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Application of the Think Aloud and System Usability Scale (SUS) Methods in Usability Evaluation in Online Transportation Applications for the Elderly

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ABSTRACT

Technological advancements have driven the adoption of online transportation applications by various user groups, including the elderly. However, limitations in cognitive aspects and digital experiences cause barriers to application use. This study was conducted to evaluate the usability of online transportation applications for elderly users using the Think Aloud and System Usability Scale (SUS) methods. The evaluation was carried out through a series of tests with eight elderly respondents to measure effectiveness, efficiency, and user satisfaction. The Think Aloud method was used to explore the experiences and difficulties faced by the elderly on the application interface, respondents verbally expressed their thoughts and feelings during the testing process. The Think Aloud testing process is analyzed to identify the specification of the requirements that form the basis for the redesign of the application. The measurement results showed that the average application effectiveness value increased from 85% in the initial design to 100%. Efficiency values show a significant improvement from the initial design of 73% to 100% in the proposed improvement design. The average SUS score before the improvement was 61.25 in the marginal category, and increased to 81.25 in the acceptable category after the improvement design. The results of this study confirm that optimizing design based on the needs of the elderly can improve the user experience and accessibility of online transportation services.

I. INTRODUCTION

Advances in information technology and shifting consumer behavior have significantly changed business models [1]. Information technology has brought significant changes in various aspects of life, including in the transportation sector. One of the most striking innovations is the presence of online transportation applications that utilize the internet and digital devices to provide fast, easy, and efficient services. According to the World Health Organization (WHO), an elderly person is someone who has entered the age of 60 years and above. In the 2024 BPS percentage data, the elderly have increased consistently every year, starting from 8.43% in 2015 to projected to reach 12.00% in 2024 [2]. Factors that affect the level of independence of each elderly person are of course difficult to handle, factors that affect the independence of the elderly such as cognitive factors, psychological factors, economic factors, nutritional factors, and health factors [3]. In addition, there are also many factors of need for the elderly, such as traveling for shopping needs, the need for health care, or social activities such as community meetings and gathering with friends [4].

Transportation applications *online* such as Gojek, Grab, and Uber have revolutionized the way people book vehicles and use public transportation services. With just a few taps on the smartphone screen, users can easily book transportation services, track vehicles in real-time, and make payments digitally [5]. Gojek becomes a transportation application

online the most downloaded app available on the Google Play Store, Gojek has been downloaded more than 100 million downloads and has 6 million reviews by users. Customers complained about the increasingly complex and less efficient display of the application, one of which is the homepage. Regarding feature efficiency, customers complained about the lack of features to help users, complaints about the lack of features that accommodate the needs of elderly users.

Although transportation applications *online* Having more user-friendly features, many elderly people still face obstacles in understanding the interface, using the application, or finding features in transportation applications *online*. This situation shows that there is a gap in the *Usability* or ease of use of the app. Evaluation *Usability* is an important step to identify these obstacles. In this case, the evaluation approach *Think aloud* Method dan *System Usability Scale* (SUS) provides relevant solutions. ISO 9241-11 describes the benefits of measuring usability in terms of effectiveness, efficiency and user satisfaction [6].

Usability testing is the process of evaluating a system or product by involving the user in a real or simulated usage situation, to assess the extent to which the system or product can be used effectively, efficiently, and satisfactorily [7]. Method *Think aloud* to test a system that involves users, or end users, by verbalizing in a continuous manner what users feel and think when using a system [8]. This applied technique involves asking respondents to verbally express their thoughts, feelings, and opinions when interacting with the system. This approach aims to capture the cognitive processes that occur during the use of the system, allowing researchers to gain a deeper understanding of the user experience [9]. *Performance Measurement* used to measure aspects of effectiveness and efficiency to obtain quantitative data on the performance of test takers when they perform tasks during testing *Usability* [10].

Meanwhile, *System Usability Scale* (SUS) is used to assess the usefulness of various products and services, to answer research questions about usefulness (feasible/not) which will provide more objective quantitative data through standardized assessment scales [11]. Measurement research *Usability* using the SUS method is widely used because it has different characteristics from other questionnaires, namely it has been validated and tested for reliability even with a small sample value [12]. By combining these two methods, it is hoped that a more complete picture of the *Usability* Gojek application, so that more targeted improvement recommendations can be formulated. Figma is a design app based on *cloud* and tools *prototyping* for digital projects. Figma was created to help its users collaborate on projects and work as a team on the go. In designing a good display to be based on *website* or mobile requires communication between all teams so that there is no such thing as *redesign* [13].

This research is expected to provide more inclusive design recommendations, which take into account the specific needs of elderly users. Thus, the Gojek application can continue to develop into an application that is increasingly beneficial for all users, including elderly users.

II. METHOD

The following are the troubleshooting steps that will be solved. This process will be carried out in 6 stages, namely the first with the creation of task scenarios and SUS questionnaires. Second, by conducting *Usability* testing to evaluate *Usability*. Third, data processing and analysis of *Usability* testing evaluation results. Fourth, design a draft improvement proposal from the results of the evaluation of application testing. Fifth, by evaluating the design of the proposed improvement to the user. Sixth, decisions on the evaluation will be drawn conclusions and suggestions.

