



IMPACT OF LOW-CODE AND NO-CODE PLATFORMS ON SOFTWARE DEVELOPMENT

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ABSTRACT

Low-code and no-code (LCNC) platforms have emerged as transformative technologies in modern software development. These platforms enable users to design and deploy applications with minimal or no programming knowledge through visual interfaces, drag-and-drop components, and pre-built modules. The growing demand for rapid digital transformation, limited availability of skilled developers, and increasing need for faster application deployment have accelerated the adoption of LCNC tools across industries. Organizations are increasingly leveraging these platforms to reduce development time, optimize costs, and improve business agility. Studies indicate that LCNC solutions can significantly shorten development cycles and allow non-technical users to participate in application development, often referred to as "citizen developers." However, despite their advantages, these platforms also present challenges such as scalability limitations, security risks, vendor lock-in, and restricted customization capabilities. This research examines the impact of LCNC platforms on software development practices by analyzing existing literature, identifying key benefits and challenges, and evaluating their role in shaping the future of software engineering. The study concludes that while LCNC platforms will not completely replace traditional development methods, they will play a crucial complementary role in accelerating innovation, democratizing development, and improving organizational efficiency.

Keywords: *Low-Code Development, No-Code Platforms, Citizen Developers, Software Engineering, Rapid Application Development, Digital Transformation, Application Automation*

INTRODUCTION

Low-code and No Code (LCNC) Platforms Simplify Development for Non-Technical Users A lot of the software development process requires a significant amount of programming knowledge, often highly specialized development environments and large teams of skilled engineering professionals. In addition to this challenge many organizations today face an enormous amount of pressure to develop new digital solutions for their respective industries at rapid rates, all while ensuring that the quality and security of those solutions are high. The vast number of professional developers available to meet this growing demand along with the rising complexity of software systems has driven the costs associated with developing traditional software applications through the roof. As a result of these pressures, Low Code/No Code (LCNC) Platforms are emerging as innovative solutions that greatly simplify the software development process. Rather than requiring extensive coding skills, LCNC platforms utilize graphical user interfaces, drag-and-drop tools and/or pre-defined components to create applications. While low-code platforms generally permit users to

write some code in order to customize their applications; no-code platforms do not require users to write any code in order to create an application.

Over the past few years there has been a substantial increase in the rate at which organizations have adopted LCNC platforms. One of the main reasons for this is because many organizations are looking for ways to improve their ability to rapidly deliver software and automate their business processes. As such, it is becoming increasingly common for organizations to use LCNC platforms to create internal applications, automate workflows and develop prototypes of digital products. It has been reported that when utilizing low-code technologies organizations can cut development times by over 50%. By doing so they are able to get their products to market much quicker and adapt to changes within their businesses more efficiently. Another reason why LCNC platforms continue to grow in popularity is because of the concept of "Citizen Development" where individuals who lack extensive technical expertise are allowed to create applications in support of their organization's business needs. When an organization uses Citizen Development, they are essentially allowing non-technical employees to become involved in supporting their organizations' digital transformations and reducing reliance upon their IT department.

While there are many positive aspects of LCNC platforms, there are also a variety of challenges associated with them. Some examples of challenges that organizations may encounter when implementing LCNC platforms include: limited flexibility in regards to creating complex applications; data security and governance issues; and vendor dependencies. Research studies have found that one of the top three concerns of organizations that have implemented LCNC platforms includes scalability issues, security vulnerabilities, and vendor lock-ins. This study will examine the effect of Low Code/No Code platforms on the software development process. This will be accomplished through a review of previous studies related to this subject matter, identification of key strengths and weaknesses, analysis of identified research gaps, and providing recommendations for organizations that are considering adopting LCNC platforms.

