USF | Muma Business Review
A publication of the Muma College of Business | University of South Florida

Volume 9, Number 10	Empirical Findings	1 JULY 2025

Unlocking the Secrets to Citizen Developer Success - Insights from Industry Experts

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Organizations often face delays and reduced agility when relying solely on traditional IT departments to address business needs. Low-code/no-code (LC/NC) platforms empower non-IT personnel, known as citizen developers, to contribute to digital transformation. However, the factors maximizing their effectiveness remain underexplored. This study advances citizen development theory by (1) empirically validating the relationships between technological, organizational, and individual factors, (2) uncovering previously unrecognized moderating effects among these dimensions, and (3) establishing boundary conditions for effective citizen development implementation. Building on a previously proposed conceptual model, in-depth interviews with 14 industry practitioners validate and refine the framework, providing nuanced insights into citizen developers' roles. Key takeaways include: (1) Technological features such as platform simplicity, maintainability, interoperability, and alignment with IT best practices are foundational enablers; (2) Organizational conditions—strong leadership support, balanced governance, and structured support through Centers of Excellence—significantly impact developer outcomes; and (3) Individual attributes like adaptability, communication skills, problem-solving abilities, and domain expertise critically influence long-term effectiveness. By integrating industry-driven insights, this study offers a comprehensive roadmap for leveraging citizen development to accelerate digital transformation while addressing critical organizational challenges.

This study extends citizen development theory by empirically validating and refining a comprehensive framework of technological, organizational, and individual effectiveness factors, providing evidence-based strategies for organizations to optimize citizen developer initiatives.

Keywords: Citizen developers, Effectiveness factors, Success factors, Low-code, No-code, Development platforms, Practitioner insights, Digital transformation, Organizational innovation

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Organizations rely heavily on traditional IT departments for application development. This dependence often results in a backlog of IT projects due to limited resources and a lack of agility in responding to evolving business needs (Hedlund & Johansson, 2023). Consequently, development cycles become more extended, costs increase, and organizations struggle to keep up with the rapid pace of technological change. This scenario highlights the critical role that citizen developers can play in enhancing operational efficiency and responsiveness in today's fast-paced business environment (Carroll & Maher, 2023). Citizen developers operate outside the formal Information Technology (IT) department and utilize low-code/no-code (LC/NC) platforms to create applications for their organizations (Lebens et al., 2021). Another definition of a *citizen developer* is an individual in a non-IT role who creates software applications using tools provided, recommended, or accepted by the IT department (Binzer & Winkler, 2022). According to Binzer et al. (2025), citizen developers are individuals with limited programming experience or non-expert coders who create tailored, lightweight digital solutions to address their specific business needs. While definitions of citizen developers vary in the literature, they consistently emphasize three key elements: non-IT personnel, use of low-code/no-code platforms, and focus on business-specific applications. Building on these shared elements, we define citizen developers as individuals external to formal Information Technology (IT) departments who leverage low-code/no-code (LC/NC) platforms to design applications that address business challenges within their functional roles and areas of responsibility.

The emergence of low-code development platforms and the democratization of technology have been pivotal in paving the way for the adoption of citizen developers (Binzer & Winkler, 2022). This shift allows citizen developers with varying technical expertise to participate in application development and innovation within their organizations actively. As a result, companies can accelerate their digital transformation efforts by leveraging the contributions of citizen developers rather than relying solely on centralized IT teams.

The research problem that motivates this study is the absence of a comprehensive, empirically validated framework that explains how technological, organizational, and individual factors interact to shape the effectiveness of citizen developers. While prior research has explored these dimensions in isolation, a critical gap exists in understanding how these factors work together within real-world organizational settings. Without this clarity, organizations may face governance, security, and sustainability risks when implementing citizen development initiatives. This study addresses this gap by expanding on the theoretical framework introduced in our first article (Muhammad et al., 2024) by engaging practitioners from diverse industries. Through in-depth interviews with 14 industry experts, we examine the factors that drive citizen developer effectiveness. We validate and enhance the previously proposed conceptual model using empirical evidence, prioritizing critical technological, organizational, and individual factors. The refined model underscores these dimensions' interconnectedness, providing theoretical insights and practical strategies to optimize citizen development initiatives.

This study is significant for several reasons. This study advances both theory and practice in three key ways. First, it extends citizen development theory by empirically validating the interdependencies between technological, organizational, and individual factors. Second, it reveals previously unidentified moderating effects between these dimensions, mainly how organizational factors influence the relationship between individual capabilities and development outcomes. Third, it establishes clear boundary conditions for effective citizen development implementation, providing organizations with evidence-based guidelines for optimization. By bridging the gap between theoretical propositions and real-world practices, this research equips business leaders with the tools to navigate challenges and capitalize on opportunities in citizen development.

In the following sections, we delve into the findings from industry practitioners, exploring how technological, organizational, and individual factors shape citizen developer effectiveness. By refining the conceptual model and presenting qualitative insights, this study contributes to the academic discourse and practical implementation of citizen development strategies.

Review of Research

Citizen development, driven by the rapid proliferation of low-code/no-code (LC/NC) platforms, has significantly reshaped application development within organizations. The literature review organizes existing research into three key themes: LC/NC platforms as enablers of citizen development, the organizational impact of citizen developers, and individual characteristics critical to their effectiveness. The review identifies gaps in current knowledge by critically analyzing these themes and establishing a foundation for this research.

LC/NC Platforms as Enablers of Citizen Development: Low-code/no-code platforms have democratized technology, empowering non-IT personnel to create applications without programming expertise. This democratization is particularly crucial as organizations face increasing demand for innovation amidst talent shortages (Callinan & Perry, 2024). Alsaadi et al. (2021) highlight that LC/NC

Protocol

In this study, we aimed to answer the research question: *What are the critical factors contributing to citizen developers' effectiveness?* To build on the conceptual framework proposed in our initial article (Muhammad et al., 2024), we conducted a qualitative study involving in-depth interviews with industry practitioners with direct experience working with citizen developers. Our methodology focused on validating and refining the framework by exploring the individual, organizational, and technological factors that shape citizen developer success.

