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Compliance Without Experience? A Task-Based WCAG 2.1 Evaluation of Mobile Banking in Indonesia

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Abstract
Mobile banking applications play a central role in digital financial systems; however, accessibility for users with visual impairments remains insufficiently examined in real task contexts. Existing studies primarily emphasize automated and interface-level assessments, with limited attention to interaction processes during task execution. This study evaluates the accessibility of a widely used mobile banking application in Indonesia using a task-based approach based on WCAG 2.1 Level A and AA criteria. An exploratory descriptive case study was conducted on BRImo (version 2.92.0) using Android 13 and TalkBack 16.2.0. The evaluation integrates manual WCAG inspection, automated testing, and screen reader-based interaction testing across three core tasks: login authentication, balance inquiry, and fund transfer. The unit of analysis focuses on interaction steps within task workflows, examined through a triangulation approach comparing structural compliance and interaction-level outcomes. The findings show substantial partial conformance, with over 70% of Level A and nearly 90% of Level AA criteria categorized as "Supports with Exceptions." However, critical barriers persist in transactional workflows, including missing labels, inconsistent screen reader feedback, and navigation failures that hinder task completion. These results indicate that WCAG conformance alone is insufficient to ensure functional accessibility, highlighting the distinction between structural conformance and experiential task accessibility.

Keywords: accessibility evaluation; inclusive design; task-based evaluation; visual impairment; wcag 2.1

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INTRODUCTION

Mobile banking is now a key part of modern digital financial systems, enabling fast, convenient, and continuous access to financial services. However, not all users benefit equally from these advancements. Individuals with visual impairments encounter substantial obstacles when engaging with mobile financial applications, hindering their ability to independently perform essential financial activities and fully participate in digital financial ecosystems (Matos et al., 2023; Puli et al., 2024). In this context, accessibility is not merely a usability enhancement but a fundamental requirement for inclusive digital participation. Inclusive design emphasizes the importance of developing systems that accommodate diverse user abilities and ensure meaningful access to digital services from the outset (Avni et al., 2026).

The Web Content Accessibility Guidelines (WCAG) 2.1 provide a widely adopted framework for evaluating digital accessibility. WCAG defines accessibility through four core principles perceivable, operable, understandable, and robust and offers testable success criteria applicable to both web and mobile platforms (W3C WAI, 2024). As a result, WCAG conformance is commonly used as a benchmark for assessing accessibility in practice. However, recent research indicates that compliance with WCAG does not necessarily ensure effective accessibility in real-world usage, particularly for users who rely on assistive technologies (Alayed, 2024; Vollenwyder et al., 2023). This issue becomes more evident in mobile applications, where gesture-based interaction, dynamic content updates, and multi-step navigation increase interaction complexity.

Empirical studies have consistently identified recurring accessibility barriers in mobile applications, including missing or unclear labels, insufficient color contrast, inconsistent screen reader output, and navigation breakdowns (Di Gregorio et al., 2022; Oliveira & Eler, 2024). Similar issues are observed in mobile banking systems, where accessibility barriers become especially critical during transaction-related tasks such as login authentication, balance inquiry, and fund transfer (Alayed, 2024; Naeem et al., 2022). These findings indicate that accessibility challenges extend beyond structural compliance and also arise from interaction processes during task execution.

Many existing studies continue to rely on compliance-oriented evaluation methods, particularly automated tools and static interface inspection, to assess accessibility (Ismailova & Inal, 2022). While these approaches are effective in identifying structural violations, they are limited in capturing interaction-level barriers that emerge during actual use. Prior research shows that accessibility breakdowns often occur within task flows, where sequences of user actions, system responses, and assistive technology interpretation interact in complex ways (Droutsas et al., 2025; Vollenwyder et al., 2023). As a result, systems may achieve high levels of WCAG conformance while still failing to support successful task completion for users with visual impairments. This limitation is especially critical in mobile banking applications, where users must complete multi-step, transaction-focused workflows that require accuracy, continuity, and timely feedback. When these workflows are not fully accessible, the impact extends beyond usability concerns and affects users' financial autonomy and independence (Puli et al., 2024).

