

Analysis of Factors Influencing the Acceptance Level of ChatGPT of Developer in Software Development in Indonesia

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ABSTRACT

The urgency of IT Professionals to solve their tasks becomes more prominent in this digital era. Business competitiveness keeps on increasing, leaving less determined companies to get left behind. As stated by technology leaders, 58% of them believe that developer roles are crucial to determining a company's success. With the advent of Generative AI Assistance, namely ChatGPT, and its ability to perform programming-related tasks such as software creation, debugging, refactoring, and more, made ChatGPT's acceptance by the developers essential to increase their productivity. To understand how developer behavior intention to use, this study will employ UTAUT methodology as a technology acceptance model with PLS-SEM, added with constructs such as personal innovativeness and attitude towards AI. It was found that the default constructs in UTAUT framework such as performance expectancy, effort expectancy, social influence, facilitating conditions, and also the proposed construct, attitude towards AI, were found to be significant to the behavioral intention. From this research, stakeholders hopefully could have a broader comprehension of acceptance factors and possibly implement targeted strategies to increase competitive advantage from the IT employee side.

Keywords: UTAUT, Software Development, ChatGPT, Attitude Towards AI

INTRODUCTION

The developer profession is one of the professions in the IT industry. In their work, searching through general purpose search engines such as Google is major during process of developing application, with example to search for relevant information while in the process of development, that includes API comprehension, reusing code snippets that are available, and finding usable references to be followed (Rahman et al., 2021). With the presence of ChatGPT, the process of searching for programming-related references, will be able to display formulated answers compared to using conventional search methods that will refer to links of possible (Fraivan & Khasawneh, 2023). ChatGPT can be a supporting tool for developers to perform tasks such as code debugging, generation, refactoring, optimization, and technical documentation, thus simplifying their work and can also help educate junior developers. In addition, ChatGPT can significantly help developers improve error detection, and can quickly provide accurate code for repetitive code writing more simply (Andersson et al., 2023).

From the survey conducted by Gartner in 2023, 58% of software engineering leaders in large companies from various countries revealed that software developers play a crucial role in their organization, then the leaders also see developers as able to generate business value when developers also face significant risks of implementing new technologies. Organizations recognize that a high-quality developer experience can increase productivity and is very important to attract and retain software engineer talent (Gartner, 2023). In addition, according to AWS (2023), the median time developers code is about 52 minutes per day on weekdays. This certainly has room for optimization so that it can increase the productivity of developers.

Some research had been conducted focuses on the use of UTAUT framework to investigate acceptance level on the ChatGPT utilized by the developers to be used as a tool for bug fixing among developers (Ge & Wu, 2023). In addition, (Andersson et al., 2023; Hörnemalm, 2023), were trying to understand ChatGPT's adoption and acceptance as some a device that helped carry out system and software development process. In the research mentioned above, there is

no discussion related to the problem of the level of acceptance of ChatGPT technology in Indonesia, especially in the realm of developers population. Therefore, in this study, the authors will try to examine more deeply and conduct analysis with the help of UTAUT to gather the factors that are affecting the ChatGPT acceptance by the developers, and see how useful tool like ChatGPT is better utilized by developers.

LITERATURE REVIEW

ChatGPT

ChatGPT is one of the product that are developed based on the concept of Large Language Model (LLM) released by the OpenAI in November, 2022 (OpenAI, 2022). Its product has been trained and still continued to be trained with machine learning algorithms that are massive amounts of data and information (Mohamadi et al., 2023). In recent times, ChatGPT has gained much recognition for its ability to create human-like text-based interactions with the help of the Language Model Transformer principle (Haleem et al., 2022). According to OpenAI in November 2022, 5 days after its launch, ChatGPT had 1 million registered accounts. Then in January 2023, ChatGPT monthly active users reached 100 million users. By March 2024, it was estimated that ChatGPT had been visited 1.8 billion times (SimilarWeb, 2024).

ChatGPT has 2 products, the free version and ChatGPT Plus which is the paid version. The free version of ChatGPT is powered by the GPT-3.5 model and can be used immediately by simply creating an account and logging in to either web or mobile version (OpenAI, 2022). While on the other hand, the ChatGPT plus version, other than signing up, it requires its users to be charged by monthly payment for the subscription fee. Among the many benefits of the ChatGPT plus version is the capability to perform better reasoning on a given task without having to be given the initial context related to the given (Qin et al., 2023). According to (Nazir & Wang, 2023), ChatGPT has upside such as increasing effectivity and efficiency across industries such as education, mobile, software, content production and medical, however it poses major concern to its user, because of issue like ethical problems, data privacy and security, questionable bias and fairness, even misinformation.

