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EVALUATING THE EFFECTIVENESS OF ONLINE BANKING APPS

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ABSTRACT

Online banking applications have transformed financial management by allowing users to access banking services anytime and anywhere. The effectiveness of the online banking apps have been established through varied sources but there is a paucity in the literatures locally as well as utilization of the evaluative perceptions of Purisimian students. This study investigates the effectiveness of the online banking apps among the college students of Colegio de la Purisima Concepcion applying a mixed-method methodology using explanatory sequential design. Sequentially, the quantitative data were collected from the randomly selected 332 respondents through a validated and pilot-tested researcher-made questionnaire. Subsequently, the qualitative data were gathered from the six participants through an in-depth interview. The study investigated the online banking apps' effectiveness across context, input, process, and product dimensions considering the demographic variables like age, sex, and department affiliation. Quantitative analysis utilized frequency counts, percentages, t-test, and analysis of variance, while the qualitative analysis followed Colaizzi's method. Results showed that online banking apps are perceived as highly effective overall, but their effectiveness varies notably based on the sociodemographic profile such as age and department affiliation. While users generally perceive these apps positively, differences in perception exist regarding their context, input, process, and product among distinct demographic groups. This research enriches the literature by highlighting the need to consider user demographics in designing online banking apps to enhance user experience and satisfaction.

Keywords: *evaluation, online banking apps, context, input, process, product*

1. Introduction

In today's digital world, online banking applications became a common way for people to manage their finances without physically going to the bank. It is like holding the bank within the palm of your hands through your phone or monitoring the state of your financial capabilities through your computer. In this way, an individual can do monetary activities such as checking one's account balance, pay bills, or transfer money virtually to anyone. The effectiveness of online banking refers to how well it meets the expectations and cater the needs of the people while assuring a reliable and secure financial service. When it comes to online banking, we want to know if it is easy to use, secures our money, and makes managing our finances easier.

A study on impact of online banking services by Mohan (2021) implied that most of the financial institution customers are privy to all the online banking offerings in Chennai, India. It is concluded in the study that financial institutions must take essential steps in instructing clients with regards to the brand-new technology and services offered by the banks. Tackling the intention of Generation Y and Generation Z to employ digital banking utilizations in the Philippines, a study by Tugade et al. (2021) concluded that usability, perceived utility, perceived risk, trust, and assurance had a notable impact in the usage of online banking services, while the socio-demographics do not.

This study also emphasizes focus on GCash on its recent setbacks last 2023. The temporary suspension of crucial features such as Express Send, Bank Transfers via Instapay, Real-time Transaction History access, QRPH, Card Transactions, and Online Web Pay underscores inherent vulnerabilities within the GCash ecosystem (Icogo, 2023). This study endeavors to assess the implications of these mishaps on user experience, reliability, and trust in online banking applications, illuminating broader concerns regarding the resilience and robustness of digital financial infrastructures in an increasingly digitized economy. Motivated by these concerns and informed by personal experiences, the researchers have ventured this study to explore and identify strategies for improving the safety and accessibility of online banking applications for diverse user groups.

Having the aforementioned studies from international and local settings, this study aimed to determine the effectiveness of online banking apps in terms of context, input, process, and product. Specifically, this study sought to answer the following questions: 1. What is the degree of effectiveness of online banking apps as a whole and in terms of context, input, process, and product? 2. Is there a significant difference in the degree of effectiveness of online banking apps in terms of context when the respondents are grouped according to age, sex, and department affiliation? 3. Is there a significant difference in the degree of effectiveness of online banking apps in terms of input when the respondents are grouped according to age, sex, and department affiliation? 4. Is there a significant difference in the degree of effectiveness of online banking apps in terms of process when the respondents are grouped according to age, sex, and department affiliation? 5. Is there a significant difference in the degree of effectiveness of online banking apps in terms of product when the respondents are grouped according to age, sex, and department affiliation?

This study is anchored in the technology continuance theory (TCT) by Liao et al. (2009), which posits that the continued use of technology products depends on user satisfaction and attitude. Users are more likely to engage with technology that meets their needs, is easy to use, performs satisfactorily, and offers additional benefits. Given that online banking apps rely on user continued usage, TCT serves as a foundational theory for this research.

