TAF Journal of Advances in Technology and Engineering Research JATER
2024, **10**(1): 1-10

PRIMARY RESEARCH

User-centric evaluation: Unveiling insights through net promoter score analysis in mobile app testing

Juhriyansyah Dalle[1*], Nurul Huda[2], Ahmad Yusuf[3], Muhammad Fadillah Hassan[4], Charles Phandhurand[5]

[1,4,5] Department of Information Technology, Universitas Lambung Mangkurat, Banjarmasin, Indonesia

[2] Department of Mathematics, Universitas Lambung Mangkurat, Banjarmasin, Indonesia

[3] Politeknik Negeri Banjarmasin, Banjarmasin, Indonesia

Keywords

Net promoter score
User experience testing
Mobile application
User satisfaction

Received: 6 January 2024
Accepted: 8 March 2024
Published: 21 April 2024

Abstract

In the dynamic landscape of mobile applications, optimizing User Experience (UX) is crucial for app success. This study investigates the user experience of mobile applications through rigorous testing methodologies, focusing on aspects such as design, functionality, navigation, performance, and overall usability. Utilizing the Net Promoter Score (NPS) as a quantitative metric, the study aims to evaluate user satisfaction and loyalty. The process consists of five phases, i.e., defining the object, determining participants, collecting data, using the NPS formula, and NPS analysis. The analysis of data was conducted on a sample of 50 participants. Findings reveal a favorable NPS score of 52, indicating positive user sentiment and a higher proportion of promoters than detractors. The statement suggests that conducting UX testing for mobile applications yields advantageous outcomes. However, The interpretation of the score is contingent upon the specific industry and contextual factors. It is imperative to recognize that the application of NPS should not be utilized in isolation but rather in conjunction with other usability measures to attain a more comprehensive understanding of user experience. The inclusion of qualitative feedback in conjunction with NPS has the potential to aid in the identification of specific areas that may benefit from improvement. Future research can include advanced analytics integration and exploration of emerging technologies. Overall, this study underscores the importance of NPS analysis in driving strategic decision-making and enhancing user satisfaction in the competitive realm of mobile application development.

I. INTRODUCTION

In contemporary society, the pervasive integration of technology and mobile phones has fundamentally altered various aspects of daily life [1]. The ubiquitous presence of mobile devices has revolutionized communication, enabling instantaneous connectivity across vast distances [2, 3]. Furthermore, technological advancements have facilitated seamless access to information and services, transcending geographical boundaries and enhancing productivity [4, 5]. Mobile phones serve as multifunctional tools, offering functionalities beyond communication, such as navigation, entertainment, and financial transactions [6]. Moreover, the integration of innovative applications and platforms has revolutionized industries ranging from healthcare to education, fostering efficiencies and improving outcomes. However, the pervasive use of technology and mobile phones also raises concerns regarding privacy, digital dependency, and social disconnect [7]. Therefore, while recognizing the profound benefits of technology and mobile phones, navigating this evolving landscape with mindfulness becomes essential, employing robust (User Experience) UX testing methodologies to ensure optimal user satisfaction and engagement.

Mobile application UX testing serves as a cornerstone in the realm of app development, acting as a critical conduit for detecting, understanding, and addressing a plethora of

*Corresponding author: Juhriyansyah Dalle
†email: j.dalle@ulm.ac.id

issues that can either impede or enhance user experience (UX) [8]. While traditional methods like the System Usability Scale (SUS) have been valuable, they also reveal certain weaknesses, prompting the exploration of more robust alternatives [9]. As the app development landscape evolves, a pressing need arises to identify existing methodologies and pinpoint gaps in current practices to drive innovation. At the heart of this exploration lies the quest for a comprehensive understanding of user sentiment and satisfaction [10]. While SUS and similar tools offer insights into usability, they often lack the depth to capture the nuances of user loyalty and advocacy [11]. This limitation underscores the need for a more holistic approach, one that not only assesses usability but also delves into the emotional resonance of the app with its users.

Besides, beyond its role in merely uncovering bugs and errors, UX testing is a multifaceted process that delves deep into user behavior, identifies opportunities for improvement, optimizes development costs, and ultimately boosts sales [12]. With the ever-expanding landscape of mobile applications, where competition is fierce, and user expectations are continually evolving, the importance of comprehensive UX testing cannot be overstated [13]. At its core, UX testing is about ensuring that the end-users of a mobile application have a seamless, intuitive, and gratifying experience. This involves a systematic approach to evaluating various aspects of the app, including its design, functionality, navigation, performance, and overall usability [14]. By subjecting the app to rigorous testing protocols, developers can gain valuable insights into how real users interact with the interface, pinpoint pain points and friction areas, and iterate upon the design to enhance user satisfaction.

