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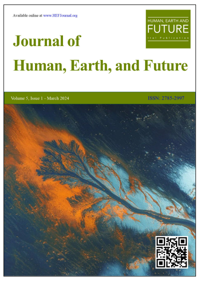

Enhancing Business Efficiency through Low-Code/No-Code Technology Adoption: Insights from an Extended UTAUT Model

Siti Fatimah Abdul Razak [1*], Yow Phey Ernn [1], Farah Izzati Yussoff [1], Umar Ali Bukar [2], Sumendra Yogarayan [1]

[1] *Faculty of Information Science and Technology, Multimedia University, Ayer Keroh, Melaka, 75450 Malaysia.*

[2] *Centre for Intelligent Cloud Computing, Multimedia University, Ayer Keroh, Melaka, 75450 Malaysia.*

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Abstract

The growing need for new applications and software has driven developers to seek quick development options. As a result, the low-code/no-code technology platform emerges as a potential option, leading to the adoption of low-code and no-code technologies in enterprises becoming a focus of inquiry. This study aims to examine users' behavioral intentions toward the adoption of the low-code/no-code technology platform, considering the increasing need for new applications. The Extended Unified Theory of Acceptance and Use of Technology (UTAUT) model serves as the theoretical framework for understanding the factors influencing individuals' intentions to adopt low-code or no-code technologies. The study focused on the five key components of the model: Performance Expectation (PE), Effort Expectation (EE), Social Influence (SI), Perceived Risk (PR), and Perceived Cost (PC). Based on the surveys and data analysis techniques, the findings show relationship between these five categories with an individual's Behavioral Intention (BI) to adopt low-code/no-code technologies. Furthermore, the analysis identifies the most significant BI construct. These findings are beneficial to businesses seeking to enhance efficiency and expedite application development processes in response to increasing digital demands. In general, this study contributes to the topic of technology adoption and improves our understanding of the practicality of the Extended UTAUT model.

Keywords: Low Code/No Code; Extended UTAUT; Business Technology; Technology Adoption.

1. Introduction

Low code is a software development strategy that employs little or no coding to create applications and processes, whereas no code is a software design approach that does not require any coding. It is a cloud-based software development platform that provides a Platform-as-a-Service (PaaS) paradigm that allows customers to construct turnkey operational applications utilizing declarative languages, dynamic graphical user interfaces (UI), and visual diagrams [1]. It allows both programmers and non-programmers to construct application software using graphical user interfaces and configurations rather than traditional computer code. As a result, application creation no longer requires extensive coding abilities; even unskilled developers may construct completely working applications. Low code and no code are sometimes mixed. No code development occurs on simple and user-friendly systems that are accessible to non-technical individuals. However, no-code development is more constrained, with fewer customization options than low-code development. Low code extends the functionality of apps by allowing them to be enhanced with custom

* Corresponding author: fatimah.razak@mmu.edu.my

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code [2]. Based on a survey conducted by OutSystems in 2019, 39% of businesses have invested in low-code application development platforms to speed up application delivery processes [3], as shown in Figure 1. Market research firms predict that these platforms will become more important to businesses [4]. The LCNC, along with agile methodologies like Scrum, are critical for success since these approaches greatly expedite app development and increase the overall efficiency, quality, and speed of a business organization.

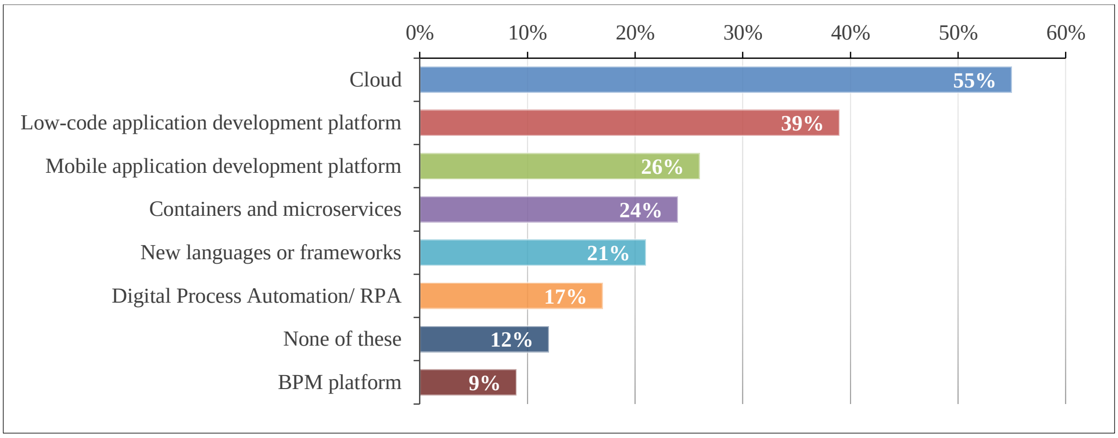

Figure 1. Businesses approach aiming for fast application development.

