

USABILITY TESTING OF THE IFS PRO ANDROID MOBILE APPLICATION FOR CRYPTOCURRENCY TRADING SIGNAL FORECASTING USING THE CONCURRENT THINK-ALOUD (CTA) TECHNIQUE AND PERFORMANCE MEASUREMENT

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Abstract

The IFS Pro android application is a decision support application for cryptocurrency traders determining a buy or sell position when trading. Since its inception until now, IFS Pro has never evaluated the user and system performance aspects, so it is not known whether the system has run well or not. Based on these problems, researchers conducted an evaluation using usability testing with CTA techniques and Performance Measurement. The results of the analysis for the effectiveness of the IFS Pro android application are said to be effective because there are no errors (0%) made by respondents from the Performance Measurement data. Then the results of the efficiency analysis have been efficient because there is no significant time difference from the Mann Whitney U-test data. The results of the analysis of user satisfaction based on the features of the IFS Pro android application have a fairly satisfying category with an average value of 61 (C) obtained from the CTA usability data with the SUS (System Usability Scale) questionnaire. Because IFS Pro user satisfaction is still in the quite satisfied category, the researchers assess the need for improvement recommendations, including adding features and display adjustments. Suggestions for the future, IFS Pro periodically carries out usability testing analysis on the IFS Pro android application so that the quality of the IFS Pro user satisfaction category is getting better.

Keywords: *Usability Testing, Ifs Pro, Evaluation, Android Application.*

INTRODUCTION

Since 2017, Flat Five has developed an application for forecasting cryptocurrency market price movements called IFS Pro, which was officially published and put into operation in mid-2018, specifically in July. The development of this application aims to increase traders' interest in cryptocurrency trading, particularly for novice traders who seek recommendations on asset purchases to be traded with the expectation of obtaining financial gains. IFS Pro is an application whose main feature is the display of recommended asset purchases in the form of trading signals for the Indodax market (local cryptocurrency market) as well as trading signals for the Binance market (international cryptocurrency market). Since its initial launch until the present, the IFS Pro application has never undergone a formal evaluation from either the user perspective or system performance perspective. Consequently, it remains unclear whether the system has been well designed or still contains significant shortcomings, especially in terms of user experience. Preliminary observations indicate several opportunities for improvement and refinement, particularly in the billing system, user account features, activation purchase features, and the mobile application. Deficiencies identified from the initial observation based on feature feasibility questionnaires (Appendices 7 and 8) include: (1) users experience difficulty in using or interpreting prediction information due to the absence of explanatory pages such as a help section to serve as a reference when confusion arises; (2) several buttons or interface elements are not optimally effective or efficient in their current placement, potentially causing user difficulties; and (3) certain user interface displays are not visually appealing. Based on these findings, an evaluation of the IFS Pro application is necessary to determine the extent to which the application functions properly, to identify existing system issues, and to provide guidance for future development. Falahah and Rijayana (2011:84) state that implemented systems need to be assessed or evaluated to determine their performance and success in achieving the originally established objectives and targets. One form of system evaluation that can determine whether an application operates effectively, efficiently, and supports user decision-making is usability evaluation.

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Usability testing is a method that requires users of a product to perform specific tasks in order to measure and observe the product's ease of use, task completion time, and user perceptions while interacting with the product (Nagaraj et al., 2014). Usability testing encompasses various evaluation techniques, including performance measurement and think-aloud methods. Performance measurement is a technique used to assess the success rate and speed of users in completing tasks within a system (Utama, 2011). Concurrent Think Aloud (CTA) is a think-aloud evaluation technique conducted while respondents are interacting with the system (Utami, 2016). In CTA implementation, respondents are asked to explore the system and articulate in detail the problems they encounter during task execution, thereby producing accurate identification of usability issues. Another advantage of the CTA technique is that respondents' recollection of encountered problems remains strong because reporting occurs simultaneously with task performance. Based on the above considerations, this study evaluates the usability aspect of the IFS Pro Android mobile application using the CTA technique combined with performance measurement. Performance measurement is employed to assess system effectiveness and efficiency, while CTA is used to evaluate user satisfaction with the system (Utami, 2016). The results of this evaluation analysis will serve as a reference for developing improvement recommendations for the IFS Pro Android mobile application, including enhancements to the system's user interface.

