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# Participating in Citizen Development: Theory of Planned Behavior

*Emergent Research Forum (ERF)*

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## Abstract

Digital technologies are vital for organizations to create strategic value and align business and IT. Organizational digital transformation has drastically changed the idea of the workforce. Low-code and no-code solutions may help businesses deal with the demands for professional software development and leverage the technological skills of non-IT employees. Based on the theory of planned behavior, this study proposes to examine the antecedents affecting non-IT employees' intention to participate in citizen development. The study's empirical results have the potential to shed light on how organizations can motivate non-IT employees to participate in citizen development.

## Keywords

Citizen development, citizen developer, low-code, theory of planned behavior, self-efficacy.

## Introduction

Organizations face paramount pressure to deliver a digital experience to customers and employees. The challenges of growing IT backlogs, increasing professional developers' shortage and constant requirement changes from volatile business markets undermine organizations' ability to respond to business needs quickly and deliver value effectively (Glasscock 2021). Reports state that recruiting developers will be one of the biggest challenges in 2022 (Infragistics 2022). Many organizations seek talent out of the traditional IT staff pool. The coronavirus disease 2019 (COVID-19) has pushed the demand for rapid application development to fulfill emergent needs for tracking and information sharing. Low-code and no-code development platforms (LCDPs) provide the tools to deliver application development quickly (Woo 2020). LCDPs essentially utilize graphical "drag-and-drop" interfaces, easy-to-understand metaphors and abstractions to express programming logic and replace professional developers' manual coding processes (Farrish 2020). LCDPs enable strategic innovation by empowering business units to quickly develop and test a concept and a potential solution without involving IT staff (Farrish 2020).

LCDPs provide organizations with tools and opportunities to recruit non-professional developers and ask employees with no programming background to develop software. Citizen development (CD) employs LCDPs to enable non-IT employees to develop software with minimal involvement of professional developers (Hoogsteen and Borgman 2022; Oltrogge et al. 2018). A citizen developer is "an employee who creates application capabilities for consumption by themselves or others, using tools that are not actively forbidden by IT or business units" (Gartner 2019). A citizen developer is a business technologist who resides in a business unit or function and has a passion for business changes. Citizen developers are not pre-designed roles or official job titles. While CD is critical for organizational value delivery and business-IT alignment, organizations need to enable CD by cultivating positive attitudes and norms and upskilling employees with training.

Although much research has focused on the features and benefits of LCDPs, there is little discussion on what organizations can do to encourage non-IT employees to participate in CD. However, not everyone can become a citizen developer. For example, citizen developers should have high technological skills and knowledge of business process management (BPM). Additionally, it is a giant leap from using software to participating in software design, development, programming, and testing. Industry suggests that citizen

developers may be selected from power users, system analysts and other roles representing business functions and close interactions with IT teams (Glasscock 2021). Little is known about the transition from non-IT employees to citizen developers.

This paper aims to fill this research gap by investigating non-IT employees' intentions to use LCDPs for process improvement and value delivery. The theory of planned behavior (TPB) is one of the primary theoretical frameworks to explain and predict people's behavioral intentions. The TPB posits that behavioral intentions are determined by attitudes towards the behavior, subjective norms, and perceived behavioral control (Ajzen 2020). The TPB has been widely adopted to explain various behaviors, from health behaviors to physical activities and technology use. TPB is appropriate to examine the new set of the behavior of interests and its related elements in CD. Following the TPB (Ajzen 2020), this study focuses on the specific behavior of interest, participating (action) in application development on LCDPs (target) in organizational business units (context). While Thacker et al. (2021) explore business students as potential citizen developers, little attention has been paid to the antecedents of non-IT employees' intentions to participate in LCDPs. Therefore, this research takes into account non-IT employees' attitudes, subjective norms, and perceived behavior control on their intentions to use LCDPs for value delivery.

This study offers critical theoretical contributions as it applies the TPB to understand the antecedents of non-IT employees' behavioral intention to participate in LCDPs. This study differentiates domain-specific self-efficacies related to low-code development, motivations to make changes, and normative beliefs on LCDPs. Understanding the factors affecting non-IT employees' intention to participate in LCDPs can generate implications for organizations to cultivate a talent pool and achieve fast value delivery.

