

Investigating User Experience Disparity in E-Commerce: A Case Study of Computer Science Professionals vs. Regular Users on the Saudi Airlines Platform

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ABSTRACT

This research aims to elucidate the divergent perspectives of computer science professionals and general users on e-commerce system usability. By examining the Saudi Airlines reservation system as a case study, this study seeks to identify key disparities in user experience between these two groups. The research will contribute to a deeper understanding of how system design can be optimized to cater to a wider range of users. A user experience evaluation of the system was undertaken using the user experience questionnaire (UEQ) framework, focusing on the dimensions of attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Findings indicate no significant disparity in user experience between regular and professional computer users when interacting with the Saudia Airlines reservation system. However, a notable trend emerged: a mean increase of 1.96 in perspicuity ratings and a mean decrease of 0.53 in novelty ratings across all user groups. The research findings offer a valuable resource for Saudia development teams in their pursuit of optimising the reservations website. Specifically, the results provide actionable insights for enhancing the system's interface and overall user experience.

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1. INTRODUCTION

The rapid proliferation of the internet has facilitated a paradigm shift in consumer behaviour, enabling remote purchasing without physical store visitation [1], [2]. E-commerce platforms have emerged as pivotal facilitators of online transactions [3]. User experience (UX) has become a critical determinant of e-commerce success [4]. Efficient navigation and information accessibility within e-commerce websites are paramount for customer satisfaction and retention.

While UX has gained prominence within Human-Computer Interaction (HCI), a definitive consensus on its exact nature remains elusive. The burgeoning interest in UX can be attributed to the recognition of the limitations inherent in traditional usability frameworks, which primarily emphasise cognitive and performance aspects of

human-technology interactions. In contrast, UX encompasses a broader spectrum, including affective, sensory, and semantic dimensions of user engagement [5].

Airline reservation systems have revolutionised air travel, providing unparalleled convenience and efficiency for both passengers and airlines. These sophisticated systems empower users to effortlessly search, compare, and book flights while also facilitating essential functions such as seat selection, baggage handling, and check-in. By automating routine processes and providing real-time updates, airline reservation systems optimise operational efficiency and enhance customer satisfaction [6], [7].

Saudia Airlines, the national carrier of Saudi Arabia, is a prominent example of a successful airline leveraging advanced reservation technology. Established in 1945, Saudia has evolved into a global aviation leader, offering comprehensive online booking capabilities through its user-friendly website. The platform allows passengers to seamlessly reserve flights, manage itineraries, and access



a wealth of travel-related information. With its extensive route network and commitment to exceptional service, Saudia Airlines has solidified its position as a major player in the global airline industry, particularly within the Middle East region [8].

This research employed the Saudia Airlines reservation website interface as a case study to investigate user experience through the lens of the UEQ framework. The study compared the perceptions of computer specialists and non-specialists to identify potential areas for interface enhancement and overall system improvement.

The paper follows a clear structure. After the introduction, Section 2 presents relevant background and prior research. Research methods and questions are detailed in Section 3. Section 4 outlines the research findings and their implications. Finally, Section 5 summarises key points and offers recommendations based on the research.

2. BACKGROUND AND RELATED WORK

E-commerce, defined as the electronic buying and selling of goods and services [9], has significantly transformed the airline industry. The advent of online booking systems has revolutionized the distribution of airline tickets, shifting away from traditional agent-based models.

Numerous studies have explored the impact of the Internet on the travel industry. Connolly *et al.* [10] investigated the Internet as a distribution channel, emphasizing its role in providing information and facilitating price comparisons. Brunger and Perelli [11] focused on consumer behaviours and purchasing patterns in the online travel marketplace. Lang [12] highlighted the transformative effects of the Internet on distribution channels and consumer behaviour. Research [13]–[16] emphasized the Internet's dual role as a source of information and a platform for purchasing travel products.