Interview Protocol Development and Process: We developed the interview protocol based on a thorough review of the existing literature to ensure relevance to the research question. We conducted a pilot test with two industry practitioners to refine the protocol. Feedback from this pilot led to iterative adjustments, ensuring the final set of questions was clear, comprehensive, and capable of eliciting meaningful insights. The finalized protocol incorporated open-ended and semi-structured questions thoughtfully designed to enable flexible yet focused discussions, providing deep insights into the factors that drive citizen developers' effectiveness.

The interview protocol focused on various topics, including participants' roles, technical backgrounds, and experiences with citizen development. We asked about the LC/NC platforms used in their organizations, the development methodologies employed, and the role of citizen developers in digital transformation initiatives. Additionally, questions were designed to uncover the key factors driving the success of citizen developers.

Sampling Strategy: We used purposive sampling to recruit participants with direct experience working with citizen developers. Leveraging personal and LinkedIn networks ensured a diverse representation of industries and organizational roles. Our final sample comprised 14 participants from the healthcare, consulting, manufacturing, and financial services sectors. These participants held roles ranging from C-level executives and directors to managers and individual contributors. Participants represented companies with annual revenues ranging from $1 billion to over $10 billion across the U.S. and Canada.

Data Collection: We conducted 14 interviews between November 2023 and May 2024 using UNT's Zoom facilities. Each interview lasted approximately one hour, and the conversations were recorded and transcribed using Zoom's transcription feature. To protect confidentiality, we assigned participant codes (P1–P14), which were used throughout the analysis process. The interviews concluded upon reaching data saturation, ensuring that no new themes emerged. Table 1 summarizes the information about the participants.

Data Analysis: We conducted a thematic analysis to examine the transcribed data systematically. Initial codes were generated by identifying recurring patterns across individual, organizational, and technological factors. These codes were organized into broader categories and refined iteratively to develop cohesive and meaningful themes. To manage and structure the coding process efficiently, we utilized an Excel spreadsheet, which provided a clear framework for organizing data and tracking the coding progression. Throughout the analysis, we continuously compared the emerging themes with the raw data to ensure credibility, consistency, and alignment with participant responses.

platforms streamline application development by reducing time and complexity, enabling faster delivery of solutions. Hedlund and Johansson (2023) underscore the inclusivity of these platforms, which broaden participation by allowing employees from various functional backgrounds to innovate and address business challenges. Rokis and Kirikova (2021) emphasize the unique advantage of citizen developers as domain experts who define requirements effectively and contribute throughout the software development lifecycle, aligning applications with organizational needs.

Despite these insights, the existing research often focuses on the broad potential of LC/NC platforms without delving into the specific mechanisms that enable citizen developers to transition from users to innovators. Addressing these gaps requires a deeper analysis of the technical factors facilitating this transformation.

Organizational Impact of Citizen Developers: Citizen development strategies have shown substantial organizational benefits, enhancing efficiency and addressing IT backlogs. For example, Asad et al. (2024) describe how a government employee used the Power Platform to develop a COVID-19 information dashboard, demonstrating the ability of citizen developers to meet critical public needs. Ullrich et al. (2021) report that citizen developers enhance data accuracy and promote responsible practices in process mining, while Lebens et al. (2021) illustrate how HR processes can be automated through LC/NC tools such as SAP HXM Suite. The transformative potential of citizen development is evident in Carroll and Maher's (2023) analysis of Shell's implementation, which demonstrates how citizen developers reduced IT backlogs and delivered tailored solutions,

enhancing organizational productivity and employee upskilling. Hintsch et al. (2021) further highlight the flexibility and speed citizen developers bring to application development when adequately supported by minimal IT intervention.

These examples underscore the significant benefits citizen developers can bring to organizations, yet they also highlight a gap in understanding the underlying factors that enable such successes. Critical questions remain unanswered, such as how governance structures, cultural factors, and resource allocation influence the success of citizen developers. This research examines these dynamics to provide a more nuanced understanding of the organizational conditions that enable citizen development to thrive.

Individual Characteristics of Citizen Developers: Citizen developers are often motivated to bypass IT bottlenecks and streamline organizational processes (Biedova et al., 2024). They typically possess domain expertise and a deep understanding of business processes, enabling them to identify operational inefficiencies and articulate requirements effectively (Binzer & Winkler, 2022; Rokis & Kirikova, 2021). These individuals are characterized by their enthusiasm for technology, which plays a vital role in sustaining interest and fostering innovation (Hedlund et al., 2023). Problem-solving ability is another critical competency, as it empowers citizen developers to create tailored solutions using LC/NC platforms (Carroll & Maher, 2023). While LC/NC platforms reduce the need for advanced programming skills, a baseline level of technical competence remains essential. Viljoen et al. (2023) caution that insufficient knowledge of software engineering best practices can limit the adoption and effectiveness of LC/NC platforms. Rokis and Kirikova (2021) highlight that inadequate programming skills may hinder citizen developers from fully leveraging these tools, suggesting a need for ongoing training and support to bridge this gap.

While these characteristics highlight the potential of citizen developers to drive innovation and streamline processes, they also underscore the need to understand the individual factors that influence their effectiveness. Building on the conceptual framework from our initial study (Muhammad et al., 2024), this follow-up research incorporates insights from industry practitioners to examine the factors that shape the quality and impact of citizen developers' contributions.