In Indonesia, accessibility research has largely focused on public-sector and informational websites, with relatively limited attention given to transactional mobile applications (Fithriyaningrum et al., 2022; Nastiti et al., 2022). At the same time, the rapid growth of digital financial services increases the importance of ensuring inclusive access to mobile banking. Current evidence provides limited insight into how accessibility barriers influence real task execution in mobile financial systems, particularly within developing digital ecosystems such as Indonesia.

This study conducts a task-based accessibility evaluation of a widely used mobile banking application in Indonesia using WCAG 2.1 Level A and Level AA criteria. The evaluation integrates manual inspection, automated analysis, color contrast assessment, and screen reader testing across core financial tasks, including login authentication, balance inquiry, and fund transfer. The findings demonstrate that structural WCAG conformance does not necessarily ensure successful task execution, identify workflow complexity as a key source of interaction-level accessibility barriers, and support a shift toward task-oriented, assistive-technology-informed evaluation approaches for mobile financial systems.

METHOD

This study adopts an exploratory descriptive evaluative case study design to investigate accessibility barriers in a real-world mobile banking context. Case study methodology is

suitable for examining complex interaction phenomena within natural settings and supports analytical generalization rather than statistical inference. The exploratory approach enables the identification of interaction-level accessibility issues, while the evaluative component assesses compliance with established accessibility standards.

The evaluation applies WCAG 2.1 Level A and AA criteria, a widely used framework for digital accessibility assessment (Puli et al., 2024). A structured checklist was used to operationalize WCAG criteria, with each success criterion classified as supports (fully compliant), supports with exceptions (partially compliant with minor issues), or fails (non-compliant and affecting accessibility). Classifications were based on observed interaction outcomes, particularly their impact on task completion and assistive technology usability.

An exploratory survey involving 15 users with visual impairments was conducted using purposive sampling to identify commonly used mobile banking applications and general accessibility concerns. The survey served as contextual grounding rather than statistical representation. BRImo was selected as the evaluation object based on both survey findings and its widespread adoption as one of Indonesia's major mobile banking applications, making it a relevant case for transaction-critical accessibility analysis. Testing was conducted on BRImo version 2.92.0 using an Android 13 device with TalkBack 16.2.0, Accessibility Scanner 2.4.1, and Color Contrast Analyzer 3.5.5. Data collection took place between December 2025 and January 2026 using a consistent device configuration to ensure stability. Observations were documented through structured field notes and external recording due to security constraints.

Accessibility was evaluated across three core tasks: (1) login authentication, (2) balance inquiry, and (3) fund transfer. Each task followed a predefined step-by-step protocol. For example, the login task included launching the application, locating and selecting the login field, entering credentials, and confirming authentication. Similar structured procedures were defined for the other tasks to ensure consistency and replicability.

The unit of analysis was each interaction step within the task workflow, including screens, input actions, navigation transitions, and system feedback. Three complementary methods were applied: (1) manual WCAG inspection, (2) automated testing using Accessibility Scanner and Color Contrast Analyzer, and (3) screen reader testing (TalkBack) to evaluate navigation order, focus behavior, announcement clarity, and task operability. Interaction-level barriers were defined as issues emerging during dynamic interaction, such as incorrect focus order, unclear screen reader output, navigation inconsistency, and task execution failure (Ismailova & Inal, 2022). A triangulation approach was used to integrate findings across methods, comparing structural issues with interaction-level outcomes.