The quality of airline websites has been the subject of extensive research. Mohd Sam and Tahir [17] examined various dimensions of website quality, including usability, design, information quality, trust, perceived risk, and empathy. They found that empathy and trust were particularly influential factors in consumer purchase decisions. Shchiglik and Barnes [18] proposed a framework for assessing website quality based on site quality, information quality, interaction quality, and airline-specific factors. Xie and Barnes [19] further refined the dimensions of website quality assessment, incorporating usability, website design, service quality, information quality, and enjoyment.

User experience (UX) encapsulates the overall quality of a user's interaction with a website or digital product [20]. As defined by ISO 9241-210, UX is a measure of user satisfaction and comfort derived from an interface's aesthetics, accessibility, and performance. To evaluate UX effectively, methodologies such as the User Experience Questionnaire (UEQ) are employed. This approach facilitates a comprehensive understanding of user interactions and informs design improvements.

The User Experience Questionnaire UEQ is a standardised instrument for assessing user experience [21]. It quantifies the usability and appeal of a product or system

by combining pragmatic factors (effectiveness and efficiency) with hedonic attributes (aesthetics, comfort, and attractiveness). Notably, UEQ offers a rapid and efficient method for evaluating user perceptions. Administration typically requires 3–5 minutes, and subsequent data analysis can be readily conducted using the provided Excel tools. A significant advantage of UEQ is its free availability, including an Arabic version. The User Experience Questionnaire (UEQ) comprises six distinct scales, encompassing a total of 26 items as follows:

- Attractiveness assesses the overall affective response to the product, encompassing dimensions of pleasantness, likability, and interest.
- Efficiency evaluates the product's operational speed, systematicity, and organization.
- Perspicuity measures the ease of learning, understanding, and navigating the product.
- Dependability assesses the user's perceived control, safety, and predictability of the product.
- Stimulation evaluates the product's capacity to engage and motivate the user.
- Novelty assesses the perceived creativity and innovativeness of the product design.

A substantial body of research has examined internet usage within the airline industry, with a particular focus on airline websites. Studies have predominantly explored user experiences and satisfaction, likely due to the intensive and frequent use of airline websites compared to other companies. However, there is a paucity of research investigating disparities in user experience between specialized computer science users and non-specialized users.

3. RESEARCH QUESTIONS AND METHODOLOGY

Drawing upon the existing literature and the core aims of this investigation, two central research questions were developed:

- *Research Question 1 (RQ1)*: Is there a difference in the user experience (UX) between individuals with backgrounds in software engineering, computer science, and general user populations? To investigate this, participants were divided into three groups corresponding to their respective fields. Subsequent data analysis was conducted to identify potential dissimilarities in UX among these groups.
- *Research Question 2 (RQ2)*: What factors influence the user experience (UX) among specialised and general user populations? To address this, data on gender, usage preferences, and age were collected through a questionnaire. These variables will be analysed in conjunction with UX data to identify potential correlates.

The research instrument employed a three-section questionnaire. Demographic data was collected in the initial section, followed by user experience (UX) evaluations based on the UEQ metric, assessing attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty [22]. The third section captured user priorities regarding

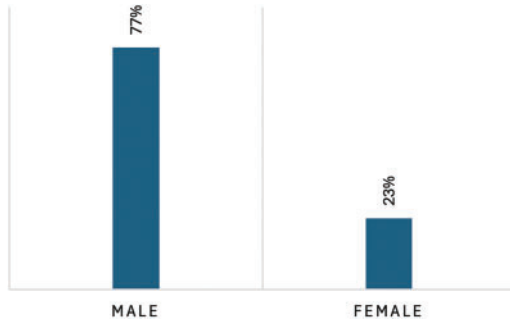


Fig. 1. Participants' gender.

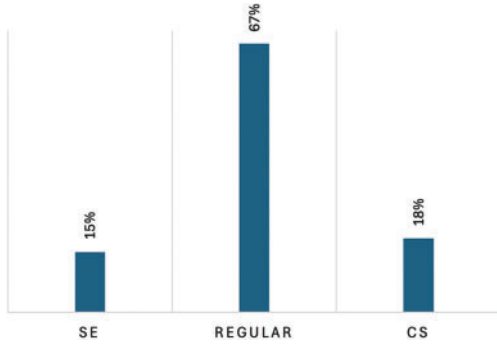


Fig. 2. Participants' gender.