One of the key methodologies employed in UX testing is collecting and analyzing the Net Promoter Score (NPS), a widely recognized metric that quantifies customer loyalty and satisfaction. The decision to integrate NPS into the realm of mobile application UX testing stems from its potential to transcend traditional usability metrics and offer a more nuanced perspective on user experience [15]. The rationale behind using NPS lies in its inherent connection to user behavior and perception. By posing a single, straightforward question—"How likely are you to recommend this business to a friend or colleague?"—NPS encapsulates not only satisfaction but also the likelihood of advocacy, reflecting a deeper level of engagement and loyalty. This aligns seamlessly with the overarching goal of UX testing: to not just meet user expectations but to exceed them, fostering a sense of connection and loyalty to the app [16].

Additionally, in the realm of mobile application development, integrating NPS into the UX testing process has become increasingly prevalent. By incorporating NPS surveys directly within the app interface, developers can solicit feedback from users in real time, capturing their sentiments and perceptions at various touchpoints along their journey [17]. This proactive approach not only facilitates continuous improvement but also fosters a sense of user engagement and empowerment, as individuals feel valued and heard by the development team [18, 19]. Moreover, NPS serves as more than just a quantitative metric; it offers qualitative insights into the underlying factors driving user satisfaction or dissatisfaction. By analyzing the verbatim comments provided by respondents alongside their NPS ratings, developers can uncover nuanced details about what aspects of the app resonate positively with users and where improvements are warranted. This qualitative feedback is invaluable for understanding the 'why' behind the numerical scores, providing context and depth to the evaluation process.

Furthermore, the strategic integration of NPS into user interviews, surveys, and usability testing sessions empowers UX practitioners to leverage data-driven insights in their decision-making processes [20]. Armed with concrete evidence of customer sentiment, they can advocate for UX improvements and secure buy-in from key stakeholders within their organizations. Quantitative statistics showcasing enhanced customer loyalty, as reflected in rising NPS scores, carry significant weight in boardroom discussions, underscoring the tangible benefits of investing in the UX process [21, 19]. At the same time, NPS enables UX practitioners to prioritize their efforts effectively, focusing on areas of the app that have the greatest impact on user satisfaction and loyalty [13].

By segmenting users based on their NPS ratings and analyzing feedback trends across different demographic or behavioral cohorts, developers can tailor their optimization strategies to address the needs and preferences of specific user segments [22]. This targeted approach not only maximizes the efficiency of UX improvements but also ensures that resources are allocated where they can generate the most significant returns. Hence, the primary objective of this study includes a) evaluation of the user experience (UX) of mobile applications; b) identification of existing issues and potential opportunities for improvement within the mobile applications under evaluation; c) gain insights into user behavior by observing how real users interact with the mobile applications; d) enhance user satisfaction by improving the overall quality of the mobile applications.

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1

RESEARCH METHODOLOGY

The study methodology encompasses several phases aimed at systematically evaluating the user experience (UX) of a mobile educational game through the implementation of Net Promoter Score (NPS) surveys. Each phase is carefully designed to ensure the collection of robust data and the derivation of meaningful insights into user satisfaction and loyalty. The stages of the study method are described in Figure 1.

Determining the Object: The first phase of the study involves identifying the object of evaluation, which, in this case, is a mobile educational game that has been developed. This step is crucial as it sets the foundation for the subsequent stages of the study, guiding the selection of participants and the formulation of survey questions tailored to the specific context of the mobile application [23].

Participant Selection: In Phase 2, the study aims to determine the number of participants to be included in the evaluation process. The decision is made to involve a sample size of up to 50 individuals. This sample size is chosen to ensure an adequate representation of diverse user demographics and usage patterns, thereby enhancing the validity and reliability of the study findings.

Data Collection: Data collection in this study is primarily conducted through the administration of questionnaires adapted from the Net Promoter Score (NPS) framework. Participants are presented with a standardized question: "On a scale of 0-10, how likely are you to recommend our mobile educational game to a friend or colleague?" This question serves as the cornerstone of the NPS methodology, allowing respondents to express their likelihood of recommending the app based on their overall satisfaction and perceived value.

Implementing the NPS Formula: Following the collection of survey responses, Phase 4 involves implementing the NPS formula to derive a numerical score indicative of customer satisfaction and loyalty. The NPS formula is applied according to procedural guidelines outlined in the study, which include categorizing respondents into three groups based on their rating scores: promoters (9-10), passives (7-8), and detractors (0-6).

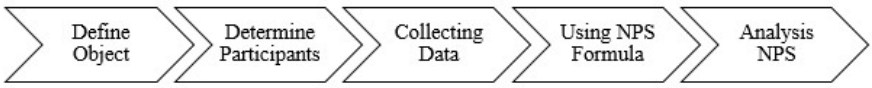

Fig. 1. Study phase

NPS Analysis: The final phase of the study entails analyzing the Net Promoter Score (NPS) obtained from the survey data. This analysis involves calculating the percentage of promoters and detractors among the total respondents and subtracting the percentage of detractors from the percentage of promoters to derive the NPS score. The resulting score provides a quantitative measure of user satisfaction and loyalty. In order to derive the NPS for usability testing, it is important to adhere to the following procedural guidelines:

1) Conduct a respondents survey with the NPS question. “On a scale of 0-10, how likely are you to recommend our mobile educational game to a friend or colleague?”