Figure 1 shows the variables of the study. The independent variables of the study are the sociodemographic profile of the respondents in terms of their age, sex, and department affiliation. The dependent variables of the study comprised the online banking apps in terms of context, input, process, and product. It encapsulated the hypothesis of the researchers that respondents would vary their evaluation of online banking apps in terms of context, input, process, and product when they are grouped according to age, sex, and department affiliation.

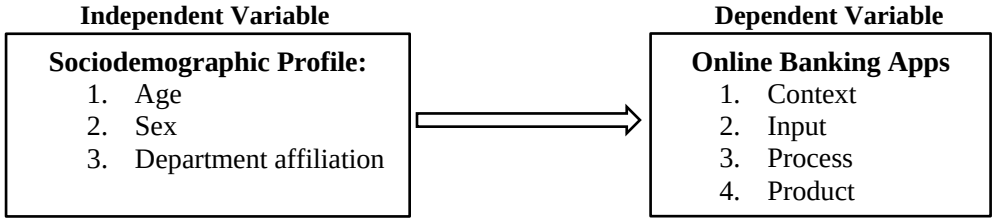

Figure 1. Schematic diagram showing the framework of the study

2. Literature Review

Context. The online banking app landscape is rapidly evolving due to various factors, including user demographics, security threats, and competition within the fintech industry. A study by Fenu and Pau (2015) on Italian banks revealed that mobile applications have outpaced mobile-optimized websites in terms of maturity and service offerings, prompting banks to invest more in mobile app development. This investment is driven by the unique functionalities provided by smartphones and tablets, as well as access to mobile data for targeted marketing and personalized recommendations. The study predicts an increasing gap between mobile web and app capabilities, underscoring the growing significance of mobile applications in online banking.

Input. Fang and Quintos (2023) examined user perceptions of security measures in digital banking and found that while users felt core security features were adequate, there were areas for improvement, including multi-device access and one-time password security. This highlights the need to not only establish baseline security but also enhance the user experience related to security features within the app. Ubam et al. (2021) studied mobile banking app preferences among senior citizens in Malaysia, discovering that fast loading times and essential banking functionalities were the most desired features. Conversely, advanced options like QR code payments were considered less important. This suggests that app design for older users should prioritize core functionalities and user interface elements that ensure a smooth and efficient interaction.

Process. Data analysis plays a pivotal role in understanding user behavior in online banking. Quantitative data can uncover usage patterns and identify areas of poor engagement, while qualitative data provides insights into user experiences and satisfaction levels. Chav and Ou (2021) investigated the factors influencing online banking attitudes among 250 users in Cambodia. They found positive correlations among job relevance, confidence, accessibility, perceived convenience, and perceived utility, suggesting that users view internet banking apps as relevant and trustworthy, positively influencing their attitudes and intentions. This underscores the importance of delivering a clear value proposition and user-friendly interface to create positive perceptions.

Product. Ghayeb (2021) investigated the link between effective online banking and customer experience in Bahrain. Based on surveys from 100 customers, the study found a strong positive connection between effective online banking services and customer satisfaction. Notably, education level moderated this relationship, indicating that effective online banking can serve as a key driver of customer satisfaction and a competitive advantage for banks. Additionally, Abualsaoud and Othman (2020) assessed quality gaps in online banking in Saudi Arabia, revealing that technology and human interaction disparities affected customers' willingness to adopt online banking. Factors such as service reliability, technical expertise, and personal interaction significantly influenced satisfaction. Addressing these gaps is crucial for enhancing the overall online banking experience, ultimately fostering greater user adoption and satisfaction in the banking industry.

3. Method

The mixed-method research approach using explanatory sequential design was employed to gather data on evaluating the effectiveness of online banking apps in terms of context, input, process, and product. The process begins with the gathering and analysis of quantitative data, followed by collecting and analysing of qualitative data, ultimately leading to interpretation. Explanatory research aims to determine causation and assess hypotheses through testing. (Riazi, 2016). The researcher intends to use statistical methods like the F-test to determine the association between variable(s). ANOVA, correlation, and/or regression. These statistical tests enable researchers to "not reject" or "reject" the hypotheses that were generated.