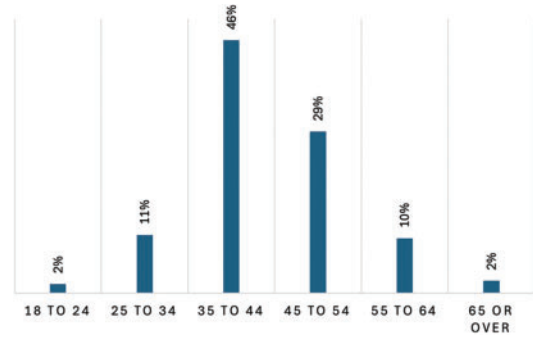


Fig. 3. Participants' ages.

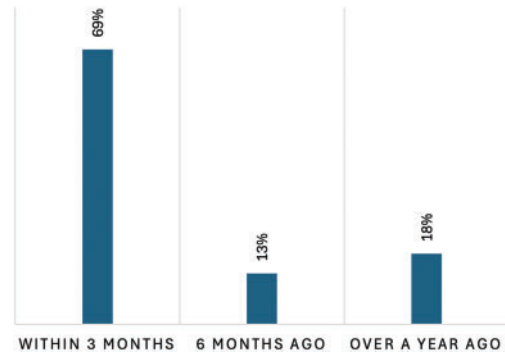


Fig. 4. Pre-visit: Saudia flight website.

functionality, aesthetics, responsiveness, and help accessibility. Additionally, respondents provided information on their last visit to the Saudi Arabian Airlines (Saudia) website and their preferred booking channel (Saudia website or third-party platforms).

As a leading and prominent airline within the Saudi Arabian market, with a substantial online presence, Saudia was selected as a suitable e-commerce platform for this study to investigate user experiences within the airline booking sector. Add more about Saudia.

The sample for this study comprised 179 participants, with a gender distribution of 77% male and 23% female (Fig. 1). Data were collected using an Arabic-language questionnaire administered via Google Forms. To maximise participant recruitment, the questionnaire was disseminated through social media, email, and during the summer holiday of July 2024 in Saudi Arabia, a period characterised by increased travel activity among the target population.

To further refine the sample, participants were stratified based on their computer-related expertise. The resulting dataset comprised three distinct groups, as illustrated in Fig. 2. The largest group (67%) consisted of individuals with no specialised computer skills, designated as "Regular Users." A second group (18%) comprised those with general computer expertise, labelled "CS Users." The remaining 15% of participants held specialised roles in software engineering and were categorised as "SE Users."

A cross-sectional design was employed to investigate potential age-related influences, utilising a six-group stratification strategy (Fig. 3). Age cohorts were defined as follows: 18–24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, and 65+ years. The sample distribution across these groups was 2%, 11%, 46%, 29%, 10%, and 2%, respectively. This age-based categorisation ensured a

broad representation of the population, thereby facilitating subsequent analyses to identify age-related patterns or disparities in the study variables.

To assess the frequency of Saudi Airlines website usage, participants were queried about the timing of their last visit. Response options included within the past three months (69%), six months ago (13%), and one year ago (18%), as illustrated in Fig. 4. This data provides insights into website familiarity and potential recall of booking experiences.