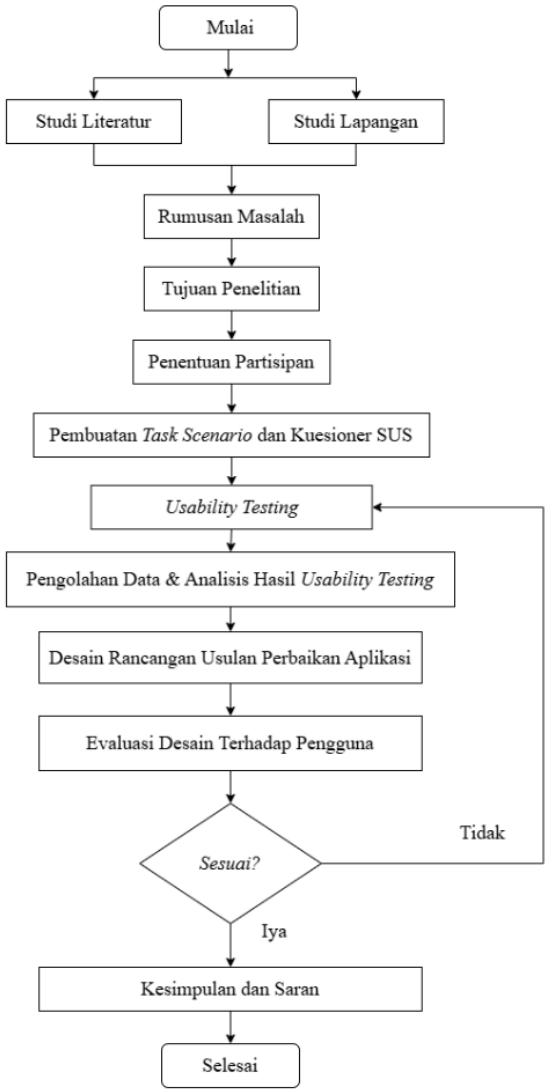

Figure 1. Flowchart

A. Determination of Respondents

Determination of the number of respondents/users to be used According to Ericsson and Simon (1993) method *think aloud* It only requires the number of respondents as many as

8 to 10 people. This number is sufficient to understand the behavior of users in doing some *task scenario* given [14]. From this explanation, this study will use a total of 8 respondents, who will be respondents to Usability testing to measure effectiveness and efficiency, and measure customer satisfaction including Usability testing respondents who are tested on the System Usability Scale (SUS).

TABLE I
KRITERIA RESPONDEN

Kriteria Responden
Elderly ≥ 60 years old
Have ever made a Gojek order or at least interacted with the application
Have the ability to express feelings and thoughts
Be willing to participate in research

B. Usability testing

In an effort to assess the credibility of online transportation applications in increasing user loyalty, each application must have a level of *Usability* The good [15]. In this study, a task scenario was determined that would be given to respondents to conduct usability testing for the elderly.

TABLE IITASK SCENARIO

It	***Task***
1	Log in to the main app and explore the settings and profile menus
2	Search for destination addresses, estimated fares and waiting times in the app
3	Saving Favorite Addresses (Home/Work/Routine Destinations)
4	Check your previous travel history
5	Explore help features (*Help Center*)

C. Performance Measurement

Performance Measurement is used to measure aspects of effectiveness and efficiency to obtain quantitative data on the performance of test takers when they perform tasks during Usability testing [10]. In Performance Measurement, the resulting data is used in comparative analysis, especially in measuring efficiency through task completion time and assessing effectiveness by comparing the number of errors that occur during testing [9].

The average result of the percentage of success of the respondent's effectiveness score in completing task scenarios will be detailed based on the 1991 Ministry of Home Affairs R&D Reference Standards which are explained regarding the standard for measuring effectiveness [16].

TABLE III
STANDARD MEASURES OF EFFECTIVENESS

No.	Effectiveness Ratio	Achievement Level
1	< 40%	Highly Ineffective
2	40% - 59,99%	Ineffective
3	60% - 79,99%	Quite Effective
4	≥ 80%	Highly Effective

Furthermore, the results of the average time needed to work on the task scenario are interpreted using the time range on the time behavior indicator to determine the duration of time used by the user in completing the task so that the results of measuring the efficiency level can be known in the following table [16].

TABLE IV
TIME INTERVALS ON TIME BEHAVIOR

No.	Length of Time	Qualification
1	60 – 300 *Second*	Very Fast
2	360 – 600 *Second*	Fast
3	660 – 900 *Second*	Slow

D. Retrospective Think Aloud

RTA (Retrospective Think aloud) is a method that allows respondents to express their thoughts on what has been done when the task has been completed [17].

E. System Usability Scale (SUS)

The System Usability Scale (SUS) is a simple ten-item scale that provides a global view of subjective assessments of Usability [18]. Based on the final SUS score, it will be known how high the Usability and acceptability level of the application system design developed [19]. The following is a list of questions that will be given for the System Usability Scale (SUS) [18].