Table 1 describes the mandatory features of LCNC platforms. Some examples of low-code/no-code (LCNC) development platforms are Mendix, OutSystems, and Google App Maker [5]. OutSystem [6] is a low-code development platform for creating desktop and mobile apps that may operate in the cloud or on local infrastructure. It has built-in capabilities that allow you to publish an application via a URL with a single button click. OutSystems consists of two essential components, i.e., Intermediate Studio and Service Studio, that work together seamlessly to enable application development and streamline database interaction for various types of applications, including billing systems, operational dashboards, Customer Relationship Management tools, business analytics, and Enterprise Resource Planning systems.

Table 1. Mandatory features of LCNC platforms

Features	Descriptions	Examples	
Graphical user interface	This feature set represents the accessible functionalities in the front-end of the evaluated platform to facilitate consumer interactions.	• Drag-and-drop • Forms • Reporting tools	• Pre-built templates • Point and click
Integration	The ability to communicate with third-party services like Dropbox, Zapier, SharePoint, and Office 365 as well as link to various data sources to develop forms and reports.		
Security	Security elements of the applications produced using the platform in use.	• Authentication systems • Approved security protocols	• User access control infrastructures
Workflow and Logic Design	The methods available to model and specify business logic of the application being modelled. May apply one or more API calls.	• Business rules engine • Graphical workflow editor	• API support for interfacing with other application(s)
Deployment and scalability	Feature to enable deployment to possible local or cloud deployment infrastructure, or app stores with ability to handle increased user demand and data growth.		
Build mechanism	The methods used to build the specified program with robust data management capabilities.	• Code generator • Runtime execution model	

Similarly, Google AppSheet [7] is a no-code application creation tool that is part of the Google Cloud ecosystem and offers a user-friendly interface for developing apps that may utilize data from a variety of sources, including Google Sheets, SQL databases, Excel files, and others. Moreover, Mendix [8] is a powerful low-code development platform that provides users with a collaborative and real-time experience with its easy drag-and-drop features. The platform offers a graphical development tool that enables the efficient reuse of various components, greatly speeding up the development process—from setting up data models to creating user interfaces. Customers may utilize pre-established solutions from Solution Gallery 4 to help them start their projects more efficiently. This resource is extremely valuable since it has the ability to fulfill the individual demands and interests of users without requiring them to start from the beginning. In addition, Zoho Creator, Microsoft Power Apps, and Kissflow are also among the LCNC development platforms [9]. In general, LCNC platforms may provide a graphical user interface for users to drag and drop with little or no code. The inclusion of APIs and components makes them easy to learn and use while also speeding development processes. Therefore, it is especially popular in domains that require automated processes and workflows. However, practitioners have differing opinions on the benefits and drawbacks of the platforms [10].

As LCNC platforms have grown in popularity and importance in today's competitive landscape, non-practitioners and businesses should be encouraged to utilize the technology as well. It is critical for businesses and people to use LCNC technology to enhance job productivity, the efficiency of software and application development [1, 6, 10], and to remain competitive. However, there is a lack of research focusing on factors influencing adoption decisions [11, 12] based on theoretical frameworks. The lack of emphasis on theoretical frameworks in adoption decisions hinders our understanding of the complex interaction between many factors that affect the decision-making process. An established theoretical framework will provide guidance for research inquiries, creating hypotheses, and obtaining valuable insights for businesses, academics, and practical applications. Moreover, many organizations are facing an increasing shortage of software developers and the uncertainty of how to enable non-IT individuals to use technology effectively to harness employees' intellectual potential [13, 14]. Understanding these factors will help the LCNC providers address the primary concerns of businesses and individuals who intend to adopt the technology. For example, enhancing platform security can build trust between companies and individuals. By uncovering and addressing the main factors that affect adoption, it can encourage more widespread use of LCNC platforms, enabling businesses and individuals to benefit from their capabilities effectively.

Hence, the purpose of this study is to fill in the research gap by examining the factors that influence Malaysian businesses' adoption of LCNC technology. This study investigates the influence of five key factors on users' intentions to embrace the technology using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2), i.e., Performance Expectation (PE), Effort Expectation (EE), Social Influence (SI), Perceived Risk (PR), and Perceived Cost (PC). This study fills the knowledge gap about the unique drivers of LCNC adoption in the Malaysian corporate sector. The findings of this study will be extremely useful to people and companies considering LCNC adoption as they empower non-technical people, leading to increased productivity. Furthermore, businesses interested in LCNC demonstrate a forward-thinking attitude toward technology, which may result in improved customer experiences, new income streams, and better market positioning, supporting overall growth. This information on adoption intentions also provides vital market trends, allowing them to make educated decisions and resolve any issues that may develop during the adoption process.

The following Section 2 describes the technology adoption models, with an emphasis on the UTAUT2 framework. The formulation of the hypothesis and the methodology are presented in Section 3. Section 4 presents the findings revealed from the study along with the discussions. Finally, the conclusion is provided in Section 5.