METHOD

The usability testing research on the IFS Pro Cryptocurrency Trading Signal Forecasting Application employs a mixed methods approach because it requires both quantitative and qualitative data simultaneously. According to Sugiyono, (2016) mixed methods combine quantitative and qualitative approaches to produce data that are more comprehensive, valid, reliable, and objective. This study applies the concurrent triangulation strategy, in which both types of data are collected in a single phase simultaneously: quantitative data are obtained through performance measurement techniques to assess effectiveness and efficiency, while qualitative data are gathered using the Concurrent Think Aloud (CTA) technique combined with the System Usability Scale (SUS) questionnaire to evaluate user satisfaction. CTA was selected because it produces more accurate and spontaneous information compared to the Retrospective Think Aloud (RTA) technique, as respondents express difficulties while performing tasks rather than relying on fading memory (Muslim, 2017). The research population consists of 2,000 active users (300 premium and 1,700 freemium), with a sample of 20 respondents selected through purposive sampling (Sugiyono, 2016; Usman, H. and Akbar, 2006). based on their experience using the application. This sample size follows the recommendation of Jakob Nielsen (2000, in Utama, 2011), who states that approximately 12 respondents are sufficient to identify nearly all usability problems. The collected data include task success rates and completion times (quantitative), as well as user difficulties, suggestions, and satisfaction (qualitative), gathered through online interviews, usability testing task scenarios, and the SUS questionnaire.

RESULTS AND DISCUSSION

Effectiveness Analysis

The analysis conducted to assess the effectiveness of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting is based on the number of errors or failures made by respondents in completing their assigned tasks, as obtained from performance measurement data. The following presents the results of the effectiveness analysis of the IFS Pro Android Mobile Application according to each respondent group.

Effectiveness Analysis Results for the Premium Version Users of the IFS Pro Android Mobile Application

Based on performance measurement data (Error! Reference source not found.), it was found that no errors were made by any respondents who were IFS Pro Premium members, both novice and experienced users. Therefore, the Premium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting can be considered effective, as no usability issues were identified on the pages examined in this study.

Effectiveness Analysis Results for the Freemium Version Users of the IFS Pro Android Mobile Application

Based on performance measurement data (Error! Reference source not found.), it was found that no errors were made by any respondents who were IFS Pro Freemium members, both novice and experienced users. Consequently, the Freemium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting can be regarded as effective, as no usability problems were identified on the pages used as research objects.

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Efficiency Analysis

The efficiency analysis resulting from usability testing of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting was conducted by comparing the time required by experienced respondents with that required by novice respondents to complete each assigned task using the Mann–Whitney U-test. Conclusions regarding the application’s efficiency were drawn based on the formulated hypotheses combined with statistical testing using the Mann–Whitney U-test method with the assistance of SPSS 20 software.

Efficiency Analysis Results for Premium Version Respondents of the IFS Pro Android Mobile Application

The mean rank values derived from the statistical analysis of task completion times on the Premium user pages of IFS Pro are presented in graphical form, as shown in Figure 1.

