its services to additional countries, such as Bangladesh, Kenya, Sudan, and others.. These initiatives in e-service innovation and e-government development not only enhanced the organization's reputation but also contributed positively to Pakistan's global image.

### *B. SIGNIFICANCE OF RESEARCH*

Recognizing user satisfaction as a vital aspect of websites, the quality assurance of a website hinges on the utilization of automated testing tools. These tools, designed for performance testing, not only reduce costs but also enhance efficiency. Their utilization is pivotal in evaluating the effectiveness and proficiency of websites [8].

Pakistan has NADRA e-services, however, the use of such services is very difficult for non-experienced and non-graduate users. To overcome this problem, the current study conducted the usability evaluation on NADRA site. Afterwards, the study also provided suggestions to enhance the design for non-experienced and non-graduate users.

### *C. AIM OF STUDY*

The virtual nature of this service necessitates a thorough understanding of citizens' initial perceptions. The recognition of citizens' needs is a driving force for enhancing 'Pak-identity' and gaining wider embrace among the public. Furthermore, the current offerings by NADRA to citizens encounter various challenges, such as time-consuming procedures, application rejections due to incomplete or inappropriate document submissions, and inconsistencies in service quality, reflecting

the diverse opinions citizens hold regarding service quality. In summary, the current study sought to elucidate citizens' viewpoints on designs, features, and amenities of 'Pak-identity' service, with a specific emphasis on aspects, such as navigation, personalization, and design.

The current study delved into the challenging landscape surrounding the 'Pak-Identity' utility. The study begins with an exploration of its objectives, succeeded by a literature review addressing the concerns related to 'navigation,' 'personalization,' and 'design' within web services. These considerations would be amalgamated into a conceptual model for the current study to meet its objectives. To fulfill the study's objectives based on the conceptual model, the methodology would be subsequently discussed after the literature review. This will pave the way for inspection and insights, where quantitative measures would be examined that may challenge the conceptual model.

## II. LITERATURE REVIEW

The logical flow of information plays a critical role in understanding and predicting customer acceptance and adoption in the realm of e-services. The government's website serves as a platform for interaction with citizens [8]. When addressing quality parameters, the website, including its design, significantly influences customer adaptability, trust, satisfaction, and usage. An appealing and well-designed website can help meet customer expectations and needs, thereby enhancing their satisfaction and intent to revisit and adopt the offered e-services provided by service providers [9], [10]. Regarding satisfaction and re-visitation ambition, the website's impact can be a mixed bag [11]. For instance, a website with accessibility, usability, usefulness, sufficient information, quality content, and an attractive appearance can positively influence customer satisfaction [12]. Conversely, the lack of any of these elements can have a negative impact on customers' intentions and perceptions regarding revisiting government e-services [13]. In the existing body of literature, it is evident that website design significantly affects customer satisfaction (e-loyalty) and revisit intentions. It is also argued that if website design falls short of meeting customer expectations and needs, it can impact customers' intentions to revisit. After discussing the criteria for a well-designed and appealing website, it becomes evident that the initial user experience with the website greatly influences their intention to revisit [14]–[16]. This is akin to the first impression a shopper gets while entering a physical store and it's closely connected to the moment a visitor first interacts with a website. Hence, this initial encounter with a website is akin to the first impression a consumer has when they visit a web page and engage with it. A well-designed website has the power to captivate its users, encouraging them to remain interact and return to the site.

The continuous evolution of new tools and practice in website design is giving rise to innovative ways of navigation. The current trend in e-service offerings emphasizes the need for seamless and obstacle-free interactions between website users and e-banking platforms. Navigation, in the sense of moving swiftly between loads of information, is becoming faster and more efficient. In academic literature, navigation is deemed crucial for the search task within website design, enabling the users to access all the necessary information and webpages. Efficient navigation is, therefore, a pivotal element in website quality, distinct from the design itself. In simpler terms, navigation

significantly and critically impacts customer satisfaction.

Navigation can also be described as a user facilitator that aids users in locating the information and destinations they seek. Furthermore, it enhances the website's user-friendliness and aims to foster customer e-loyalty. Previous research has shown that in the general framework of website design, effective navigation emerges as a fundamental aspect cutting across diverse domains, such as e-health, e-learning, e-commerce, and e-government. Every e-platform requires a unique set of parameters and functionalities to engage and cater to its specific audience. In terms of functionality, composition, and system, every web platform solution offered in market demands efficient browsing as a critical success factor. In essence, it underscores the significance of customization and adaptability. Additionally, hardware-based support is essential for achieving the desired acceleration rate, encompassing factors, such as CPU requirements, supportive applications, plugins, browser capabilities, and web application capacity [17].