TABLE I: UEQ RESULTS FOR NS, CS, SE GROUPS

Attribute	Group	Average score	Compared to benchmark
Attractiveness	NS	1.24	Above average
	CS	1.22	Above average
	SE	1.18	Below average
Perspicuity	NS	1.93	Good
	CS	1.98	Good
	SE	1.97	Good
Efficiency	NS	1.21	Above average
	CS	1.19	Above average
	SE	1.00	Below average
Dependability	NS	1.12	Below average
	CS	1.18	Above average
	SE	0.85	Below average
Stimulation	NS	1.04	Above average
	CS	0.94	Below average
	SE	0.96	Below average
Novelty	NS	0.56	Below average
	CS	0.61	Below average
	SE	0.41	Below average

4. RESULTS AND DISCUSSION

4.1. UEQ Results

The study focused on individuals who had used the Saudi Airlines reservation website within the past three months, under the assumption of consistent interface design. Participants were classified into three groups: non-specialised users (NS), computer specialists (CS), and software engineering specialists (SE). All participants completed the Arabic UEQ questionnaire after receiving a detailed explanation of the study's purpose and procedures. The resulting user experience data for each group is presented in Table I. Moreover, Figs. 5–7 provide visual representations of these findings.

Overall, the Saudi Airlines reservation system garnered positive evaluations across all dimensions from the three participant groups. However, novelty assessment indicated a neutral stance. According to the standard interpretation, scores ranging from -0.8 to 0.8 indicate a neutral evaluation of the corresponding dimension. Positive evaluations are represented by scores exceeding 0.8 , while negative evaluations are reflected by scores below -0.8 . The scale extends from $+3$ (extremely positive) to -3 (extremely

negative). Due to response biases inherent in such questionnaires, scores between 1.5 and 2 are indicative of a high level of quality.

4.2. Preferences based on groups and other factors

Fig. 8 illustrates the participants' prioritised system attributes. Responsiveness emerged as the most critical factor, accounting for approximately 75% of first and second-priority selections. Functionality was ranked second, representing around 50% of preferences. Appearance and accessibility followed, with respective percentages of 35% and 40%. The subsequent sections will provide a detailed analysis based on the study groups.

Analysis of the results indicates a consistent pattern across all three groups: software engineering, computer science, and non-specialised users. While Functionality and Responsiveness were rated highly, Appearance and Accessibility to help received lower evaluations. Notably, no significant disparities were observed in the assessment of these four attributes among the groups, as depicted in Figs. 9–11.

Fig. 12 illustrates a correlation between age and booking site preference. Participants aged below 25 and above 64

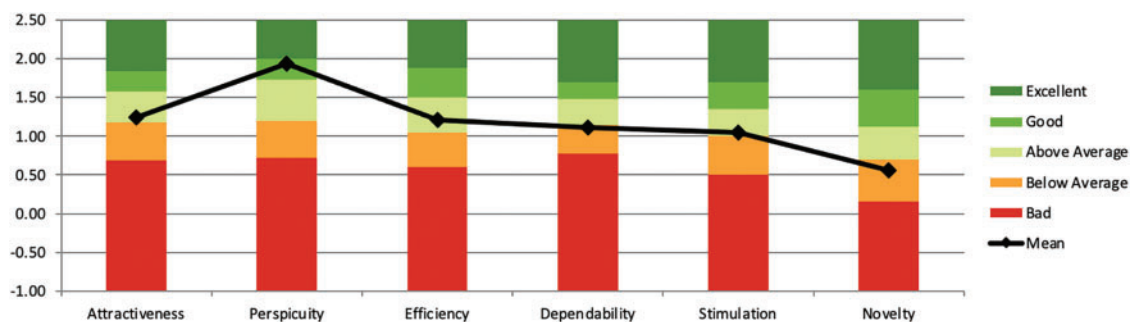


Fig. 5. UEQ results for regular group.