As indicated by Tenny et al. (2022), qualitative research offers profound insights into the "whys" and "hows" of user experiences with online banking apps. By collecting rich, descriptive data from the college students of Colegio de la Purisima Concepcion, we can gain a deeper understanding of the factors that influence their satisfaction, trust, and the overall effectiveness of these digital platforms. The application of the explanatory sequential design technique clarifies the causes, mechanisms, and connections behind specific behaviors or events, hence filling in research gaps from earlier studies. Using narrative data to explain or interpret numerical findings—especially those that are unexpected—is a common goal of an explanatory sequential design.

The primary tool utilized for data collection to address the specific inquiries was a researcher-designed questionnaire. The structured questionnaire was divided by the researchers into two (2) sections: Part I encompassed the socio-demographic characteristics of the respondents, encompassing their age, sex, and department affiliation, and Part II contained items aimed at evaluating the effectiveness of online banking apps in terms of context, input, process, and product. A researcher-made questionnaire, frequency count, percentage, mean, and One-way analysis of variance were used in the collection and analysis of data. The research instrument consisted of forty (40)-item liker-type questions clustered into four (2) components, ten (10) questions for context, ten (10) questions for input, ten (10) questions for process, and ten (10) questions for product with one (1) as never observed, two (2) as hardly observed, three (3) as occasionally observed, four (4) as regularly observed, and five (5) as significantly observed.

Data Gathering Procedure

The data gathering procedures were segmented into various phases. Hence, all necessary precautions were implemented to ensure the highest level of accuracy and ethical standards for the data (Punch & Oancea, 2014, as cited in Glemer, 2024). *First Stage.* The researchers obtained the official student count of the six (6) undergraduate departments in the Office of the Registrar of Colegio de la Purisima Concepcion. Subsequently, the sample size was determined based on the collected data. The researcher-developed questionnaires underwent validation by recognized specialists and subject-area experts. The pilot testing was conducted and administered towards thirty (30) random initial respondents, five (5) each from the six tertiary departments of Colegio de la Purisima Concepcion. Upon establishing a satisfactory reliability coefficient, permission was sought to distribute the questionnaire across the tertiary departments of Colegio de la Purisima Concepcion. The questionnaire was then reproduced and prepared for distribution to the intended respondents. *Second stage.* The questionnaires were personally distributed to the respondents, ensuring anonymity, confidentiality, informed consent, after providing a clear and concise explanation of the study's objective to the participants. After the respondents have accomplished the questionnaires, the questionnaires were then gathered and readied for the data analysis. *Third stage.* Great caution was taken in managing the data to prevent any compromise of confidentiality and anonymity. Participants were assured of privacy protection for both quantitative and qualitative data by securely storing them in a safe location after the completion of the research study (Bos, 2020).

As per the semi-structured interview, six (6) undergraduate students from each of the departments were randomly sampled and interviewed. Audio recording devices were employed with the participant's agreement, explicitly stating that the recordings were solely for research reasons. The researchers provided an incentive or remuneration to express their gratitude for the participant's assistance. Following the interviews, the planning for the subsequent stage began. The researchers prepared the acquired data for analysis and thematization. However, this level appeared to be less complex. Nevertheless, it was the most demanding aspect of this current investigation.

4. Results and Discussion

Degree of Effectiveness of Online Banking Apps as a Whole

The means obtained for the degree of effectiveness of online banking apps as a whole and in terms of context, input, process and product are presented in Table 1.

Table 1. Degree of Effectiveness of Online Banking Apps as a whole

Indicators	Mean	Verbal Interpretation
Product	4.33	Very Effective
Process	4.28	Very Effective
Input	4.26	Very Effective
Context	4.26	Very Effective
Grand Mean	**4.29**	**Very Effective**

Legend: 4.21 – 5.00 = Very Effective; 3.41 – 4.20 = Effective; 2,61 – 3.40 = Moderately Effective; 1.81 – 2.60 = Less Effective; 1.00 – 1.80 = Least Effective. Note: Components are presented from highest to lowest.

Upon considering all 332 respondents collectively, the data in Table 1 indicates that online banking apps' overall degree of effectiveness had a mean score of 4.29, categorically interpreted as 'very effective'. Further analysis outlines that the domain of product had the highest mean score of 4.33, denoting a "very effective" level. Both context and input categories had identical mean scores of 4.26 and followed process (4.28), all interpreted as "very effective."