Research Gaps: The reviewed literature highlights the transformative potential of citizen developers in addressing IT backlogs, fostering innovation, and driving digital transformation. LC/NC platforms have enabled the democratization of application development, reducing reliance on traditional IT teams and expanding organizational capabilities. However, significant gaps remain in understanding the interplay between technological, organizational, and individual factors that shape citizen developer

Table 1: Participants Information

Interviewee	Role	Technical Background	Industry
P1	Director	Yes	Healthcare
P2	Manager	Yes	Healthcare
P3	Individual Contributor	Yes	Consulting
P4	Director	No	Food and Beverage
P5	Manager	Yes	Healthcare
P6	Manager	Yes	Telecom
P7	C-Level	Yes	Consulting
P8	Manager	Yes	Software Product
P9	Manager	No	Cyber Security
P10	Manager	No	Telecom
P11	C-Level	Yes	Manufacturing
P12	Individual Contributor	No	Financial
P13	Director	Yes	Food and Beverage
P14	Manager	Yes	Manufacturing

effectiveness. This qualitative study seeks to address these gaps by validating and refining the conceptual framework proposed in our initial article (Muhammad et al., 2024), providing a more comprehensive understanding of the factors driving citizen developer effectiveness.

Findings

This section presents the participants' feedback on technological, organizational, and individual factors contributing to citizen developers' effectiveness.

Technological Factors: Low-code/no-code (LC/NC) platforms are the cornerstone of citizen development, enabling individuals with minimal programming experience to create impactful applications. By simplifying their use, these platforms lower barriers to entry and expand the pool of application developers beyond the IT department. The participants identified the following crucial factors of LC/NC platforms that contribute to the effectiveness of citizen developers.

User-friendly GUI: The participants consistently emphasized the importance of a user-friendly GUI for low-code/no-code platforms. They highlighted that an intuitive and easy-to-use interface simplifies system adoption, facilitates implementation, and encourages usage among citizen developers. Most participants mentioned that user-friendly features help gain buy-in from users and aid in demonstrating quick proofs of concept.

Simplicity: Participants underscored the importance of simplicity as a key feature in low-code/no-code (LC/NC) platforms, emphasizing its role in facilitating adoption and ease of use for citizen developers. Simplicity reduces potential points of failure and supports the onboarding process, particularly during the initial stages of using new platforms. However, a few participants (P7, P8) cautioned against prioritizing simplicity at the expense of functionality.

P7 remarked, "… good to have in the beginning for starters; but it should not hinder complex solutions; the platform should be robust." Similarly, P8 noted, "… simplicity should not bar the ability to do complex work." These perspectives highlight the need for a balanced approach where simplicity enhances usability without compromising the platform's ability to handle sophisticated tasks.

The consensus among participants was that simplicity, when paired with user-friendliness, creates an optimal user experience. This balance ensures that platforms are accessible to beginner users while remaining robust and capable of meeting advanced development needs, maximizing their utility and effectiveness for diverse use cases.

Reusability: It is applying pre-built modules or templates in multiple projects to save time and maintain consistency. Participants expressed diverse perspectives on the importance of reusability in low-code/no-code (LC/NC) platforms, though several common themes emerged. Most agreed that reusability is beneficial, simplifying updates and coding processes and making it particularly valuable in specific contexts. However, the consensus indicated that while reusability is "good to have," it is not universally prioritized by citizen developers, as many prefer creating new, customized solutions.

P7 highlighted the critical role of reusability in specific scenarios, noting, "… mission-critical applications require high reusability." This insight underscores the situational importance of reusability, which becomes indispensable for maintaining reliability and efficiency in high-stakes applications.

Overall, participants recognized reusability as a feature that adds value by enhancing maintainability and reducing development effort, but its relevance may vary depending on the project's complexity and objectives. Balancing reusability with the flexibility to innovate remains key to optimizing the effectiveness of LC/NC platforms.

Maintainability: Participants consistently underscored the importance of maintainability in low-code/no-code (LC/NC) platforms, emphasizing the need for systems to be adaptable, stable, and easy to update. They highlighted that maintaining platform sustainability prevents obsolescence and ensures long-term usability. A recurring theme was the necessity for platforms to handle frequent upgrades seamlessly without disrupting ongoing projects or workflows.

However, perspectives on the significance of maintainability varied based on the development context. Some participants (P3, P8, P12) acknowledged its importance but noted that it is less critical for ad-hoc or short-term development efforts. P12 offered an intriguing perspective: "…companies do not think of using platforms for more than 2-3 years, so Citizen Developers (CDs) do not have to worry too much about their maintainability."

Another key insight came from P13, who emphasized the shared responsibility for maintainability between IT teams and citizen developers. They remarked, "…CDs should hand over maintenance to central/global (e.g., IT teams), and those teams should maintain them." This underscores the importance of clearly delineating roles, ensuring that while CDs focus on solution creation, IT teams take responsibility for platform sustainability and long-term upkeep.

Adhering to established IT best practices: "Security" was identified as a critical factor in the previously proposed model. However, based on insights from practitioners, this factor was refined to "Adhering to Established IT Best Practices" to encompass security, regulatory compliance, and standardization. This

broader approach reflects the practical realities organizations and citizen developers (CDs) face.

Participants emphasized the critical importance of adhering to established practices in low-code/no-code (LC/NC) platforms, noting its role in ensuring regulatory compliance, enhancing security, and promoting standardization (P1, P2, P5, P6, P11, P13, P14). Many highlighted that following best practices simplifies compliance with frameworks like CCPA and GDPR, with P1 stating, "…platforms should take care of the compliance-related CCPA/GDPR requirements." Similarly, P6 underscored the significance of data security, remarking, "…CDs should ensure that the data is protected by taking care of data security."

While the value of adherence to best practices was widely acknowledged, its necessity varied depending on the context. Some participants (P3, P4, P7, P10, P12) viewed it as beneficial but not essential for ad-hoc or short-term development efforts. Others (P8, P9) emphasized the importance of IT involvement to facilitate smooth progress and effectively handle errors, underscoring the collaborative aspect of maintaining these standards.