UTAUT

One of the important framework in the System Information field is Technology Acceptance Model (TAM). The framework is used to analyzed users tendency to adopt and use new information systems presented. From the first time its shown in the research field, the model centered to the two concepts in it which is perceived usefulness and perceived ease of use as the key determinants that drives user acceptance (Bach et al., 2022). The main reason why the TAM framework gain its popularity is because the framework capabilities to predict the user behavior and explain its action when adopting new technologies, which is one of the key factos in providing insights in the phase of strategic planning and implementation of the information systems from in various different sectors (Nadri et al., 2018).

However, in some conditions, TAM framework could not predict the user adoption because of its limited capacity and seemed to be too simplistic when presented with broader, more contextualized individuals to the technology (Lee et al., 2003). As a response to these limitations, the Unified Theory of Acceptance and Use of Technology (UTAUT) was developed. This framework came up with major revisions, to further expanding the concepts perceived usefulness and perceived ease of use from TAM (Davis, 1989; Venkatesh et al., 2003).

The UTAUT framework is constructed on four constructs. The first is Performance Expectancy, which encapsulates individual's belief that utilizing a particular technology will help them achieve something in their performance. Other expectancu related construct is Effort Expectancy, with the definition as the degree of ease from a person that are associated with the use of a system, or the belief that the system itself can be utilized with slight or minimum effort. Other than the expectancy related construct, the framework introduce Social Influence, which referring to how much an individual's social circle or environment affect users to use a technology. And lastly, Facilitating Conditions construct considers whether the necessary organizational infrastructure and technical support are in place to help the use of technology, as their availability is seen as important to the adoption proces (Venkatesh et al., 2003).

Attitude Towards AI

Attitude towards Artificial Intelligence (AI) reflects how individuals perceive and feel about AI technologies, capturing their beliefs, emotions, and inclinations regarding the use and potential impact of these systems. Understanding this attitude is crucial, as it directly shapes people’s willingness to accept, embrace, and effectively utilize AI in different areas of their lives. By examining these perceptions, we can gain insights into how users engage with AI technologies, ultimately influencing their adoption and integration into everyday practices (Ajzen & Fishbein, 1975; Venkatesh et al., 2012).

Attitude Towards AI points out to the different emotional dispositions from the individuals to engage in certain behaviors associated with technology adoption. It reflects whether individuals' attitudes towards AI technologies are positive or negative, and explores attitude affecting the propensity to utilize digital technologies with the likes of ChatGPT (Hasan Emon et al., 2023).

Personal Innovativeness

Personal Innovativeness in Information Technology (PIIT) captures person’s inclination for exploring and engaging to the recently developed information technologies. Said concept involved heavily with the importance on how people adopt and accept IT systems. By focusing on personal traits, it sheds light on why some individuals are quicker and more enthusiastic in embracing technological innovations than others. Recognizing these differences can help organizations and researchers better predict technology adoption patterns and tailor strategies to encourage wider acceptance and use (Agarwal & Prasad, 1998; Strzelecki, 2023).

METHODS

This research employs the UTAUT Model with the added construct of Personal Innovativeness and Attitude Towards AI (Ajzen & Fishbein, 1975; Hasan Emon et al., 2023; Venkatesh et al., 2012). Attitude Towards Using (ATU) in general technology was previously used in the early TAM model. However, the construct was later replaced by perceived usefulness and also perceived ease of use since those two were seen as having more compelling and straightforward effect to behavioral intention to use.

In this case, attitude towards using AI construct is explored by adding its construct to the existing UTAUT model with the goal to explain the behavioral intention to use ChatGPT, as it serves among the AI tools that are used by the developers. Meanwhile, Personal innovativeness was also explored by connecting the construct with the UTAUT model because based on several research prior, strong correlation was found amid personal innovativeness and also the behavioral intention to use ChatGPT within several education, and also professional settings.