The effectiveness of an online banking app is vital for adoption and user satisfaction. It should be functional and user-friendly, providing accurate information and resources. Additionally, the app must ensure

operational efficiency and intuitive navigation while consistently delivering on its features and performance to meet user expectations.

Context. Results on the degree of effectiveness of online banking apps in terms of context had a grand mean of 4.26 with a verbal interpretation of "very effective" as presented in Table 1a.

Table 1a. Degree of Effectiveness of Online Banking Apps in terms of Context

Statements	Mean	Verbal Interpretation
The online banking apps that I use…		
1. provide a wide range of services.	4.41	Very Effective
2. use simple language	4.40	Very Effective
4. provide tutorial features.	4.32	Very Effective
3. provide timely notifications.	4.30	Very Effective
10. help in managing finances.	4.28	Very Effective
8. remind constantly	4.23	Very Effective
5. allow access in multiple devices.	4.21	Very Effective
7. ensure system dependability.	4.20	Effective
6. provide quick customer support.	4.13	Effective
9. utilize calendar alarms.	4.11	Effective
Grand Mean	**4.26**	**Very Effective**

Legend: 4.21 – 5.00 = Very Effective; 3.41 – 4.20 = Effective; 2,61 – 3.40 = Moderately Effective; 1.81 – 2.60 = Less Effective; 1.00 – 1.80 = Least Effective. Note: Components are presented from highest to lowest.

Among the ten (10) statements assessing the degree of effectiveness of online banking apps in the context of their usage, seven (7) statements received mean scores interpreted as "very effective," while the remaining three statements garnered mean scores categorized as "effective."

The highest mean score of 4.41 with a verbal interpretation of "very effective" was on the statement, "provide a wide range of services." This implies that online banking apps are highly appreciated for their extensive service offerings. This indicates that users find these apps versatile and capable of meeting various financial needs, from basic transactions to more complex financial management tasks.

The results collectively indicate that users find online banking apps very effective in most aspects of their functionality. This corroborates with the statements of Participant 3: "Using apps for my bank is better than the old ways because it's easy, always there, and safe,"; and Participant 4: "It's easy and quick to manage my money on my phone or computer." This is also consistent with the study by Banu (2019), which highlighted the significant role of perceived usefulness in enhancing customer satisfaction with online banking services. The high ratings for diverse service offerings and user-friendly design demonstrate that these apps meet user expectations and facilitate a positive user experience, contributing to high satisfaction levels.

Input. Results on the degree of effectiveness of online banking apps in terms of input had a grand mean of 4.26 with a verbal interpretation of "very effective" as presented in Table 1b.

Table 1b. Degree of Effectiveness of Online Banking Apps in terms of Input

Statements	Mean	Verbal Interpretation
The online banking apps that I use…		
2. use various security authentication methods.	4.42	Very Effective
8. send notifications based on my activity.	4.38	Very Effective
7. secure accounts biometric.	4.37	Very Effective
9. allow easy access of accounts.	4.36	Very Effective

Statements	Mean	Verbal Interpretation
10. accept user's feedback.	4.28	Very Effective
1. handle recurring payments.	4.26	Very Effective
4. have simple input commands	4.25	Very Effective
3. prompt for feedback accordingly.	4.18	Effective
5. use autocomplete system for a speed up entry of data.	4.11	Effective
6. resolve issues quickly.	3.97	Effective
Grand Mean	**4.26**	**Very Effective**

Legend: 4.21 – 5.00 = Very Effective; 3.41 – 4.20 = Effective; 2,61 – 3.40 = Moderately Effective; 1.81 – 2.60 = Less Effective; 1.00 – 1.80 = Least Effective. Note: Components are presented from highest to lowest.

Among the ten statements assessing the effectiveness of online banking apps in terms of input, seven (7) received mean scores interpreted as "very effective," while the remaining three (3) statements were categorized as "effective."

The highest mean score of 4.42, with a verbal interpretation of "very effective," was for the statement, "use various security authentication methods." This suggests that online banking apps prioritize security by employing diverse authentication methods, ensuring users' trust and safety when accessing their accounts. Security is a paramount concern for users, and robust authentication methods address this critical need effectively.

