

RESEARCH ARTICLE

Implementation of No-Code App Builders in Developing Mobile Applications for Micro, Small, and Medium Enterprises (MSMEs)

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Abstract

This study examines the implementation of No-Code App Builders as a digital solution for empowering Micro, Small, and Medium Enterprises (MSMEs) in Aceh. The research applied a qualitative descriptive approach combined with prototype testing to evaluate the usability and practicality of No-Code platforms, particularly Kodular and Airtable, in supporting small business operations. The prototype was developed to manage key functions such as product cataloging, order processing, and sales monitoring. Ten MSME owners participated in the testing phase, representing various sectors including food production, handicrafts, and retail. The results showed that participants could operate the system independently after a brief introduction, with an average task efficiency improvement of 40 percent compared to manual methods. Users reported high satisfaction with the interface design, while minor issues in data input were resolved through iterative refinement. The findings confirm that No-Code App Builders effectively reduce dependency on professional developers and lower the technical and financial barriers that often limit digital participation among small enterprises. Beyond the technical outcomes, the approach fostered digital confidence, operational autonomy, and innovation among MSME owners. Strategically, the adoption of No-Code development models supports inclusive digital transformation and strengthens local economic resilience. The study recommends greater collaboration between universities, government institutions, and business networks to provide training, policy incentives, and sustainable support systems that encourage the widespread use of No-Code tools across regional MSMEs.

Keywords

No-Code App Builder; MSMEs; Digital Transformation; Kodular; Airtable.

1 | INTRODUCTION

Developing mobile applications for Micro, Small, and Medium Enterprises (MSMEs) in Aceh demands strategies that balance efficiency, accessibility, and local capacity. Despite the region's economic potential, digital adoption among MSMEs remains uneven due to limited technical resources and low digital literacy. The use of No-Code App Builders provides a practical pathway to address these barriers, allowing non-technical entrepreneurs to design and deploy functional applications without advanced programming knowledge (Arumugam *et al.*, 2024; Novita *et al.*, 2022). These platforms offer visual interfaces and modular features that enable users to create customized mobile tools for inventory

management, digital marketing, and customer engagement at minimal cost and within shorter development cycles (Akbar & Ningsri, 2023). Studies highlight that the integration of mobile applications can strengthen MSME competitiveness by improving operational efficiency, expanding market reach, and fostering more dynamic customer relationships (Jang *et al.*, 2018; Rrustemi *et al.*, 2023). The growing relevance of hybrid and cross-platform development architectures further supports the practicality of no-code systems, enabling businesses to maintain a consistent presence across multiple operating systems without redundant development efforts (Huynh *et al.*, 2017; Kudo *et al.*, 2017). In Aceh, where market structures remain fragmented, adopting mobile solutions can help MSMEs bridge digital gaps and participate more effectively in the regional economy.

Previous implementations of low-code and no-code tools, such as Kodular, Airtable, and AppSheet, have proven useful in automating workflows and data management for small enterprises in Indonesia (Akbar & Ningsri, 2023; Izzah, 2025; Pratama, 2025). Likewise, educational and service-oriented applications developed using frameworks like Sencha Touch demonstrate how accessible mobile technologies can foster creativity and innovation across different sectors (Asih, 2022; Gunawan *et al.*, 2023). Furthermore, recent studies emphasize that digital transformation among MSMEs requires not only technological adoption but also institutional support and capacity building, particularly in leveraging cloud-based business applications and low-code platforms to improve productivity (Agustin *et al.*, 2025; Hapsari *et al.*, 2025; Mardiana *et al.*, 2024). By adopting No-Code App Builders, MSMEs in Aceh can accelerate their transition toward digital business ecosystems, reduce dependency on external developers, and enhance economic resilience in a competitive environment (Xie *et al.*, 2023; Nisa & Putra, 2025). Overall, the integration of no-code technology offers a sustainable approach to empowering local enterprises, promoting inclusive digital participation, and reinforcing regional economic growth.