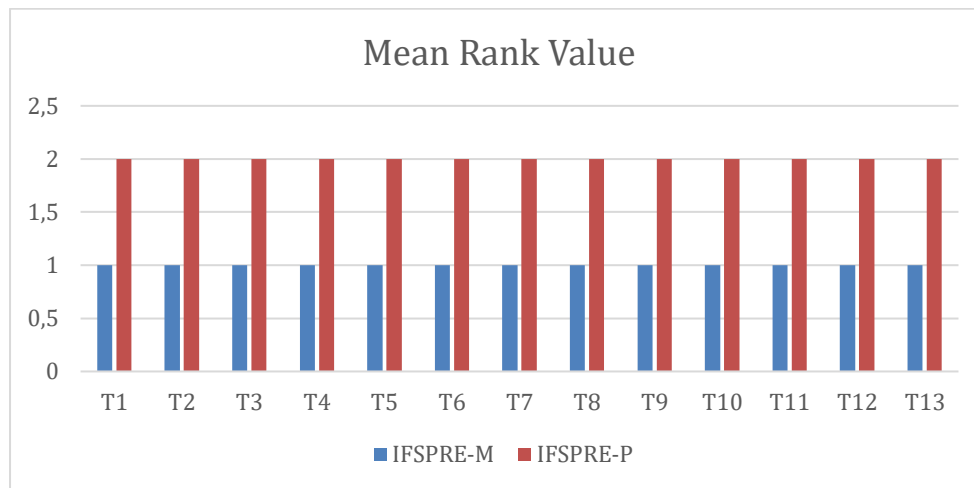


Figure 1. Mean Rank Value Graph of Statistical Test Results for IFS Pro Premium Member Respondents

Figure 1 shows that the mean rank values of experienced respondents are consistently lower than those of novice respondents. This result indicates that the Premium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting become easier to use as users gain more experience interacting with the interface. The Mann–Whitney U-test results for both respondent groups are presented in Table 1.

Table 1. Statistical Test Output for IFS Pro Premium Users

Output Test	Task_1	Task_2	Task_3	Task_4	Task_5	Task_6	Task_7	Task_8	Task_9	Task_1_0	Task_1_1	Task_1_2	Task_1_3
Mann-Whitney U	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000	,000
Wilcoxon W	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Z	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000
Asymp. Sig. (2-tailed)	,317	,317	,317	,317	,317	,317	,317	,317	,317	,317	,317	,317	,317
Exact Sig. [2*(1-tailed Sig.)]	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b

The results of the Mann–Whitney U-test for Premium users, as shown in Table 1, indicate that the p-value for all tasks is 0.317. Since this p-value exceeds the significance level α (0.05), the decision for each task is to accept the null hypothesis (H_0) and reject the alternative hypothesis (H_1). The decisions for each task on the Premium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting are as follows:

1. **Task 1**

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. There is no significant difference in the completion time of Task 1 between experienced and novice respondents.

2. **Task 2**

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference exists between the two groups.

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3. Task 3

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference is found between experienced and novice respondents.

4. Task 4

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is observed.

5. Task 5

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference is identified.

6. Task 6

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is detected.

7. Task 7

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference is observed.

8. Task 8

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is found.

9. Task 9

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference exists.

10. Task 10

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is observed.

11. Task 11

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference is detected.

12. Task 12

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is found.

13. Task 13

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference exists between the two respondent groups.

The statistical test output indicates that there is no statistically significant difference in task completion times between experienced and novice respondents for all tasks on the Premium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting, although experienced respondents tended to complete tasks faster than novices. Based on these findings, the application pages for IFS Pro Premium users can be considered efficient.

Efficiency Analysis Results of the IFS Pro Android Mobile Application Data for Freemium Version Users

The mean rank values based on the statistical analysis of task completion times on the IFS Pro Freemium user pages are presented in graphical form, as shown in Figure 2.

