BIS INFORMATION TECHNOLOGY And computer science



UI/UX design of AlterOmah architect consultation booking application using design thinking

P J E Ayu^{1*}, A Setiawan¹ and P Sukmasetya¹

¹ Engineering Faculty, Universitas Muhammadiyah Magelang, Magelang, Indonesia ^{*}Corresponding author email: javaesya0120@gmail.com

Abstract

Architectural services have leveraged technological advancements to engage in diverse business practices, notably through social media platforms. Marketing architectural services via social media introduces several challenges for consumers, including difficulties locating local architects, insufficient product information, and concerns regarding transaction security. This research addresses these issues by designing a user interface (UI) and user experience (UX) for a consultation booking application with architects. Employing the design thinking method with stages such as empathizing, defining, ideating, prototyping, and testing, the research culminates in developing the "AlterOmah" applications UI UX design. Usability testing, incorporating task scenarios and the System Usability Scale (SUS), reveals a score of 78.5 out of 100, categorizing the "AlterOmah" application as Grade B, indicating a good rating regarding learnability and user satisfaction. The design of the "AlterOmah" application provides a new alternative for public access to architectural services. It increases awareness of the existence of local architects, with scientific implications for applying Design Thinking methods in developing architectural service-oriented applications.

Keywords

UI/UX design, Booking application, Design thinking

Introduction

Published: October 20, 2024

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Selection and Peerreview under the responsibility of the 5th BIS-STE 2023 Committee APJII survey results show an increase in internet users by 1.17%, from 210 million (2022) to 215 million (2023) [1]. The high prevalence of public online purchasing behavior [2] and internet users is related to the widespread integration of information technology into daily activities. The architecture workforce increased consistently, reaching 58,615 people in 2019 [3]. This surge encourages business adaptation with creative innovation [4]. The implementation of the right information technology system will have an impact on work effectiveness and performance [5]. Marketing architectural services through social media is a challenge for consumers.

These challenges encompass difficulties in finding local architects, a lack of product information, and concerns regarding security guarantees in transactions. Such issues

contribute significantly to consumer anxieties and foster a sense of distrust toward architects and the services they provide. The absence of clear information can complicate the decision-making process for potential customers. Many people think that using architects is expensive, and there are rarely architects who really understand what people expect in a fairly low-cost [6]. Architectural businesses must utilize technological advancements to attract people to purchase their products and services. Therefore, electronic commerce of services has become a very important strategy. Electronic commerce not only ensures more targeted dissemination of product information, but also improves the efficiency of the transaction process [7].

Faced with these challenges, this research aims to design an architect service booking application using the design thinking method intended for Android or iOS mobile devices. The selection of mobile devices is based on the large number of users and widespread use [8]. This research is expected to increase public awareness of local architects and encourage the growth of the architecture business. The practical and effective design thinking method is applied by observing and paying attention to user problems [9].

Methods

This research starts with problem analysis and data collection through observation and literature study. Understanding and fulfilling user needs and overcoming barriers to user experience are important considerations in designing systems to increase implementation effectiveness [10]. Observing consumers who have used architectural services is carried out to understand the problems when ordering services, making transactions, and project implementation. Literature studies are used to strengthen the use of design thinking methods. Data processing uses the design thinking method as a problem-solving approach because it gives users various perspectives. The design thinking method is expected to meet user needs and effectively overcome user problems using the application [9]. The design thinking process consists of five stages: empathize, define, ideate, prototype, and test.

The empathize stage involves collecting user views and needs through observation and interviews [9]. The define stage elaborates on identified problems using user personas and HMW (How Might We). Ideate is the third stage, where researchers generate ideas and solutions based on data from the define stage, utilizing user flows and mood boards. The prototype stage follows, creating interface designs using low-fidelity and high-fidelity wireframes in Figma, aligned with the ideated solutions [11]. At this stage, researchers will use Figma as the main tool to create an application interface design. The final test stage involves usability testing on the completed "AlterOmah" application prototype, assessing learnability, efficiency, errors, and satisfaction [12] using scenario tasks and the System Usability Scale (SUS) questionnaire for 5 participants.