Personalization, on the other hand, provides users with a sense of importance and enables the companies to target individuals directly, facilitating effective one-to-one communication. The previous discussions in this section highlight the pivotal role of navigation while assessing the consumer e-loyalty and satisfaction. Previous studies have proposed that the significance of efficient navigation in shaping customer satisfaction is a continuously evolving aspect, with ongoing efforts to define standardized scales and values for navigation components.

Oliver (2014) underscored the significance of elements, such as product knowledge, website design, and navigation as vital and dynamic contributors to e-satisfaction. The level of support from service provider, particularly in terms of reciprocity and fostering a sense of engagement in two-way communication, emerges as key factors in defining the attributes of website reciprocity. Measuring usability can be a challenging task since it is largely subjective [18], [19]. Consequently, there are various methods to assess the usability, one of which is the System Usability Scale (SUS). A systematic evaluation of SUS studies, spanning over a decade, has revealed that this tool is valuable for quickly and easily gauging system usability.

The current study represented an inaugural endeavor to empirically examine people's subjective viewpoints on e-participation usability in Malaysia. Renowned for its extensive research and widespread adoption, SUS is a method for gauging user perceptions of usability in websites, software, and diverse human-machine systems [20], [21]. This straightforward scale has exhibited greater dependability across varied sample sizes in comparison with alternative usability scales. Additionally, SUS method has been referenced in over 1200 publications [22].

## III. METHODS

### *A. PARTICIPTANTS*

In this usability study, twenty five participants were enrolled, and their participation was entirely voluntary. All participants were adults or older than 20 years. Among the participants, sixteen were male, and the remaining nine were female. These were the students of Bachelor's degree. As a gesture of gratitude, a token of appreciation was provided to each participant at the conclusion of the session.

### *B. MATERIAL AND REQUIRMENTS*

The sessions were conducted concurrently in a computer laboratory at the university, utilizing computers with identical specifications (Dell Core i5; 8 GB RAM; 500 GB storage) and the web browser used was Google Chrome.

### *C. USABILITY QUESTIONER*

In this study, SUS questionnaire was employed comprising 10 items, each using a 5-point Likert scale. To assess the usability, participants completed the SUS questionnaire. The questionnaire included ten statements related to the website under evaluation, and participants could express their level of agreement by assigning scores on the form, ranging from 1 to 5, with 5 indicating strong agreement.

### *D. PROCEDURES*

In the current study, usability tests were conducted with the active presence of a researcher. Participants were welcomed into a laboratory-like setting and they willingly provided their consent to participate. Following the completion of the consent form, the researcher provided a concise overview of the study's objectives and procedures to be followed. Subsequently, participants were directed to explore the website and engage in various tasks, with a specific focus on the e-participation module.

Upon concluding the usability tests, participants were asked to fill out the SUS questionnaire. A visual representation of the experimental procedure can be found in Figure 1 below, illustrating the flow of activities.

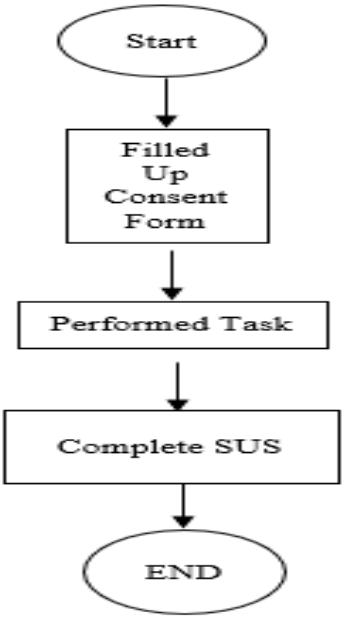


**Figure 1.** Experimental procedure

## IV. Results

Table I shows the description of the collected data which comprises information of data frequency of different users and different age groups of people along with mean score of SUS.