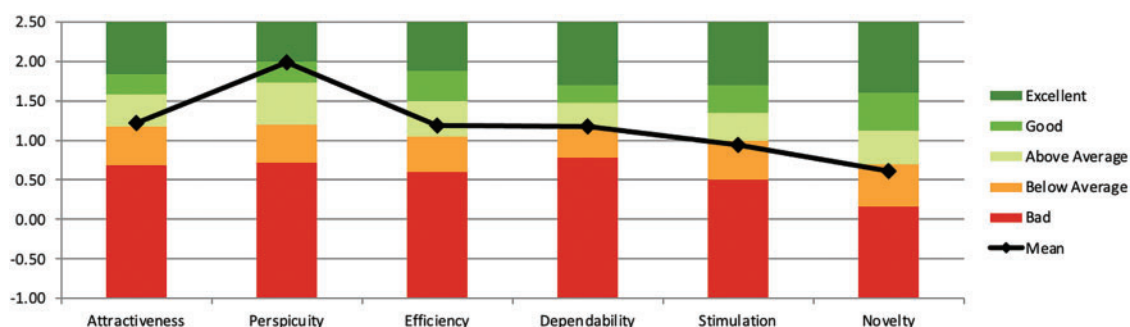


Fig. 6. UEQ results for CS group.

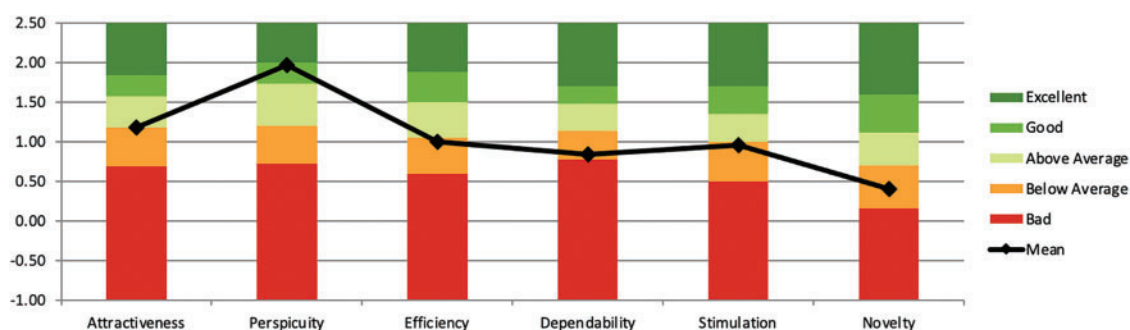


Fig. 7. UEQ results for SE group.



Fig. 8. All group preferences on the Saudia website.

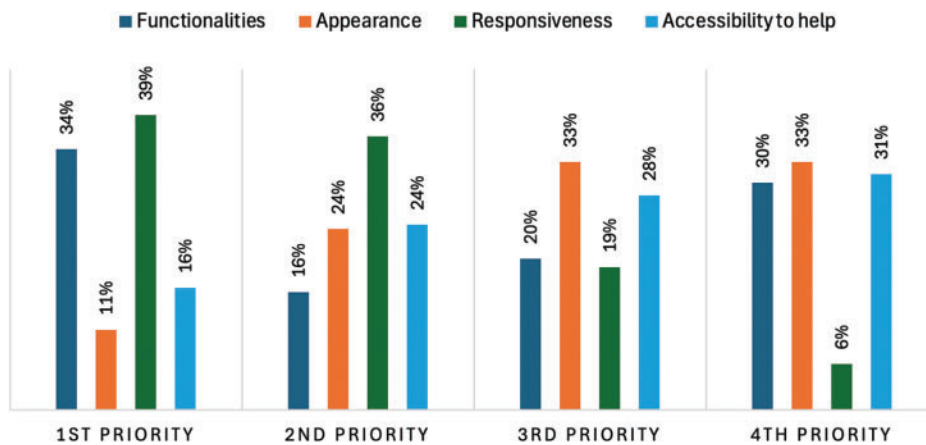


Fig. 9. The SE preferences on the Saudia website.