2) Based on the responses, classify respondents into three categories.

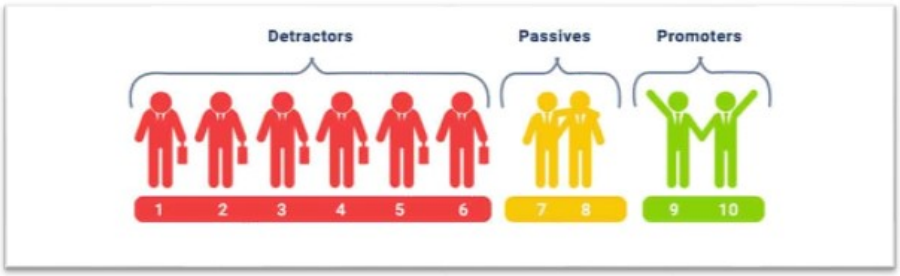

Fig. 2. Categorical presentation of respondents

In Figure 2, promoters are the respondents who give a score of 9 or 10; passives give a score of 7 or 8; and detractors give a score of 0 to 6

3) Calculate the percentage of Promoters and Detractors among the total respondents.

4) Subtract the percentage of Detractors from the percent-

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1

age of Promoters to get the NPS.

$NPS = \frac{\text{Promoters} \times 100}{\text{Total Respondent}} - \frac{\text{Detractors} \times 100}{\text{Total Respondent}}$

As an illustration, in a hypothetical scenario where there are 100 participants, consisting of 70 Promoters, 10 Passives, and 20 Detractors, the NPS can be computed using the following formula:

Promoters: 70% (70/100)

Detractors: 20% (20/100)

NPS = Promoters - Detractors = 70% - 20% = 50

The Net Promoter Score (NPS) is a metric that quantifies customer satisfaction and loyalty on a scale of -100 to 100. Higher scores on this scale are indicative of greater levels of customer pleasure and loyalty. By systematically following these phases, the study aims to gain valuable insights into the user experience (UX) of the mobile educational game and identify areas for improvement based on user feedback. The rigorous application of the NPS methodology ensures the collection of reliable and actionable data, empowering developers to make informed decisions aimed at enhancing customer satisfaction and driving long-term success in the competitive mobile app market [24, 16].

II. ANALYSIS AND RESULT

The collected data was converted into NPS categories. The score was categorized into three groups, specifically Promoters, Passives, and Detractors, and described in Table 1.

TABLE 1
NPS CATEGORY DESCRIPTIONS

NPS Categories	NPS Score	Description
Promoters	9 or 10	Promoters respond with a score of 9 or 10 and are typically loyal and enthusiastic on mobile applications.
Passives	7 or 8	Passive individuals exhibit a response level ranging from 7 to 8 for mobile applications. The customers express a level of satisfaction with the provided service, yet their level of contentment does not reach a threshold that would classify them as promoters.
Detractors	1 to 6	Detractors respond with a score of 0 to 6. These individuals are dissatisfied clients who are unlikely to utilize the mobile application.

Table 1 reflects that promoters, as the respondents with a score of 9 or 10 on the Net Promoter Scale, serve as the cornerstone of mobile application success, embodying the pinnacle of user satisfaction, loyalty, and advocacy. These enthusiastic advocates not only signify a high degree of satisfaction but also actively promote the app to their social circles, driving organic growth and fostering a strong sense of brand loyalty [25]. Their unwavering support extends beyond mere usage, manifesting in positive reviews, referrals, and active engagement, making them invaluable assets in a competitive marketplace [26]. Promoters represent not just satisfied customers but brand evangelists, offering insights into what aspects of the app resonate most strongly with users and where further enhancements can be made to solidify their loyalty [27]. Their feedback serves as a barometer of excellence, guiding developers toward a user-centric approach that prioritizes genuine connection and emotional resonance [28]. Hence, cultivating a base of Promoters is not just a goal but a strategic imperative for long-term success and sustainability in the dynamic landscape of mobile applications.

Besides, passive individuals, falling within the response range of 7 to 8 on the Net Promoter Scale for mobile applications, demonstrate a moderate level of satisfaction with the provided service. While they express contentment, their responses do not elevate them to the status of Promoters, indicating a lack of strong enthusiasm or advocacy. These customers represent a segment that is generally satisfied but may not actively promote the app or exhibit strong loyalty. Their feedback provides valuable insights into areas where the app meets expectations but may fall short of eliciting a passionate response [29]. Understanding the perspectives of passive users is essential for developers seeking to bridge the gap between satisfaction and advocacy, as their feedback can uncover opportunities for improvement that may enhance the overall user experience and potentially convert them into promoters [30]. Therefore, acknowledging and addressing the needs of passive individuals is crucial for optimizing app performance and fostering a broader base of enthusiastic advocates.