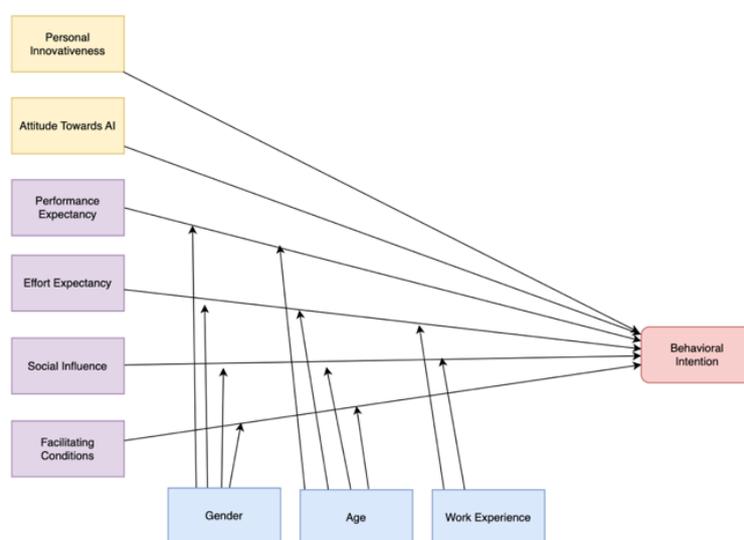


Figure 1 Proposed Model

As shown from the above model, the writer develop 6 hypothesis, from H1 to H6, briefly stating that each hypothesis, have positive and also significant impacts of the 4 variables from the UTAUT framework, and 2 additional proposed construct which is Personal Innovativeness and also Attitude Towards AI, to the target variable Behavioral Intention to Use. Gender, Age and Work Experience acts as moderating variables to the proposed model.

Variables and Indicators

Table 1. Variables and Indicators

Variables	Item	Indicator	Reference
Performance Expectancy (PE)	PE1	I am convinced that ChatGPT is advantageous in the application development process	(Venkatesh et al., 2003, 2012)
	PE2	ChatGPT improves the possibility of finishing major tasks in the application development process	
	PE3	ChatGPT allows me to complete my app development work faster.	
	PE4	ChatGPT increases my productivity in the application development process	
Effort Expectancy (EE)	EE1	Attaining knowledge to utilize ChatGPT was not a difficult task for me	(Venkatesh et al., 2003, 2012)
	EE2	The interactions between me and ChatGPT are obvious and not difficult to understand	
	EE3	It is to be found that ChatGPT is simple to employ	
	EE4	To be proficient in utilizing the ChatGPT was not difficult	
Social Influence (SI)	SI1	Key figures in my life support that I better utilize ChatGPT	(Venkatesh et al., 2003, 2012)
	SI2	Key figures that are affecting my behavior have such faith that I have to employ ChaGPT	
	SI3	Some figures whose viewpoint I respect, appreciate that I utilize ChatGPT	
Facilitating Conditions (FC)	FC1	There are plenty of resources that I could take advantage of to utilize ChatGPT	(Venkatesh et al., 2003, 2012)
	FC2	The amount of expertise I posses is enough to make utilize ChatGPT	
	FC3	In work setting, technologies I work with is suitable with ChatGPT	
	FC4	When I utilize ChatGPT, I am able to get an assistance whenever difficulties come up	
Attitude Towards AI (AI)	AI1	ChatGPT allows my application development process to be more efficient	(Hasan Emon et al., 2023)
	AI2	The application from ChatGPT will become more convenient in the future	
	AI3	By using ChatGPT, the autonomy of daily life become more prominent	
	AI4	I have strong confident in the utilization of ChatGPT	
Personal Innovativeness (PI)	PI1	I enjoy experimenting with the latest information technology devices	(Strzelecki, 2023)
	PI2	My curiosity about new technology draws me to do some experimentation towards the technology	
	PI3	I am person, who most of the time in the circle family or friends become the first one who tries new information technology	
	PI4	When there is a new technology I have no doubt in trying to try it out.	
Behavioral Intention (BI)	BI1	For the future, I have strong tendency to continue the utilization of ChatGPT	(Venkatesh et al., 2003, 2012)
	BI2	In the application development process, I have willingness to carry on using ChaGPT	
	BI3	I am intended to carry on utilizing ChatGPT more often	

Research Method

The study employs a quantitative research method, which the collection of the data is gathered from primary and also secondary types resources to support the analysis. Through questionnaire that are distributed via Google Forms through social media, emails and instant messaging platforms, the primary data was gathered. Meanwhile the secondary type data was acquired through the process of discovering available literatures, such as books, articles, papers and other types of trusted and reputable sources. The process of literature review from the secondary types of

data was done to identify the relevant constructs and indicators of the proposed model to design and develop clear questionnaire. The measurement of the responses obtained from the questionnaire uses a 5-point Likert scale ranging from “strongly disagree” (5) to “strongly agree” (1). In this research the sampling method used was non-probability and purposive sampling method, by employing Slovin formula to elect the size of the sample, with 7% margin of error, its required to gather questionnaire result at least from 204 respondents, since it is estimated the Indonesian IT workforce population is around 1.7 million (Kemenaker, 2021).