2. Related Works

2.1. Low Code/No Code

LCNC has been reported in various domains, including healthcare, education, manufacturing, blockchain, artificial intelligence, e-commerce, mobile applications, corporate services, request handling, etc. [15]. LCNC software development is compatible with Agile methodology since they both emphasize an iterative and frequent delivery strategy with ongoing stakeholder interaction [16, 17]. In businesses, it aids in addressing the issue of insufficient developers by allowing businesses to create and develop apps independently or with minimal assistance from IT experts [11, 18]. The common issue of misinterpretation of requirements may also be minimized since the business requirements can be specified accurately and completely [16, 19]. Moreover, knowledge integration and innovation capability in organizations can also be supported using LCNC [20]. The dynamic nature of fulfilling business requirements in a shorter time is made possible by LCNC development [21–23], which has low cost [10] and requires low maintenance effort [24]. Prinz et al. applied the socio-technical system (STS) to analyze the current research landscape in low-cost development platforms (LCDP). The study found that most studies focused on the technical aspect and very few studies focused on the social system, i.e., users of low-cost development platforms [25]. For example, Sahay et al. analyze eight LCDPs to assist businesses in identifying the platform that best meets their needs. The authors argue that the utilization of LCDP to delegate processes to corporate departments can result in cost and time savings, leading to a more effective fulfillment of their specific requirements [9]. In another study, Khorram et al. conducted an examination of the testing components of five LCDPs, including Mendix, Lightning, PowerApps, Temenos Quantum, and OutSystems. Sixteen features for low-code testing that may serve as benchmarks for evaluating different low-code testing components and provide guidance for developers when creating new LCDP testing components were proposed [19]. Tisi et al. proposed a training program called the Lowcomote project to teach professionals about the design, development, and implementation of innovative LCDP. The authors highlighted that LCDP should be scalable, open, and heterogeneous [1].

Sanchis et al. [26] proposed a research model to explain LCDP adoption based on the Technology-Organization-Environment (TOE) framework and Socio-Technical Systems (STS) theory, which considers 13 factors including security and data privacy concerns, compatibility, training opportunities, internal IT capabilities, top management support, organizational culture, and external pressure. Kass et al. [23] employed the Diffusion of Innovation framework and categorized thirteen criteria that impede the acceptance of LCDP and seven criteria that promote its adoption. Recently, Kass et al. employed semi-structured interviews and performed a Delphi survey including seventeen experts. The study discovered twelve factors that promote the adoption of LCDPs, as well as nineteen factors that hinder their adoption [12]. In addition, Hoogsteen et al. [15] employed an extended Technology-Organization-Environment (TOE) framework to identify influential factors in organizational decisions to adopt LCDP. Factors like risk perceptions, active top management support, alignment between business and IT through a project-based approach, centralized IT governance, and utilization of business network systems significantly impact adoption decisions. Furthermore, McHugh et al. [28] assessed publications discussing LCNC based on the Expectation Confirmation Theory. The review focused on the benefits and limitations of LCNC technology. Besides, in AlSharji et al. [29], an analysis of posts in online forums revealed that increased efficiency, simplicity of use, and reduced complexity are the main factors in acquiring LCDP, while challenges in learning to use LCDP, high price, and lack of customization are factors that hinder LCDP adoption among individuals.

2.2. Technology Acceptance Models

There are several elements that affect how people utilize and adapt to technology [30]. There have been several types of technology adoption models proposed to explain why individuals accept new technology and intend to utilize it. These technology adoption models also help in understanding and predicting an individual's technology acceptance behavior. The adoption models include the Unified Theory of Acceptance and Use of Technology (UTAUT), the Model of PC Utilization (MPCU), Uses and Gratification Theory (U&G), the Motivational Model (MM), the Social Cognitive Theory (SCT), the Diffusion of Innovation (DOI), and the Theory of Reasoned Action (TRA) [31].

The Unified Theory of Acceptance and Use of Technology (UTAUT) model was created by combining eight models, including the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), the combined model of TAM and TPB (C-TAM-TPB), Motivation Model (MM), Model of Personal Computer Utilization (MPCU), Social Cognitive Theory (SCT), and Diffusion of Innovation (DOI) [32–34]. It is a well-known and established theory that was frequently applied in information technology (IT) [35], which can successfully foresee users' intentions to adopt technology-based systems and applications, and it has outperformed other popular models [36]. It is also a commonly applied tool to evaluate the potential success of new technological capabilities and to help the individual thoroughly comprehend the causes of technology adoption to actively build barriers such as training, marketing, and so on.

