Importance Role of IT Self-Efficacy towards IT Actual Competency, IT Usage, and Productivity: A Case Study on University Students

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Abstract. Teaching how to use technology and encouraging students to improve their learning productivity by using technology are challenging. This study aims to investigate the important role of IT self-efficacy towards IT actual competency, actual usage of IT, and productivity in the case of university students to propose a teaching strategy that can improve students' competency from "know-what" to "know-how" continued to real usage and productivity. It produces a model of the relationships between IT self-efficacy, IT actual competency, actual usage of information technology, and productivity. The relationships were quantitively measured using data from 89 students. The construct validity of the measurement model was examined using convergent and discriminant validity analysis. The hypothesized model was tested using structural equation modeling and bootstrap analysis. The findings suggest that IT self-efficacy does not directly impact actual usage and productivity. Still, it directly affects IT actual competency, leading to actual usage and productivity. In terms of novelty, this study examines a comprehensive relationship between 4 variables: IT self-efficacy, IT actual competency, IT usage, and Productivity, while the other existing studies just examined the relationships between 2 variables: IT self-efficacy and IT actual competency, IT self-efficacy and attitude towards IT usage, IT self-efficacy and IT Usage. For practical contributions, this study highlights the importance of improving students' IT self-efficacy as an initial strategy to motivate students to use technology in their learning process which can lead to improved productivity.

Keywords: IT Self-Efficacy; IT Actual Competency; Productivity; Actual Usage

1. Introduction

Teaching new technology skills to university students is challenging due to the variety of their backgrounds and competencies. This is supported by the fact that the average drop rate of technology courses is quite high compared to non-technology courses [1]. Therefore, many studies have investigated strategies to teach technology courses in university and to understand factors influencing students to learn and to use technology [1][2]. One of the factors that can influence a student to learn and finally use of

technology in real tasks is IT self-efficacy (a person's belief in their ability to use technology) [1][2][3][4] and IT actual competency (one's actual ability to use the technology) [5][6].

IT self-efficacy, also referred to as computer self-efficacy (CSE) in some previous studies, is an individual's belief in their competence in using technology [2]. Self-efficacy itself emerged from social theory, particularly the Theory of Behavioral Change (TBC) proposed by Bandura [7] that defines self-efficacy as an individual's self-perception of their ability to accomplish a specific task or activity [4]. Some previous studies have proven that IT self-efficacy increases individual competency [4], performance, technology usage [4] [8] and fosters positive attitudes and technological confidence [4]. The perceived utility of a person's capacity to use computing technology for specific computer-related tasks can contribute to the definition of IT self-efficacy, which entails self-evaluation of a person's ability to use computer expertise for particular activities [1].

IT actual competency involves the interactive use of technology, encompassing both cognitive and technical skills [6]. In reality, most IT professionals acquire fundamental computer skills through formal education, typically at a college or university [1]. User competence can be defined as the potential of users to maximize their performance on specific tasks or jobs through the application of technology [9]. This definition acknowledges that competence precedes performance. Competence is a concept applied in various research areas, such as psychology, education, management, human resources, and information systems. It is used in different contexts, at times interchangeably with performance, and at other times to refer to a skill or personality trait [5].

Actual usage refers to how users employ technology. The use of information technology can be evaluated from multiple perspectives, including intensity, duration, and frequency. Intensity is measured by the variety of technology types they use, such as computers, tablets, or netbooks. Duration measures how long a user engages with information technology, while frequency assesses how often a user interacts with technology [10].

Productivity is a straightforward concept: it measures the output produced to input units [11]. Companies use information technology to enhance the speed, accuracy, and productivity of corporate operations, helping them achieve their objectives [12]. This is done because it has been shown that using information technology increases productivity [10].