The data collection process was done in 2 months, to ensure the amount of valid responses that can be used was sufficient. The data yielded from the questionnaire was gathered and prepared, and served as an input in the tool used to conduct the analysis, which is SmartPLS. In this research, the Partial Least Square-Structural Equation Modelling (PLS-SEM) method was used to examine the relationships between variables and explains the variance in the dependent constructs. Validity Testing was required to be performed in order to ensure that the questionnaire accurately measured the intended constructs. There are two types of validity testing measured, convergent, that are used to show the construct correlation, and discriminant, that are used to determine the uniqueness from one construct to the others (Fornell & Larcker, 1981). The convergent validity has standard is as follows, outer loadings > 0.7 and Average Variance Extracted (AVE) > 0.5, and for the discriminant validity, its square roots of the Fornell-Larcker criterion compared to AVE needed to be higher to its same construct compared to other construct. Reliability Testing also needed to see the questionnaire answer consistency from the research instrument, and the reliability of the results was assessed using Cronbach’s Alpha (> 0.7) and composite reliability (0.6–0.7) (Hair et al., 2019; Nunnally & Bernstein, 1994). Finally, hypothesis testing was conducted via bootstrapping in SmartPLS, with hypotheses considered significant if the p-value is below 0.05.

RESULTS

Validity and Reliability Tests

Data validity test is conducted by performing the measurement of the value of the outer loading from every indicator on the variables used in this study. After calculating the outer loading value, we calculate the value of AVE for each construct. Below are shown the the validity test results. To say that the research indicators are valid, the outer loading value must be above 0.7. Apart from the outer loading value, the Average Variance Extracted (AVE) value must be above 0.5 so that the indicator is said to be valid (Hair et al., 2019)

Table 2. Validity Testing Result

Item	Loading Factor	AVE	Result
Attitude Towards AI			
AI1	0.824	0.653	Valid
AI2	0.832		Valid
AI3	0.755		Valid
AI4	0.818		Valid
Behavioral Intention			
BI1	0.887	0.765	Valid
BI2	0.885		Valid
BI3	0.851		Valid
Effort Expectancy			
EE1	0.858	0.722	Valid
EE2	0.854		Valid
EE3	0.844		Valid
EE4	0.843		Valid

Item	Loading Factor	AVE	Result
Facilitating Conditions			
FC1	0.859	0.699	Valid
FC2	0.837		Valid
FC3	0.834		Valid
FC4	0.814		Valid
Performance Expectancy			
PE1	0.876	0.756	Valid
PE2	0.847		Valid
PE3	0.883		Valid
PE4	0.871		Valid
Personal Innovativeness			
PI1	0.849	0.732	Valid
PI2	0.845		Valid
PI3	0.863		Valid
PI4	0.865		Valid
Social Influence			
SI1	0.843	0.706	Valid
SI2	0.846		Valid
SI3	0.833		Valid

Based on the calculation of values using SmartPLS, the AVE value of all constructs is greater than 0.5, and all outer loading of each indicator is greater than 0.7. Hence, it can be said that all indicators are valid for measuring variables.

Table 3. Fornell-Larcker Criterion

	AI	BI	EE	FC	PE	PI	SI
AI	0.808						
BI	0.588	0.874					
EE	0.564	0.499	0.849				
FC	0.540	0.523	0.609	0.836			
PE	0.530	0.476	0.553	0.563	0.870		
PI	0.565	0.433	0.568	0.559	0.484	0.856	
SI	0.534	0.521	0.371	0.401	0.373	0.407	0.841

From the table above, it can be observed that the Fornell-Larcker criterion value in the diagonal position, between the same constructs has a greater value than other constructs, this indicates that the correlation is strong between constructs so that it can be said that the variables used are unique to one another.