The results corroborate findings from previous studies, such as those by Fenu and Pau (2015), which highlighted the increasing importance due to their unique functionalities and the data input system they can leverage to improve the experience. The results validate the statement of Participant 1: "The security measures that I like when using online banking apps are fingerprint and/or facial recognition when logging in."

Process. Results on the degree of effectiveness of online banking apps in terms of process had a grand mean of 4.28 with a verbal interpretation of "very effective" as presented in Table 1c.

Table 1c. Degree of Effectiveness of Online Banking Apps in terms of Process

Statements	Mean	Verbal Interpretation
The online banking apps that I use…		
3. show account history.	4.45	Very Effective
9. maintain financial updates	4.42	Very Effective
8. have features for easy transactions.	4.41	Very Effective
1. guide me through complex transactions	4.34	Very Effective
10. offer support resources	4.28	Very Effective
4. have menus logically organized for easy navigation.	4.25	Very Effective
5. conduct update transparently.	4.25	Very Effective
7. simplify tasks based on my history.	4.24	Very Effective
6. have backup system.	4.19	Effective
2. use predictive AI.	3.98	Effective
Grand Mean	**4.28**	**Very Effective**

Legend: 4.21 – 5.00 = Very Effective; 3.41 – 4.20 = Effective; 2,61 – 3.40 = Moderately Effective; 1.81 – 2.60 = Less Effective; 1.00 – 1.80 = Least Effective. Note: Components are presented from highest to lowest.

Among the ten statements assessing the effectiveness of online banking apps in terms of process, eight were rated as "very effective," while two were categorized as "effective." The statement with the highest mean score of 4.45, interpreted as "very effective," was “Online banking apps show account history,” indicating users value this feature for financial management. Conversely, the lowest mean score of 3.98, categorized as "effective," was for “Online banking apps use predictive AI,” suggesting that users see potential for improvement in this area.

These findings align with Participant 1's observations that online banking apps provide transaction details, enhancing user experience, and with Participant 2's comment about features that help users make informed financial decisions, such as budgeting tools and personalized recommendations. Overall, the results indicate that while users appreciate existing features, there is still room for enhancements, particularly in predictive AI capabilities.

Product. Results on the degree of effectiveness of online banking apps in terms of product had a grand mean of 4.33 with a verbal interpretation of "very effective” as presented in Table 1d.

Table 1d. Degree of Effectiveness of Online Banking Apps in terms of Product

Statements	Mean	Verbal Interpretation
The online banking apps that I use…		
2. have security updates and new features	4.43	Very Effective
8. have user-friendly design.	4.40	Very Effective
9. ensure strong data protection.	4.40	Very Effective
7. have clear policies.	4.38	Very Effective
10. offer tutorials for new features.	4.38	Very Effective
6. provide quality service.	4.36	Very Effective
1. offer assistive tools for managing finances	4.34	Very Effective
4. conduct update constantly for performance.	4.26	Very Effective
5. update features based on market trends.	4.25	Very Effective
3. give rewarding points for transactions.	4.14	Effective
Grand Mean	**4.33**	**Very Effective**

Legend: 4.21 – 5.00 = Very Effective; 3.41 – 4.20 = Effective; 2,61 – 3.40 = Moderately Effective; 1.81 – 2.60 = Less Effective; 1.00 – 1.80 = Least Effective. Note: Components are presented from highest to lowest.

Among the ten statements assessing the effectiveness of online banking apps in terms of product, nine (9) received mean scores interpreted as "very effective," while one (1) statement garnered a mean score categorized as "effective." The highest mean score of 4.43 was on the statement, "Online banking apps have security updates and new features," indicating that users perceive these apps as highly effective in providing security measures and innovative features.

This suggests that users value the continuous improvement and security measures implemented by online banking apps.

The lowest mean score of 4.14 was on the statement, "Online banking apps give rewarding points for transactions." Although still categorized as "effective," this suggests that while users appreciate rewards, it might not be as crucial a factor compared to other aspects such as security and usability.