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1

At the same time, detractors, indicating a score between 0 and 6 on the Net Promoter Scale for mobile applications, signify dissatisfied clients who are unlikely to engage with or advocate for the app. Their responses reflect significant discontent with the service provided, highlighting areas where the app falls short of meeting user expectations or fails to address their needs effectively. Detractors pose a critical challenge for developers, as their feedback illuminates potential pain points and areas requiring urgent attention [31]. Understanding the perspectives of detractors is paramount for identifying and rectifying issues that may hinder user satisfaction and impede the app's success [32]. By addressing the concerns raised by detractors, developers can strive to improve overall user experience, mitigate churn, and potentially convert detractors into more satisfied users over time [33]. Therefore, proactively addressing the concerns of detractors is essential for fostering a positive reputation, retaining users, and driving sustained growth in the competitive mobile application landscape.
Additionally, the collected data is subsequently transformed into Net Promoter Score (NPS) categories and presented in Table 2.

TABLE 2
SCORE CONVERSION TO THE NPS CATEGORY

Respondents	NPS Score	Score Categories	Calculation
Respondent 1	9	Promoters	Promoters = 34 Passives = 8 Detractors = 8
Respondent 2	10	Promoters	
Respondent 3	9	Promoters	
Respondent 4	8	Passives	
Respondent 5	9	Promoters	
Respondent 6	9	Promoters	
Respondent 7	10	Promoters	
Respondent 8	5	Detractors	
Respondent 9	10	Promoters	
Respondent 10	4	Detractors	
Respondent 11	9	Promoters	
Respondent 12	10	Promoters	
Respondent 13	9	Promoters	
Respondent 14	10	Promoters	
Respondent 15	10	Promoters	
Respondent 16	10	Promoters	
Respondent 17	9	Promoters	
Respondent 18	7	Passives	
Respondent 19	8	Passives	
Respondent 20	8	Passives	
Respondent 21	7	Passives	
Respondent 22	3	Detractors	
Respondent 23	9	Promoters	
Respondent 24	10	Promoters	
Respondent 25	9	Promoters	
Respondent 26	9	Promoters	
Respondent 27	10	Promoters	
Respondent 28	10	Promoters	
Respondent 29	9	Promoters	
Respondent 30	10	Promoters	
Respondent 31	10	Promoters	
Respondent 32	10	Promoters	
Respondent 33	8	Passives	
Respondent 34	5	Detractors	

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1

CONT.....

Respondents	NPS Score	Score Categories	Calculation
Respondent 35	4	Detractors	
Respondent 36	10	Promoters	
Respondent 37	5	Detractors	
Respondent 38	10	Promoters	
Respondent 39	8	Passives	
Respondent 40	7	Passives	
Respondent 41	9	Promoters	
Respondent 42	10	Promoters	
Respondent 43	10	Promoters	
Respondent 44	9	Promoters	
Respondent 45	9	Promoters	
Respondent 46	9	Promoters	
Respondent 47	4	Detractors	
Respondent 48	9	Promoters	
Respondent 49	10	Promoters	
Respondent 50	6	Detractors	

Based on the respondents' data presented in Table 2, it can be deduced that out of the total respondents surveyed, 34 individuals were categorized as promoters of mobile gaming education. These respondents expressed high levels of satisfaction and enthusiasm, indicating a strong likelihood of recommending the educational mobile gaming platform to others. Additionally, 8 respondents fell into the passive category, suggesting a moderate level of satisfaction with the platform but lacking the same level of enthusiasm and advocacy as promoters. Furthermore, 8 respondents were identified as detractors, indicating dissatisfaction with the mobile gaming education platform and an unlikely propensity to utilize or endorse it. These findings highlight the diverse range of perspectives among respondents regarding the platform's effectiveness and user experience, emphasizing the importance of addressing concerns raised by detractors while further engaging and leveraging the support of promoters to enhance overall user satisfaction and app success.

NPS Formula Implementation

NPS is calculated by subtracting the percentage of detractors from the percentage of promoters. Passives, those who score a 7 or 8 on the NPS scale, are not included in the calculation. Based on [32] passives are neutral, lack of impact, and inclusion in the denominator. Passives are commonly seen as exhibiting a neutral or uninterested stance towards the product. While individuals may have a positive inclination towards it, their level of satisfaction may not be sufficient to warrant recommending it to others. The absence of bias and absence of allegiance render them somewhat less captivating than critics or advocates since they can be perceived as neither a valuable resource nor a hindrance to the advancement of a mobile application [34]. The impact of passives on growth or decrease is not substantial. The presence of a greater number of promoters compared to detractors signifies a state of growth, whereas a higher number of detractors relative to promoters suggests a state of decline. Previous research shows that the presence of a higher number of passive constructions does not offer a definitive indication of either [35]. Although passives are not counted in the numerator of the NPS, they are included in the denominator, which represents the overall number of replies. This phenomenon leads to a decrease in the NPS when the overall denominator expands, resulting in a reduction in the NPS [32]. Besides, calculations were done using the NPS Formula as follows:

$$NPS = \left[\frac{(34 \times 100)}{50}\right] - \left[\frac{(8 \times 100)}{50}\right]$$

$$NPS = \left[\frac{3400}{50}\right] - \left[\frac{(800)}{50}\right]$$

$$NPS = 68 - 16$$

$$NPS = 52$$

In the given scenario, the calculation of the NPS yields a score of 52, derived from the formula NPS = (Promoters - Detractors)/Total Respondents. With 34 promoters and 8 detractors out of a total of 50 respondents, the NPS reflects a positive sentiment towards the mobile gaming education platform. This score suggests a relatively favorable perception among users, indicating potential for growth and continued success.Analyzing NPS