In the UTAUT theory, the four essential elements are Facilitating Condition (FC), Social Influence (SI), Effort Expectancy (EE), and Performance Expectancy (PE). The four constructs that directly affect behavioral intention are voluntarism of use, age, gender, and experience. In order to balance the effects of those determinants on usage intention and behavior, gender, age, experience, and voluntariness of use were constructed [38]. In 2012, Venkatesh et al. created and tested the Unified Theory of Acceptance and Use of Technology 2 (UTAUT 2), which introduced new constructs including Habit (HB), Price Value (PV), and Hedonic Motivation (HM). HM indicates "the pleasant sensation of individual immediate satisfaction," PV indicates the return on investment that the customer is aware of," while HB indicates "the extent to which the consumer instinctively conducts activities with technology". UTAUT 2 was also expanded into four significant categories: "new endogenous, new exogenous, new result, and new moderating" mechanisms [38]. The UTAUT 2 model is illustrated in Figure 2.

Further development of technology adoption models, such as UTAUT, might illustrate the model's enhanced usability and practical applicability as a conceptual lens for behavioral modeling in current technology-mediated situations [39]. Hence, the researchers utilized the extended UTAUT model in this study, which has included other related elements.

3. Research Methodology

This study follows the research framework illustrated in Figure 2. The research objectives were set based on our research aims, i.e., to investigate the adoption of Low-Code/No-Code (LCNC) technology among businesses. We conducted a literature review by acquiring articles related to LCNC that are published in scholarly databases like Scopus and ScienceDirect, preferably between 2018-2023. Based on the literature, the extended Unified Theory of Acceptance and Use of Technology (UTAUT) model was chosen as the theoretical model for this study. Afterwards, the hypotheses were formulated based on the model, and the research design was determined. The survey instrument was designed, and the data collection process was specified. Next, the collected data was analyzed, and the research outcomes were presented.

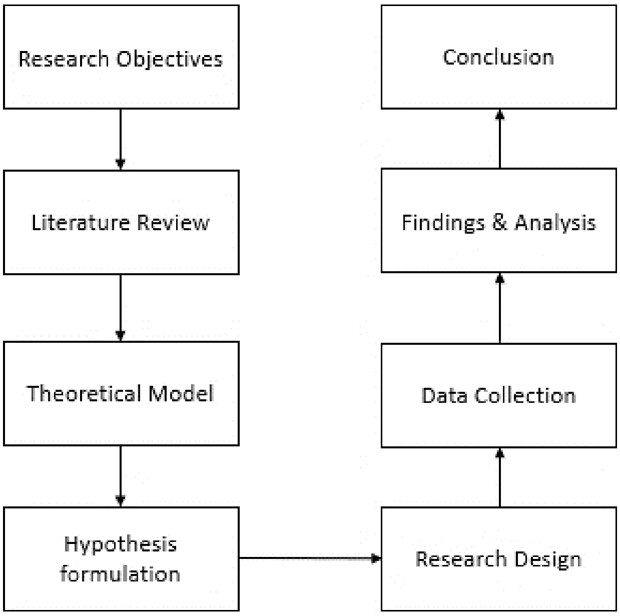

Figure 2. Research Framework

3.1. Hypothesis Formulation

To form hypotheses that matched the current business environment, a study of previous research was conducted. Various types of papers were referenced to discover and notice how current individuals' attitudes are being affected by adopting new technology. Hypotheses and assumptions were formulated by referring to the acceptance model with different key constructs and the current business environment.

3.1.1. Performance Expectations

Performance expectation refers to user confidence in a technology that can make their daily tasks easier [38]. Users believe that the applications were easy to develop using the LCNC platform. In addition, users believe that the LCNC platform could help them save time [40]. Previous research discovered an individual's belief in technology would help to enhance optimal performance (performance expectation) [41–44]. As a result, these studies produce the following hypothesis:

H_1: Performance expectation (PE) has a positive relationship with the behavioral intention of adopting the low- code and no-code technology.

3.1.2. Effort Expectations

Effort expectation is the degree to which users of a specific technology report ease of use, which depicts effort expectancy [45]. The users of the LCNC platforms state that the platforms are easy to use. The users also recommend the LCNC technology as it is easier to develop compared to coding development. In essence, the users would feel confident that the LCNC technology is easy to use as it is simple to execute and does not require a lot of effort [40]. Previous research discovered that effort expectancy would affect one's intention to adopt low-code/no-code technology. As a result, these studies produce the following hypothesis:

H_2: Effort expectation (EE) has a positive relationship with the behavioral intention of adopting the low-code and no-code technology.

3.1.3. Social Influence

Social influence is defined as a person's understanding of social norms and belief that using technology is crucial to his life [38]. For instance, someone would be more likely to adopt low-code/no-code technology if the surrounding person has adopted the technology. Moreover, people are open to changing their attitudes, perceptions, and behaviors when they hear suggestions and recommendations from surrounding people [45]. Additionally, the preliminary results in [46] suggest that individuals' positions in the group will increase and be maintained when they believe in new technologies and systems. They have a higher tendency to quickly adopt certain technologies. As a result, these studies produce the following hypothesis:

H_3: Social influence (SI) has a positive relationship with the behavioral intention of adopting the low-code and no-code technology.