The results corroborate with the statements of Participant 5: “I can say that it was good since the features of the app is easy to learn” in terms of the apps having a user-friendly design; and Participant 3: “I like when the app asks for extra security stuff, like codes or passwords” in terms of apps ensuring strong data protection. These findings align with the expectations of users for modern online banking platforms to offer secure, user-friendly, and feature-rich experiences.

Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when Grouped according to their Sociodemographic Profiles in terms of Context

The findings on the difference in the degree of effectiveness of online banking apps when respondents are grouped according to their socio-demographic profiles in terms of context are revealed in Table 2.

Table 2. Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when grouped according to their Socio-demographic Profiles in terms of Context

Profile	t/f-Value	Significant Value	Verbal Interpretation
Age	5.928	0.003	s.
Sex	1.051	0.294	n.s.
Department Affiliation	2.054	0.071	n.s.

Legend: p-value > 0.05 = not significant (n.s); p-value < 0.05 = significant (s.)

Context and Age. As shown in Table 2, there is a significant difference in the effectiveness of online banking apps based on respondents' age, with an f-value of 5.928 and a significance value of 0.003, both lower than the 0.05 alpha level. Thus, the null hypothesis—indicating no significant difference—is rejected. Respondents aged 24 and above perceived online banking apps as more effective compared to those aged 18-20. This finding aligns with previous research highlighting age as a critical factor in technology adoption (Fenu & Pau, 2015).

Context and Sex. Table 2 indicates no significant difference in effectiveness based on sex, with an f-value of 1.051 and a significance value of 0.294, exceeding the 0.05 alpha level. Therefore, the null hypothesis—suggesting no significant difference—is accepted. This result contrasts with some studies that propose gender differences in technology acceptance (Fang & Quintos, 2023). However, other factors may significantly influence users' perceptions of app effectiveness.

Context and Department Affiliation. Table 2 also shows no significant difference in effectiveness based on department affiliation, as indicated by an f-value of 2.054 and a significance value of 0.071, which is above the 0.05 alpha level. Thus, the null hypothesis regarding department affiliation is accepted. The analysis did not identify accessible sources that specifically address the relationship between context and department affiliation.

Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when Grouped according to their Sociodemographic Profiles in terms of Input

The findings on the difference in the degree of effectiveness of online banking apps when respondents are grouped according to their socio-demographic profiles in terms of input are revealed in Table 3.

Table 3. Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when grouped according to their Socio-demographic Profiles in terms of Input

Profile	t/f-Value	Significant Value	Verbal Interpretation
Age	6.231	0.002	s.
Sex	1.715	0.087	n.s.
Department Affiliation	4.686	0.000	s.

Legend: p-value > 0.05 = not significant (n.s); p-value < 0.05 = significant (s.)

Input and Age. Table 3 reveals a significant difference in the effectiveness of online banking apps based on respondents' age, with an f-value of 6.231 and a significance value of 0.002, both below the 0.05 alpha level. Thus, the null hypothesis—indicating no significant difference—is rejected. Data show that respondents aged

21-23 perceive online banking apps as more effective in terms of input than those aged 18-20. This aligns with Fenu and Pau (2015), suggesting that younger users may be more skilled in using digital interfaces and comfortable with various input methods.

Input and Sex. According to Table 3, there is no significant difference in effectiveness based on sex, as the f-value is 1.715 with a significance value of 0.08, exceeding the 0.05 alpha level. Consequently, the null hypothesis—indicating no significant difference—is accepted. This outcome supports previous research that suggests gender does not significantly impact perceptions of technology effectiveness (Banu, 2019).

Input and Department Affiliation. Table 3 indicates a significant difference in the effectiveness of online banking apps based on department affiliation, with an f-value of 4.686 and a significance value of 0.000, which is below the 0.05 alpha level. Thus, the null hypothesis—suggesting no significant difference—is rejected. Data indicate that respondents from CHTM and CBMA perceive online banking apps as more effective in terms of input compared to those from CCJ. This suggests that users' educational or professional backgrounds may influence their expectations and preferences regarding input functionality (Fenu & Pau, 2015).

Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when Grouped according
to their Sociodemographic Profiles in terms of Process

The findings on the difference in the degree of effectiveness of online banking apps when respondents are grouped according to their socio-demographic profiles in terms of process are revealed in Table 4.