Additionally, participants stressed the importance of accuracy, role-based access, and transparency in platform roadmaps for fostering trust and usability. P11 and P13 highlighted these elements as key enablers of successful implementation and compliance, noting that clear documentation and predictable platform updates significantly enhance citizen developers' effectiveness.

Interoperability: Participants highlighted the pivotal role of interoperability in low-code/no-code (LC/NC) platforms, emphasizing its importance for seamless integration with other tools and systems. They noted that interoperability enhances operational efficiency, minimizes risks, and facilitates smooth data flow across platforms (P1, P4, P5, P7, P8, P10–P14). P12 remarked, "…platforms should easily integrate with other tools," underscoring the necessity of compatibility to maximize the utility of LC/NC solutions.

While some participants (P2, P3, P6) considered interoperability beneficial but not critical, most stressed its significance, particularly in ensuring flexibility and compatibility with diverse systems and applications. This adaptability allows organizations to leverage existing technologies effectively while enabling citizen developers to create solutions that align with broader organizational goals.

In addition to integration, participants underscored the need for platforms to support open standards and provide robust APIs to enable seamless connectivity. This capability was deemed crucial for organizations operating in dynamic environments where multiple tools and systems must work together.

Collaborative platforms: Participants' perspectives on collaborative platforms varied, but many underscored their significance in fostering team connections, preventing silos, and integrating data from diverse systems (P2, P3, P4, P8, P10, P14). Several participants (P7, P12) highlighted the critical importance of collaboration features, particularly in scenarios involving multiple users. P7 remarked, "… if multiple people are working, then it is important that the platform offers collaboration channels."

While some participants (P1, P6, P11) considered collaborative platforms beneficial but not indispensable, P13 was uncertain about their relevance or applicability. This view divergence reflects different organizational needs and use cases for citizen development.

Interactive online training and help: Participants shared varied perspectives on the value of interactive online training and support, emphasizing its role in fostering learning and promoting adherence to best practices (P2, P8, P11, P13, P14). Many highlighted its importance in enabling quick comprehension and efficient use of tools, with P2 noting that it streamlines onboarding and skill acquisition. P6 and P13 similarly emphasized the practicality of such training in accelerating tool adoption and usage.

However, some participants pointed out limitations, observing that while online training is beneficial, it often lacks depth and may not always be essential (P1, P4, P5). P1 remarked that people learn differently, and online modules might not fully address complex or nuanced topics.

Participants recognized interactive training as a valuable resource, especially for beginners, but highlighted the need for supplemental methods to address more in-depth learning requirements. This suggests a balance between accessible training and more profound learning opportunities for comprehensive skill development.

Rapid application development: It is an approach that emphasizes speed and iteration by using visual tools to build applications quickly and adapt them based on user feedback. Participants highlighted the critical role of rapid application development (RAD) in responding to rapidly evolving technologies and processes (P1, P3, P7, P8, P11, P13, P14). They emphasized that RAD enables citizen developers (CDs) to create solutions quickly through iterative processes, making it a key enabler of innovation and adaptability. P3 remarked, "…people would often be working on exploring ideas; RAD helps ideas to take shape faster."

Several participants (P6, P7, P8, P11) stressed the significance of RAD for CDs, as it allows for swift experimentation and solution deployment. P13 proposed that organizations could enhance RAD by establishing a "repository of accelerators," providing

reusable components to streamline development further.

Participants regarded RAD as an essential tool for fostering creativity, enabling organizations to maintain agility, and empowering CDs to bring ideas to fruition rapidly. Most participants agreed that RAD is highly beneficial for quickly shaping and implementing innovative solutions.

Flexibility: Some participants highlighted that flexibility is crucial for citizen developers in low-code/no-code platforms. It ensures that the platform offers multiple ways to create solutions, accommodating various user preferences and project requirements. This adaptability allows citizen developers to choose the most suitable task methods, enhancing their productivity and creativity.

In summary, the most critical technological factors influencing citizen developers' effectiveness include platform simplicity, which lowers barriers to entry; maintainability, enabling long-term scalability and flexibility; interoperability, allowing integration with diverse systems and data sources; and adherence to IT best practices, ensuring security and stability. These features empower citizen developers to build impactful applications efficiently while aligning with enterprise standards.

Organizational Factors: Organizations play a critical role in shaping the success of citizen development initiatives. Providing the necessary governance structures, leadership support, and collaborative ecosystems enables citizen developers to thrive within a structured yet flexible framework. The participants identified the following critical organizational factors contributing to citizen developers' effectiveness.

Leadership and management support: Participants unanimously regarded "leadership and management support" as critical in enabling citizen developers (CDs) to create solutions using low-code/no-code platforms. P1 emphasized the importance of managerial understanding and access to key resources, including financial, human, and technical skills. P1 noted, "…sometimes top management (TM) does not deeply understand; sales reps promise a lot, making it hard for the team to manage the TM when expectations are set too high."

P2 and P3 highlighted that progress stalls without leadership backing, citing the role of leadership in removing barriers to development. Similarly, P4 and P5 stressed that management support is vital for project success, with leaders providing the vision and resources necessary for outcomes.

P7 and P8 emphasized the importance of technological support, encouragement, recognition, and creating feedback loops to empower CDs. P11 and P12 underscored the value of fostering a safe environment, enabling subject matter experts (SMEs), and ensuring the right tools and access for effective development. P13 succinctly stated, "…leadership should provide safe zones: all resources available for CDs to do their work; let them overcome the fear of failure; leadership should provide a fail-safe environment."

Governance: We proposed "Processes and Frameworks" as a separate factor in the previously proposed model. However, insights from practitioners revealed a significant overlap, leading to its integration with "Governance" as a unified factor. This combined factor emphasizes the critical role of governance in supporting citizen developers (CDs) on low-code/no-code (LC/NC) platforms. Practitioners highlighted that effective governance encompasses control, documentation, and proactive communication, streamlining processes while aligning with business objectives (P4, P5, P6). (P1, P2, P3) emphasized that governance ensures regulatory compliance, standardization, and safety. Transparency and resource planning emerged as pivotal benefits, fostering process efficiency and equipping CDs to meet organizational goals (P7, P9, P10).