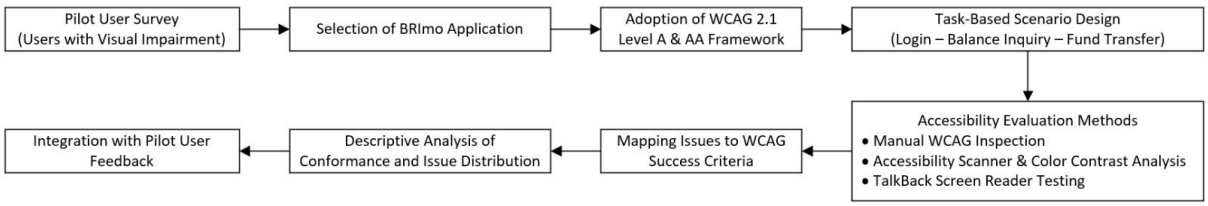

Figure 1. Task-based accessibility evaluation workflow

Consistency and reduced bias were maintained through the use of a standardized checklist, task protocols, and device configuration across all evaluations. Tasks were repeated, and TalkBack testing was conducted twice to confirm result stability. Since the evaluation involved a single trained evaluator, inter-rater reliability could not be established and is acknowledged as a limitation. Accessibility issues were classified as minor, moderate, or critical based on their impact on task completion. The findings are context-dependent and intended for analytical generalization.

RESULTS AND DISCUSSION

Results

A pilot survey involving 15 participants with visual impairments was conducted prior to the accessibility evaluation to ensure alignment between the study focus and user needs. The respondents consisted of nine blind participants and six participants with low vision, all of whom used Android smartphones as their primary mobile devices. Eleven participants reported using mobile banking applications, whereas five avoided them because of security concerns and usability barriers. At least one participant used multiple mobile banking platforms; the overall count reflects overlapping usage. The most frequently mentioned applications were BRImo, Beyond by BSI, BSI Mobile, Livin' by Mandiri, BCA Mobile, Muamalat DIN, and Bank Jateng. TalkBack screen reader users experienced accessibility issues during login authentication and facial verification, with several participants noting that certain interface elements within the application were unreadable to TalkBack. Table 1 lists the most-accessed features.

Table 1. Most frequently used mobile banking features (n = 15)

Feature	Number of Users
Fund Transfer	8
Balance Inquiry	7
Top-up / Mobile Credit	6
Bill Payment	5
Transaction History	5
Top-up E-Wallet	4
QRIS Payment	2

The accessibility evaluation looked at some of the WCAG 2.1 Level A and AA success criteria that are important for mobile interaction (Table 2). The overall results show that the application is only partially accessible. Table 3 shows that 74.3% of Level A criteria and 88.9% of Level AA criteria were classified as "Supports with Exceptions." No criteria were classified as "Does Not Support." This indicates a baseline level of structural compliance; however, the significant proportion of partial conformance reveals that accessibility support is inconsistent and context-dependent, especially during task execution.

Table 2. Evaluated WCAG 2.1 success criteria and identified issues

WCAG Principle	Success Criterion	Description	Issues Found
Perceivable	1.1.1	Non-text Content	Missing labels on icons
Perceivable	1.3.1	Info and Relationships	Incorrect reading behavior, semantic structure
Perceivable	1.3.2	Meaningful Sequence	Column miscount announcement
Perceivable	1.4.3	Contrast (Minimum)	Text contrast failures
Operable	2.1.1	Keyboard Accessibility	-
Operable	2.1.2	No Keyboard Trap	-
Operable	2.4.3	Focus Order	-
Operable	2.4.7	Focus Visible	-
Understandable	3.2.1	On Focus	-
Understandable	3.2.2	On Input	-

Robust	4.1.2	Name, Role, Value	Missing/unclear labels on buttons and inputs

Table 3. WCAG 2.1 conformance summary

WCAG Level	Applicable Criteria	Supports	Supports with Exceptions	Does Not Support
Level A	35	9 (25.7%)	26 (74.3%)	0 (0%)
Level AA	18	2 (11.1%)	16 (88.9%)	0 (0%)

A more in-depth task-level analysis shows that accessibility problems are not evenly spread out across workflows and are heavily affected by how complex interactions are. Transactional tasks, especially fund transfers, had the most problems across all evaluation methods. This means that there were more problems per interaction step than with logging in and checking the balance. This pattern shows that transfer workflows are more complicated because they need multi-step input, interface updates that happen in real time, and confirmation sequences. Balance inquiry, on the other hand, had fewer problems because it had fewer steps and more static content.