Table 4. Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when grouped according to their Socio-demographic Profiles in terms of Process

Profile	t/f-Value	Significant Value	Verbal Interpretation
Age	10.104	0.000	s.
Sex	1.825	0.069	n.s.
Department Affiliation	4.492	0.001	n.s.

Legend: p-value > 0.05 = not significant (n.s); p-value < 0.05 = significant (s.)

Process and Age. Table 4 indicates a significant difference in the effectiveness of online banking apps based on age, with an F-value of 10.104 and a significant value of 0.000 ($p < 0.05$). Thus, the null hypothesis is rejected. Respondents aged 21-23 perceive these apps as more effective than those aged 18-20. Chav and Ou (2021) suggest that age influences attitudes toward online banking, with older users finding these apps less intuitive. Lim (2013) also highlights that perceived ease of use is crucial for adoption, noting that older adults face greater technological challenges, underscoring the need for targeted user education.

Process and Sex. Table 4 shows no significant difference in effectiveness by sex, with an F-value of 1.825 and a significant value of 0.069 ($p > 0.05$), leading to the acceptance of the null hypothesis. This aligns with Ghayeb's (2021) findings that sex does not significantly affect customer satisfaction with online banking.

Process and Department Affiliation. A significant difference based on department affiliation is noted, with an F-value of 4.492 and a significant value of 0.001 ($p < 0.05$), leading to the rejection of the null hypothesis. Respondents from CHTM perceive these apps as more effective than those from CET and CCJ.

Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when Grouped according to their Sociodemographic Profiles in terms of Product

The findings on the difference in the degree of effectiveness of online banking apps when respondents are grouped according to their socio-demographic profiles in terms of product are revealed in Table 5.

Table 5. Differences in the Respondents' Degree of Effectiveness of Online Banking Apps when grouped according to their Socio-demographic Profiles in terms of Product

Profile	t/f-Value	Significant Value	Verbal Interpretation
Age	7.430	0.001	s.
Sex	1.296	0.205	n.s.
Department Affiliation	4.196	0.001	s.

Legend: p-value > 0.05 = not significant (n.s); p-value < 0.05 = significant (s.)

Product and Age. Table 5 reveals a significant difference in the effectiveness of online banking apps regarding product when respondents are grouped by age. The obtained F-value of 7.430 and a significant value of 0.001 ($p < 0.05$) lead to rejecting the null hypothesis, which posits no difference. Respondents aged 24 and above, as well as those aged 21-23, perceive the apps as more effective than those aged 18-20. This finding contrasts with Tan's (2021) study, which emphasized system availability and privacy as key factors for satisfaction without focusing on age.

Product and Sex. Table 5 indicates no significant difference in effectiveness when respondents are grouped by sex, with an F-value of 1.269 and a significant value of 0.205 ($p > 0.05$). Thus, the null hypothesis is accepted. This aligns with Ghayeb's (2021) findings that gender does not significantly influence customer satisfaction with online banking, corroborated by Banu (2019), which found perceived usefulness drives satisfaction across genders in India. This consistency suggests that men and women value the functionality and usefulness of online banking apps similarly.

Product and Department Affiliation. Table 5 shows a significant difference in effectiveness based on department affiliation, with an F-value of 4.196 and a significant value of 0.001 ($p < 0.05$). Thus, the null hypothesis is rejected. Respondents from CHTM and CBMA perceive a higher effectiveness of online banking apps compared to those from CCJ. However, the current references do not provide a comprehensive understanding of the relationship between product and department affiliation, indicating a need for further studies in this area.

Semi-structured Interview Results

From the participants' interview responses, three themes emerged regarding the effectiveness of online banking apps in terms of context, input, process, and product. Thus, to do, to consider, and to mind. These themes represent the collective views of the participants on the effectiveness of online banking apps as displayed in Table 6.