Table 4. Reliability Testing Results

Variable	Cronbach's Alpha	Composite Reliability	Result
Attitude Towards AI	0.822	0.826	Reliable
Behavioral Intention	0.846	0.848	Reliable
Effort Expectancy	0.874	0.896	Reliable
Facilitating Conditions	0.858	0.867	Reliable
Performance Expectancy	0.893	0.903	Reliable
Personal Innovativeness	0.880	0.901	Reliable
Social Influence	0.796	0.809	Reliable

The reliability test is conducted by checking at the value of Cronbach's Alpha and Composite Reliability. Based on the results of measuring these two values for each variable, it can be concluded that the answers from the questionnaire (indicators) with the Likert scale model are consistent over time or reliable because the Cronbach's Alpha value > 0.6 and Composite Reliability > 0.7 (Santosa, 2018)

Table 5. R-Square Test

	R-square	R-square adjusted
Behavioral Intention	0.464	0.448

The R-Square value of 0.448 on the dependent variable Behavioral Intention is influenced by the independent variables Attitude Towards AI (AI), Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), and Social Influence (SI). This means that the independent variables can explain 44.8% of the relationship in the dependent variable Behavioral Intention.

Hypothesis Testing Result

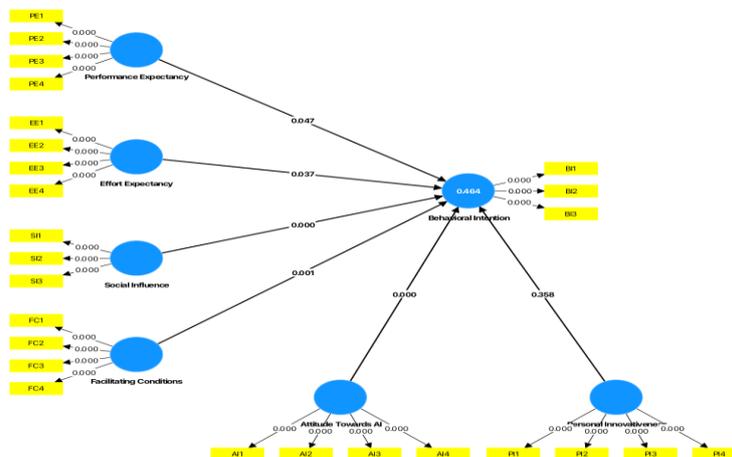


Figure 2. Bootstrapping Results

From the figure above shows the results of testing with the bootstrapping method on SmartPLS. It can be observed that the path coefficient value of each path or path from the relationship between constructs, and constructs with their indicators.

Table 6. Path Coefficient Result

Hypotheses	Path	T statistics	P values	Result
H1	AI → BI	3.870	0.000	Accepted
H2	EE → BI	1.792	0.037	Accepted
H3	FC → BI	3.251	0.001	Accepted
H4	PE → BI	1.676	0.047	Accepted
H5	PI → BI	0.363	0.358	Rejected
H6	SI → BI	3.648	0.000	Accepted

It can be observed that the results of Attitude Towards AI (AI), Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), and Social Influence (SI) have a significant influence on Behavioral Intention (BI) because the p-value <0.05.

DISCUSSION

This study confirms that several factors significantly influence developers' intention to use ChatGPT in their workflow. Performance Expectancy positively impacts behavioral intention, as ChatGPT enhances task efficiency, particularly in critical stages like bug fixing and debugging. Effort Expectancy also plays a role, with developers finding ChatGPT user-friendly, reliable, and capable of delivering quick, conversational responses that streamline development tasks. Additionally, Social Influence from colleagues encourages adoption, as developers are inspired by peer recommendations and the widespread use of ChatGPT in the workplace. Facilitating Conditions, such as compatibility with other development tools and available resources, create an enabling environment that further supports its use.

Furthermore, developers' positive Attitude Towards AI strengthens their intention to incorporate ChatGPT, as it proves beneficial for efficiency and workflow management. This positive outlook highlights the potential for broader AI adoption, with disruptive tools like ChatGPT recognized as strategic assets that support job performance. However, Personal Innovativeness does not significantly affect the intention to use ChatGPT, potentially due to its technical complexity. Managers might consider promoting knowledge-sharing activities to encourage developers to explore emerging technologies, fostering a culture of innovation and adoption.

Author Contributoship, **M. Fikri Ghazali Mukti** contributed to the development of the research framework, data collection and analysis, and drafting of the initial manuscript. **Sfenrianto** provided methodological guidance, critically reviewed the manuscript, and contributed substantive input to the final revision

Data Availability, through the following link, the data and findings produced by the processing and analysis carried out in this study are available to the general public: <https://doi.org/10.5281/zenodo.17121519>

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