Results and Discussion

Empathize

The Empathize stage is carried out through observations and interviews to understand the problems faced [11]. Interviews were conducted with consumers who have used architect services to determine user needs based on their experience. The interviews with consumers who have used architectural services revealed several needs, including difficulty finding a trusted architect, lack of product information, slow consultation services, and the desire for more monitored project reporting. From the results of these interviews, an empathy map was created in Table 1, which illustrates the researcher's understanding of potential users based on their words, thoughts, actions, and feelings.

SAYS	THINKS	DOES	FEELS
find it difficult to find architects with designs that I like	I want it to be easy to choose an architect	Ask experienced colleagues	Worried
When I contacted him, his response was less than enthusiastic	Tracking orders anywhere	Observation by reading product descriptions	Interesred
A little information about architectural services around me	Product material specifications will be more helpful	Comparing several architects	Confused
I have little time to find an architect	I would like to see reviews from other consumers	View existing design portfolios on social media	Excited
don't trust their responsibility	I am confused about the types of products offered	Search for information on social media	Undecided
The architect did not fully understand my wishes	Consult as needed with the architect	Choosing a preferred design concept	Lack of trust

Observation with competitor analysis used as a reference for designing the "AlterOmah" application solution. Competitor analysis was conducted on 3 similar applications: "Dekoruma," "Homify," and "Qanvast." The difference in appearance between the competitor apps provides a reference for developing a better design approach. The result of the competitor analysis is shown in Table 2.

·		1 /		
Competitor Analysis	Dekoruma	honefy 🖈	🕜 Q A N V A S T	ALTER MAH
Design Portfolio Details	V	Х	V	V
Save/like Design	X	V	V	V
Project consumer review	V	Х	V	V
Architect Search	X	V	V	V
Order Tracking	Х	Х	Х	V
Scheduled Consultation	Х	Х	Х	V

Table 2. Competitor analysis

Define

Data from the empathize stage is processed with user personas and HMW (How Might We). User persona consists of persona data, goals, frustrations, and motivations [13]. Researchers create user personas based on these data and characteristics to deeply understand user behavior and needs. The user persona is illustrated in Figure 1 as a fictional representation that reflects the user's desires and feelings from the previous empathy map.

By using the How Might We(HMW) method, the problems found will be converted into statements that are followed up to develop various scenarios into solutions [14] in designing the "AlterOmah" application. The results of making HMW in this study can be seen in Table 3.



27, Tangerang, Office worker

"I wanted to get professional help practically and quickly, and to know exactly what my interior needs were." About Ayudia is a person who often does repairs and construction on her home and business and is currently in need of an architect. Feeling confused because she has little time to get a trusted architect. She hesitated if the results did not match her expectations because the information displayed on some architects' social media was incomplete and uninformative. She wanted the renovation not to exceed her budget. She was also confused to find the right concept for her renovation

Motivation

Can find interior design references with various concepts, make service order transactions more safely and can consult with the architect more responsively and efficiently.

Figure 1. User persona

Goals

Easy-to-use flow of the application.
Get interior design references.
View other users' reviews and rates.

- Book a service with an architect.
- Get price estimation information.
- View detailed product information
 Conduct scheduled consultations

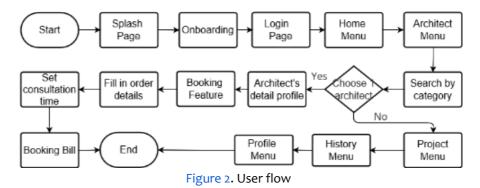
Frustrations

- Difficulty finding a preferred interior concept.
- Difficult to find interior design services around.
- The consultation took a long time.
- Information on services offered is not convincing
- Have little time to look for architectural services

HOW	MIGHT
How can consumers book architectural services easily?	Created an architect page to search and select architects. Consultation feature on architect profile and product details.
How can we enhance consumer understanding of the products we offer?	By providing an FAQ feature and providing a special section for important information.
How can we showcase customer reviews to attract new customers?	By creating a section containing customer reviews about projects that have ended on the architect's profile and each
	product.
How can customers order services with clear order details?	By creating a Consultation feature to fill in the order details, which will display the estimated price.
How can consumers organize the consultation so that it is scheduled?	By selecting a booking time for consultation on the Consultation feature when placing an order.
How can customers see the progress of their project?	By creating a History page that displays a list of scheduled consultations and ongoing projects.
How can we make it easier for consumers to get design references?	By providing a Project page that showcases a variety of architects' design products. Users will be able to search and filter
	these products based on their preferences.
How do consumers save preferred products and architects?	By offering comparable features on the product specifications and profile of the architect.