Table 6. Themes and subthemes on the effectiveness of online banking apps

Themes	Subthemes	Codes	Frequency
To do	To facilitate	Convenience	P 2, P 3, P 4, P 5
		Ease of use	P 1, P 2, P 3, P 4, P 5, P 6
	To transact	Payment and purchase	P 1, P 2, P 3, P 4, P 6
		Account balances	P 1, P 2, P 3, P 4, P 5
		Money transfer	P 1, P 2, P 3, P 4, P 5, P 6
	To expedite	Integration	P 1, P 3, P 4
		Systemic processes	P 1, P 2, P 3, P 4, P 6
	To gain	Investing	P 1, P 3
		Managing	P 2, P 3, P 4, P 5, P 6
To consider	Customer support	Maintenance	P 4, P 5
		Update	P 2, P 6

	Security measures	Password and authentication	P 1, P 2, P 3, P 4, P 5, P 6
		Alerts	P 2
		Errors within the app	P 1, P 2, P 3, P 4, P 5
To mind	Flaws	Reactions within the person	P 1, P 2, P 4, P 6

Legend: P – Participant

The overarching theme of this analysis is the functionality of online banking apps, which has evolved from subthemes: to facilitate, to transact, to expedite, and to gain. These functionalities significantly enhance users' financial management experiences, promoting user adoption and satisfaction through user-friendly design, efficient transactions, and robust security measures (Fenu & Pau, 2015; Ghayeb, 2021). Continuous improvement is crucial in the rapidly changing online banking landscape to meet user needs and expectations.
The subtheme "to facilitate" emerged from codes related to convenience and ease of use. Online banking apps aim to streamline financial transactions, making them more accessible. Fenu and Pau (2015) noted that mobile banking apps have advanced beyond mobile-optimized web applications due to the capabilities of smartphones and tablets. This evolution emphasizes user-centric design that leverages mobile technology. Users highlight the convenience of these apps, as demonstrated by statements such as: “The process is smooth and very convenient since you don't need to go to the bank” (Participant 5) and “It's easy and quick to manage my money on my phone” (Participant 4).
The subtheme "to transact" focuses on the essential functions of online banking apps, including payments, account balances, and money transfers. Yu (2012) highlighted the significance of performance expectations in the uptake of mobile banking services. Hossain et al. (2020) found that perceived ease of use enhances user satisfaction and continued engagement. Users emphasized the importance of essential features, such as: “When I am in a hurry, I don’t have to go to the payment location” (Participant 2) and “A good online banking app should let you check your account balance easily” (Participant 1).
The subtheme "to expedite" addresses the integration of online banking apps and their processes. Fang and Quintos (2023) pointed out that security enhancements, like multi-device access, streamline user experiences. Efficient transactional capabilities allow users to navigate banking functions swiftly. Statements such as: “I typically log in securely and confirm the transaction with a secondary authentication method” (Participant 1) illustrate users' appreciation for the speed and security of transactions.
The subtheme "to gain" focuses on investment and fund management through online banking apps. These platforms not only provide banking services but also facilitate investment in various instruments. Ghayeb (2021) noted that real-time access to market data helps users make informed decisions. Participants shared positive experiences, stating: “It manages my money on the go from depositing funds to creating savings goals” (Participant 5) and “I can also monitor my spending patterns and track investments” (Participant 1).

5. Conclusions and Implications

Key findings from the study indicated that the overall effectiveness of online banking apps—assessed through the dimensions of context, input, process, and product—was rated as very effective. Notably, a significant difference in perceptions of app effectiveness was observed in relation to context when respondents were grouped by age. This suggests that different age groups interpret the contextual usefulness of online banking apps in varied ways, highlighting the importance of considering age demographics in app design. Furthermore, significant differences were identified in the input, process, and product dimensions when respondents were categorized by both age and department affiliation. This indicates that demographic factors play a crucial role in shaping user experiences and perceptions.
The conclusions drawn from the study emphasize that online banking apps are generally viewed positively across all evaluated dimensions. However, the observed variations in effectiveness based on age and department affiliation underline the necessity for app developers to take these factors into account when refining app features and functionalities.
Recommendations stemming from the findings advocate for a focus on enhancing system reliability, intuitive design, and overall user satisfaction. This could be achieved through regular app maintenance, investment in

robust infrastructure, and the integration of in-app feedback mechanisms. Additionally, the implementation of loyalty programs could foster greater user engagement. Future research should delve deeper into specific features and usability factors, as well as further investigate the role of individual characteristics to optimize online banking app functionality for diverse user groups.

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