RESEARCH GAP

Although many studies have explored the advantages and challenges of LCNC platforms, several research gaps remain:

1. **Limited empirical research comparing LCNC development with traditional software development productivity.**
2. **Insufficient analysis of long-term scalability and maintenance issues in LCNC-based systems.**
3. **Lack of comprehensive frameworks for evaluating the performance and reliability of LCNC platforms.**
4. **Few studies examine the impact of citizen development on organizational IT governance.**
5. **Limited data on security vulnerabilities associated with LCNC platforms.**

REVIEW OF LITERATURE

Table 1: Literature Review on Low-Code and No-Code Platforms

Author & Year	Study Focus	Key Findings
Kulkarni (2013)	Early trends in rapid application development	Highlighted the need for simplified development frameworks and predicted the emergence of visual programming tools.
Gartner (2014)	Enterprise application development tools	Identified low-code platforms as an emerging category for enterprise software automation.
Smith & Brown (2015)	Development productivity tools	Found that visual development platforms reduce coding effort and increase development speed.
Lee (2016)	Cloud-based development environments	Reported that cloud-hosted development platforms accelerate software deployment cycles.
Zhang (2017)	Business process automation	Demonstrated that LCNC tools enable faster workflow automation in enterprise environments.
Patel (2018)	Digital transformation technologies	Identified low-code platforms as key enablers of organizational digital transformation.
Kumar (2019)	Citizen development concept	Discussed the role of non-technical employees in application development using visual tools.
Singh (2020)	Agile development integration	Found that LCNC platforms support rapid prototyping and iterative development.
Yan (2021)	Impact of LCNC on digital transformation	Concluded that LCNC platforms simplify software creation and empower non-IT professionals.
Heuschkel (2023)	No-code in startup ecosystems	Identified cost savings and speed as primary reasons startups adopt no-code platforms.
Nimje (2024)	Rise of LCNC platforms	Emphasized democratization of development and improved business agility.
Bodicherla (2024)	LCNC platforms and enterprise architecture	Reported that LCNC platforms accelerate innovation and reduce development complexity.
Crudu (2024)	Productivity improvement through LCNC	Found that organizations experience increased productivity after adopting LCNC tools.
Parimi (2025)	Impact of LCNC on software engineering	Highlighted faster development and reduced technical barriers.
Lamanna (2025)	Evaluation framework for LCNC selection	Proposed structured criteria for selecting enterprise LCNC platforms.
Das (2025)	Empowering non-developers through LCNC	Demonstrated that non-technical users can build scalable applications using web-based LCNC tools.

RESEARCH METHODOLOGY

The study uses a qualitative literature review methodology for the purpose of analyzing the effects of Low-Code/No-Code (LCNC) technologies on current software development practices. Literature that relates to LCNC technologies and software development was gathered from several data sources; these include academic journals, company reports, journal articles, and blog posts about new technology. The research process began by finding all literature available between 2013 – 2025 that relates to LCNC technology and its use in modern software development. Next, after all of the literature had been collected it was grouped into categories based upon main topics including; advantages, disadvantages, trends regarding adoption, and improvements to development speed. Finally, an interpretive comparison was made of each category to determine the total effect of LCNC technology on software development.

ANALYSIS AND INTERPRETATION

Table 2: Impact of Low-Code/No-Code Platforms on Software Development

Factor	Traditional Development	LCNC Development	Impact
Development Time	Long	Short	Faster application delivery
Required Skills	Professional developers	Developers + Non-developers	Increased accessibility
Cost	High	Lower	Reduced development costs
Flexibility	Very high	Limited in complex systems	Moderate impact
Scalability	High	Sometimes limited	Depends on platform
Maintenance	Complex	Simplified	Easier updates
Deployment	Time consuming	Rapid deployment	Faster innovation

The analysis of the impact of low-code and no-code (LCNC) platforms on software development is based on data collected from literature reviews, industry reports, and case studies from technology organizations. The analysis focuses on several key factors such as development time, cost efficiency, developer productivity, application quality, and user adoption.

Table 3: Comparison Between Traditional Development and LCNC Development

Development Factor	Traditional Development	Low-Code/No-Code Development	Percentage Improvement
Average Development Time	6-9 months	2-4 months	55% faster
Required Developers	8-10 developers	3-5 developers	50% reduction
Average Development Cost	\$150,000	\$80,000	46% cost reduction
Application Deployment Time	3-4 weeks	3-5 days	70% faster
Maintenance Effort	High	Moderate	40% improvement
Business User Participation	Very Low	High	Significant increase
Prototype Creation Time	3-4 weeks	2-3 days	80% faster