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1

Expanding on the analysis of the Net Promoter Score (NPS) of 52, it's essential to delve into the implications and actionable insights derived from this figure. This score signifies a predominantly positive sentiment among users towards the mobile application UX testing, with a notable majority of respondents identifying as promoters, indicating satisfaction and potential advocacy. However, while a score above 50 suggests a favorable standing, it's crucial to recognize that the effectiveness of this score is contingent upon various industry-specific and contextual factors. A positive NPS number denotes a favorable position, showcasing a higher proportion of promoters compared to critics.

Thus, surpassing the 50-point threshold is indicative of performance that exceeds the average and is generally perceived as commendable within the industry. However, it's important to consider that achieving an NPS above 50 doesn't necessarily equate to absolute success, as there may still be areas for improvement and optimization. In light of this, focusing on converting detractors into passive individuals emerges as a strategic imperative. While promoters advocate for the mobile application, detractors present an opportunity for improvement, highlighting areas of dissatisfaction and unmet needs. By addressing the concerns of detractors and enhancing the user experience, organizations can mitigate negative sentiment and cultivate a more positive perception among users.

III. DISCUSSION

The Net Promoter Score (NPS) of 52 obtained in mobile application UX testing represents a positive indication of user sentiment and satisfaction. However, it's essential to contextualize this score within the industry landscape, and specific user needs to derive actionable insights. A high NPS score in mobile application UX testing signifies that the app is user-friendly, intuitive, and effectively meets the needs of its target audience. [36] elucidate several factors contributing to a favorable score in mobile application UX, including ease of use, efficient design, user satisfaction, and consistency.

Firstly, ease of use is paramount in ensuring a positive user experience. This aligns with the fact that mobile applications should be intuitive and easy to navigate, allowing users to quickly grasp how to utilize their features [37]. Secondly, an efficient design streamlines user interactions, ensuring that users can accomplish tasks seamlessly and without unnecessary friction [38]. Thirdly, user satisfaction is a key metric in evaluating the success of UX design. Previous researchers also stated that users should find the app enjoyable and satisfying to use, a factor that can be gauged through user feedback and ratings [39, 40]. Lastly, consistency in design and functionality across various devices and platforms is crucial for maintaining a cohesive user experience. This also aligns with the findings of [41].

While a score above 0 in the absolute NPS method is generally considered favorable due to the presence of more promoters than detractors, it's imperative to recognize the limitations of NPS when used in isolation. NPS may not capture all dimensions of usability, and its relevance is contingent upon sample size adequacy. Therefore, it's recommended that NPS be complemented with other usability metrics and qualitative feedback to obtain a comprehensive understanding of the user experience. By incorporating qualitative feedback alongside NPS, organizations can pinpoint specific areas requiring enhancement and gain deeper insights into user sentiment and preferences.

Thus, while NPS provides a valuable quantitative measure of customer loyalty and satisfaction [33, 28], its efficacy is maximized when used in conjunction with other usability indicators and qualitative feedback [42]. NPS serves as a valuable tool for assessing the success of UX testing, offering insights into user sentiment, and providing a basis for strategic decision-making. However, to truly optimize the user experience and drive continuous improvement, organizations must adopt a multifaceted approach that integrates NPS with other usability metrics and qualitative insights. By doing so, organizations can ensure that their mobile applications not only meet but exceed user expectations, fostering long-term engagement and loyalty in an increasingly competitive digital landscape.

A. Study Implications

This study contributes to methodological advances in mobile application UX testing by demonstrating the efficacy of rigorous testing methodologies in uncovering user sentiment and satisfaction. Future research could explore novel approaches to integrating NPS with other usability metrics and qualitative feedback to further enhance the validity and reliability of UX assessments. The insights gained from our study shed light on user behavior and preferences in the context of mobile applications. Future research could delve deeper into understanding user motivations, usage patterns, and the factors influencing user satisfaction and loyalty, providing valuable insights for UX design and optimization.