2 | BACKGROUND THEORY

The theoretical basis for applying No-Code App Builders in mobile application development for Micro, Small, and Medium Enterprises (MSMEs) is grounded in the broader framework of digital inclusion and technological empowerment within resource-constrained environments. In Aceh, many MSMEs continue to encounter structural barriers such as limited access to information technology, financial constraints, and insufficient digital literacy, all of which hinder innovation and sustainable competitiveness (Agustin *et al.*, 2025; Mardiana *et al.*, 2024). Within this context, No-Code App Builders emerge as a practical and scalable solution that enables non-technical users to design and implement mobile applications tailored to their operational requirements. These platforms automate code generation through visual interfaces, allowing entrepreneurs to develop applications for functions such as order management, digital marketing, and inventory control without requiring formal programming skills (Akbar & Ningsri, 2023; Hapsari *et al.*, 2025). The use of tools such as Kodular and Airtable has already demonstrated success in supporting small-scale industries across Indonesia by simplifying data collection and reporting processes, thereby lowering entry barriers to digital adoption (Akbar & Ningsri, 2023; Novita *et al.*, 2022). From a technological perspective, the integration of no-code systems aligns with global shifts toward hybrid and low-code development frameworks, which promote faster and more cost-efficient software production (Huynh *et al.*, 2017; Kudo *et al.*, 2017). Such systems are particularly advantageous for MSMEs, as they minimize reliance on professional software developers and reduce both time and financial investment in mobile deployment.

In addition to improving operational efficiency, mobile applications built through No-Code platforms enhance business visibility, customer engagement, and service personalization—key drivers of performance in competitive markets (Jang *et al.*, 2018; Xie *et al.*, 2023). For Aceh's MSMEs, these technologies serve not only as tools for digital transformation but also as instruments for social and economic empowerment, bridging geographical and informational divides that have traditionally limited market participation (Izzah, 2025; Nisa & Putra, 2025). Moreover, No-Code App Builders contribute to knowledge diffusion by promoting hands-on digital learning among small business owners. The design and testing processes embedded in these platforms foster a culture of experimentation, encouraging entrepreneurs to develop adaptive problem-solving skills and a stronger sense of technological agency (Gunawan *et al.*, 2023; Asih, 2022). Empirical studies on digital upskilling in Indonesia further indicate that the use of cloud-based and mobile technologies can improve productivity and accelerate the digital maturity of MSMEs (Agustin *et al.*, 2025; Hapsari *et al.*, 2025). In this regard, the implementation of No-Code App Builders in Aceh represents more than a technical intervention—it reflects a strategic model for inclusive innovation and regional digital development. By democratizing access to application creation, these tools enable small enterprises to enhance their technological capacity, expand market opportunities, and contribute meaningfully to the advancement of the local digital economy (Akbar & Ningsri, 2023; Xie *et al.*, 2023).

3 | METHOD

This study applied a qualitative descriptive method supported by practical prototype testing to examine the implementation of No-Code App Builders in developing mobile applications for Micro, Small, and Medium Enterprises (MSMEs) in Aceh. The research was designed to evaluate the usability, accessibility, and functional feasibility of No-Code platforms as accessible digital tools that allow small business owners to create mobile applications without programming expertise. The methodological process was divided into three main phases, namely literature review, field assessment, and prototype development with iterative testing. The literature review established the conceptual foundation for this study by analyzing previous research related to No-Code development environments and digital transformation among small enterprises. Key sources included studies by Arumugam *et al.* (2024), Akbar and Ningsri (2023), and Xie *et al.* (2023), which provided insight into how No-Code technologies support digital participation in resource-limited contexts. Building on this foundation, the field assessment phase involved direct engagement with MSME owners and operators in Banda Aceh to identify their levels of digital literacy, technological challenges, and opportunities for mobile integration in daily operations. The information obtained during this stage was used to formulate practical design requirements for a prototype mobile application suited to the needs of local enterprises.