The remainder of this paper is structured as follows. Section 2 presents the theoretical background and the research model. Next, Section 3 describes the research method and plan for the future endeavor. Finally, Section 4 provides a summary at the end.

## **Theoretical Background**

### ***Citizen Development and Low-code Development Platforms (LCDPs)***

LCDPs are a cloud-based solution through the platform-as-a-service, employing graphical user interfaces to enable users to develop an application with minimal or no-code development (Sahay et al. 2020; Waszkowski 2019). It is predicted that \$187 billion in revenue will be generated in the global low-code platform market by 2030 (PR Newswire, 2020). LCDPs have multiple features, including graphical user interface, interoperability support with external services and data sources, security support, collaborative development support, reusability, scalability, business logical specification mechanisms, application build mechanisms, and deployment support (Sahay et al. 2020). These features enable the development of databases, business processes, and user interfaces (web-based applications) (Waszkowski 2019). Past studies have reported many successful use cases of LCDPs (Baumgarten et al. 2020; Farish 2020; Sanchis et al. 2020; Totterdale 2018). Low-code development has proven effective in business process automation, workflow automation, and rapid application development (Bock and Frank 2021; Centric Consulting 2021).

Organizations need to consider several factors for the adoption decision, such as risks, business-IT alignment, governance, and top management support (Hoogsteen and Borgman 2022). While LCDPs empower citizen developers to develop software and deliver values, organizational software system management and maintenance are affected (Overeem and Jansen 2021). The challenges of implementing LCDPs range from customization, platform adoption, database management to third-party integration (Al Alamin et al. 2021).

### ***End User Development (EUD)***

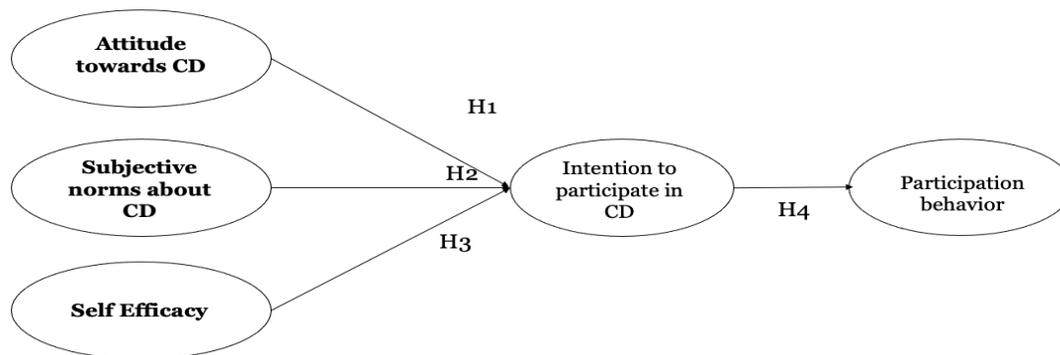
EUD has been a significant research stream to improve software quality, user experience and user experience (UX) design (Paterno and Santoro 2019; Barricelli et al. 2019). Its goal is to enable people with no programming skills to develop software (Paterno and Santoro 2019). The recent development of Internet of Things (IoT) and robotics further the growing need for EUD. Paterno and Santoro (2019) developed a design space to identify the critical aspects of EUD methods and tools for IoT and robotics applications. These characterizing aspects of the EUD methods and tools include the type of metaphor, programming style, platforms supported (desktop or mobile or multiple types) and the types of events and their associated

actions. EUD metaphors such as jigsaws, pipelines, timeline, rules, Lego, and cards illustrate programming concepts to people with no programming background. The metaphors translate into different programming styles such as trigger-action rules, if-then-else or event-condition-action, etc. While interaction events are the focus of the EUD, a full range of events should be considered. Boolean operators such as “and” and “or” are commonly used in event composition.

The features of LCDPs resonate with the major aspects of EUD. For example, LCDPs empower users with graphical user interfaces that visualize metaphors and perform domain-specific application functionalities. LCDPs focus on artifact reuse that supports abstraction and representation, such as conceptual models. In addition, LCDPs automatically transform design artifacts to executable representations, drastically reducing coding and increasing productivity (Bock and Frank 2021).