Ideate

This stage aims to generate ideas and solutions that guide the designed [9]. Researchers created a user flow to understand the flow of using the "AlterOmah" application to facilitate user interaction. User flow helps identify user steps in completing tasks or achieving goals [14]. The "AlterOmah" application has 5 menus: Home, Architect, Project, History, and Profile. The results of the user flow are shown in Figure 2, covering all stages of the consultation booking scenario from start to success. This user flow becomes a reference in designing the interface and user experience of the product.



The mood board in Figure 3 contains references for designing the app, with the color green chosen to create a sense of calm and balance for the user. In addition to color, the mood board includes references to typography, icons, buttons, and other design styles.



Figure 3. Mood board

Prototype

A low-fidelity wireframe or a rough picture of a design that will be developed into a highfidelity wireframe. A high-fidelity wireframe is the final product design created by providing images of coloring, fonts, and shapes [11]. For making wireframes at this stage, researchers use Figma tools. The wireframe pages created at this stage are architect and project details, booking features, tracking features, and several pages of detail and filter (Figure 4a and Figure 4b).



Figure 4a. Low-fidelity wireframe for the 5 menus of the "AlterOmah" application



Figure 4b. High-fidelity wireframe for the 5 menus of the "AlterOmah" application

1. Wireframe detail architect and project

Architect details include the architect's profile, service range, distance, and reviews. Project details include specifications, price estimates, reviews, and before and after photos. Users can use the Wishlist button to save preferences and the Consultation button to book architect services (Figure 5a and Figure 5b).

	941	941		823	9.41	9.41 .4.7	
6 Politikan 🔮	← Ulasan - Zainal Pegi	← Project - Zainal Firgl	•	€ /ndi kratus <	← Project - Zainal Firgi	🔶 Ulasan - Zainal Firgi	
Zainal Firgi - Line State Street	(Seal Seal And Arts)	(bear true to a free to a		Tainal Plays - rive Character Stream	New York here here	Sear (Sear (Brandward (Sear))	
1 A A	Bat Milet over terms		Kitchen Set Minimalia Witchen - Innerse - Innerse and Ingen	· M. Station · Annual · Annual	in the second	Milder States	Ritchen fet Minimale http://www.second.com
Noting Registrate of the state is before a strength intervention of the state of the strength of the strengt	And the couple is the first fraction of the second state of the se	Kitchen Set Minimula ###### 19 Johnse Richards @ III @ III and III (III and III) Richards @ III @ IIII and III (IIII)	Composition Descention stands Composition Composition	Varian Marine (1973) - 19 Marine Strange, more and a solution strange of solution strange solution of a solution strange of solution strange solution of solution strange of solutions and solutions of solutions of solutions and solutions of solutions of solutions and solutions of solutions and solutions and solutions of solutions and solutions and solutions of solutions and solutions	Etchen Set Mislandis Der Mislandis Annuel Misl	Stand designs for first with instants on a design data data designs of the stand stand stand stand designs of the stand stand stand designs of the stand stand stand stand designs of the stand	101 Second second 101 Second second 102 Second second 103 Second second 104 Second second 105 Second second 106 Second second 106 Second second 106 Second second 106 Second secon
Anna Anna Anna Anna Anna Anna Anna Anna	8 mart		(and projection (spin) professional deal (spin) (spin) and (spin) profession (spin) and (spin) (spin) and (spin) profession (spin) and (spin) (spin) profession (spin) and (spin) and (spin) (spin) and (spin) and (spin) and (spin) and (spin) and (spin) (spin) and (spin) and (spin) and (spin) and (spin) and (spin) (spin) and (spin) and (spin) and (spin) and (spin) and (spin) (spin) and (spin) and (spin) and (spin) and (spin) and (spin) (spin) and (spin) and (spin) and (spin) and (spin) and (spin) (spin) and (spin) and (spin) and (spin) and (spin) and (spin) and (spin) (spin) and (spin) and	A and the R of the R of the	and the second division of the second divisio	Se manh	
Band deem Democratic control of the second deem The second descendence of the second deem deem deem deem deem deem deem de	"Next or an and a performance of the second	Rang Salarga Katerganar (2017) (2009) SEESE (2010) (1) (2010) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2)	Sector Se	Merce M Merce M Merce Market Market Market M Merce Market Market Market Market Mark		"Autors and action to white specifications between data and believeness forther sample receipt description areas on A location over the same way being the result of the same same being being the result of the same same same being the result of the same same same being the result of the same same same being the being and the same same same same same same same same same same same same same same same	An Team Constitution Team Constitution Cons
NININI	daman daman		$\times \times \times 2$		Ranne Tamu Kontemporer Starl Street		
Name A Concession	8 Terrison	Kanar Tolar Industrial Electroneuro	8 ************************************				
Distance (1070-00)	This couple received way because the set of the latter with the set of the set of the latter with the set of the latter with the set of the se	n	An and a second se	Refere to March Toronto	Kanar Tahr Modern BAW	Taga sangar na giranga bandhazar dar scort skan renden administration kinnen Honden titte Taga na dag sanga berlanga Kari tercar tercar tercar senti sang sanga berlanga Kari tercar tercar tercar terchicitas an adap sangari.	298.A
Tester	8		() 24-14 M		A second B == B (second section	·····	
Figure 5a	. Low-fidelity	for detail arcl	nitect &	Figure 5b	. High-fidelity	for detail arc	hitect &