However, participants advocated for a balanced approach, cautioning against excessive bureaucracy that could hinder creativity and agility. P10 stated, "… there should be less scrutiny, less process, less red tape—bureaucracy stifles creativity and quick application development." Similarly, P12 noted, "… governance helps to reign it in, saving organizations from chaos. It provides best practices but should remain balanced. If the overhead is too much, it ruins the fun."

Participants also stressed the importance of practical and adaptable governance tools tailored to CDs' needs. P13 proposed, "… lighter versions of tech docs, templates, and frameworks should be provided to CDs."

Center of Excellence (COE): Most participants regarded the Center of Excellence (COE) as essential, emphasizing its pivotal role in fostering innovation, driving consistent progress, and ensuring standardization. Many highlighted that a COE functions effectively when supported by robust champion networks and insights from business subject matter experts (SMEs). P4 emphasized the COE's role in expanding opportunities, stating, "… COE should provide network opportunities—internal, third-party providers, and industry peers—so employees can learn about new features, possibilities, and broaden their horizons."

P8 underscored the importance of organizational synergy, noting, "… COE should report what projects are in play; there needs to be synergy within the organization to keep track. COE should let CDs know how many automations they have completed and the impact they have made." Beyond fostering collaboration, the COE aids in resource allocation,

project assignments, and effectively communicating the value of citizen developers' work to stakeholders. P13 summarized the COE's role: "… COE engages with business leaders to understand their vision and roadmap, evaluates how many CDs they are enabling, and plans project commitments accordingly."

Participants also highlighted the significance of recognizing and incentivizing CDs' contributions while cultivating a collaborative and inclusive culture. However, some, like P8, acknowledged that while beneficial, a COE is not mandatory for success and must ensure fair opportunities for all contributors.

Democratization of Technology: Participants emphasized that making information widely accessible empowers a more extensive user base, fostering an environment where citizen developers can independently obtain necessary tools and resources. This approach shifts from a push to a pull model, allowing citizen developers (CDs) to access what they need more efficiently. P2 noted, "… it levels the playing field for everyone, providing equal opportunities for all team members."

However, participants also acknowledged challenges associated with democratizing technology. P4 emphasized that successful implementation requires robust IT support, while P5 highlighted potential pitfalls, stating, "… not everyone needs to be a citizen developer; they struggle. Managing projects consisting of CDs becomes challenging; standardization and sustainability are hard to maintain with CDs."

Concerns were raised about maintaining consistency and sustainability when too many individuals are involved in development efforts. Several participants suggested that dedicated teams better manage these complexities. Additionally, they noted that not all organizations need to unlock every technology for everyone, which could lead to challenges in project management and maintaining uniform standards. Balancing accessibility with oversight was crucial to ensure effective citizen development without compromising organizational stability and efficiency.

Collaboration of Citizen Developers with IT: Participants emphasized the critical importance of a strong collaboration between citizen developers (CDs) and IT teams, highlighting its role in ensuring best practices, adherence to standards, and seamless execution of user stories. Such collaboration promotes standardization, methodology, and visibility of work, reducing surprises and enabling IT to support detailed implementation plans effectively.

However, perspectives varied. P7 noted that while collaboration is beneficial, it can result in overwhelming requests for IT, suggesting that a buffer, such as a Center of Excellence (COE) or dedicated leads, could help manage this demand. Collaboration provides a way to leverage technical expertise, but some participants acknowledged that friction between CDs and IT can occasionally drive innovation.

In less supportive environments, CDs face challenges due to siloed or antagonistic attitudes within IT teams. P12 remarked, "… in some organizations, IT does not appreciate or care about CDs because the IT department is super siloed … and at other places, IT is antagonistic because CDs do weird things." Despite these challenges, participants valued supportive and friendly IT teams, which significantly contribute to the success of citizen development initiatives.

P13 suggested that IT ownership of platforms used by CDs, complemented by governance and support from COEs or subject matter experts (SMEs) within IT, would enhance the effectiveness and sustainability of citizen developer efforts.

Citizen Developer-Centric Culture: Participants stressed the importance of fostering a citizen developer (CD)-centric culture within organizations, emphasizing its role in promoting innovation and collaboration. Most participants highlighted the benefits of such a culture, including encouraging diverse perspectives, building a sense of community, and cultivating a mindset of automation and ownership among CDs. P1 and P2 underscored its necessity for driving holistic development and organizational growth.

However, not all participants advocated for an exclusive focus on CDs. P3 cautioned against prioritizing CDs at the expense of other development approaches, stating, "... if they become CD-centric, they tend to obsess toward that and ignore others. Organizations should fully integrate Citizen Developers with other kinds of development (for example, IT)." This perspective highlights the need for balance, ensuring CDs are integrated into broader organizational development strategies.

The recurring theme across responses was the value of creating a supportive and inclusive environment for CDs. Participants emphasized that such an environment should provide trust, training, and community-building opportunities. These elements are crucial for empowering CDs and driving their contributions to organizational innovation and change management efforts.

Training programs: Participants generally regarded training programs as vital for empowering citizen developers (CDs) and enhancing their effectiveness. P1 and P2 highlighted the necessity of robust, continuous training to ensure system responsibility and drive ongoing improvement. P3 emphasized that training is critical in introducing new skills and addressing knowledge gaps, while P5 and P6 underscored its importance for fostering continuous learning and skill development.