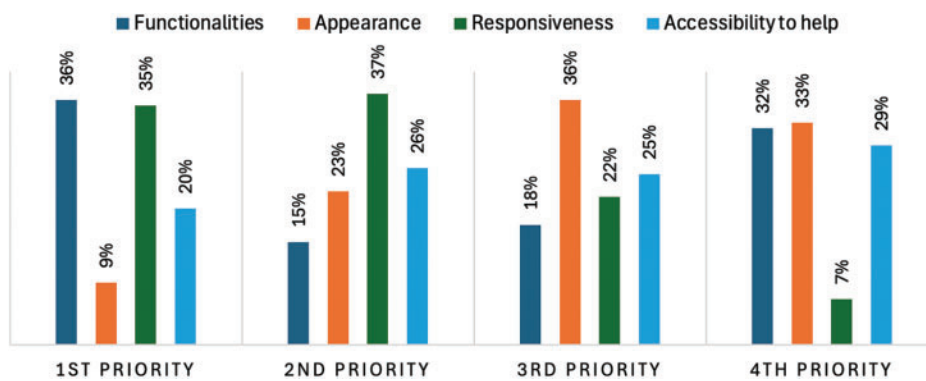


Fig. 10. The regular users' preferences on the Saudia website.



Fig. 11. The CS preferences on the Saudia website.

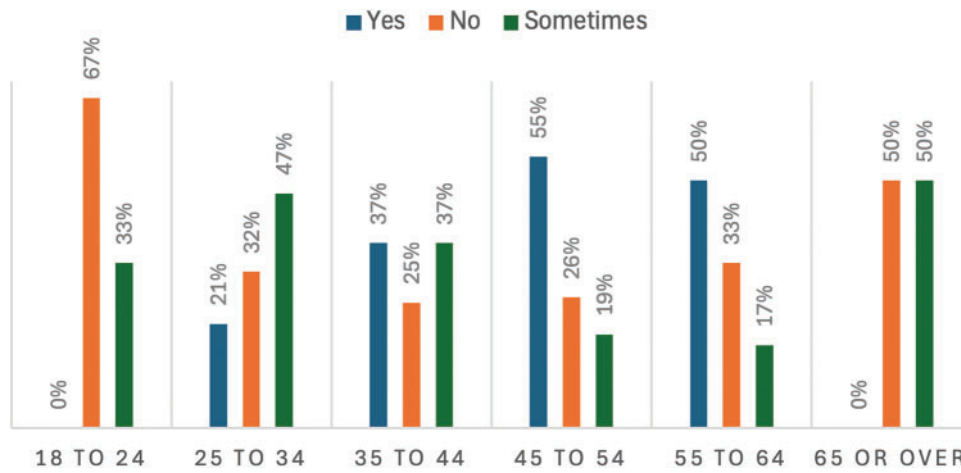


Fig. 12. Preferences of using third party website for flights based on ages groups.

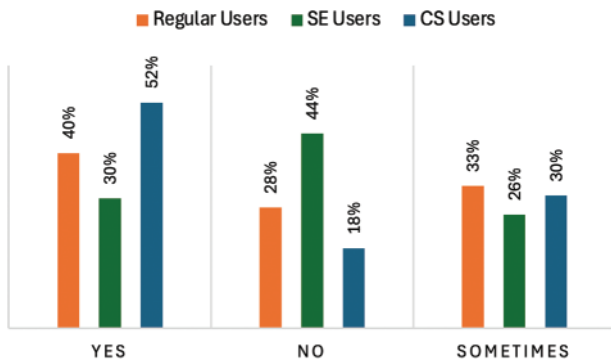


Fig. 13. Preferences of using third party website for flights based on specialisations groups.

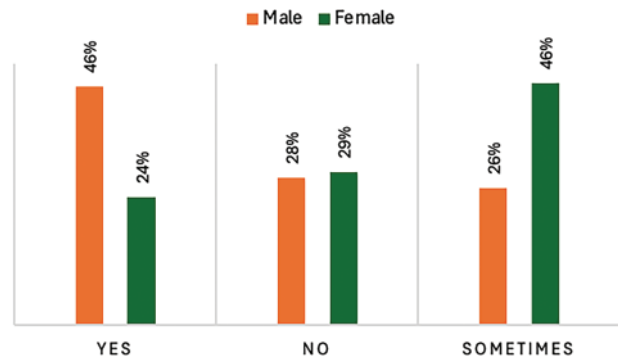


Fig. 14. Preferences of using third-party website for flights based on gender groups.

exhibited a strong preference for direct airline booking platforms (approximately 58%). Conversely, the 35–64 age group demonstrated a higher inclination towards intermediary booking websites (approximately 47.33%). The 25–34 age group displayed a more neutral preference, opting for both direct and intermediary booking options with approximately equal frequency.