TABLE V
LIST OF QUESTIONS SYSTEM *USABILITY* SCALE (SUS)

No	**Item In Indonesian**	**Scale**				
		1	**2**	**3**	**4**	**5**
1	I think I will use this Gojek application again	○	○	○	○	○
2	I feel that this Gojek application is complicated to use	○	○	○	○	○
3	I feel that the Gojek application is easy to use	○	○	○	○	○
4	I need help from other people or technicians in using this Gojek application	○	○	○	○	○
5	I feel that the features of the Gojek application are running properly	○	○	○	○	○
6	I feel that there are many inconsistent (incompatible) things in this Gojek application	○	○	○	○	○
7	I feel that others will understand how to use this Gojek application quickly	○	○	○	○	○
8	I find this Gojek application confusing	○	○	○	○	○
9	I feel that there are no barriers in using Gojek application	○	○	○	○	○
10	I need to get used to it first before using this Gojek application	○	○	○	○	○

III. RESULTS AND DISCUSSION

A. Usability Testing Data Processing Results

1) Performance Measurment

- *Effectiveness*

The analysis was carried out by assessing the working time and the success of the respondents in completing the task scenario. Successful respondents will be given a binary number sign '1' and if the respondent fails to complete the task scenario, they will be given a binary number sign '0' [20].

VITASK COMPLETENESS TABLE OF GOJEK ONLINE TRANSPORTATION APPLICATION

Respond	*Task* Scenario					Value of Effectiveness	Category
	T1	T2	T3	T4	T5		
R1	1	1	1	1	1	100%	Highly Effective
R2	1	1	0	0	1	60%	Quite Effective
R3	1	1	1	1	1	100%	Highly Effective
R4	1	1	1	1	0	80%	Highly Effective
R5	0	1	1	1	0	60%	Quite Effective
R6	1	1	0	1	1	80%	Highly Effective
R7	1	1	1	1	1	100%	Highly Effective
R8	1	1	1	1	1	100%	Highly Effective
Average Effectiveness Score	**88 %**	**100 %**	**75 %**	**88 %**	**75 %**	**85%**	

Based on the calculation of the effectiveness value of the Gojek online transportation application for elderly users is 85%. Where according to the 1991 Ministry of Home Affairs R&D Reference Effectiveness Standard, it is included in the very effective category [16].

- *Efficiency*

At this stage, an analysis was carried out about the average time required by the staff to work on the task scenario that has been given to achieve efficiency in the Gojek online transportation application.

TABLE VII
EXECUTION TIME PER TASK OF GOJEK ONLINE TRANSPORTATION APPLICATION

Respo From	Task Scenario					Total	OER
	T1	T2	T3	T4	T5		
R1	21	49	42	10	15	137	100%
R2	25	54	60	28	14	181	3%
R3	19	45	30	8	9	111	100%
R4	25	55	40	14	15	149	80%
R5	15	59	40	11	12	137	61%
R6	20	50	17	10	12	109	69%
R7	17	49	35	13	13	127	100%
R8	25	45	40	10	15	135	100%
Total	167	406	304	104	105		
OER	82 %	100 %	49 %	46 %	49 %	1086	77%
	65%					792	73%

Based on the average working time done by the time range respondents on the time behavior indicator to determine the duration of time used by users in completing tasks is included in the category of very fast [16]. By calculating using *Overall Relative Efficience* In the table above, it can be seen that the average result of the time spent working on each task scenario needed by users in working on each task scenario is 73%.

2) Retrospective Think Aloud (RTA)

The response will be recorded directly during the think aloud test. The following is a summary of all the responses that have been made on 5 *task scenario* on transportation applications *online* Gojek.

TABLE VIII
SUMMARY OF THINK ALOUD RESPONSES TO RESPONDENTS' OPINIONS ON THE GOJEK APPLICATION

Task Scenario	Respondents' Opinion
T1	On the profile view, many respondents have found the location of the profile, but some respondents still complain about the profile picture that does not indicate that the icon is for the profile. In the editing section, there is only a pencil logo which is very confusing because the description is not clear and the suggestion from some respondents to add with the word "Edit".
T2	Some respondents said the display at the time of booking was too much promotion. The bike or car icon is helpful enough. However, the writing is too small. Suggestions from several respondents to increase the size of the icon and also the caption of the writing.
T3	In the addition of favorite addresses, there are still many respondents who are confused to find the addition icon. So many respondents feel that the icon

Task Scenario	**Respondents' Opinion**
	can be replaced with a star icon or others that indicate the icon for something they like.
T4	In the travel history activity menu, it is easy to find and some respondents find it in the profile section. However, the suggestion given is to replace other icons that show the feature for travel history activities and increase the size of the writing.
T5	On this feature menu, there are still many who have not found it. Some should be directed to a profile and shown to look for a question mark icon for the help center. Suggestions to add an already accessed "Report a Problem" button or add a "Quick Help" button to each to report a problem

At the usability testing stage, which has been carried out by analyzing the responses of think aloud regarding the needs of users of the Gojek online transportation application for the elderly. The needs obtained from the results of data processing vary from the experience of elderly users. The specification of the user requirements will be described in the User Requirements table.