Additionally, the Net Promoter Score (NPS) obtained in this study serves as a valuable metric for guiding strategic decision-making in mobile application development. By leveraging NPS insights alongside other usability metrics

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1

and qualitative feedback, organizations can prioritize UX initiatives, allocate resources effectively, and drive continuous improvement. Our study underscores the importance of adopting a user-centric approach to mobile application design and development. By integrating qualitative feedback with NPS, developers can gain deeper insights into user preferences, behavior, and pain points, informing design decisions that better meet user needs and expectations. Proactively detecting and rectifying UX issues during the testing phase can help optimize development costs. By addressing issues early in the development lifecycle, organizations can avoid costly rework and iterations, streamline the development process, and maximize resource efficiency.

Furthermore, organizations can leverage NPS insights to gain a competitive advantage in the mobile application market. By delivering a seamless, intuitive, and gratifying user experience, organizations can increase user engagement, retention, and loyalty, ultimately leading to higher conversion rates and increased profitability. Finally, improving the overall quality of mobile applications based on NPS insights can lead to enhanced user satisfaction and positive word-of-mouth referrals. Organizations that prioritize user experience and actively address user feedback are more likely to build strong relationships with their user base and foster long-term loyalty.

IV. CONCLUSION

In this study, we conducted a comprehensive evaluation of the user experience (UX) of mobile applications through rigorous testing methodologies. Our objectives were to assess various aspects of mobile applications, identify existing issues, gain insights into user behavior, optimize development costs, and enhance sales and user satisfaction. Through our analysis, we obtained a Net Promoter Score (NPS) of 52, signifying a favorable perception among users and a higher proportion of promoters compared to detractors. This score underscores the effectiveness of our testing methodologies in uncovering user sentiment and satisfaction. Our findings highlight the importance of a high NPS score in mobile application UX testing, indicating that the apps under evaluation are user-friendly, easy to navigate, and meet the needs of their target audience. Moreover, by integrating qualitative feedback with NPS, we gained deeper insights into user behavior, preferences, and pain points, informing design decisions and optimization strategies. Furthermore, our study emphasizes the significance of complementing NPS with other usability metrics and qualitative feedback to drive continuous improvement. By proactively detecting and rectifying UX issues during the testing phase, developers can optimize development costs and enhance the overall quality of mobile applications.

A. Limitations and Future Directions

While our study provides valuable insights into mobile application UX testing and the implications of NPS analysis, there are several limitations that warrant acknowledgment. Additionally, there are opportunities for future research to further advance our understanding of user experience and optimization strategies. This study focused on a specific set of mobile applications and user demographics, which may limit the applicability of the findings to other contexts. Future research could explore how contextual factors such as cultural differences, industry-specific requirements, and technological advancements influence user experience and NPS scores. While this study employed rigorous testing methodologies, methodological limitations may be inherent in the measurement and analysis of NPS. Future research could explore alternative NPS assessment and validation methodologies to enhance the reliability and validity of the results. Moreover, investigating cross-cultural differences in mobile application UX and NPS scores could offer valuable insights into user preferences and behavior across diverse cultural contexts. Comparative studies could identify cultural factors influencing user satisfaction and inform culturally sensitive design strategies. Finally, exploring the integration of emerging technologies such as augmented reality (AR), virtual reality (VR), and artificial intelligence (AI) into mobile application UX testing and NPS analysis could open new avenues for innovation. By harnessing the potential of these technologies, organizations can create immersive and personalized user experiences that drive user engagement and satisfaction.

V. ACKNOWLEDGMENT

This paper is a part of research report that was funded by LPPM (Lembaga Peneltian dan Pengabdian) Universitas Lambung Mangkurat (ULM) with contract number: 360/UN8.2/PG/2023. We express our highest gratitude to the rector and head of the LPPM ULM for providing the funds. Also, We express our appreciation and thanks to all parties who have helped in the implementation, especially to all respondents who have been involved in this research.

REFERENCES

[1] Z. Van Veldhoven and J. Vanthienen, ``Digital transformation as an interaction-driven perspective between business, society, and technology,'' *Electronic Markets*, vol. 32, no. 2, pp. 629-644, 2022.

[2] A. Shepard, D. Diamond, L. Willard, J. Staples, K. Martin, and N. Witherspoon, ``Discovering misattributed paternity after dna testing and its impact on psychological well-being and identity formation,'' *American Journal of Qualitative Research*, vol. 6, no. 3, pp. 189-211, 2022. doi: https://doi.org/10.29333/ajqr/12611

[3] H. Tanaka and I. Rossi, ``Revolutionizing communication: Machine translation with AI-language agents,'' *Innovative Computer Sciences Journal*, vol. 10, no. 1, pp. 1-8, 2024.

[4] M. H. Alsamhi, A. Hawbani, S. Kumar, and S. H. Alsamhi, *Multisensory metaverse-6G: A new paradigm of commerce and education*. IEEE, 2024.

[5] U. Noor, M. Mansoor, and A. Shamim, ``Customers create customers!-Assessing the role of perceived personalization, online advertising engagement and online users' modes in generating positive e-WOM,'' *Asia-Pacific Journal of Business Administration*, no. ahead-of-print, 2022. doi: https://doi.org/https://doi.org/10.1108/APJBA-11-2021-0569

[6] A. S. George, ``Universal internet access: A modern human right or a path to digital colonialis,'' *Partners Universal International Innovation Journal*, vol. 2, no. 2, pp. 55-74, 2024.