3.1.4. Perceived Risks

According to the degree of uncertainty a person has about a given behavior, perceived risk relates to how that person perceives the potential consequences of an action. People seek to avoid risks while making decisions in risky situations as much as possible, which can be done by taking precautions [47, 48]. Risks such as security may affect the behavior and intention of an individual to adopt low-code/no-code technology [40]. However, previous research suggests that perceived risk has a positive relationship with behavioral intention [49–51]. As a result, these studies produce the following hypothesis:

H_4: Perceived risk (PR) has a positive relationship with the behavioral intention of adopting low-code and no-code technology.

3.1.5. Perceived Cost

Perceived cost refers to the subjective evaluation individuals make regarding the expenses with a particular action. The expenses may include the cost of the equipment, the subscription fee, and the cost of internet access to download the necessary programs [52]. The perceived cost has a positive relationship with behavioral intention [53, 54]. As a result, these studies produce the following hypothesis:

H_5: Perceived cost (PC) has a positive relationship with the behavioral intention of adopting low-code and no-code technology.

3.2. Data Collection and Survey Instrument

In this study, the questionnaire was distributed via email and in person to several companies, and random employees from those companies completed the questionnaire. The study was approved by the University's Ethical Committee (approval code: EA0802022). Using the convenience sampling approach, a total of 65 responses were collected during a one-month data collection period. The results were analyzed in Section 4.

Furthermore, the survey instruments were created in accordance with the extended UTAUT model suggested in this work, with three separate sections. The initial section offered a comprehensive overview of the data gathering procedure, ensuring respondents' comprehension and cooperation. The second section concentrated on acquiring important personal information from participants, such as age, gender, and the nature of their business activities. The survey's third and most important section analyzed the extent of LCNC technology adoption among businesses, as shown in Table 1. The participants' thoughts and opinions were gauged using a five-point Likert scale ranging from "1 = strongly disagree" to "5 = strongly agree," offering a full evaluation of the primary dimensions under inquiry.

Table 2. Survey instruments

Constructs	Questions
Performance Expectation (PE)	PE1: I believe low-code/no-code development platform would be a useful service in my day-to-day activities.
	PE2: Using low-code/no-code development platform would save time so I can do other activities in my day to day.
	PE3: Low-code / no-code development platform would bring me greater convenience.
Effort Expectation (EE)	EE1: It would be easy for me to develop the skills to use the low-code / no-code development platform.
	EE2: I believe that it is easy to use the low-code / no-code development platform.
	EE3: Learning to use the low-code / no-code development platform would be easy for me.
Social Influence (SI)	SI1: People who are important to me would think that I should use low-code / no-code development platform.
	SI2: People who are important to me could assist me in the use of low-code / no-code development platform.
	SI3: In the future, organizations that offer low-code / no-code development platform will guarantee its proper functioning.
Perceived Risk (PR)	PR1: I wouldn't feel completely safe by providing personal information through the low-code / no-code development platform.
	PR2: I'm worried about the future use of low-code / no-code development platform, because other people might be able to access my data.
	PR3: The likelihood that something wrong will happen with the low-code/no-code development platform is high.
Perceived Cost (PC)	PC1: I believe the low-code/no-code development platform would be very expensive.
	PC2: I believe I would have to do a lot of effort to obtain the information that would make me feel comfortable in adopting low-code/ no-code development platform.
	PC3: It takes time to go through the process of moving to a new means of developing applications.
Behavioral Intention (BI)	BI1: If I had access to low-code / no-code development platform, I would have the intention of using them.
	BI2: If I had access to low-code / no-code development platform, I would really use them.
	BI3: I think it will be worth it for me to adopt low-code/no-code development platform when it's available.

4. Findings and Analysis

In this section, the responses to the questionnaire were interpreted and analyzed anonymously. Demographic profile analysis was performed to analyze the respondents' profiles and characteristics. Then, the measurement model is assessed, followed by the structural model. Several methods are conducted to evaluate the discriminant validity, internal consistency reliability, convergent validity, and indicator weights' statistical significance. Besides, the hypotheses are assessed to determine whether to accept or reject them. The explanatory power of the model and construct predictor is also tested.

4.1. Respondents

In this study, most respondents (66.2%) were male, while 33.8% were female. The bulk of respondents (33.8%) were between the ages of 40 and 49. Respondents aged 50 to 59 made up 30.8% of the total, with those aged 18 to 29 accounting for 27.7% of the total. Furthermore, 4.6% of those surveyed were above the age of 60. The age category that received the fewest responses was 30 to 39 (3.1%). Following that, the majority of respondents (29.2%) picked other corporate industries such as banking, art, and telecommunications, followed by the computer or technology industry (23.1%). 10.8% of the responses were from the engineering, education, and manufacturing industries. The transportation business had 7.7%, the food and beverage industry had 4.6%, and the pharmaceutical industry had the fewest replies (3.1%). Table 3 summarizes the respondents' profile.