Previous research related to IT self-efficacy, IT actual competency, utilization of IT, and productivity, mostly focused on the effect of IT self-efficacy on IT actual competency [1][2][8], effect of IT self-efficacy on the utilization of information technology [2] [8], development of IT self-efficacy in an individual for their success in utilizing technology [4], factors that affect and are affected by IT self-efficacy, as well as reciprocal links between them [3], and how information technology usage affects productivity [10]. As a novelty of this study, it extends the previously existing studies by examining relationships between the four main variables comprehensively on university students: *IT self-efficacy*, *IT actual competency*, *IT usage*, and *productivity*, and compares which factor is the stronger factor effects between IT self-efficacy and IT actual competency on technology usage and productivity. This study answered the following research questions: in the case of university students learning information technology (IT)

(1) Does IT self-efficacy affect IT actual competency?
(2) Does IT self-efficacy affect the use of IT?
(3) Does IT self-efficacy affect individual productivity?
(4) Does IT actual competency affect the use of IT?
(5) Does IT actual competency affect individual productivity?
(6) Which has a greater effect on increasing productivity and technology use: IT self-efficacy or IT actual competency?

In terms of practical contribution, this study can contribute to universities by suggesting a strategy on teaching technology courses more effectively. For business companies, this study can suggest a strategy

on how to improve productivity through technology usage by recommending what individual factors of employees should be improved first by the company to increase technology usage leading to their productivity.

2. Theoretical Framework and Hypotheses

According to the knowledge gap found in the literature review, this study focuses on the influences of IT self-efficacy factor on the other three factors in the case of university students: IT actual competency, IT usage, and productivity. Below are the conceptual and operational definitions of the factors, relationships between the factors found in the existing theories and previous studies, hypotheses, and the conceptual model of this study.

2.1. IT Self-Efficacy

The Theory of Behavioral Change (TBC), introduced by Bandura in 1977, is the origin of self-efficacy theory [3][4]. Some studies refer to the self-efficacy term as 'the self of efficacy' [13]. Self-efficacy is defined as the self-perception of the ability to accomplish an activity [4][7]. Specifically in computer usage, self-efficacy is defined as IT self-efficacy, also known as computer self-efficacy (CSE), which refers to a person's belief in the ability to perform specific computer tasks effectively [2].

Existing studies have suggested that IT self-efficacy increases individual competency [4], performance, and technology utilization [4][8], and fosters positive attitudes and technological confidence [4]. Individual IT self-efficacy is considered one of the important factors when examining how people use information technology.

2.2. IT Actual Competency

IT competency or IT actual competency refers to an individual's proficiency in using information technology, or the ability of a user to maximize their performance on specific job tasks by effectively applying technology [5][9].

IT actual competency is suggested as a crucial factor influencing the quality of individual's work results [14]. Students with higher computer competence are likely to have greater expectations of achieving favorable work outcomes when utilizing technology in computer-related tasks compared to students with lower computer competence [15].

In terms of the relationship between IT actual competency and IT self-efficacy, research conducted on students in Taiwan has demonstrated a significant link between these two factors. Individuals who possess high levels of IT self-efficacy tend to exhibit greater competence with technology compared to those with lower levels of self-efficacy. In the study, IT self-efficacy was defined as the perceived belief in an individual's ability to utilize computing technology effectively to perform specific computer-related tasks [15]. Accordingly, this study suggests two hypotheses:

H3. IT self-efficacy has a positive relationship with IT actual competency
H2. IT actual competency has a positive relationship with productivity.

2.3. Actual Usage of IT

Actual usage of information technology refers to how users engage with information technology, which can be assessed through intensity, duration, and frequency. *Intensity* is measured by the variety of technology types they use (e.g., computers, tablets), *duration* measures the time spent using it, and *frequency* quantifies how often users interact with technology [10].

A previous study found that Information technology usage positively impacts individual performance. However, factors such as complexity, task suitability, long-term consequences, and facilitating conditions do not influence the adoption of information technology [16].

A survey conducted by Compeau and Higgins [2, 8] has shown that individuals with high IT self-efficacy are more likely to use information technology extensively and are better equipped to overcome obstacles when doing so [8]. These findings suggest other hypotheses of this study:
H4. IT self-efficacy affects actual usage
H5. IT actual competency affects actual usage

2.4. IT Productivity
Productivity is a straightforward concept that compares the quantity of output produced with the quantity of input [11]. Measuring productivity in today's context is a complex task. Previously, calculating productivity was a 'concrete calculation,' but nowadays, many abstract factors have become input variables. In the past, input variables included the amount of money, weight of objects, and area, while today, factors like loyalty, satisfaction, comfort, and quality are also considered [11].