P8 and P13 noted that training significantly impacts

CDs' ability to develop effective solutions, stressing the need for tailored programs that cater to varying skill levels. However, some participants (P4, P7, and P10) viewed structured programs as beneficial but not mandatory, suggesting that well-designed starters like documentation and videos can often suffice. P7 remarked, "… it is not necessarily important to have structured training programs; if good starters (documentation, videos) are available, they can be good enough." P14 provided a practical suggestion, advocating for "lunch and learn" sessions to share knowledge and promote learning within teams.

Overall, the most influential organizational factors supporting citizen developer effectiveness include strong leadership support, which sets a clear vision and provides legitimacy; balanced governance, which ensures quality without stifling innovation; centers of excellence, which offer structured guidance and knowledge sharing; and peer learning environments, which sustain motivation and engagement. Together, these elements foster a supportive culture that enables citizen developers to thrive and contribute meaningfully to digital transformation efforts.

Individual Factors: The effectiveness of citizen developers hinges on their attributes, including domain expertise, adaptability, and problem-solving skills. These qualities empower individuals to effectively leverage LC/NC platforms, crafting innovative solutions that address specific organizational challenges. The participants identified the following critical skills and traits contributing to citizen developers' effectiveness.

Availability: The participants unanimously emphasized the critical role of availability in the effectiveness of citizen developers (CDs). Several practitioners (P1, P2, and P5–P7) underscored how availability facilitates knowledge growth, enhances responsiveness, and ensures client satisfaction. P3 highlighted the necessity of allocating time for learning and training, noting, "…you cannot learn if you do not find time to get trained." Similarly, P7 remarked on the value of prompt responses, stating, "…clients love how fast CDs respond." Other participants (P4, P8, P10, P11, P12, and P14) echoed these sentiments, emphasizing that a CD's readiness to assist and adapt to client schedules is vital for maintaining alignment and trust.

Domain expertise: Most participants recognized domain expertise as a critical factor for citizen developers (CDs), citing its importance for effective performance and informed decision-making. A significant portion (P1, P2, P7, P8, P9, P10, P12, and P14) stressed that domain expertise enables CDs to understand better and address specific industry needs, thereby enhancing their contributions. However, some participants (P3, P4, P5, and P6) viewed it as "good to have" rather than essential, suggesting that experience and collaboration can develop domain knowledge over time. P3 remarked, "...if you are not an expert, you are more likely to try out-of-the-box approaches," highlighting the potential benefits of a fresh perspective. P11 similarly acknowledged the advantage of domain expertise but considered it less critical.

Programming skills: Participants offered diverse perspectives on the significance of programming skills for citizen developers (CDs). A subset (P1, P6, P10, P11, P13) argued that programming skills are not critical, stressing the availability of alternative resources and the value of logical thinking over technical proficiency. In contrast, others (P2, P3, P4, P5, P12) deemed programming skills essential, underscoring the importance of understanding major programming languages and being able to read code to mitigate potential challenges. P3 remarked, "...know the major languages; know how to read the code; have at least the knowledge of the code." Meanwhile, several participants (P7, P8, P9, P14) considered programming skills advantageous but not obligatory, emphasizing that CDs can develop these skills progressively. P9 noted, "...you can survive with basic programming knowledge."

Enthusiasm: Participants underscored enthusiasm as a pivotal individual factor in citizen development, emphasizing its profound influence on success. Many highlighted enthusiasm as essential, noting its role in fostering continuous learning, curiosity, and resilience in overcoming challenges. Enthusiastic individuals are more likely to seek training, ask questions, and explore innovative solutions, making them self-driven and highly effective in their roles. This intrinsic motivation accelerates personal growth and enhances problem-solving capabilities, ultimately benefiting both the individual and the organization.

Enthusiasm was also linked to self-motivation, an entrepreneurial mindset, and a proactive approach to addressing challenges. Participants noted that such traits enable citizen developers to navigate complex tasks with creativity and determination. P7 remarked, "...CDs should have an entrepreneurial spirit. The CD is working by himself. He is hungry, a trailblazer, helping the company create solutions for their problems." This passion for continuous improvement and innovation translates into increased productivity and impactful results, reinforcing the value of enthusiasm as a cornerstone of effective citizen development.

Problem-solving skills: Participants unanimously emphasized the vital role of problem-solving skills in the success of citizen developers, identifying it as a cornerstone of their effectiveness. They highlighted problem-solving as a daily requirement, where practical and impactful solutions emerge from analytical abilities and creative, out-of-the-box thinking. P3

remarked, "…95% of a CD's time should be spent on solving problems; the more practice they have, the better they get at it."

Participants underscored the need for citizen developers to deeply understand problems before crafting innovative solutions. They noted that consistent practice in tackling diverse challenges refines these skills and enables developers to approach issues with greater insight and precision. This iterative process of identifying and addressing problems helps citizen developers devise effective solutions tailored to meet specific needs, reinforcing the critical importance of problem-solving in their roles.

Adaptability: In the previously proposed model, "Self-Driven" and "Change Agent" were distinct factors. Practitioner insights, however, revealed a significant overlap between the two, leading to their merger and renaming as "Adaptability." Participants underscored adaptability as a critical individual factor in citizen development, often linking it to the role of a change agent. Adaptable individuals are valued for their openness to change and flexibility in navigating various situations, making collaboration more straightforward and effective in dynamic environments. P1 noted, "… it is much easier to work with someone open to change."

Adaptable citizen developers play a pivotal role in driving innovation by challenging established norms and embracing new approaches to problem-solving. P5 remarked, "…we establish some guidelines/standards, but CDs come up with a way to solve the problem differently—new ways of doing/thinking."

While some participants viewed adherence to established guidelines as "good to have," others stressed that adaptability, an eagerness to embrace and implement change, is essential for innovatively addressing complex challenges. This flexibility enables citizen developers to push boundaries and contribute fresh perspectives, fostering creativity and progress within their organizations.

Communication Skills: Based on practitioner insights, communication skills emerged as a newly recognized and pivotal factor influencing the effectiveness of citizen developers. Participants highlighted its significance across multiple responsibilities, including engaging with customers and business partners, articulating solutions, and documenting processes. It also plays a crucial role in fostering collaboration, understanding stakeholders' needs, and creating effective communication channels.