[7] B. Mutsvairo, M. Ragnedda, and K. Mabvundwi, ``'our old pastor thinks the mobile phone is a source of evil.'Capturing contested and conflicting insights on digital wellbeing and digital detoxing in an age of rapid mobile connectivity,'' *Media International Australia*, vol. 189, no. 1, pp. 89-103, 2023.

[8] W. T. Nakamura, L. C. Marques, D. Redmiles, E. H. de Oliveira, and T. Conte, ``Investigating the influence of different factors on the UX evaluation of a mobile application,'' *International Journal of Human-Computer Interaction*, vol. 39, no. 20, pp. 3948-=-3968, 2023.

[9] W.-H. Cheah, N. M. Jusoh, M. M. T. Aung, A. Ab Ghani, and H. M. A. Rebuan, ``Mobile technology in medicine: Development and validation of an adapted system usability scale (SUS) questionnaire and modified technology acceptance model (TAM) to evaluate user experience and acceptability of a mobile application in MRI safety screening,'' *Indian Journal of Radiology and Imaging*, vol. 33, no. 01, pp. 036-045, 2023.

[10] M. Al-Makky, K. A. Ahmad *et al.*, ``Usability Analysis of the DKI Jakarta Online Tax Application Using the System Usability Scale (SUS) Method,'' *Jutisi: Jurnal Ilmiah Teknik Informatika dan Sistem Informasi*, vol. 12, no. 2, pp. 807-815, 2023.

[11] C. J. Ensink, N. L. Keijsers, and B. E. Groen, ``Translation and validation of the system usability scale to a Dutch version: D-SUS,'' *Disability and Rehabilitation*, vol. 46, no. 2, pp. 395-400, 2024.

[12] M. J. Silverstein and N. Fiske, ``Luxury for the masses,'' *Harvard Business Review*, vol. 81, no. 4, pp. 48-59, 2003.

[13] T. d. J. Álvarez Robles, A. Sánchez Orea, and F. J. Álvarez Rodríguez, ``UbicaME, mobile geolocation system for blind people: User experience (UX) evaluation,'' *Universal Access in the Information Society*, vol. 22, no. 4, pp. 1163-1173, 2023.

[14] Y. Yanfi and P. D. Nusantara, ``UI/UX design prototype for mobile community-based course,'' *Procedia Comput. Sci*, vol. 216, no. 2022, pp. 431-441, 2023.

[15] A. Bicer, Y. Lee, and C. Perihan, ``Inclusive STEM high school factors influencing ethnic minority students' STEM preparation,'' *Journal of Ethnic and Cultural Studies*, vol. 7, no. 2, pp. 147-172, 2020. doi: https://doi.org/10.29333/ejecs/384

[16] S. Müller, R. Seiler, and M. Völkle, ``Should Net Promoter Score be supplemented with other customer feedback metrics? An empirical investigation of Net Promoter Score and emotions in the mobile phone industry,'' *International Journal of Market Research*, vol. 66, no. 2-3, pp. 303-320, 2024.

[17] L. A. Bettencourt and M. B. Houston, ``The untested assumption: Can a net promoter study be used to improve net promoter score?'' *International Journal of Market Research*, vol. 66, no. 2-3, pp. 216-240, 2024.

[18] L. M. Sekonyela, ``Academic writers as interdisciplinary agents in the university access programme,'' *Journal of Ethnic and Cultural Studies*, vol. 10, no. 3, pp. 89-102, 2023. doi: https://doi.org/10.29333/ejecs/1629

[19] M. T. A. Razak and M. A. A. Rahman, ``Usability and user satisfaction evaluation on JTMK project selection system by single blind method using system usability scale and net promoter score,'' *Borneo Engineering & Advanced Multidisciplinary International Journal*, vol. 2, no. Special Issue (TECHON 2023), pp. 227-231, 2023.

[20] Å. Stige, E. D. Zamani, P. Mikalef, and Y. Zhu, ``Artificial intelligence (ai) for user experience (ux) design: a systematic literature review and future research agenda,'' *Information Technology & People*, 2023.

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1

[21] J. Kim, ``Racism's back door,'' *Journal of Ethnic and Cultural Studies*, vol. 7, no. 3, pp. 142-162, 2020. doi: https://doi.org/10.29333/ejecs/392

[22] S. Fleury and N. Chaniaud, ``Multi-user centered design: acceptance, user experience, user research and user testing,'' *Theoretical Issues in Ergonomics Science*, vol. 25, no. 2, pp. 209-224, 2024.