TABLE I

FREQUENCY AND SYSTEM USABILITY SYSTEM (SUS) MEAN SCORE

| Factor | Category | Frequency | Percentage | Mean SUS Score |
|---|---|---|---|---|
| Gender | Male | 16 | 16% | 50.4 |
| | Female | 9 | 9% | 56 |
| Age | 18-25 | 23 | 23% | 53 |
| | 25-30 | 2 | 2% | 35 |
| Education | Intermediate | 25 | 25% | 53.1 |
| | Bachelors | 0 | 0% | 0 |

Figure 2 shows the graph of SUS' mean score which is divided in two categories based on male and female. There were total 25 members.

SUS was applied and the mean SUS score of usability scale was maximum 56 for female and 50.4 for the male participants which is quite low for the usability range. Value of education is 53.1 which is also low to the range of SUS scale.

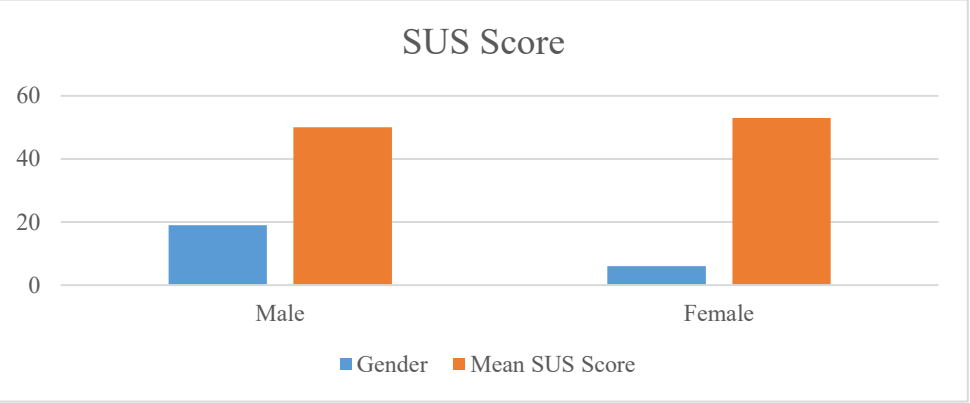


**Figure 2.** Mean system usability scale score

## V. CONCLUSION

The current study reported on SUS assessment of e-NADRA in Pakistan. The results showed that all participants were experienced users of internet and university students. They faced no problems to participate in the study. The study also highlighted that there are usability issues in e-NADRA site according to SUS scale. One impediment was that the sample size was partisan only for 25 people who participated in it. The scope of the study was confined to assessing usability using the SUS measurement tool, featuring a10-question questionnaire for measuring usability. Therefore, a more thorough consideration of e-participation's usability can be achieved by employing a comprehensive survey tool designed to specifically explore various usability principles.

Here is the link for the questionnaire.

https://docs.google.com/forms/d/1I6bpU2xVkQyb_F-MP0pFchb4cv0MO7YmiHcHUCq4kMQ/edit

### *A. FUTURE WORK*

The study suggested that the dataset should be more than 100 participants to test the usability of e-NADRA site and must design the interface which is easy to use for the non-graduated users.

## REFERENCES

[1] D. A. Aaker and E. Joachimsthaler, *Brand Leadership*. Simon & Schuster, 2012.

[2] M. M. Al-Kasasbeh, S. Dasgupta, and A. H. AL-Faouri, "Factors affecting e-service satisfaction," *Commun. IBIMA*, vol. 2011, Art. no. 547937, 2011, doi: https://doi.org/10.5171/2011.547937

[3] F. Ameen, *A User Acceptance of Web Personalization Systems: Model Validation using SEM: A PLS-PM*

*Approach with Moderating Effects*. Iris Publishing, 2014.

[4] M. Ali, S. Hassan, M. S. Ahmad, Y. Yen, and F. Asmi, "Critical success factors of e-government services in developing countries (A case study of NADRA Pak-identity service)," *Info. Know. Manag.*, vol. 6, no. 11, 2016.