Table 3. Respondents Profile

Item	Description	Sample	Percentage (%)
Gender	Male	43	66.2
	Female	22	33.8
Age	18 - 29	18	27.7
	30 – 39	2	3.1
	40 – 49	22	33.8
	50 – 59	20	30.8
	60 above	3	4.6
Nature of business	Computer / Technology	15	23.1
	Construction / Building Engineering	7	10.8
	Education	7	10.8
	F&B	3	4.6
	Manufacturing / Production	7	10.8
	Pharmaceutical	2	3.1
	Transportation	5	7.7
	Others	19	29.2
Job level	Executive	12	18.5
	Senior	25	38.5
	Mid	16	24.6
	Junior	9	13.8
	Entry	3	4.6

In addition, the respondents' occupational levels were examined. The job levels were classified as executive, senior, mid, junior, and entry-level. Each job level denotes a distinct amount of responsibility and prestige within the organization. The majority of respondents (38.5%) held senior-level roles within their firms, followed by mid-level (24.6%) and executive-level (18.5%). Furthermore, 13.8% of respondents held junior-level roles, with the minority (4.6%) holding entry-level positions, showing the least amount of experience.

4.2. Evaluation of Measurement Model

This study's theoretical underpinning includes formative constructs, which are Perceived Cost (PC), Perceived Risk (PR), Social Influence (SI), Effort Expectation (EE), and Performance Expectation (PE). It is critical to ensure the precision and alignment of these measurements with the underlying theoretical components, which requires a detailed investigation of the measuring model [37]. To evaluate the extended UTAUT model suggested in this work, the Smart PLS 4 program was used. The assessment of the inner model (the structural model) is preceded by a systematic evaluation of the outer model, which reflects the measuring aspect [36]. When dealing with formative measurable constructs included in the structural model, the PLS-SEM approach is excellent. The statistical significance, relevance, indicator collinearity, and convergent validity of indicator weights are among the evaluation criteria [37].

This study performed factor loading and Average Variance Extracted (AVE) analysis, which are two established methods to verify convergent validity [55, 56]. There should be a factor loading of at least 0.7 for each construct to achieve convergent validity in the model. Since all loadings were higher than the minimal threshold as shown in Table 4, convergent validity was attained. This is also supported by the AVE values, which are above the minimum criterion (between 0.712 and 0.899). These findings confirm the convergent validity of our items for each construct. Additionally, Figure 3 illustrates the full model evaluated in this study.

Table 4. Measurement model results

Constructs	Items	Loadings	Average Variance Extracted (AVE)
Performance Expectation	PE1	0.903	0.863
	PE2	0.934	
	PE3	0.949	
Effort Expectation	EE1	0.975	0.899
	EE2	0.921	
	EE3	0.947	
Social Influence	SI1	0.892	0.798
	SI2	0.880	
	SI3	0.909	
Perceived Risk	PR1	0.824	0.712
	PR2	0.881	
	PR3	0.825	
Perceived Cost	PC1	0.852	0.787
	PC2	0.912	
	PC3	0.897	
Behavior Intention	BI1	0.913	0.808
	BI2	0.880	
	BI3	0.904	