TABLE IX
SPECIFICATION OF USER NEEDS

Needs	*Requirement*
Users need clearer indicators for editing profiles, especially the more intuitive and labeled photo change icons.	Added an "Edit" label to the change profile icon to make it clearer. Added a more prominent and intuitive photo transform icon.
Users need larger, clearer icons for easier recognition and larger text for improved readability.	Increase the size of the icon and give it a contrasting color to make it easier to recognize. By improving readability by increasing the size of the text.
Users need an easier way to mark their favorite addresses, for example with a star icon or other clearer indicators.	Add a custom indicator icon for your favorite address. Create simpler navigation to mark up favorite addresses.
Users need more intuitive icons for travel history as well as larger text to make it easier to read.	On the travel history icon for easier understanding. Increase the size of text and layout to make it clearer.
Users need quicker and easier access to the help center, especially the "Help" feature so they don't have to search manually.	Provides a "Quick Help" feature to make it easier to access the help center.

Overall, the requirements identified in the table emphasize the importance of designing an elderly-friendly interface by prioritizing the aspects of clarity, readability, and ease of access to the main features of the online transportation application.

3) Kuesioner System Usabilty Scale (SUS)

TABLE X
ASSESSMENT SYSTEM USABILTY SCALE (SUS)

Responds	**Question**										**J**	**N**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
R1	4	4	4	4	5	3	5	4	2	3	22	55
R2	4	3	4	5	4	3	4	4	2	4	19	47,5
R3	5	2	4	3	4	3	5	2	5	2	31	77,5
R4	5	3	5	5	4	4	4	2	3	4	23	57,5
R5	5	4	5	5	4	4	4	3	3	4	21	52,5
R6	4	2	4	4	3	3	5	3	3	4	23	57,5
R7	5	4	4	3	4	3	5	3	4	4	25	62,5
R8	5	3	4	1	4	3	5	2	5	2	32	80
Sum of SUS Average Score												**61,25**

From the results of the SUS calculation in the table above, the result for the Gojek online transportation application is 61.25. Where the numbers in the description of the acceptability category, grade scale, and adjective rating are categorized at the acceptability level in the marginal category, for the grade scale level in the D category, and the adjective rating level in the Good category. However, in Brooke's theoretical statement, the average SUS score for the category is 68. This shows that the Gojek online transportation application still needs a redesign to improve user satisfaction and experience.

B. Design of Application Improvement Proposal Design

Based on the needs of the specifications that have been identified for elderly users, the application interface design is redesigned using Figma software. This improvement aims to improve the clarity of indicators, text readability, ease of navigation, and accessibility of key features needed by the elderly. In this process, a prototype will be created on relevant parts, such as the edit profile icon, tagging favorite addresses, travel history, and quick access to the help center.