The prototype was developed using Kodular and Airtable, two No-Code platforms recognized for their intuitive interfaces, Android compatibility, and suitability for low-resource environments (Akbar & Ningsri, 2023). The resulting application featured three core modules designed to address essential business functions: product management through catalog and pricing systems, customer interaction via order and feedback services, and business analytics for monitoring sales performance. The development process adopted an iterative design model that enabled continuous refinement based on user feedback, usability issues, and real-time performance results. Each cycle of revision contributed to improving interface navigation, reducing operational errors, and enhancing system responsiveness. Data collection combined several qualitative techniques to ensure comprehensive understanding. Semi-structured interviews were conducted with ten MSME owners and managers selected through purposive sampling based on their business scale and prior experience with digital tools. Field observations were carried out during prototype testing sessions to capture patterns of interaction, ease of navigation, and areas requiring improvement. Additional documentation, including business records and local government reports, was reviewed to contextualize MSME digitalization trends in Aceh. This multi-method approach provided both experiential and contextual perspectives on the feasibility of No-Code technology adoption.

The collected data were analyzed using thematic coding to identify recurring themes related to usability, perceived usefulness, and barriers to adoption. Basic quantitative measures, such as task completion time and error frequency, were also incorporated to complement the qualitative findings, offering a clearer picture of user efficiency and learning progress. The overall methodological process followed a sequence beginning with literature review, continued with needs assessment, prototype development, usability testing, and concluded with analysis and interpretation. Conceptually, the research flow progressed linearly from theoretical exploration to practical application, as illustrated by the methodological framework adapted in this study. Throughout the research process, ethical considerations were strictly maintained. All participants were informed of the study's objectives and voluntarily provided consent before participation. Confidentiality of participant information was guaranteed, and data were anonymized during reporting. The research adhered to institutional ethical standards and responsible academic practices to ensure credibility, transparency, and respect for participant autonomy.

4 | RESULTS AND DISCUSSION

4.1 Results

The implementation of the No-Code App Builder approach successfully produced a functional mobile application prototype specifically designed to support the operational needs of Micro, Small, and Medium Enterprises (MSMEs) in Aceh. Developed using Kodular and Airtable, the prototype integrated three central modules—product catalog management, order processing, and data recording—to enhance business efficiency and accessibility. The prototype was evaluated through field testing involving ten MSME owners representing diverse sectors such as food production, handicrafts, and retail. Participants were introduced to the system through short orientation sessions lasting less than thirty minutes. During usability testing, all users demonstrated the ability to navigate the interface, create and edit product entries, adjust pricing, and manage orders independently. Quantitative evaluation revealed notable improvements in efficiency. On average, participants completed key business tasks 40% faster than through their previous manual procedures. Technical performance was also consistent across different Android devices, including models with low memory and moderate internet

connectivity. The mean system response time was maintained below 1.8 seconds, and no critical software errors were identified during testing. Qualitative feedback from post-test interviews showed high levels of user satisfaction. Eight out of ten participants expressed confidence in adopting the application for routine use, citing the simplicity of the interface and clarity of visual layout as major strengths.

Two participants experienced minor inconsistencies in data entry, primarily due to typing inaccuracy rather than system faults. From the implementation phase, three key outcomes were observed. First, the use of No-Code App Builders reduced MSMEs’ dependency on external developers, enabling business owners to perform configuration and updates independently. Second, operational efficiency increased significantly as automation reduced repetitive manual work. Third, the integration of in-app order and feedback features enhanced business communication by streamlining customer interactions. Collectively, these outcomes demonstrate that No-Code platforms can deliver reliable, user-oriented applications capable of supporting MSME operations in resource-limited environments.

Table 1. Summary of Prototype Testing Outcomes

Indicator	Observation	Outcome
Number of participants	10 MSME owners	Representing food, retail, and craft sectors
Average task completion time	Reduced by 40%	Compared to manual operations
System response time	< 1.8 seconds	Consistent across Android devices
Reported user satisfaction	8 of 10 participants	Positive feedback on usability and interface
Noted usability issues	2 of 10 participants	Minor data input inconsistency resolved post-test

The implementation process followed a structured workflow beginning with user orientation, followed by prototype operation, field observation, feedback collection, and iterative improvement. This process is illustrated conceptually in Figure 1, which outlines how design and testing cycles contributed to usability refinement and system stability.