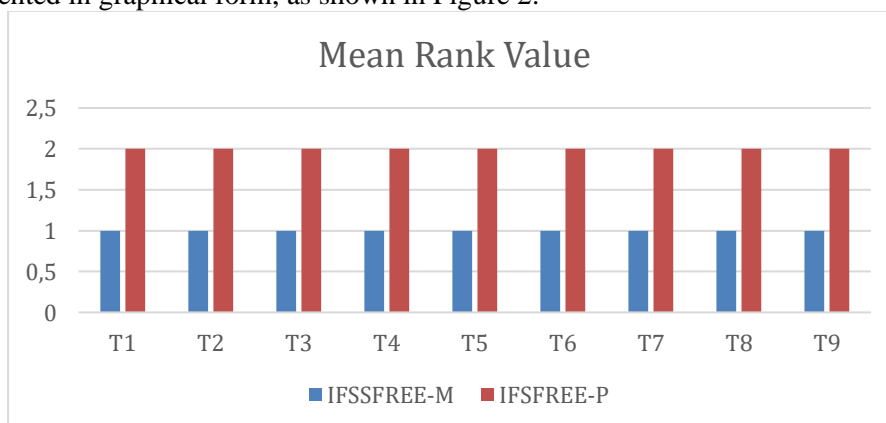


Figure 2. Mean Rank Value Graph of Statistical Test Results for IFS Pro Freemium Member Respondens

Figure 2 shows that the mean rank values of experienced respondents are consistently lower than those of novice respondents. This finding indicates that the Freemium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting become easier to use as users gain more experience interacting with the interface. The Mann–Whitney U-test results for both respondent groups are presented in Table 2.

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Table 2. Statistical Test Output for IFS Pro Freemium Users

	Task_1	Task_2	Task_3	Task_4	Task_5	Task_6	Task_7	Task_8	Task_9
Mann-Whitney U	,000	,000	,000	,000	,000	,000	,000	,000	,000
Wilcoxon W	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Z	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	-1,000
Asymp. Sig. (2-tailed)	,317	,317	,317	,317	,317	,317	,317	,317	,317
Exact Sig. [2*(1-tailed Sig.)]	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b	1,000 ^b

The results of the Mann–Whitney U-test for Freemium users, as shown in Table 2, indicate that the p-value for all tasks is 0.317. Since this p-value exceeds the significance level α (0.05), the decision for each task is to accept the null hypothesis (H_0) and reject the alternative hypothesis (H_1). The decisions for each task on the Freemium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting are as follows:

1. **Task 1**

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. There is no significant difference in task completion between experienced and novice respondents.

2. **Task 2**

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference exists between the two groups.

3. **Task 3**

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference is found between experienced and novice respondents.

4. **Task 4**

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is observed.

5. **Task 5**

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference is identified.

6. **Task 6**

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is detected.

7. **Task 7**

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference is observed.

8. **Task 8**

The p-value is 0.317 (> 0.05); thus, H_0 is accepted. No significant difference is found.

9. **Task 9**

The p-value is 0.317 (> 0.05); therefore, H_0 is accepted. No significant difference exists between the two respondent groups.

The statistical test output indicates that there is no statistically significant difference in task completion times between experienced and novice respondents for all tasks on the Freemium user pages of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting, although experienced respondents tended to complete tasks faster than novices. Based on these findings, the application pages for IFS Pro Freemium users can be considered efficient.

User Satisfaction Analysis

The level of user satisfaction with the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting from each user group can be seen in Figure 3

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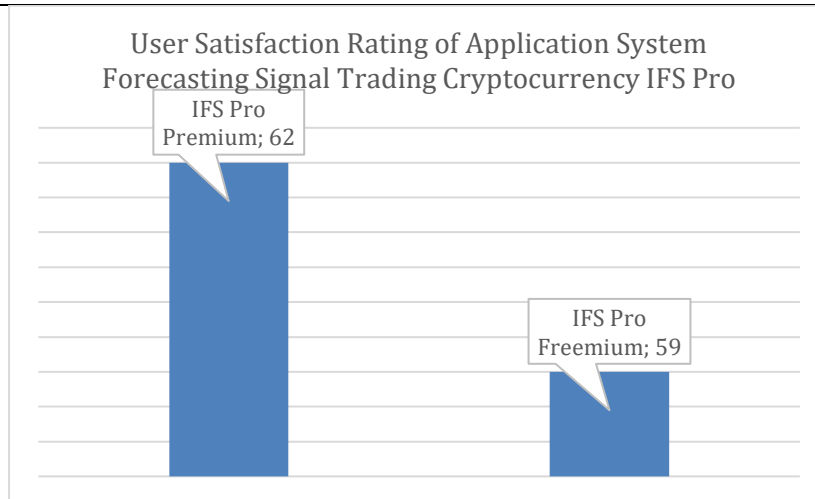