1) Home Section

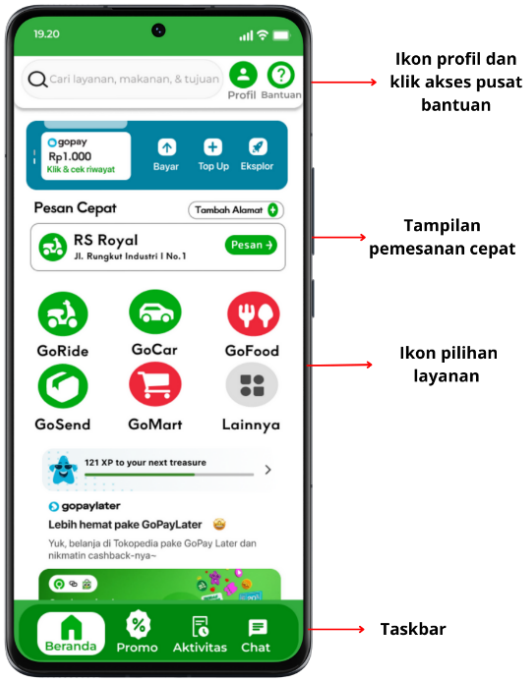

Figure 2. Home View Design Proposed Improvements

Figure 3. Profile Display of Proposed Repair Design

2) Order Section

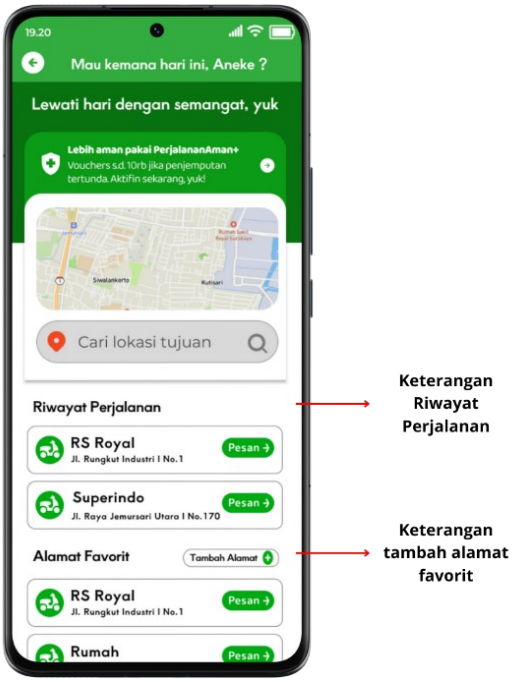

Figure 4. Repair Proposal Design Address Selection Display

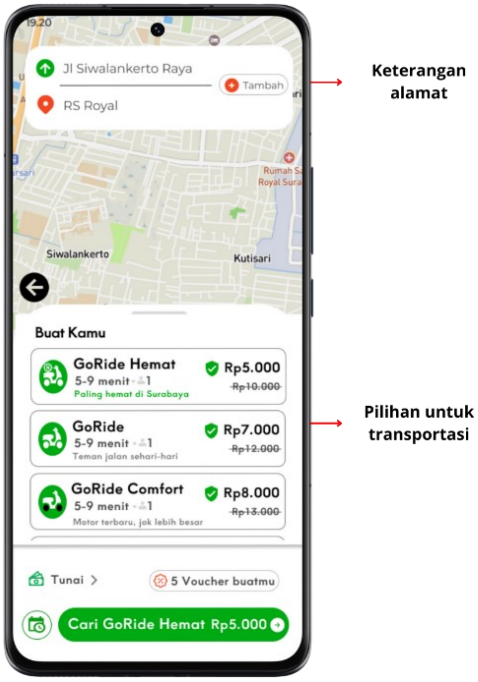

Figure 5. Order Display of Repair Proposal Design

3) Favorite Address Section

Figure 6. Display of Adding Favorite Address Design Proposed Improvements

4) Activity/Travel History Section

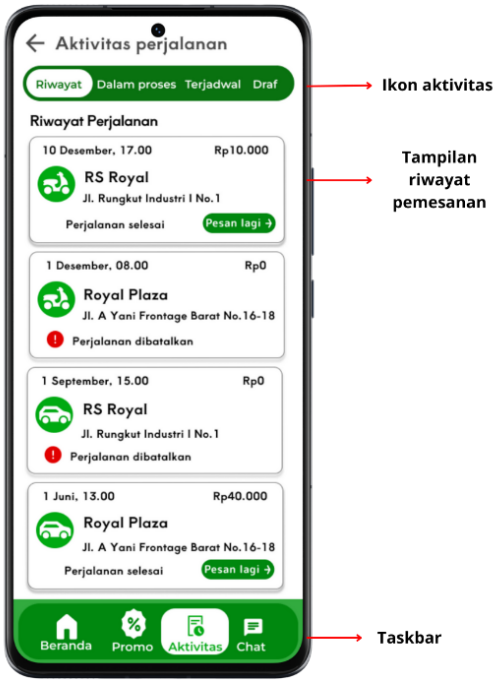

Figure 7. Activity Display and Travel History Design Proposed Improvements

5) Help Center Section

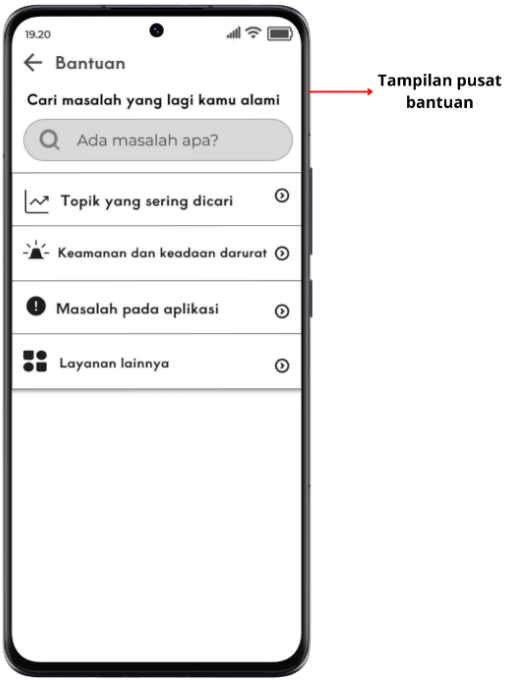

Figure 8. Initial Design Help Center View Repair Proposal Design

C. *Re-evaluation of Repair Design*

At this stage, a re-analysis was carried out regarding the work of respondents to the task scenario given to achieve the effectiveness, efficiency and customer satisfaction of the Gojek application improvement design.

1) Performance Measurment

- *Effectiveness*

TABLE XI
TASK COMPLETENESS DESIGN PROPOSED REPAIR OF GOJEK ONLINE TRANSPORTATION APPLICATION

Respond	*Task Scenario*					Value of Effectiveness	Category
	T1	T2	T3	T4	T5		
R1	1	1	1	1	1	100%	Highly Effective
R2	1	1	1	1	1	100%	Highly Effective
R3	1	1	1	1	1	100%	Highly Effective
R4	1	1	1	1	1	100%	Highly Effective
R5	1	1	1	1	1	100%	Highly Effective
R6	1	1	1	1	1	100%	Highly Effective
R7	1	1	1	1	1	100%	Highly Effective
R8	1	1	1	1	1	100%	Highly Effective
Average Effectiveness Score	**100 %**	**100 %**	**100 %**	**100 %**	**100 %**	**100%**	

Based on the calculation of the effectiveness value of the design of the proposed improvement of the Gojek online transportation application for elderly users, the result was 100%. Where according to the 1991 Ministry of Home Affairs R&D Reference Effectiveness Standard, it is included in the very effective category [16].