Organizations utilize information technology to enhance the efficiency, effectiveness, and productivity of their business processes to achieve their goals [12]. However, individual productivity can be influenced by a variety of things, such as education, wages, incentives, social security [17], job dimensions [18], organizational communications [19], technologies, and skills. The higher the education or skills of the individual, the higher the labor productivity is expected to be [17].

It has been proven that the utilization of information technology increases productivity [15]. This study, armed with previous research confirming the productivity-boosting effects of information technology, aims to provide empirical evidence of the relationship between IT self-efficacy and productivity.
H1. IT self-efficacy affects productivity.

2.5. Conceptual Model
This research focuses on demonstrating the importance roles of IT Self-Efficacy towards IT actual competency, IT usage, and productivity. Based on the previous studies' results presented above, this research proposes a conceptual model that integrates the relationship of the four factors shown in Figure 1.

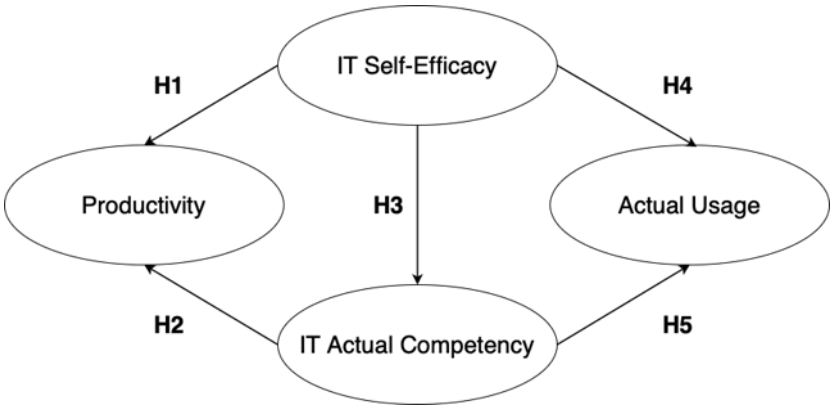

Figure 1. Research model

3. Research Methodology
This study conducted a deductive approach by developing a conceptual model based on related theories and previous studies. The conceptual model was further validated quantitively using the survey and observation methods. The object of this study is self-efficacy, actual competency, actual usage, and productivity to use the XAMPP software. XAMPP is a free open-source software package that provides a

local web server environment for testing and development including MySQL (or MariaDB) database, Apache HTTP Server, PHP, and Perl. The research subjects are undergraduate students of the informatics engineering program of STTQ Gresik - Indonesia who have completed the database course and enrolled for the Advanced Database course.

3.1. Variable Measurement

As explained in Figure 1, the conceptual model of this study encompasses four variables: IT self-efficacy, IT actual competency, productivity, and actual usage.

IT self-efficacy is a latent variable since it is a psychological concept that cannot be measured directly. It is a reflective variable that can be measured from its indicators (latent constructs cause the measured indicators). Adapted from the self-efficacy concept [2], this study measured IT self-efficacy covering 3 dimensions: magnitude, strength, and generality [3][4]. *Magnitude* refers to one's perception of the difficulty level of tasks they believe they can complete (level of difficulty). Individuals with high self-efficacy magnitude see themselves as capable of tackling challenging tasks, whereas those with low self-efficacy magnitude feel confident in handling simpler tasks. *Strength* reflects how certain a person is in being able to perform a specific task (level of confidence). Strength in self-efficacy can significantly impact how individuals respond to obstacles. Individuals with weak self-efficacy are easily discouraged by obstacles, leading to a decline in their perception of their own abilities. On the other hand, individuals with strong self-efficacy remain undeterred by difficult challenges. *Generality* refers to the scope of individuals' self-efficacy beliefs. Some may believe they can perform specific behaviors but only in certain domains or circumstances, while others have broader self-efficacy beliefs, allowing them to perform various behaviors across diverse situations [2][8]. The difference in these dimensions is different for each person and causes a person's self-efficacy to be different from others [5].