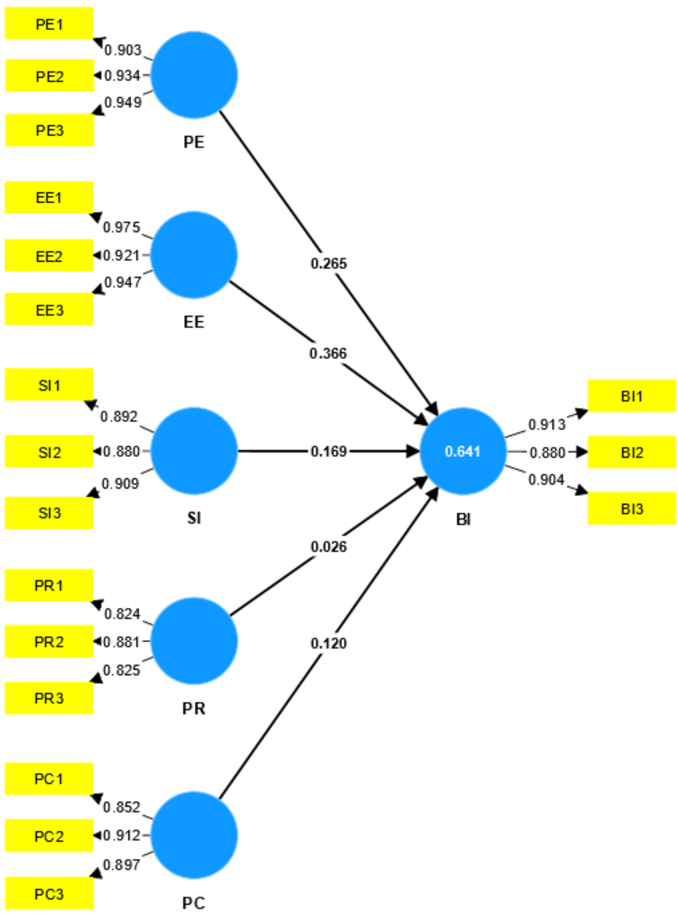

Figure 3. Full Model of Implementation of UTAUT in LCNC Adoption

Next, the model was assessed using the indicator of collinearity, which is a statistical phenomenon that occurs when two or more variables employed to quantify a certain construct in a research model are significantly connected. In other words, these indicators are so closely linked that when included together in a statistical analysis, they effectively produce duplicate information, making it difficult to discern the unique contribution of each indicator to the construct being examined. Hence, the variance inflation factor (VIF) is computed to assess the correlation of the formative indicators. According to VIF, the variation of the predicted coefficients is magnified due to collinearity between predictor variables. The VIF is ideally below 3 [57]. There may be possible collinearity issues when the VIF value is between 3 to 5. Table 5 presents the VIF values of the items in our model.

While the collinearity issues probably will happen if it is above 5, the Heterotrait-Monotrait ratio (HTMT) is proposed as a novel metric to evaluate the discriminant validity of the model [58]. Even though the VIF values for the outer and inner models in Table 4 show that there is no multicollinearity among all constructs, there are two values of the item in the outer model, which are between 5 and 8. This indicates a high probability of collinearity happening. In this situation, the HTMT criterion is employed to assess the discriminant's validity. If the constructs show low discriminant validity, there may be a potential conceptual overlap. Since all the values were below the recommended threshold of 0.9 [58], the HTMT criteria are deemed to be met. It shows high discriminant validity, and the potential for conceptual overlap is very low.

Finally, the statistical significance and relevance of the indicator weights are evaluated. The statistical significance is assessed by bootstrapping because PLS-SEM is a nonparametric technique [59]. The indicator should be removed from the measurement if the confidence interval of an indicator weight includes 0, which shows that the weight is not a statistically significant model [57]. Based on Table 6, there is no confidence interval of 0. Hence, the weight of the model is statistically significant.

Table 5. Variance Inflation Factor (VIF) of the Inner Model and Outer Model

Items	Variance Inflation Factor (VIF)
BI1	2.869
BI2	2.324
BI3	2.395
EE → BI	2.176
EE1	8.492
EE2	3.934
EE3	5.441
PC → BI	1.910
PC1	2.188
PC2	2.684
PC3	2.128
PE → BI	2.505
PE1	2.760
PE2	3.867
PE3	4.480
PR → BI	1.796
PR1	1.518
PR2	2.053
PR3	1.819
SI → BI	2.651
SI1	2.344
SI2	2.254
SI3	2.471
BI1	2.869

Table 6. Confidence intervals

Path	Confidence Intervals
PE →BI	0.557
EE →BI	0.677
PR →BI	0.234
PC →BI	0.341
SI → BI	0.524

Validation testing is evaluated in order to obtain a more accurate model, such as internal consistency and reliability. Internal consistency and reliability are measured using Cronbach's Alpha. The findings in Table 7 show that Cronbach's Alpha values are all greater than the threshold value (0.7), which ranges from 0.798 to 0.944 [60]. According to Cronbach's Alpha, the internal consistency and reliability are validated. Overall, the measurement model assessment is satisfied.

Table 7. Cronbach's Alpha

Constructs	Items	Cronbach's Alpha
Performance Expectation	PE1 PE2 PE3	0.920
Effort Expectation	EE1 EE2 EE3	0.944
Social Influence	SI1 SI2 SI3	0.874
Perceived Risk	PR1 PR2 PR3	0.798
Perceived Cost	PC1 PC2 PC3	0.867
Behavior Intention	BI1 BI2 BI3	0.882

4.3. Evaluation of Structural Models

Based on Table 8, each of the paths, which includes the PE, EE, PR, PC, and SI, towards the behavioral intention of adopting the LCNC, has a p-value of less than 0.001. This means that all the hypotheses stated in Section 2.2 are valid. According to Hair et al. [61], we can conclude that a relationship exists between the constructs since the p-values are less than the significance value (0.05).

Table 8. p-value of the paths

Path	Confidence Intervals
PE →BI	<0.001
EE →BI	<0.001
PR →BI	<0.001
PC →BI	<0.001
SI → BI	<0.001

In the structural model assessment, the path coefficient is assessed. The values of the path coefficients, which normally range between -1 and +1, are evaluated and assessed via bootstrapping [57]. Each of the constructs demonstrates either a positive or negative relationship with behavioral intention. Based on Table 8, it shows the path coefficient of each of the constructs toward the behavioral intention; the path coefficient of each construct ranges from 0.026 to 0.366. This means that each of the constructs has a positive relationship with the BI. Besides, the higher the path coefficient value, the stronger the relationship between the two constructs.