- *Efficiency*

TABLE XII
EXECUTION TIME DESIGN PROPOSED IMPROVEMENT OF GOJEK ONLINE TRANSPORTATION APPLICATION

Respo From	Time					Total	OER
	T1	T2	T3	T4	T5		
R1	15	20	21	8	12	76	100%
R2	20	29	33	21	11	114	100%
R3	19	35	30	8	9	101	100%
R4	21	32	30	10	10	103	100%
R5	13	28	26	10	9	86	100%
R6	13	28	24	9	12	86	100%
R7	15	34	29	11	12	101	100%
R8	25	30	27	10	14	106	100%
Total	141	236	220	87	89	773	100%
	100%	100%	100%	100%	100%		
OER	100%					773	100%

Based on the calculation using the Overall Relative Effectiveness in the table above, it can be known that the average result of the time required by the user in working on each task scenario is 100%. From the analysis, it can be concluded that the Gojek online transportation application shows an increase in efficiency.

2) Kuesioner System Usabilty Scale (SUS)

TABLE XIII
ASSESSMENT OF PROPOSED DESIGN FOR IMPROVEMENT OF THE USABILTY SCALE (SUS) SYSTEM

Respo nd	Question										J	N
	1	2	3	4	5	6	7	8	9	10		
R1	5	2	5	3	5	3	5	1	4	2	33	82,5
R2	5	2	4	3	5	3	4	1	4	2	31	77,5
R3	5	1	4	1	5	2	5	1	5	1	38	95
R4	5	2	5	2	4	2	4	2	4	3	31	77,5
R5	5	2	5	2	4	2	5	3	5	3	32	80
R6	4	2	5	2	5	2	5	3	4	3	31	77,5
R7	5	1	5	3	4	3	5	3	4	3	30	75
R8	5	2	5	2	4	3	5	2	5	1	34	85
Sum of SUS Average Score												**81,25**

From the results of the SUS calculation in the table above, it is obtained from the results of the improvement design for the Gojek online transportation application, which is 81.25. Where these numbers in the description of the acceptability category, grade scale, and adjective rating are categorized at the acceptability level in the acceptable category, for the grade scale level in the B category, and the adjective rating level in the excellent category. The results obtained are more than the average SUS score category, which is 68.

D. Comparison of Usability Testing Results of Initial Design and Improvement Proposals

In this improvement design, calculations and retesting will be carried out to evaluate various aspects of effectiveness, efficiency, and customer satisfaction. The test aims to ensure that the changes implemented actually improve ease of use, speed up access to key features, and provide a more intuitive experience for older users. The results of the evaluation will be the basis for further improvements to create an optimal interface that suits the needs of users.

1) Performance Measurment

- *Effectiveness*

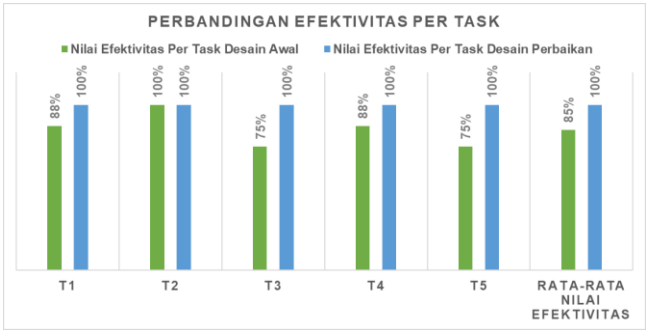

Figure 9. Comparison Chart of *Effectiveness* Per *Task Value*

The graph above shows the comparison of effectiveness per task between the initial design and the improvement design. Effectiveness is measured in the percentage of user success in completing each task. Overall, the average effectiveness of the initial design was 85%, while the improvement design reached 100%, with an average increase of 15%.

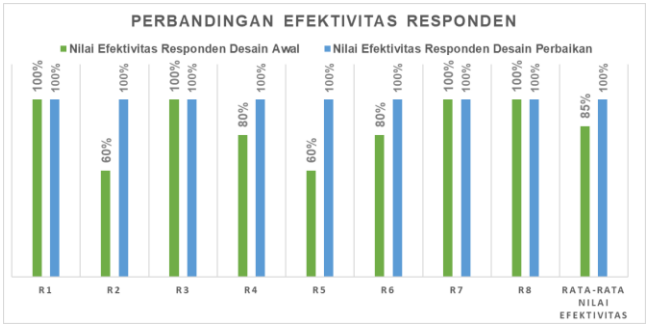

Figure 10. Comparison Chart of Respondent Effectiveness Values

The graph above shows a comparison of respondent effectiveness between the initial design and the improvement

design. Effectiveness is measured based on the respondent's ability to complete the assigned task. Overall, the average effectiveness of the initial design was 85%, while after the design improvements were made, the effectiveness increased to 100%.