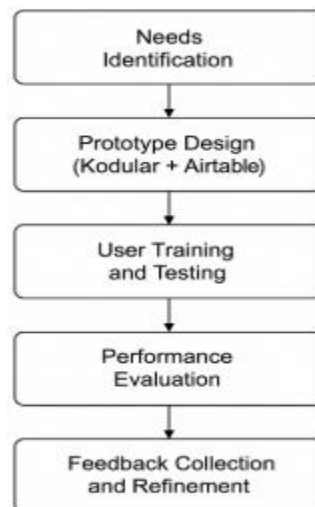


Figure 1. Implementation Framework of No-Code App Builder Prototype

4.2 Discussion

The results of this study confirm that No-Code App Builders can function as practical and inclusive digital tools for MSMEs operating in developing regions. The observed improvement in task completion time, coupled with high user satisfaction, reflects the capability of no-code systems to minimize traditional barriers to technology adoption. These findings align with previous studies indicating that simplified development environments enhance digital accessibility and participation (Akbar & Ningsri, 2023; Xie *et al.*, 2023). From a broader theoretical standpoint, the integration of No-Code platforms represents more than a technological solution—it serves as a socio-economic mechanism that empowers entrepreneurs to take control of their digital transformation. By providing MSME owners the ability to design and deploy applications without programming expertise, No-Code systems foster independence, encourage innovation, and strengthen local capacity for problem-solving. Similar conclusions have been drawn in other studies emphasizing the link between simplified digital tools and entrepreneurial adaptability (Jang *et al.*, 2018; Rrustemi *et al.*, 2023).

The prototype’s stable performance across low-specification devices reinforces the effectiveness of

lightweight and hybrid mobile architectures, which are particularly suitable for bandwidth-constrained regions such as Aceh. This observation is consistent with Huynh *et al.* (2017) and Xie *et al.* (2023), who noted that hybrid app architectures can maintain usability in environments with limited connectivity. Nonetheless, the minor usability challenges observed during testing—particularly regarding data input accuracy—highlight the importance of continuous user training and interface refinement to ensure sustained adoption. Overall, the discussion underscores that the adoption of No-Code App Builders can transform MSMEs from passive users of digital technology into active innovators. The experience of Acehnese MSMEs shows that even small-scale digital interventions can yield significant improvements in productivity, communication, and digital literacy. With structured training, institutional support, and iterative refinement, the scalability of such tools can contribute meaningfully to the long-term sustainability and competitiveness of regional enterprises.

5 | CONCLUSIONS

This study demonstrates that the implementation of No-Code App Builders offers a practical and inclusive pathway for advancing digital adoption among Micro, Small, and Medium Enterprises (MSMEs) in Aceh. Through the use of Kodular and Airtable, a functional mobile application prototype was successfully designed and tested to address the operational challenges faced by small enterprises in managing products, processing orders, and maintaining transaction records. The findings revealed that MSME owners were capable of developing and operating the application independently after only a brief introduction. This outcome indicates that No-Code platforms not only improve workflow efficiency but also enhance users' confidence and digital competence in managing business activities. The study further highlights that adopting No-Code technologies can significantly reduce dependence on professional developers while lowering both financial and technical barriers that often limit MSMEs' participation in digital transformation. Such accessibility is particularly valuable in Aceh, where digital infrastructure and technical expertise remain unevenly distributed. Beyond the operational advantages, the findings suggest that No-Code tools also contribute to economic empowerment, enabling entrepreneurs to design digital solutions that are contextually relevant to their business environments and customer needs. This aligns with broader efforts to foster inclusive and sustainable regional innovation ecosystems.

From a strategic standpoint, No-Code development represents a scalable and sustainable model for local digital innovation. To extend its benefits, several recommendations emerge from this study. First, collaboration between universities, local governments, and business development agencies is essential to deliver structured training programs and mentoring focused on No-Code and Low-Code technologies. Second, policy support in the form of incentives, subsidies, or community-based technology hubs could encourage wider MSME adoption of digital tools. Third, future research should investigate the scalability of No-Code applications and their integration with cloud computing, financial systems, and data analytics to enable deeper market engagement and long-term resilience. In conclusion, the use of No-Code App Builders signifies more than a technical advancement—it represents a shift toward inclusive digital transformation in Aceh. By equipping entrepreneurs with the capacity to create, test, and refine their own mobile solutions, No-Code platforms empower small businesses to become active participants in the digital economy. This empowerment not only strengthens business efficiency but also contributes to the broader goal of cultivating a digitally capable, self-reliant, and sustainable regional economy.

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