project

2. Wireframe booking features

project

Pressing the consultation button directs the user to the consultation booking page, where they enter details of their renovation needs and personal information. Upon completion, pressing the reservation button leads to the consultation checkout page, confirming a successful booking (Figure 6a and Figure 6b).

		941	• 0.41
Stating Percelant	+ Restautori	← Declast formital	 Taphan Kenaibai
🗴 best forment o 💥 one former of a 🙀	O to a face a 1 O continue o 1		
e fogelas	Longhant Date State		Binus Ailmin Ry/500
2 <u>2</u> <u>2</u> <u>2</u>	Canacionghap	Analytic (M)	 Fill states and state states without
abb magan	Same Tropie	and the second	Bauer Salasham 211 and 11 and 11 and 11 and 11 and 12 and
a Resident		Doubl coursed tools Proved Joseph	1.00
far during hourses	tend .	Junior Chinese	Bank BCA (string accurd)
		Tax Abbe at the	
	And Descriptions became finited	Annual Master States	
and the time of the second	designs bljuk yns it	1111-11111-1111-1111-1111-1111-1111-1111	
Section 1996 Area	Analytic philasters	Augusta Bardenia	
(360)	(iii) 2 and Phy (10) ap (cont)	Paula Barrar Barrar Barrar Barrar	
resources and a president state of the state	The American		Biographics for service stream and account place selection mentional personal site dampine efficient account again some for
4m *		Information Date	1875.
el ensi 10 en el campo	S Annalisative and Annalisative and Annalisative Annalisa	Basis Parinel And American Street	Hang more in antiques had bed \$74.
af .	(C). Annufaci è Ventoire	-production () from the	Patiential transfer dampar. (Chi
Allowing the literation of the second s	Contract of the second	Metala Perikaran incom	
	Matter Constituted	Con Taxaba Read Mon	Provide respects Barting 2
and Texas			Transa antiser and transart
	C +4c Trappet	Repairs Permanent Ayana	
	The set of set	Bassianas (1) 89-500	- hoters biteter
Actual line for instances	and the second	ally between the	Statistic interest and the state baseline such
Marrie and	Strength International Advances	Contraction of the second seco	and to come in the distance
Contraction of the	Local Design	Autom Testartester	Mergerti