Figure 3. User Satisfaction Scores of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting

Notes:

Category A : >80 (Very Satisfied)

Category B : 70–80 (Satisfied)

Category C : 60–70 (Fairly Satisfied)

Category D : 50–60 (Less Satisfied)

Category F : <50 (Very Dissatisfied)

Figure 3 illustrates the user satisfaction scores for the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting. Based on the graph, the lowest satisfaction score is reported by IFS Pro Freemium users at 59 (Category D), while IFS Pro Premium users obtained a score of 62 (Category C). These results indicate that both Premium and Freemium users are not yet fully satisfied with the system.

Based on the analysis of each questionnaire item from the System Usability Scale (SUS), the relatively low satisfaction scores are caused by several factors, as follows:

1. Respondents reported a high level of inconsistency within the application (corresponding to item 6).
2. Respondents perceived the application as complex and difficult to use (item 8).
3. Respondents did not feel comfortable using the application (item 9).
4. Respondents indicated that they needed to learn many things before being able to use the application effectively (item 10).

Table 4. Average User Satisfaction Scores for the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting

Respondent Code	Statement Item										SUS Score
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
IFSPRE-P-01	5	4	4	5	4	2	3	2	4	5	55
IFSPRE-P-02	5	5	5	1	5	1	5	1	5	4	83
IFSPRE-P-03	4	4	4	2	4	2	4	2	4	3	68
IFSPRE-P-04	1	4	1	4	4	4	4	3	4	4	38
IFSPRE-P-05	3	4	4	2	4	4	4	2	4	3	60
IFSPRE-P-06	4	4	4	4	4	3	4	2	4	4	58
IFSPRE-P-07	4	4	4	4	4	3	4	2	4	4	58
IFSPRE-P-08	5	4	4	2	5	2	5	1	5	4	78
IFSPRE-P-09	4	4	4	3	4	3	4	2	4	4	60
IFSPRE-P-10	4	2	2	4	2	4	2	4	3	4	38
IFSPRE-M-01	4	3	4	1	4	2	4	3	4	3	70
IFSPRE-M-02	5	5	5	1	5	1	5	1	5	1	90
IFSPRE-M-03	4	5	4	1	4	2	4	2	4	2	70
IFSPRE-M-04	4	4	4	2	4	2	4	2	4	2	70

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IFSPRE-M-05	4	4	4	2	3	3	4	4	4	2	60
IFSPRE-M-06	4	3	3	5	4	5	4	5	3	5	38
IFSPRE-M-07	4	4	4	3	3	3	4	3	3	3	55
IFSPRE-M-08	4	4	4	2	3	3	3	3	4	2	60
IFSPRE-M-09	5	4	4	2	4	2	5	1	4	2	78
IFSPRE-M-10	4	3	3	2	4	3	3	3	3	2	60
IFSFREE-P-01	4	4	5	2	4	2	4	2	4	4	68
IFSFREE-P-02	3	2	3	2	3	3	2	4	3	3	50
IFSFREE-P-03	4	2	4	2	2	2	4	2	4	2	70
IFSFREE-P-04	4	3	3	3	2	3	2	2	2	4	45
IFSFREE-P-05	4	4	4	2	4	2	2	3	3	4	55
IFSFREE-P-06	5	5	4	2	4	2	5	1	4	2	75
IFSFREE-P-07	5	4	5	2	4	2	4	1	5	4	75
IFSFREE-P-08	5	5	5	2	4	2	4	1	5	2	78
IFSFREE-P-09	4	3	4	2	4	2	4	2	4	3	70
IFSFREE-P-10	5	4	4	4	4	3	4	3	4	5	55
IFSFREE-M-01	4	4	4	3	4	2	4	2	2	2	63
IFSFREE-M-02	3	3	2	4	3	2	3	3	4	4	48
IFSFREE-M-03	4	3	3	4	4	3	4	3	3	5	50
IFSFREE-M-04	3	2	3	4	2	2	3	3	3	4	48
IFSFREE-M-05	4	4	4	2	2	2	3	2	3	2	60
IFSFREE-M-06	4	4	4	2	2	2	4	2	4	2	65
IFSFREE-M-07	4	4	4	2	4	3	3	3	4	2	63
IFSFREE-M-08	4	4	4	4	4	2	3	3	3	3	55
IFSFREE-M-09	3	4	3	3	3	2	3	3	4	3	53
IFSFREE-M-10	3	4	4	3	3	3	2	3	3	4	45
Total SUS Scores Of All Respondents										2430	
Average SUS Score Of Respondents										61	