[23] S.-H. Jun, ``The effects of perceived risk, brand credibility and past experience on purchase intention in the Airbnb context,'' *Sustainability*, vol. 12, no. 12, p. 5212, 2020. doi: https://doi.org/10.3390/su12125212

[24] V. N. Bitencourt, F. Crestani, M. Z. Peuckert, G. R. H. Andrades, J. R. M. Krauzer, C. d. C. Cintra, M. L. d. R. Cunha, G. U. Eckert, L. Girardi, I. S. Santos *et al.*, ``Net Promoter Score (NPS) as a tool to assess parental satisfaction in pediatric intensive care units,'' *Jornal de Pediatria*, vol. 99, no. 3, pp. 296-301, 2023.

[25] J. Jeong, N. Kim, and H. P. In, ``Detecting usability problems in mobile applications on the basis of dissimilarity in user behavior,'' *International Journal of Human-Computer Studies*, vol. 139, p. 102364, 2020.

[26] W. Ali, O. Riaz, S. Mumtaz, A. R. Khan, T. Saba, and S. A. Bahaj, ``Mobile application usability evaluation: A study based on demography,'' *IEEE Access*, vol. 10, pp. 41 512-41 524, 2022.

[27] A. Kara and D. Zeren, ``The relationship between the Net Promoter Score (NPS) and students' college experiences at a state university,'' *International Review on Public and Nonprofit Marketing*, vol. 20, no. 4, pp. 721-737, 2023.

[28] J. G. Dawes, ``The net promoter score: What should managers know?'' *International Journal of Market Research*, vol. 66, no. 2-3, pp. 182-198, 2024.

[29] N. R. Tungare and A. Jain, ``Net promoter score (nps) framework for improving customer loyalty in supermarket,'' *The Online Journal of Distance Education and e-Learning*, vol. 11, no. 2, 2023.

[30] T.-M. Nguyen, S. Quach, and P. Thaichon, ``The effect of ai quality on customer experience and brand relationship,'' *Journal of Consumer Behaviour*, vol. 21, no. 3, pp. 481-493, 2022.

[31] K. S. Lucero, ``Net Promoter Score (NPS): What does net promoter score offer in the evaluation of continuing medical education?'' *Journal of European CME*, vol. 11, no. 1, p. 2152941, 2022.

[32] S. Baehre, M. O'Dwyer, L. O'Malley, and V. M. Story, ``Customer mindset metrics: A systematic evaluation of the net promoter score (nps) vs. alternative calculation methods,'' *Journal of Business Research*, vol. 149, pp. 353-362, 2022.

[33] A. Baquero, ``Net promoter score (nps) and customer satisfaction: relationship and efficient management,'' *Sustainability*, vol. 14, no. 4, p. 2011, 2022.

[34] M. Cazzaro and P. M. Chiodini, ``Statistical validation of critical aspects of the net promoter score,'' *The TQM Journal*, vol. 35, no. 9, pp. 191-209, 2023.

[35] N. Raassens and H. Haans, ``Nps and online wom: Investigating the relationship between customers' promoter scores and ewom behavior,'' *Journal of Service Research*, vol. 20, no. 3, pp. 322-334, 2017.

[36] W. T. Nakamura, E. C. de Oliveira, E. H. de Oliveira, D. Redmiles, and T. Conte, ``What factors affect the UX in mobile apps? A systematic mapping study on the analysis of app store reviews,'' *Journal of Systems and Software*, vol. 193, p. 111462, 2022.

[37] P. O. H. Putra, R. A. W. W. C. Kirana, I. Budi *et al.*, ``Usability factors that drive continued intention to use and loyalty of mobile travel application,'' *Heliyon*, vol. 8, no. 9, 2022.

[38] P. Kureerung, L. Ramingwong, S. Ramingwong, K. Cosh, and N. Eiamkanitchat, ``A framework for designing usability: usability redesign of a mobile government application,'' *Information*, vol. 13, no. 10, p. 470, 2022.

[39] A. Kosasih, T. Supriyadi, M. I. Firmansyah, and N. Rahminawati, ``Higher-order thinking skills in primary school,'' *Journal of Ethnic and Cultural Studies*, vol. 9, no. 1, pp. 56-76, 2022. doi: https://doi.org/10.29333/ejecs/994

[40] A. E. Parsons, R. H. Escobar-Lux, P. N. Sævik, O. B. Samuelsen, and A.-L. Agnalt, ``The impact of anti-sea lice pesticides, azamethiphos and deltamethrin, on European lobster (homarus gammarus) larvae in the norwegian marine environment,'' *Environmental Pollution*, vol. 264, p. 114725, 2020.

[41] W. Wang, X. Zhang, D. Hao, and W. Gong, ``Design and analysis of an integrated device for launch adapter and resettable orbital deployer for picosatellites,'' *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering*, vol. 234, no. 3, pp. 818-826, 2020.

[42] D. P. Srirahayu, E. P. Anugrah, and K. Layyinah, ``Influence of satisfaction and loyalty on net promoter score (nps) in academic libraries in indonesia,'' *Library Management*, vol. 42, no. 6/7, pp. 325-339, 2021.

ISSN: 2414-4592
DOI: 10.20474/jater-10.1.1