- *Efficiency*

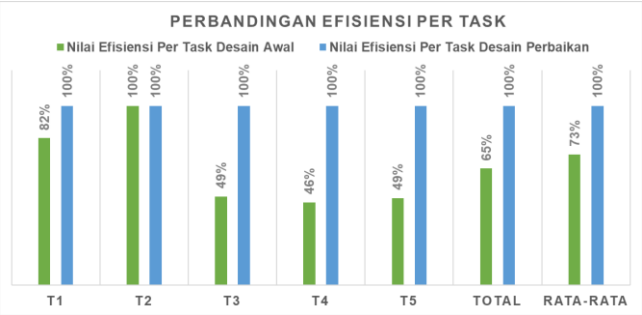

Figure 11. Value Comparison Chart *Effiiciency* For *Task*

The graph above shows the comparison of respondents' efficiency in completing tasks between the initial design and the improvement design. Efficiency is measured in the percentage of successful completion of tasks in optimal time. Overall, the total efficiency of the initial design is 65%, while the improvement design reaches 100%, with an increase of 35%.

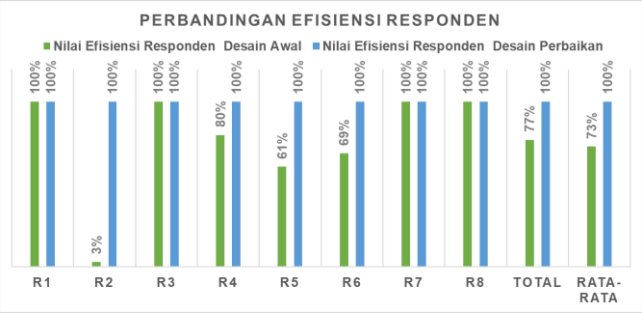

Figure 12. Respondent Effiiciency Value Comparison Chart

The graph above shows the comparison of respondents' efficiency in completing tasks between the initial design and the improvement design. Efficiency is measured in the percentage of successful completion of tasks in optimal time. Overall, the total efficiency of the initial design was 77%, while the improvement design reached 100%, with an increase of 23%.

2) Kuesioner System Usabilty Scale (SUS)

TABLE XIV
COMPARISON OF SATISFACTION VALUES

Evaluation	**SUS Total Score**	***Acceptability***	***Grade Scale***	***Adjective Rating***
Initial Design	61,25	*Marginal*	D	*Good*
Design Proposed Improvements	81,25	*Acceptable*	B	*Excellent*

From the results of the SUS calculation in the table above, the results of the comparison for the initial design and the design of the proposed improvement of the transportation application are obtained *Online* Gojek. This 20-point increase brings the design of the proposed improvement to the level of *Acceptability* higher ones, namely *Acceptable*. In addition, the value scale also increased from D to B, with *Adjective Rating* increased from *Good* become *Excellent*.

IV. CONCLUSION

The conclusion of this study emphasizes that the factors of effectiveness, efficiency, and user satisfaction are crucial aspects in the evaluation of the Usability of online transportation applications, especially Gojek, for elderly users. Based on the test results, the effectiveness of the application showed a significant improvement, where the average effectiveness value increased from 85% in the initial design to 100% in the proposed improvement design. This shows that elderly users can complete the assigned tasks better after repairs are made. In addition, the efficiency factor also shows a noticeable improvement, with the total efficiency value increasing from 73% to 100% on the proposed design, signaling that users can interact with the app in less time and fewer steps. In terms of user satisfaction, the evaluation using *the System Usability Scale* (SUS) recorded an average score of 61.25 for the initial design, which was categorized as marginal, while the score for the proposed design reached 81.25, which was marked as acceptable. In this test, it only focused on the basic tasks that elderly users performed most often. Achieving a score of 100% in usability testing is unusual. However, in the context of this test, it focuses on the basic tasks that are most often performed by elderly users, and the design improvements used specifically target the most common obstacles encountered in those tasks. Effectiveness is measured by the percentage of tasks successfully completed by users, and efficiency is measured by the average time it takes users to complete tasks. This shows that design improvements have not only succeeded in increasing effectiveness and efficiency, but also have a positive impact on the satisfaction of elderly users. By comparing the results of this study, it can be seen that the success in improving these aspects is in line with the recommendations for the development of computers and applications that adapt to the special needs of elderly users.

BIBLIOGRAPHY

[1] B. Harto *et al.*, *Transformasi Bisnis di Era Digital (Teknologi Informasi dalam Mendukung Transformasi Bisnis di Era Digital)*, no. August. Jambi: PT. Sonpedia Publishing Indonesia Redaksi, 2023.

[2] N. R. Sar, S. W. Nugroho, R. Sulistyowati, R. Agustina, K. T. Yulianto, and G. Anggraeni, *Statistik Penduduk Lanjut Usia 2024*. Badan Pusat Statistik, 2024. [Online].

[3] S. D. Kusumaningrum, H. P. Putro, N. Tou, R. Rahmadi, and C. Effendy, "Implementasi Aplikasi Tingkat Kemandirian Lansia Berbasis Shiny App," *J. UII Autom.*, vol. 2, no. 1, 2021, [Online]. Available: https://journal.uii.ac.id/AUTOMATA/article/view/17382

[4] M. D. R. Putri, R. K. Kinasih, and N. N. Nabila, "Kesertaan Warga Senior Jakarta pada Sistem Transportasi Era Industri 4.0," *Rekayasa Sipil*, vol. 9, no. 2, p. 71, 2020, doi: 10.22441/jrs.2020.v09.i2.05.