Table 4 shows a summary of the accessibility problems that were found across tasks. The most common problems are missing or unclear labels, not enough color contrast, small touch targets, and screen readers that do not work the same way every time. Most of the time, these problems were seen in interactive parts like buttons, input fields, and navigation elements. Two representative cases illustrate these interaction-level failures. First, the back navigation button present across multiple screens was announced by TalkBack solely as "Button," without any contextual label indicating its function or destination, leaving users unable to determine whether activating it would return them to the previous screen or trigger another action (SC 4.1.2 – Name, Role, Value). Second, during the fund transfer task, when users attempted to verify an account number by having TalkBack read the full input, the screen reader interpreted the digit string as a numerical value rather than reading each digit individually for example, an account number input of "1234" was announced as "one thousand two hundred and thirty four" instead of "one, two, three, four" making it impossible for users to accurately verify account digits before confirming a transaction (SC 1.3.1 – Info and Relationships). These cases demonstrate that accessibility failures are not isolated interface flaws but emerge from the interaction between interface structure, assistive technology interpretation, and task context.

Table 4. Major accessibility issues identified across task scenarios

Accessibility Issue Category	Description of Main Problems	Primary Affected Screens
Text Scaling and Readability	Use of non-scalable font units and small text size that does not adapt to system font settings	Login, Home, Check Balance, Transfer
Color and Contrast	Insufficient contrast for text and non-text UI components, particularly on blue background elements	Check Balance, Transfer
Screen Reader Labeling	Missing, duplicate, or unclear labels for interactive elements, resulting in ambiguous screen reader output	Login, Transfer
Touch Target Size	Interactive elements smaller than recommended minimum touch size	Login, Home
Screen Reader Reading Behavior	Incorrect pronunciation of abbreviations and inconsistent reading of numeric values	Login, Transfer

Table 5. Issue type count per task by evaluation method

Evaluation Method	Login	Balance	Transfer	Total
TalkBack (interaction-level)	3	2	6	11
Accessibility Scanner (structural)	4	4	6	14
Color Contrast (structural)	0	2	3	5
Total	7	8	15	30

Table 5 summarizes the number of issue types identified per task across all three evaluation methods. Fund transfer consistently presented the highest issue density with 15 issue types, compared to 8 in balance inquiry and 7 in login. Interaction-level issues accounted for 37% (11/30) of total issue types, while structural issues represented the remaining 63% (19/30). Accessibility barriers also varied in severity. Structural issues such as low contrast and small text generally had a moderate impact, affecting readability but not preventing task completion. In contrast, interaction-level issues such as missing labels, unclear button roles, and inconsistent screen reader feedback were critical, as they directly prevented successful task execution. Although fewer in number, interaction-level barriers had a disproportionately higher impact on usability outcomes. Of the 11 interaction-level issue types, 4 were classified as critical as they directly prevented task completion, 5 as moderate, and 2 as minor.

Cross-method analysis (Table 6) shows that there are big differences in how well things can be detected. Automated tools found a lot of structural problems, especially with contrast and touch target size. However, TalkBack testing was the only way to find interaction-level problems like reading order mistakes, unclear announcements, and misreading numbers. It is important to note that reading behavior problems were only found through screen reader interaction. This shows that structural evaluation alone is not enough to find real accessibility problems.

Table 6. Accessibility issues identified across evaluation method

Accessibility Issue Category	Accessibility Scanner	Color Contrast Analyzer	TalkBack Screen Reader
Text scaling & readability	✓ Detected	–	✓Indirectly observed
Color contrast (text)	✓ Detected	✓ Confirmed	✓Affects readability
Color contrast (non-text UI)	✓ Detected	✓ Confirmed	–
Missing / unclear labels	✓ Detected	–	✓ Observed
Touch target size	✓ Detected	–	✓ Observed
Reading behavior (order, pronunciation)	–	–	✓ Observed

Legend**:** ✓ = Issue observed by method; – = Not applicable or not detectable by the method.

When combining the results from Tables 4 and 6, many problems that were first thought to be structural only become important when people interact with them. For example, missing labels found by automated tools directly led to navigation problems during screen reader testing. This means that accessibility problems don't just come from single interface elements; they come from how the system works, how tasks flow, and how assistive technology interprets them. Specifically, missing labels detected structurally under SC 4.1.2 by Accessibility Scanner

manifested as critical navigation failures during TalkBack testing in the fund transfer task, where unlabeled buttons directly prevented task completion.