			9.81		8:41	.478
e lossy losses	+ hotigheadai		+ Detectionator		← Tajhan Komulia	
B	0					
Taj Properties	Longboor Data Dire		and the second s	1000	Elizar Admin	84500
	Name Language		A Deserved	And a state of the		news pulles and
	Anna Sumat				· spanner starte	
(with coups	Report Spinson		1007 10 100 1001	C (C Mart	Rear Schelute	12 per 14 ment 11 million
iner			Trial course	(64.)		a man subset and a set
Car Manager			Paget Frank		them inca term	
has bruches over the	freed		100) Promotion	Canal and a lot of the	a prosest
			the second se		In Intering	
	Anar Instanting	Annual Sectors	Report with	111000		SALM
total segurate lander	danger bliek son it		Contraction (pro-			
	dentited publications	(date)	And and a second	1,000.00	Residence of the Automation of	a manufa analah
Bill 61 Brittel	(Charles Ind		and the second second	where and	permanent bertuck	
				1 Mar 1	Base property in colour life of	
Encorp name protocogoust	Type Konneckano				reaction of proceed into designs, Milar come	same electric els unan
test and " Energy Contact.	and Manufact Ind		Advenue kontak	(84.)		
	the second second		frank Parket	14091001001	Here we was a state of the	ari bali BOA
4	The new local division of the	and all and all all all all all all all all all al	the second second second second		Parturbal transfer deruges 47	
traggers mug basilite	O more		Heads Prediction	(Fed arrest		
to minima	WHEN PERSONNEL		Transfer Beat His		Peteriak trainforcienger IP	Retting .
Distantion descent	Epilina di sedan desiria	1. Para 1. 1991				
and the second second	CD	inger .	Reducer Burdenson		Constant and the second	in des
	And address of the local data		Real-America)	No. March 100		
The root of the design of sector agent.			Reprint ()	Ap. 2.000	Persianana Sel	
Information to Suppose the second		a server	1 😅 int home to	-	and the second s	the statement of the
Xame	- in succession in the local division of					Contraction of the second
States and	Material Consider of	ry willing				

Figure 6a. Low-fidelity for booking features

Figure 6b. High-fidelity for booking features

3. Wireframe tracking features

Selecting progress on the order tracking page directs the user to the order progress details page, displaying the latest report. Users confirm progress by pressing the agree button (Figure 7a and Figure 7b).

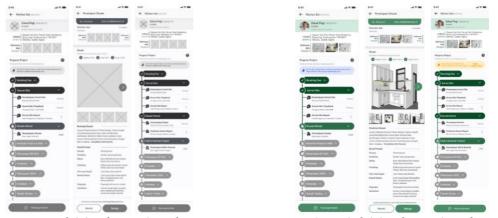


Figure 7a. Low-fidelity for tracking features

Figure 7b. High-fidelity for tracking features

Test

Usability testing was conducted on 5 representative user participants who fit the criteria of having experience using architect or renovation services. According to Nielsen (2000), testing with 5 participants can identify 85% of usability problems in a system [15][16]. Usability testing was carried out with task scenarios using the maze application to help assess the extent to which respondents could carry out the given task prototype. There were 6 task scenarios tested: login, search for architects, order consultation, search for design references, track orders, and view Wishlist. The results of the scenario task testing can be seen in the following table.

Table 4. Usability testing success								
	R1	R2	R3	R4	R5			
T1	S	S	S	S	S			
T2	S	S	S	S	S			
Т3	Р	Р	Р	Р	Р			
T4	S	S	F	F	S			
T5	S	S	S	S	S			
Т6	S	S	S	S	S			

T=Task; R=Participant; S=Success; F=Failed; P=Partial Success

Success Rate =
$$\frac{(S + (PS \times 0.5))}{Total Task} \times 100\%$$
 (1)
= $\frac{(23 + (5 \times 0.5))}{6 \times 5} \times 100\%$
= 85%

Table 5. Usability testing time duration (second)									
	R1	R2	R3	R4	R5				
T1	27	10	20	55	15				
T2	17	7	14	10	8				
Т3	88	39	50	44	48				
T4	31	17	92	169	24				
T5 33		29	45	38	19				
Т6	16	13	23	38	8				

T=Task; R=Participant;

Time Based Efficiency =
$$\frac{\sum_{j=1}^{R} \sum_{i=1}^{N} \frac{nij}{tij}}{NR}$$
(2)
=
$$\frac{\frac{1}{27} + \frac{1}{10} + \frac{1}{20} + \dots + \frac{1}{8}}{6 \times 5}$$

= 0.05 goals/sec

The learnability aspect measures how easily users can complete basic tasks in the application [12]. The learnability analysis using Table 4 obtained a success rate of 85% for the "AlterOmah" app tasks. A system is considered effective with a 78% or more success rate [17]. Data from Table 5 was used to analyze the efficiency aspect, which showed a time-based efficiency of 0.05 goals/second. This means that, on average, a participant can complete a task in 35 seconds. Efficiency reflects how users can complete tasks or achieve goals in the application [12][18][19].