### ***The Theory of Planned Behavior (TPB)***

According to the TPB, beliefs guide behavioral intention and then lead to actual behavior (Ajzen 1991, 2020). The determinants of intentions include attitude towards the behavior, subjective norms, and perceived behavioral control (Ajzen 1991). In the context of using LCDPs in business units, attitudes are the function of non-IT employees’ subjective evaluation of the outcomes of the behavior. Subjective norm is the expectation of colleagues and managers in business units. Perceived behavior control has no conceptual difference from self-efficacy regarding people’s belief if they can perform the behavior (Ajzen 2020). See the research model in Figure 1.



**Figure 1 The proposed research model**

*Attitude toward CD* is defined as the overall evaluation of the outcome of participating in CD. A favorable attitude towards CD encourages non-IT employees to receive information and spend time exploring LCDPs (Bandura 1977). A favorable attitude will reduce barriers to start engaging in CD.

*H1. Attitude towards CD positively affects non-IT employees’ intention to participate in CD.*

*Subjective norm about CD* is defined as non-IT employees’ normative belief that the behavior is approved, encouraged, and promoted by their colleagues and managers in the organization, including business units and IT departments. People tend to comply with the expectations of others surrounding them. Consequently, subjective norms bring positive effects on intention to participate in CD (Ajzen 1991).

*H2. Subjective norms about CD positively affects non-IT employees’ intention to participate in CD.*

CD requires specific task such as programming and abstraction skills. Self-efficacy is appropriate to evaluate the non-IT employees’ beliefs on performing CD tasks. Self-efficacy research has developed specific types based on the type of technologies and the domains (e.g., computer self-efficacy (Compeau and Higgins 1995; Marakas et al. 1998), ICT self-efficacy (Hatlevik et al. 2018), and financial self-efficacy and technological self-efficacy (Shiau et al. 2020)). In addition, domain-specific self-efficacy shows more predictive power than general self-efficacy (Shiau et al. 2020). To successfully participate in CD, a non-IT employee needs to have technological self-efficacy and business process management (BPM) efficacy (Overeem and Jansen 2021).

Citizen developers are not full-time developers. They are end-users with high technological skills and power users with data literacy and an in-depth understanding of software development in business functions. Technological self-efficacy is an individual's belief of the ability to create efficient business apps and automate workflow. They are familiar with the business processes and spot the opportunities for business process automation and improvements and the emergent needs that business units should fulfill quickly (Woo 2020). BPM efficacy refers to a non-IT employee's perception of efficacy in managing business processes. BPM efficacy reflects an assessment of the organizational inertia, inefficient process, individual's motivation for business process changes, and cognitive assessment of change probability.

Past studies confirm that self-efficacy has been identified as an effective predictor of a person's task performance (Bandura 1977). Self-efficacy has been found to influence behavioral intention positively since individuals will not fear barriers and have high learning outcomes and task performance (Marakas et al. 1998). Individuals with low self-efficacy tend to show low motivation, give up prematurely and perform poorly on tasks (Bandura 1977).

*H3. Self-efficacy (technological self-efficacy and BPM self-efficacy) positively affects non-IT employees' intention to participate in citizen development (CD).*

*Intention to participate in CD* is broadly described as the non-IT employee's intent to manage business processes using LCDPs, such as workflow automation, process automation, and rapid application development for newly designed business processes. In addition, LCDPs empower business users to control application development and deliver value fast. Whereas many studies have focused on choosing the appropriate LCDPs, it is crucial to understand what stimulates non-IT employees' intention to participate in CD.

*H4. Non-IT employees' intention to participate in citizen development (CD) positively affects the participation behaviors.*

## Research Methodology

This study plans to adopt a quantitative survey method to test the proposed model. The survey target includes non-IT employees with job titles such as system analysts, business analysts, application administrators, user support, business analysts, user experience designers, front-end web designers, business and intelligence specialists, etc. In addition, the survey constructs will adopt existing construct measures and modify them to fit the citizen development context. A partial least square (PLS) will be used to analyze the data and test the result.

## Research Plan and Summary

Digital technologies are vital for organizations to create strategic value and align IT and business. Organizational digital transformation drastically changed the idea of the workforce. Businesses apply low-code and no-code solutions to their business needs and processes to deal with the need for professional software developments and leverage the technological skills of non-IT employees. This study proposes to examine the antecedents affecting non-IT employees' intention to participate in CD based on the TPB. The empirical results of the study have the potential to shed light on how organizations can stimulate CD and motivate non-IT employees to participate in CD.

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