The findings reveal a consistent pattern in which accessibility breakdowns are strongly associated with workflow complexity. Structural accessibility support is present at the interface level but not consistently maintained across multi-step interactions. This occurs because dynamic interface changes, frequent focus transitions, and sequential input processes increase the likelihood of screen reader misinterpretation and loss of context. As a result, accessibility failures are more likely to occur in transaction-critical workflows than in simpler informational tasks, indicating that accessibility is shaped not only by interface design but also by the complexity and sequencing of user interaction.

Discussion

The BRImo mobile banking application meets various WCAG 2.1 Level A and AA standards; however, accessibility is still limited in practical application, especially in transaction-critical processes. Despite no criteria being categorized as "Does Not Support," users still faced obstacles during authentication and fund transfer processes. This finding indicates that formal compliance may exaggerate accessibility in practical situations, highlighting a discrepancy between structural adherence and actual task execution. Although previous research has regarded WCAG compliance as a measure of accessibility preparedness (Chait & Schwartz, 2026; Oliveira & Eler, 2024; Shin et al., 2024), this study reveals that accessibility failures arise during task execution, suggesting that adherence does not inherently guarantee usability in dynamic interaction contexts. However, unlike prior studies that treat WCAG conformance as a reliable proxy for accessibility readiness, this study shows that high conformance may coexist with task failure, challenging the assumption that compliance reflects real usability. This directly contradicts Chait and Schwartz (2026), and Vollenwyder et al. (2023), who treat WCAG conformance as a reliable indicator of accessibility readiness, as this study demonstrates that high conformance can coexist with critical task failure.

These findings theoretically correspond with and enhance current accessibility research. According to Ismailova and Inal (2022), automated tools proficiently detect structural issues but are constrained in recognizing interaction-level barriers. The accessibility must be incorporated into system design instead of being regarded merely as a compliance requirement (Jonsson et al., 2023; Vollenwyder et al., 2023). This study advances these arguments by illustrating that even with partial implementation of accessibility, failures continue to occur in multi-step workflows, indicating that accessibility pertains not only to interface elements but also to interaction sequences. This expands previous theoretical viewpoints by framing accessibility as a dynamic process instead of a fixed characteristic of interface design.

This study delineates a conceptual differentiation between structural accessibility conformance and experiential task accessibility, thereby advancing inclusive design theory. Although inclusive design prioritizes the accommodation of varied user abilities (Avni et al., 2026; Salameh et al., 2025), the results indicate that such accommodation must be maintained throughout interaction flows, rather than being limited to static interfaces. While prior studies such as Di Gregorio et al. (2022) and Oliveira and Eler (2024) identify accessibility violations at the interface level, they do not account for how these violations compound across sequential interaction steps, which this study demonstrates as the primary mechanism of task failure. This research emphasizes that accessibility failures arise as systemic interaction breakdowns, particularly in transaction-intensive contexts, in contrast to prior studies that concentrate on identifying accessibility violations (Di Gregorio et al., 2022; Oliveira & Eler, 2024). This offers a unique contribution by conceptualizing accessibility as an emergent characteristic of workflow continuity, instead of a compliance outcome based on a checklist.

The empirical results both validate and expand upon previous studies regarding mobile accessibility obstacles. In accordance with previous research, problems such as inadequate color contrast, diminutive touch targets, and ambiguous labeling persist (Oliveira & Eler, 2024; Shin et al., 2024). Comparable difficulties have been noted in financial and service-oriented applications, where heightened interaction complexity amplifies usability risks (Lu et al., 2025; Naeem et al., 2022). This study further illustrates that these issues become considerably more disruptive in transactional workflows, where multi-step inputs, dynamic interface updates, and confirmation processes exacerbate their impact. This indicates that accessibility barriers are not merely isolated interface flaws but are influenced by the order and interrelation of interaction steps.