		Table 6. Task	opportunities						
	Opportunities								
	T1		11						
	T2		3						
	Т3		11						
	T4	6							
	T5 4								
	T6 2								
Т	otal		37						
T=Task;									
		Table 7. Usabilit	y testing errors						
	R1	R2	R3	R4	R5				
T1	0	0	0	0	0				
T2	0	0	0	0	0				
T3	0	1	0	1	1				

T=Task; R=Participant

T4

T5

T6

Total Error

$$Defective \ rate = \frac{Total \ Defect}{Total \ Opportunities} (3)$$
$$= \frac{23}{37 \ x \ 5}$$
$$= 0.12$$

Sauro (2012) stated that the average number of errors per task is 0.7 [17]. Table 6 and Table 7 were used to calculate the error aspect with the defective rate formula, which resulted in 0.12. The error aspect signifies inappropriate actions or user errors [12] during task completion. With an error rate below 0.70, user errors are considered reasonable.

Table 8. SUS calculation												
Pospondont		Calculation score									- Total	Value (Sum x 2.5)
Respondent	Q1	Q2	Q3	Q4	Q5	Q6	Q 7	Q8	Q9	Q10	TOLAI	value (Sulli X 2.5)
R1	3	3	4	3	3	3	4	3	2	2	30	75
R2	4	3	3	3	4	4	4	3	3	3	34	85
R3	3	3	3	3	4	4	4	4	3	4	35	87.5
R4	3	3	2	3	3	3	3	3	2	1	26	65
R5	3	3	4	4	3	3	3	3	3	3	32	80
	Average											78.5

The satisfaction aspect was analyzed using the System Usability Testing (SUS) Questionnaire on users of the "AlterOmah" application to measure satisfaction and provide an overall picture of the user experience. The questionnaire, consisting of 10 questions with a scale of 1-5, was given after usability testing as a post-test. As a result, the SUS score reached 78.5, earning a "Grade B" and a "Good" rating. This shows the respondents were satisfied with the idea and design (Table 8).

Conclusion

Testing the "AlterOmah" application using the design thinking method on 5 participants with 6 task scenarios. Usability testing showed a learnability rate of 85%, above average. Time-based efficiency reached 0.05 goals/second, indicating a very fast achievement. Testing with the System Usability Scale (SUS) resulted in a score of 78.5, declared "Acceptable" with a "Grade B" category and a "Good" rating. A good level of usability in the "AlterOmah" application shows that users can easily understand and use the application effectively. Nonetheless, this study has limitations in covering all aspects of daily use, mainly because participants tend to be experienced. For future research, it is recommended that the user sample be diversified to increase external validity and better representativeness.

References

- [1] N. M. Hatmanti, N. F. Anjali, U. Hanik, and M. Shodiq, "Sosiodemografi dan Durasi Penggunaan dengan Smartphone Addiction pada Remaja di Surabaya," *J. Keperawatan*, vol. 16, no. 1, Art. no. 1, 2024, doi: 10.32583/keperawatan.v16i1.1539.
- [2] H. Joesoef, "Analisis Keputusan Pembelian Online Berdasarkan Faktor Diskon, Program Pengiriman Gratis, Dan Pelayanan.," *Sci. J. Reflect. Econ. Account. Manag. Bus.*, vol. 4, no. 1, Art. no. 1, Jan. 2021, doi: 10.37481/sjr.v4i1.261.
- [3] Tim Kemenparekraf, Statistik Pariwisata Dan Ekonomi Kreatif 2020. 2021. Accessed: Dec. 16, 2023.

Available: https://www.kemenparekraf.go.id/statistik-pariwisata-dan-ekonomi-kreatif/statistik-pariwisata-dan-ekonomi-kreatif-2020