Analysis of booking site preferences among CE, NS, and SE groups revealed distinct trends. CE exhibited the highest preference for intermediary booking platforms (52%), followed by NS (40%). In contrast, SE demonstrated a stronger inclination towards direct airline booking websites (44%). All groups displayed a similar tendency to occasionally utilise intermediary booking sites (approximately 26%–33%).

A comparative analysis of gender-based airlines booking sites preferences reveals a similar pattern for both males and females in directly utilising the Saudia Airlines reservation website (approximately 28.5%) as shown in Fig. 13. However, a higher proportion of males exhibited a preference for intermediary booking sites. Additionally, a high percentage of females indicated a tendency to occasionally use intermediary platforms (46%).

The Saudi Airlines reservation system received generally positive evaluations from all three user groups as illustrated in Fig. 14. While novelty was rated neutrally, the system was perceived favourably in terms of attractiveness, perspicuity, efficiency, dependability, stimulation, and overall user experience.

4.3. User Preferences and Prioritization

1. *System Attributes:* Across all groups, responsiveness was the most valued attribute, followed by functionality, appearance, and accessibility.
2. *Group Differences:* Despite the overall positive ratings, there were no significant disparities between the three groups (non-specialized users, computer specialists, and software engineering specialists) in their assessment of these attributes.
3. *Age and Booking Site Preference:* Younger and older participants (under 25 and over 64) showed a strong preference for direct airline bookings, while those aged 35–64 leaned towards intermediary booking websites. The 25–34 age group demonstrated a more balanced preference.
4. *Specialization and Booking Site Preference:* Computer engineering specialists had a higher preference for intermediary booking platforms, while software engineering specialists preferred direct airline bookings. Non-specialized users displayed a more balanced preference.
5. *Gender and Booking Site Preference:* Both males and females exhibited a similar preference for direct bookings on the Saudi Airlines website. However, a higher percentage of males preferred intermediary booking sites, and a higher percentage of females indicated occasional use of intermediary platforms.

5. CONCLUSION

This study aimed to investigate potential disparities in user experience between computer science professionals and general users when interacting with the Saudi Airlines reservation system. By employing the UEQ framework, the research sought to uncover differences in perceptions across dimensions such as attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty.

Contrary to initial expectations, the findings revealed no significant differences in overall user experience between the three user groups. However, a consistent trend emerged across all participants: a marked increase in perceived perspicuity and a decrease in perceived novelty. These findings suggest that while users generally find the system easy to understand, there is room for improvement in terms of introducing innovative elements to enhance the user experience.

The results of this research hold practical implications for system designers and developers. By prioritizing the enhancement of system perspicuity and exploring innovative design solutions, developers can create more user-friendly and engaging e-commerce platforms. Ultimately, this research contributes to the growing body of knowledge on user experience in the realm of e-commerce, with potential to inform the development of more effective and user-centred systems.

5.1. Implications and Future Research

The findings suggest that the Saudi Airlines reservation system is generally user-friendly and meets the needs of a diverse user base. However, the neutral rating for novelty indicates potential opportunities for improvement. Future research could explore:

1. *Novelty Enhancement:* Identifying innovative features or design elements to enhance the user experience.
2. *In-Depth Analysis:* Conducting more detailed studies to understand the specific factors contributing to the observed preferences for system attributes.
3. *Cross-Cultural Comparisons:* Comparing user experiences in different cultural contexts.
4. *Emerging Technologies:* Exploring the potential of emerging technologies (e.g., AI, VR) to further improve the reservation system.

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CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

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