[5] N. J. Ashill and D. Jobber, "The effects of the external environment on marketing decision-maker uncertainty," *J. Mark. Manag.*, vol. 30, no. 3–4, pp. 268–294, Mar. 2014, doi: https://doi.org/10.1080/0267257X.2013.811281

[6] B. Bender Stringam and J. Gerdes Jr., "Are pictures worth a thousand room nights? Success factors for hotel web site design," *J. Hosp. Tour. Technol.*, vol. 1, no. 1, pp. 30–49, 2010, doi: https://doi.org/10.1108/17579881011023007

[7] X. Guo, K. C. Ling, and M. Liu, "Evaluating factors influencing consumer satisfaction towards online shopping in China," *Asian Soc. Sci.*, vol. 8, no. 13, pp. 40–50, 2012, doi: http://dx.doi.org/10.5539/ass.v8n13p40

[8] A. Ilyas, S. H. Wajid, and A. Muhammad, "Usability evaluation of e-government website: A use of system usability scale," *Pak. J. Eng. Technol.*, vol. 5, no. 1, pp. 11–15, Mar. 2022, doi: https://doi.org/10.51846/vol5iss1pp11-15

[9] B. Hasan, "Perceived irritation in online shopping: The impact of website design characteristics," *Comput. Hum. Behav.*, vol. 54, pp. 224–230, Jan. 2016, doi: https://doi.org/10.1016/j.chb.2015.07.056

[10] A. Hirst and M. Humphreys, "Putting power in its place: The centrality of edgelands," *Organ. Stud.*, vol. 34, no. 10, pp. 1505–1527, Oct. 2013, doi: https://doi.org/10.1177/0170840613495330

[11] F. Asmi, R. Zhou, and L. Lu, "E-Government adoption in developing countries: need of customer-centric approach: A case of Pakistan," *Int. Bus. Res.*, vol. 10, no. 1, pp. 42–58, 2017, doi: http://dx.doi.org/10.5539/ibr.v10n1p42

[12] R. P. Mohanty and R. R. Lakhe, *TQM in the Service Sector*. JAICO publishing house, 2008.

[13] U. Inayat, M. F. Zia, S. Mahmood, H. M. Khalid, and M. Benbouzid, "Learning-based methods for cyber attacks detection in IoT systems: A survey on methods, analysis, and future prospects," *Electronics*, vol. 11, no. 9, Art. no. 1502, May 2022, doi: https://doi.org/10.3390/electronics11091502

[14] U. Inayat, M. F. Zia, S. Mahmood, T. Berghout, and M. Benbouzid, "Cybersecurity enhancement of smart grid: Attacks, methods, and prospects," *Electronics*, vol. 11, no. 23, Art. no. 3854, Nov. 2022, doi: https://doi.org/10.3390/electronics11233854

[15] U. Inayat, M. F. Zia, F. Ali, S. M. Ali, H. M. A. Khan, and W. Noor, "Comprehensive review of malware detection techniques," in *2021 Int. Conf. Innov. Comput.*, 2021, pp. 1–6, doi:

https://doi.org/10.1109/ICIC53490.2021.9693072

[16] U. Inayat, F. Ali, H. M. A. Khan, S. M. Ali, K. Ilyas, and H. Habib, "Wireless sensor networks: Security, threats, and solutions," in *2021 Int. Conf. Innov. Comput.*, 2021, pp. 1–6, doi: https://doi.org/10.1109/ICIC53490.2021.9693021

[17] A. Humphrey and K. G. Mayoka, "A framework for usability of e-Government services in developing countries," *Glob. Adv. Res. J. Social Sci.*, vol. 5, no. 1, pp. 1–10, 2015.

[18] S. McLellan, A. Muddimer, and S. C. Peres, "The effect of experience on system usability scale ratings," *J. Usability Stud.*, vol. 7, no. 2, pp. 56–67, 2012.

[19] F. Bannister and R. Connolly, "The trouble with transparency: A critical review of openness in e-government," *Policy Internet*, vol. 3, no. 1, pp. 1–30, Feb. 2011, doi: https://doi.org/10.2202/1944-2866.1076

[20] S. Yan and P. G. Ramachandran, "The current status of accessibility in mobile apps," *ACM Trans. Access. Comput.*, vol. 12, no. 1, pp. 1–31, Mar. 2019, doi: https://doi.org/10.1145/3300176

[21] M. Bakhsh, M. Ali, S. A. Ali, M. T. Ali, and S. Ahmed, "Accessibility evaluation of e-government mobile apps services in Pakistan," *J. Comput. Biomed. Inform.*, vol. 4, no. 1, pp. 251–268, 2022.

[22] M. Khalid, F. Yousaf, M. A. Khan, and S. Shaukat, "An empirical examination of e-government virtual services: Mediating role of users' perceived usefulness," *J. Manag. Res.*, pp. 99–128, May 2021, doi: https://doi.org/10.29145/jmr/81/080105