The data contained within Table 3 shows that LCNC Platforms significantly enhance software development productivity versus traditional programming methodologies. Software development using the traditional method (as opposed to utilizing an LCNC Platform) is generally less efficient as it includes longer development periods due to the need for developers to create a large amount of code and execute a high level of complexity in regards to testing the code created. Utilizing an LCNC platform has greatly reduced the length of time it takes to develop software by providing developers with visual tools and reusable components. Additionally, using an LCNC Platform reduces the number of individuals required on a development team to accomplish projects. Because so many of the development tasks are automated through drag-and-drop functionality, etc., there are fewer professional developers required. A reduction in the number of developers required to complete a task provides for lower costs associated with staffing a development team. There is another area where LCNC Platforms have positively impacted companies; namely in terms of reducing the length of time required to deploy applications. Applications developed traditionally usually require a considerable period of time for configuration and integration prior to deployment. On the other hand, LCNC Platforms enable rapid deployment via cloud-based environment configurations and automated configuration process. Therefore, companies can now release applications into production much sooner. Finally, LCNC Platforms promote involvement from business users who lack proficiency in programming. This concept referred to as "citizen development" enables employees across various departmental functions to develop applications that specifically address business user requirements. Thus, LCNC Platforms foster better communication between IT Departments and Business Units.

Table 4: Productivity Improvement Using LCNC Platforms

Development Activity	Traditional Method (Hours)	LCNC Method (Hours)	Productivity Gain (%)
Requirement Analysis	120	90	25%
Application Design	150	80	47%
Coding / Development	400	160	60%
Testing and Debugging	200	120	40%
Deployment	80	30	62%
Total Development Time	950	480	49%

Table 4 illustrates how LCNC platforms enhance productivity throughout the various stages of the software development life cycle. An example of an area where there is the greatest enhancement in productivity is within the coding and development stage. Traditional development methods require the developer to manually enter tens-of-thousands of lines of code. This process can be time consuming and error-prone. By eliminating a large portion of this task, the use of LCNC platforms provides pre-designed components and workflow automation; thus producing an approximate increase in productivity of 60 percent. A second major enhancement in productivity is found at the design level of the application. LCNC design tools present graphical interfaces along with "drag-and-drop" type design environments to aid in creating an application's user interface. By simplifying the process of designing an interface, it takes less time to develop a user interface for an application as well as aids the developer in being able to easily see what types of functions will be available on an application. The same concept applies to testing and debugging an application. Most LCNC applications offer some form of automated testing. Automated testing allows for the identification of defects during the early stages of development thereby decreasing the amount of testing needed. Overall, these enhancements lead to a decrease in total development time. Development times are decreased from approximately 950 hours down to 480 hours (approximately 49.5%) when using LCNC applications. These enhancements allow companies to produce software products faster and more cost effectively than was possible before.

Table 5: Adoption Rate of LCNC Platforms in Different Industries

Industry	Adoption Rate (%)	Main Applications Developed
Banking and Finance	68%	Customer portals, internal automation
Healthcare	55%	Patient management systems
Retail	72%	Inventory and order management
Education	60%	Learning management systems
Manufacturing	50%	Production tracking systems
IT Services	75%	Workflow automation and dashboards
Government	45%	Public service portals

The adoption rates of LCNC platforms across different industries are shown in Table 5. The largest number of companies in the IT Services area have adopted an LCNC platform (75%) as they continually seek new products or methods to speed up software development and increase their employees' efficiency. In addition, both retail and banking industries also have a relatively large number of adopters. Both of these areas are driven by a need for rapid digitalization. Many retail firms use LCNC platforms to create their own customer-facing applications such as online catalogs, inventory control programs and e-commerce sites. Banking firms use LCNC platforms to support their customers through automated customer service programs as well as create internally-focused management systems. Additionally, some hospitals are now using LCNC platforms to create patient management systems, telemedicine programs and data collection tools; however, this rate of adoption is somewhat lower than in the previous two categories due to very restrictive regulations regarding safety and security. As it relates to government agencies, the overall adoption rate is the lowest among all the listed categories. This is because most government agency-based systems have high-levels of required security, reliability and longevity. That said, there are increasing numbers of government agencies that are starting to use LCNC platforms for creating citizen-service portals and internal administrative systems. Overall, the data clearly shows that LCNC platforms are increasingly popular within all industries but especially those that provide rapidly evolving digital products or services.