P12 aptly described this, saying, "…CD should act like a salesman: sell the value of your CD work; identify the pain points; quantify the value of your work." This sentiment reflects the necessity for citizen developers to effectively convey the impact of their contributions and secure buy-in from key stakeholders.

Most participants believed strong communication skills facilitate teamwork, helping citizen developers train others and build a supportive, collaborative community. The ability to articulate solutions in user-friendly terms enhances the accessibility of their work and ensures alignment with organizational goals.

In summary, the effectiveness of citizen developers is largely shaped by domain expertise, which helps them align applications with business needs; problem-solving ability, enabling them to address real-world challenges efficiently; and adaptability and confidence, which sustain their engagement with evolving tools and tasks. Additionally, communication skills and a proactive, self-driven mindset empower citizen developers to collaborate effectively and take initiative—making them valuable agents of innovation within their organizations.

Drawing from participants' input, we propose an updated model that encapsulates their insights and recommendations, highlighting key factors essential to the effectiveness of citizen developers. Figure 1 below visually represents this model, integrating the critical elements identified through the participants' feedback.

Discussion

This study builds upon the previously proposed conceptual framework (Muhammad et al., 2024) by incorporating insights from industry practitioners, advancing both theoretical understanding and practical application of citizen development. The refined framework validates the interconnections between technological, organizational, and individual factors and establishes critical boundary conditions and moderating effects that guide effective implementation. These findings enhance the theory of citizen development by providing nuanced insights into the interplay of these dimensions.

Navigating The Nuanced Insights

One of the most complex findings based on the interviews relates to governance. Participants acknowledged that effective governance is essential to ensuring compliance, consistency, and support for citizen developers. However, opinions diverged on how much governance is "just enough." Some advocated for structured frameworks, documentation, and oversight (e.g., P1, P4, P6), while others warned against excessive bureaucracy that stifles creativity and slows innovation (P10, P12). This contradiction reflects a core tension that managers must balance—too little governance invites chaos and risks, whereas too much leads to rigidity and disengagement.

Managers can navigate this challenge by adopting graduate governance models tailored to the development context. For high-impact or mission-critical applications, tighter controls and IT oversight

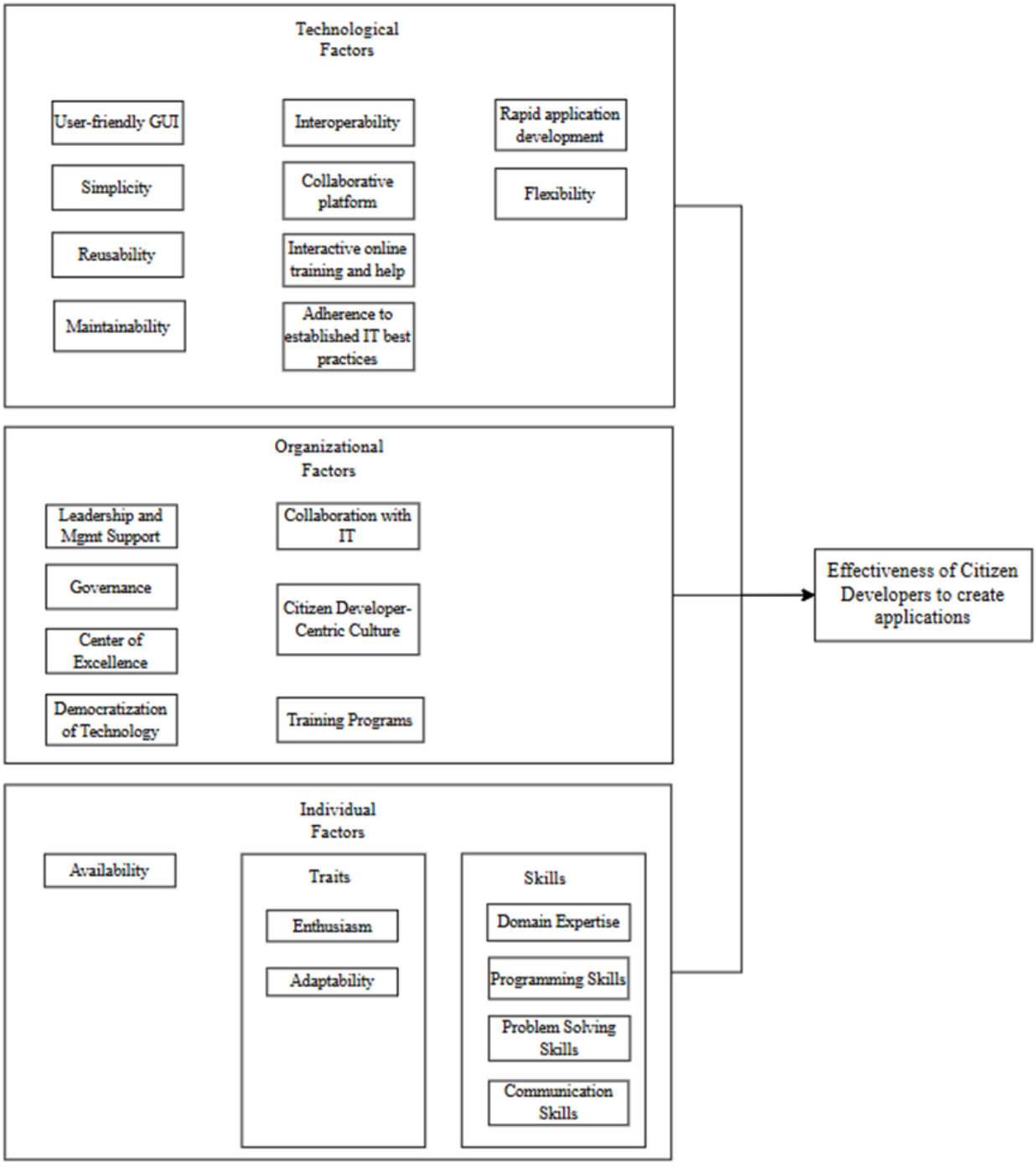

Figure 1: Updated Conceptual Model

are appropriate. Lightweight templates, self-service guidance, and sandbox environments may be sufficient for exploratory or low-risk initiatives. Adaptive governance models—where oversight scales are based on risk and maturity—emerged as a recommended path forward. Establishing Centers of Excellence (COEs) was also highlighted as mediating between freedom and oversight, especially when paired with champions representing IT and business interests.