Table 4 presents the average satisfaction scores of all respondents toward the application. Overall, the mean satisfaction score is 61 (Category C). This result indicates that respondents consider the application to have moderately good quality and feel fairly satisfied when using it. However, several shortcomings should be noted based on the data above. In general, users still believe that they require assistance from others (technical personnel) to operate both the Premium and Freemium versions of IFS Pro. This reliance contributes to the relatively modest score of 61, indicating that users are only fairly satisfied and have not yet reached the “satisfied” category.

CONCLUSION

Based on the results of the analysis presented, the following conclusions can be drawn:

1. Results of the Analysis of Effectiveness, Efficiency, and User Satisfaction

a. Effectiveness

The effectiveness analysis of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting was conducted by calculating the number of errors made by each respondent while performing the assigned tasks. A respondent was considered to have made an error if they gave up or failed to complete the given task. Based on the Performance Measurement results, no errors (0%) were recorded among all respondents, both IFS Pro Premium and IFS Pro Freemium users. Therefore, the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting can be considered effective.

b. Efficiency

The efficiency analysis of the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting was carried out by analyzing task completion time across respondent groups. This analysis compared the time required by expert users with that required by novice users to complete each assigned task using the Mann–Whitney U-test. The statistical analysis results indicate that the p-value for all tasks across respondents is greater than the significance level α (0.05), specifically 0.317. This shows that there is no significant difference in task completion time between expert and novice respondents for both IFS Pro

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Premium and IFS Pro Freemium users. Based on these findings, the application pages can be considered efficient.

c. User Satisfaction

User satisfaction was measured using the System Usability Scale (SUS) questionnaire, which assesses users' perceived satisfaction with the application. The SUS results consist of scores for each statement provided to respondents, which were then analyzed and categorized based on specific score ranges: Category A (>80), Category B (70–80), Category C (60–70), Category D (50–60), and Category F (<50). The satisfaction score for IFS Pro Premium users was 62 (Category C), while for IFS Pro Freemium users it was 59 (Category D), resulting in an average satisfaction score of 61 (Category C). These results indicate that the IFS Pro Android Mobile Application for Cryptocurrency Trading Signal Forecasting has an adequate level of quality, and respondents were moderately satisfied with its use.

2. Improvement Recommendations

The recommended improvement wireframes were developed based on the usability testing results of the IFS Pro Android Mobile Application pages, incorporating feedback and suggestions from respondents. The improvements include: (1) feature additions and (2) interface adjustments. Feature additions consist of functions for sorting signal list items based on variables such as release date and signal status, the inclusion of a help feature explaining how to read and use signals, and an upgrade-to-premium option on the signal detail page for IFS Pro Freemium users. Meanwhile, interface and layout improvements were applied to the login page, the signal list page, and the signal detail pages for both IFS Pro Premium and IFS Pro Freemium versions.

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