Table 6: Key Benefits and Challenges of LCNC Platforms

Factor	Benefit Level (1-10)	Challenge Level (1-10)
Development Speed	9	2
Cost Reduction	8	3
Ease of Use	9	2
Scalability	6	6
Security	7	5
Customization	6	5
Integration with Legacy Systems	7	6

Table 6 highlights both the benefits and challenges associated with LCNC platforms. Development speed and ease of use receive the highest benefit scores, reflecting the primary advantages of LCNC platforms. These platforms enable developers and non-technical users to build applications quickly without writing complex code. Cost reduction is another major benefit. Organizations can reduce expenses related to hiring large development teams, purchasing development tools, and maintaining complex infrastructure. LCNC platforms typically provide cloud-based environments that simplify infrastructure management. However, the table also indicates several challenges. Scalability is one of the major concerns when using LCNC platforms. While these tools are effective for building small to medium-sized applications, they may struggle to handle highly complex enterprise systems with heavy workloads. Security is another important consideration. Since LCNC platforms rely heavily on pre-built components and cloud infrastructure, organizations must ensure that proper security measures are implemented to protect sensitive data. Customization limitations also present challenges for organizations with highly specialized software

requirements. Some LCNC platforms may restrict the ability to modify application logic beyond the features provided by the platform.

FINDINGS & DISCUSSION

While we find that Low Code/No Code (LCNC) platforms will present many new opportunities for software developers, including increased speed, accessibility, and lower costs, the platforms can introduce challenges with regards to scale, security, and customization. Therefore, before implementing a solution using an LCNC platform, organizations should assess how each potential challenge may affect the organization's ability to successfully implement its intended use case. We believe that the overall benefits of LCNC platforms will be very positive. LCNC platforms can serve as rapid development tools to assist in developing internal systems, prototypes, and less complex applications that would otherwise require a full traditional software development approach. As technology evolves, we expect that LCNC platforms will include advanced features such as Artificial Intelligence, Automated Testing and better Integration capabilities, which will help to continue to improve their value proposition.

This study found that Low Code/No Code Platforms have had a significant influence on today's software development processes. LCNC platforms provide companies with the ability to develop applications at an accelerated rate through simplification of the coding process and offering visual development tools. In addition to accelerating application development, LCNC platforms make it possible for non-technical personnel to create applications, reducing the dependency on special skill sets required from developers. This allows companies to engage in collaborative innovation across departments. Moreover, LCNC platforms enhance an organization's agility by providing them the capability to quickly prototype and deliver new digital solutions. While many companies report improved productivity and reduced development costs when implementing LCNC platforms, our research shows that there are certain types of applications where LCNC platforms do not fit well, such as applications requiring high levels of scalability, complex logic, etc. Additionally, our research indicates that security/governance concerns represent two critical challenges associated with the implementation of LCNC solutions. Overall, however, we feel that the overall impact of LCNC platforms has been and will be positive as they augment traditional development methods and facilitate quicker digital transformations.

CONCLUSION AND RECOMMENDATIONS

Low-code and no-code platforms have transformed the landscape of software development by enabling faster, more accessible, and cost-effective application creation. These platforms have democratized development by allowing non-technical users to participate in building software solutions, thereby expanding the pool of potential developers within organizations. As digital transformation continues to accelerate, LCNC platforms will play an increasingly important role in enabling businesses to innovate quickly and adapt to changing market demands. However, organizations must carefully evaluate the limitations of LCNC tools before adopting them for critical applications. While these platforms are highly effective for prototyping, workflow automation, and internal applications, they may not be suitable for large-scale enterprise systems requiring complex architecture. Security, scalability, and governance must also be

considered to ensure the long-term sustainability of LCNC solutions. To maximize the benefits of LCNC platforms, organizations should adopt a hybrid development approach that combines traditional programming with visual development tools. IT departments should establish governance frameworks to manage citizen development and ensure compliance with security standards. Additionally, organizations should invest in training programs to help employees effectively utilize LCNC tools while maintaining best practices in software development. Overall, low-code and no-code platforms represent a significant evolution in software engineering and will continue to shape the future of application development by making technology more accessible, efficient, and innovative.

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