Table 9 presents the path coefficient of each of the constructs toward the BI and the R^2 value. PE's path coefficient of +0.265 towards BI reveals that PE has a positive relationship with BI. The greater the performance expectation, the higher the behavioral intention towards the LCNC platform. Then, the EE has a positive relationship (+0.366) towards the BI, which is the strongest relationship towards the BI among all the constructs. Besides, the PR has a positive relationship (+0.026) with BI too. Not only this, but the PC also has a positive relationship (+0.120) with BI. Subsequently, the SI has a positive relationship (+0.169) with the BI too.

Table 9. Structural model result

Path	Path coefficient	R^2	F^2
PE → BI	0.265		0.078
EE → BI	0.366		0.172
PR → BI	0.026	0.641	0.001
PC → BI	0.120		0.021
SI → BI	0.169		0.030

Next is the coefficient of determination (R^2) assessment. R^2 has a range of 0 to 1, and a greater number denotes a stronger explanatory power. For instance, R^2 values of 0.25, 0.50, and 0.75 are regarded as weak, moderate, and substantial [58]. The R^2 value of 0.641 indicates that the explanatory power of the model in this study is moderate. EE is the strongest predictor in influencing the behavior intention of an individual to adopt the LCNC platform compared to other predictors (F^2 = 0.172). The LCNC platform developers can increase businesses' effort expectations by emphasizing the simplicity, intuitive design, and support provided with these platforms. As a result, businesses will be more likely to adopt the technology since they anticipate a more efficient, labor-intensive, and user-friendly approach to application development.

In contrast, other predictors have weaker influences on the intention to adopt the LCNC platform. Hence, to improve the performance expectancy (PE), this study recommends that businesses be informed on the robust capabilities, quick development features, graphic interfaces, pre-built components, scalability, and cross-platform support of LCNC platforms. Since LCNC tools can streamline and accelerate application development, it is assumed that LCNC will be very appealing to individuals and businesses that aim to produce software solutions more effectively. It will also promote users' confidence and excitement for embracing LCNC technologies, resulting in their greater integration into development processes.

Besides, the association between social influence and adoption intention emphasizes the importance of fostering a supportive atmosphere and sharing success stories within professional networks. Businesses may magnify social impact by developing a culture of knowledge sharing, giving avenues for peer recommendations, and exhibiting successful case studies, resulting in a higher desire among users to embrace low-code and no-code technologies.

5. Conclusion

In summary, this study investigated the critical role of low-code/no-code technology adoption in increasing business efficiency. The study adopts an Extended UTAUT framework to find the critical elements influencing its adoption by analyzing the behavioral intents of individuals to embrace this technology within the context of businesses in Malaysia. The study emphasizes the practical relevance of these results for businesses looking to improve efficiency and adapt to the ever-changing demands of the digital world. Adopting low-code/no-code technologies can help businesses expedite application development processes, increasing productivity and competitiveness. The findings show a positive relationship between five essential factors, namely Performance Expectation (PE), Effort Expectation (EE), Social Influence (SI), Perceived Risk (PR), and Perceived Cost (PC), with the Behavioral Intention (BI) to adopt low-code/no-code technology. These components work together to shape potential adopters' decision-making processes, emphasizing their relevance in promoting technological acceptance.

Despite the study's limitations, such as the small sample size, the findings give significant recommendations for decision-makers and practitioners in a variety of sectors. Furthermore, this study opens the door to additional research on theoretical models utilized for low-code/no-code technology adoption and its potential to revolutionize company creativity and productivity. Moreover, it is critical to provide transparent and accessible information about the LCNC's capabilities, security measures, integration possibilities, and available support to develop a more favorable impression of LCNC technologies. By resolving businesses' concerns and mitigating perceived risks, it may result in a higher intention among them to use the technology. In addition, the LCNC platform provider should convey the total cost of ownership transparently, define the value proposition, and emphasize the potential cost savings and efficiency advantages that may be realized with the technology. Once businesses perceptions of the technology's cost-benefit ratio and long-term value improve, a higher intention among businesses to use the technology will be visible. Future researchers should further investigate the socio-economic consequences of LCNC technology adoption, guaranteeing that progress is inclusive and advantageous for all societal groups.

In conclusion, this study adds to the expanding body of knowledge on technology adoption by providing a thorough understanding of the factors impacting the adoption of low-code/no-code solutions in solving the problems of modern application development. Businesses that use this technology will be better positioned to succeed in a dynamic and fast-changing digital world, attaining higher levels of efficiency and success.

6. Declarations

6.1. Author Contributions

Conceptualization, S.F.A.R. and Y.P.E.; methodology, S.F.A.R. and F.I.Y.; formal analysis, F.I.Y. and Y.P.E.; data collection, Y.P.E., U.A.B., and S.Y.; writing—original draft preparation, S.F.A.R., Y.P.E., and F.I.Y.; writing—review and editing, S.F.A.R.; visualization, U.A.B. and S.Y. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.4. Institutional Review Board Statement

This study was approved by the University's Ethical Committee (approval code: EA0802022).

6.5. Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

6.6. Declaration of Competing Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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