Participants emphasized that not all employees are equally suited to be citizen developers. While democratizing access to tools is a laudable goal, over-extension can result in fragmented solutions, lack of standardization, and suboptimal outcomes. For instance, P5 noted, "Not everyone needs to be a citizen developer; they struggle," pointing to potential issues of fit and burnout.

This observation introduces a key boundary condition: citizen development should be strategic, not universal. Managers should adopt a targeted enablement strategy, identifying individuals with the right combination of availability, curiosity, domain knowledge, and resilience. Talent management teams can play a pivotal role in developing screening or assessment frameworks to evaluate an employee's readiness for CD roles, turning it into a deliberate extension of workforce planning rather than an ad hoc exercise.

Similarly, another important boundary condition pertains to collaboration with IT. While collaboration was universally seen as beneficial, several participants expressed concern that unstructured engagement can overwhelm IT or result in antagonism between departments. P7 observed that "a buffer like COE or leads can help manage demand." Thus, boundary conditions here point toward establishing clear roles, handoff mechanisms, and collaborative workflows that define when and how IT is involved—ensuring CDs are empowered but supported.

Actionable Recommendations for Practicing Managers

The findings translate into a set of concrete actions managers can take to build effective, scalable, and sustainable citizen development programs:

- **Design for Balance**: Adopt LC/NC platforms that offer simplicity for new users and robustness for advanced use cases. Avoid tools that trade power for usability or vice versa.
- **Build Adaptive Governance**: Use a tiered or modular governance framework that adjusts based on project risk, complexity, or CD maturity level. Promote templates and checklists instead of exhaustive documentation for low-risk efforts.
- **Establish COEs and Champions**: Create a central body to track citizen development efforts, provide strategic oversight, share best practices, and facilitate cross-functional collaboration.
- **Empower Through Training and Recognition**: Develop training pathways that cater to varying skill levels and incorporate continuous learning formats such as "lunch and learns" and self-paced tutorials. Celebrate CD contributions through rewards and visibility.
- **Foster a CD-Centric Culture—with Balance**: Encourage a culture of innovation, experimentation, and self-direction. However, ensure that citizen development is harmonized with traditional development models to prevent silos or ideological extremes.
- **Use Talent Management for CD Selection**: Rather than making citizen development available to all, define clear selection criteria. Identify employees with enthusiasm, availability, domain expertise, and willingness to learn.
- **Strategically Align Projects to Development Types**: Not every project suits citizen developers. Simple process automation or departmental tools may fit well. More complex or regulated applications may require IT-led development. Organizations should develop project-fit matrices to align work with the right development pathway.

Through these findings and recommendations, this study offers both a conceptual framework and a practical roadmap for navigating the complexities of citizen development. Managers can apply these insights to unlock hidden innovation capacity, strengthen organizational learning, and maintain sustained momentum in their digital transformation journeys.

Conclusions

This study refines and validates a conceptual framework for citizen development, advancing theoretical understanding and practical application. The findings extend citizen development theory by empirically demonstrating the interconnectedness of technological, organizational, and individual factors and uncovering moderating effects, such as governance's role in balancing innovation with compliance. Furthermore, the study establishes critical boundary conditions, including the necessity for simplicity in platform design without sacrificing robustness, adaptive governance frameworks, and the interplay between individual adaptability and organizational support.

This research reveals how organizational factors, such as leadership and governance, moderate the relationship between individual capabilities and development outcomes. By emphasizing these interdependencies, the study provides a more nuanced understanding of the conditions under which citizen

developers thrive. Refining the framework also highlights the critical need to align technology platforms, organizational structures, and individual capabilities to optimize citizen development initiatives.

The study offers actionable guidelines for organizations aiming to maximize the potential of citizen developers. Technological enablers like user-friendly GUIs, rapid application development capabilities, and strong interoperability are essential for reducing entry barriers and fostering agility. Equally, organizational structures such as balanced governance models and support from leadership play a pivotal role in ensuring consistency, scalability, and cultural alignment. On the individual side, traits like enthusiasm, adaptability, problem-solving ability, and strong communication skills empower citizen developers to drive meaningful change. Notably, this study establishes key boundary conditions: not every employee should be a citizen developer, and not every project is suitable for LC/NC approaches. These findings guide the strategic deployment of citizen development efforts to align with broader digital transformation goals.

Future research should explore the quantitative validation of these findings across diverse industries and examine the long-term impact of citizen development on organizational agility and digital transformation. In addition, future research could explore how organizations determine which projects are best handled by citizen developers versus traditional IT, considering factors like project complexity, time sensitivity, resource capabilities, and organizational structure. Another promising area of research is exploring how talent management teams can identify ideal candidates for citizen development roles by assessing specific traits, skills, and job functions. Finally, further studies could investigate how emerging technologies, such as generative AI, influence citizen developers' evolving roles and effectiveness.

By bridging theoretical insights with practical strategies, this study equips business leaders with tools to navigate the complexities of citizen development, enabling organizations to drive innovation, enhance operational efficiency, and maintain competitive advantage in a rapidly evolving technological landscape.

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Review

This article was accepted under the ***constructive peer review*** option. For futher details, see the descriptions at:

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