- [4] M. I. Syarif, M. Hannum, S. Wahyuni, and Nurbaiti, "The Potential Development of E-Commerce in Supporting Business in Indonesia.," J. Comput. Digit. Bus., vol. 2, no. 1, Art. no. 1, Jan. 2023, doi: 10.56427/jcbd.v2i1.30.
- [5] S. Suhada, P. Melinda, and U. Annisa, "Application Of Service Compliment Card System To Support Company Performance At Bank Mandiri Kcp Tangerang Cikupa," *Incomtech*, vol. 10, no. 2, pp. 50– 54, Dec. 2021.
- [6] G. M. S. Putra, T. Wahab, and D. Apsari, "Perancangan Aplikasi Media Informasi Pengenalan Profesi Arsitek Kepada Masyarakat," *EProceedings Art Des.*, vol. 7, no. 2, Art. no. 2, Aug. 2020. Available: https://openlibrarypublications.telkomuniversity.ac.id/index.php/artdesign/article/view/12450
- [7] N. E. K. Aprianto, "The Role of Information and Communication Technology in Business," Int. J. Adm. Bus. Organ., vol. 2, no. 1, Art. no. 1, Apr. 2021.
- [8] T. Alam, Y. M. Alharbi, F. Adel, and A. O. Hakeem, "Smart Campus Mobile Application Toward the Development of Smart Cities," Int. J. Appl. Sci. Smart Technol., vol. Vol2, No 1, 2020., Jun. 2020, doi: org/10.24071/ijasst.v2i1.2376.
- [9] S. Suryani et al., "UI/UX Design Of Mobile-Based Pharmacy Application Using Design Thinking Method," J. Comput. Netw. Archit. High Perform. Comput., vol. 5, no. 2, Art. no. 2, Sep. 2023, doi: 10.47709/cnahpc.v5i2.2811.
- [10] P. Sukmasetya, H. B. Santoso, and D. I. Sensuse, "Current E-Government Public Service on User Experience Perspective in Indonesia," in 2018 International Conference on Information Technology Systems and Innovation (ICITSI), Oct. 2018, pp. 159–164. doi: 10.1109/ICITSI.2018.8695962.
- [11] S. M. Puspita and N. Apriyanti, "The UI/UX Design with Design Thinking Method for The University Complaint Website," *Inf. Technol. Int. J.*, vol. 1, no. 1, Art. no. 1, May 2023, doi: 10.33005/itij.v1i1.2.
- [12] P. Sukmasetya, A. Setiawan, and E. R. Arumi, "Usability evaluation of university website: a case study," J. Phys. Conf. Ser., vol. 1517, no. 1, p. 012071, Apr. 2020, doi: 10.1088/1742-6596/1517/1/012071.
- [13] T. L. Azzara, G. A. A. Wisudiawan, and A. Hadikusuma, "User Interface Analysis In Mobile Banking Application Using Design Thinking Methods With User Segments For Elderly Of Pekanabaru (Study Case : Bank Xyz)," JIPI, vol. 8, no. 2, Art. no. 2, May 2023, doi: 10.29100/jipi.v8i2.3613.
- [14] Aminudin *et al.*, "Redesigning the User Interface in the Mobile-Based Ngaji.AI Application Using the Design Thinking Method," *IAIC Int. Conf. Ser.*, vol. 4, no. 1, Art. no. 1, Dec. 2023, doi: 10.34306/conferenceseries.v4i1.635.
- [15] M. Donald et al., "A Web-Based Self-Management Support Prototype for Adults With Chronic Kidney Disease (My Kidneys My Health): Co-Design and Usability Testing," JMIR Form. Res., vol. 5, no. 2, p. e22220, Feb. 2021, doi: 10.2196/22220.
- [16] R. F. Sihombing and P. P. Suarli, "Evaluasi Usability Pada Aplikasi Digiroomm by Auto 2000 Dengan Menggunakan Metode Usability Testing," *Indones. J. Comput. Sci.*, vol. 12, no. 6, Art. no. 6, Dec. 2023, doi: 10.33022/ijcs.v12i6.3506.
- [17] D. P. Hardiawan and H. Mustafidah, "Usability Testing Aplikasi Lakone Disdukcapil Pemalang Menggunakan Model PACMAD (People at the Center of Mobile Application Development)," Sainteks, vol. 18, no. 2, Art. no. 2, Feb. 2022.
- [18] I. Nauval, R. A. Widyanto, A. Setiawan, N. Nuryanto, N. A. Prabowo, and T. A. Purnomo, "Implementation of GPS for tracking of street vendor," *AIP Conf. Proc.*, vol. 2702, no. 1, p. 060006, Nov. 2023, doi: 10.1063/5.0154610.
- [19] S. P. Utomo, N. H. Aliyah, Z. A. Sani, M. Hanafi, and A. Primadewi, "Perancangan RESTFul Web Service pada Sistem Informasi Terintegrasi Menggunakan FrameWork Codelgniter," in *Seminar Nasional Dinamika Informatika*, 2020, pp. 124–128.