[5] D. Setyaningrum *et al.*, "Aplikasi Gojek Untuk Memenuhi Kebutuhan Masyarakat," *J. Gov. Public Adm.*, vol. 1, no. 3, pp. 356–367, 2024.

[6] R. Anisa and O. Marleen, "Analisis Usability Aplikasi Hijra Bank Berbasis ISO 9241-11 dengan Menggunakan Metode Partial Least Square (PLS)," *J. Eksplora Inform.*, vol. 12, no. 1, pp. 14–23, 2022, doi: 10.30864/eksplora.v12i1.1005.

[7] S. R. Wicaksono, *Usability Testing*. Malang: CV. Seribu Bintang, 2023. doi: 10.1201/9781032702049-8.

[8] M. Sulistiya, Z. Mu'afi, S. R. Natasia, H. Herlina, and M. Yusuf, "Penerapan Metode Think Aloud untuk Evaluasi Usability pada Website Dinas Pendidikan dan Kebudayaan Kota MNO," *J. Telemat.*, vol. 16, no. 1, pp. 25–32, 2021, doi: 10.61769/telematika.v16i1.389.

[9] P. M. Lestari, I. M. A. Pradnyana, and G. A. Pradnyana, "Usability Testing Menggunakan Model PACMAD Pada Aplikasi Mobile Tabanan Dalam Genggaman," *Res. J. Comput. Inf. Syst. Technol. Manag.*, vol. 4, no. 1, p. 53, 2021, doi: 10.25273/research.v4i1.7070.

[10] I. G. B. B. Sadewa, D. G. H. Divayana, and I. M. A. Pradnyana, "Pengujian Usability pada Aplikasi E-SAKIP Kabupaten Buleleng Menggunakan Metode Usability Testing," *Inser. Inf. Syst. Emerg. Technol. J.*, vol. 1, no. 2, pp. 76–87, 2020, doi: 10.23887/insert.v1i2.25975.

[11] E. Kaban, K. Candra Brata, and A. Hendra Brata, "Evaluasi Usability Menggunakan Metode System Usability Scale (SUS) Dan Discovery Prototyping Pada Aplikasi PLN Mobile (Studi Kasus PT. PLN)," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 4, no. 10, pp. 3281–3290, 2020.

[12] W. Welda, D. M. D. U. Putra, and A. M. Dirgayusari, "Usability Testing Website Dengan Menggunakan Metode System Usability Scale (Sus)s," *Int. J. Nat. Sci. Eng.*, vol. 4, no. 3, pp. 152–161, 2020, doi: 10.23887/ijnse.v4i2.28864.

[13] R. Pramudita, R. W. Arifin, A. N. Alfian, N. Safitri, and S. D. Anwariya, "Penggunaan Aplikasi Figma Dalam Membangun Ui/Ux Yang Interaktif Pada Program Studi Teknik Informatika Stmik Tasikmalaya," *J. Buana Pengabdi.*, vol. 3, no. 1, pp. 149–154, 2021, doi: 10.36805/jurnalbuanapengabdian.v3i1.1542.

[14] S. M. Yolanda S, H. Tolle, and H. M. Az-Zahra, "Perancangan Desain Interaksi Aplikasi Direktori Kota Malang Modul Informasi Pendidikan Dengan Metode Human Centered Design Dan Think Aloud," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 5, no. 3, pp. 1196–1203, 2021, [Online].

[15] N. A. Murti, "Analisis Usability Testing Pada Aplikasi Transportasi Online Untuk Mengukur Kepuasan Pengguna," *JSiI (Jurnal Sist. Informasi)*, vol. 7, no. 1, p. 19, 2020, doi: 10.30656/jsii.v7i1.2102.

[16] M. S. Tuloli, R. Patalangi, and R. Takdir, "Pengukuran Tingkat Usability Sistem Aplikasi e-Rapor Menggunakan Metode Usability Testing dan SUS," *Jambura J. Informatics*, vol. 4, no. 1, pp. 13–26, 2022, doi: 10.37905/jji.v4i1.13411.

[17] A. Salsabila, M. Uliartha, and H. Setiawan, "Evaluasi Usability Pada Aplikasi Matahari Mall Dengan Metode Think Aloud Dan System Usability Scale," *J. Inf. Syst. Manag. Digit. Bus.*, vol. 2, no. 1, pp. 18–28, 2024.

[18] T. Wahyuningrum, *Mengukur Usability Perangkat Lunak*, no. 1596. Sleman: Dee Pubblish, 2021.

[19] C. N. Kurniawan, B. Zaman, and S. Bahri, "Analisis Usability Pada Website Ayomulai Menggunakan Metode System Usability Scale," *J. Technol. Res. Inf. Syst. Eng.*, vol. 9, no. 2, pp. 90–102, 2022, doi: 10.55645/jtriste.v9i2.381.

[20] M. Zakaria, A. Ansori, R. I. Rokhmawati, and D. Priharsari, "Evaluasi dan Perbaikan Antarmuka Pengguna Kursus Perpajakan Daring Piranha Smart Center dengan Pendekatan Human-Centered Design," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 6, no. 1, pp. 333–342, 2022, [Online].