These findings can be elucidated through various fundamental interaction mechanisms. Initially, dynamic interface updates and asynchronous content alterations may hinder screen reader parsing, resulting in incomplete or inaccurate announcements. Secondly, multi-step input processes elevate cognitive load, necessitating users to sustain context throughout various interaction phases, thus exacerbating the effects of ambiguous labels and inconsistent feedback. Third, altering focus states during navigation may result in a disruption of interaction continuity, especially when the screen reader output is not aligned with interface transitions. These mechanisms elucidate why accessibility challenges are more prevalent in fund transfer tasks compared to simpler informational tasks, enhancing previous findings by clarifying how interaction complexity leads to accessibility failures (Ismailova & Inal, 2022; Shin et al., 2024).

This study methodologically illustrates the shortcomings of compliance-based and solely automated evaluation methods. Although automated tools proficiently detected structural issues, numerous significant interaction-level obstacles were only uncovered through TalkBack testing. Specifically, 37% of total issue types were exclusively detectable through screen reader testing and would have remained unidentified in an automated-only evaluation, demonstrating a critical methodological gap in compliance-based approaches. This discovery corroborates previous methodological studies endorsing multi-method evaluation (Di Gregorio et al., 2022; Ismailova & Inal, 2022; Swearngin et al., 2024) and enhances it by demonstrating that various evaluation methods reveal different dimensions of accessibility. Automated tools mainly identify structural flaws, while assistive technology assessments uncover usability failures at the interaction level, especially in dynamic environments. This underscores the necessity of incorporating screen reader testing into accessibility assessment frameworks.

These results indicate that transaction-critical applications possess a unique accessibility risk profile in contrast to informational systems. The integration of multi-step authentication, dynamic updates, and input-dependent interactions heightens the probability of semantic failures during task execution. This discovery builds upon prior research by recognizing interaction complexity as a fundamental factor influencing accessibility outcomes, instead of considering accessibility challenges as discrete interface-level issues (Alkadi & Abed, 2023; Lu et al., 2025; Vollenwyder et al., 2023).

The findings emphasize the necessity of incorporating accessibility considerations throughout the development lifecycle. Consistent labeling, stable focus management, and meaningful feedback during dynamic interactions should be prioritized by developers in accordance with inclusive design principles (Avni et al., 2026). Moreover, accessibility validation must transcend compliance-oriented methods and integrate assistive technology testing to guarantee that systems are functional in practical scenarios.
The applicability of these findings is contingent upon several boundary conditions. The evaluation was performed on an Android platform utilizing TalkBack, and outcomes may vary across platforms, such as iOS, or when employing different screen readers, indicating discrepancies in accessibility implementation (Shin et al., 2024).

The results are particularly pertinent to applications involving intricate, multi-step workflows, such as financial systems, and may be less significant in more straightforward informational applications. The study concentrates on a singular mobile banking application and a restricted user context, thereby limiting generalizability. Subsequent investigations ought to broaden this methodology across various platforms, applications, and user demographics to ascertain the consistency of these interaction-level accessibility patterns in wider contexts.

CONCLUSION

This study illustrates that partial compliance with WCAG 2.1 does not ensure effective accessibility in the execution of real tasks, especially in multi-step transactional processes. It delineates a difference between structural conformance and experiential task accessibility, demonstrating that accessibility is not merely dictated by interface-level adherence but by the seamlessness of interaction throughout entire task flows. The findings suggest that accessibility obstacles in mobile financial systems are intricately associated with interaction complexity, wherein dynamic updates and multi-step procedures heighten the likelihood of failures during the utilization of assistive technology. This underscores the necessity of integrating assistive technology testing into task-based assessments to guarantee that systems function effectively in actual usage scenarios. These findings suggest that accessibility in interactive systems should be perceived as an emergent characteristic of user–system interaction rather than a fixed quality of interface design. The results indicate wider relevance for transaction-oriented mobile systems, where accessibility directly impacts users' capacity to carry out crucial tasks autonomously, despite being restricted to a single application and environment. Subsequent research ought to broaden this investigation across platforms (e.g., Android and iOS), integrate user-based validation, and perform comparative analyses across various applications.

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