In this study, IT self-efficacy is measured using a questionnaire adapted from IT self-efficacy questionnaires of Compeau and Higgins [6] and Aesaert et al. [7] studies using a 5-point Likert scale from 1 "very unsure" to 5 "very sure". The questionnaire consists of 17 questions asking individual perceptions about their competencies to utilize the XAMPP software in creating, updating, running, and manipulating databases covering 3 dimensions: magnitude (question number 1 – 7), strength (question number 8 – 12), and generality (question number 13 – 17).

IT actual competency assessment should measure 2 dimensions: cognitive competency and technical competency [7]. *Cognitive competency* refers to an individual’s creativity, innovation, and critical thinking in finding problem solutions using a computer, while *technical competency* refers to an individual’s ability to use basic features of a software. This study assessed IT actual competency by organizing a hands-on exercise for every student consisting of 15 questions to develop a database and to revise tables using the XAMPP software. Cognitive competency was assessed based on the student’s ability to find revisions on the tables, while the student’s technical competency was assessed based on the extent to which they utilize the XAMPP software features.

This study assessed the IT Actual Usage variable by recording three indicators during the course weeks, covering intensity, duration, and frequency of using the XAMPP software for developing databases [2][8][10]. *Intensity* pertains to the types of technology used to access the XAMPP software, such as computers, tablets, and netbooks. *Duration* reflects the amount of time spent using the XAMPP software, while *frequency* measures how often a user interacts with the XAMPP software.

The productivity variable is defined as the comparison between the quantity of the output produced with the quantity of input (output-to-input ratios). In the context of this study, it assessed an individual’s productivity using two formulas: test result divided by study time and number of correctly solved questions divided by finishing time [20].

$$Productivity\ 1 = \frac{Test\ Result}{Study\ Time} \quad (1)$$

$$Productivity\ 2 = \frac{Correctly\ Solved\ Question}{Completion\ Time\ of\ All\ Questions} \quad (2)$$

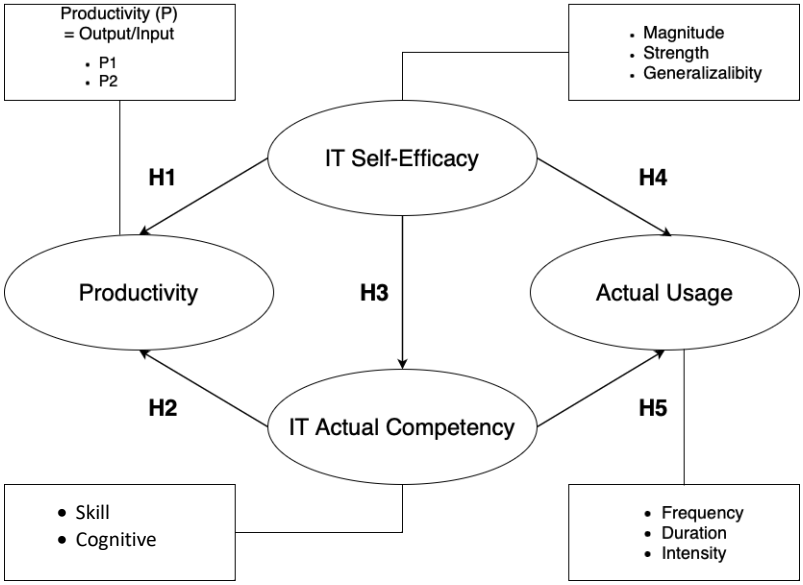

Figure 2. Indicators of the conceptual model's variables

3.2. Sample, Data Collection, and Data Analysis

Subjects of this study are undergraduate students of the informatics engineering program, the STTQ Gresik - Indonesia who have completed the Database course and enrolled for the Advanced Database course. The group of students who have completed the Database course was chosen because they were expected to initially have self-efficacy in learning the next course, the Advanced Database course. The education sector was chosen due to its significance and openness to technology adoption.

Before collecting data, the IT self-efficacy questionnaire was tested on 40 prospective respondents to confirm its validity and reliability. The reliability value obtained was 88.6%, indicating high reliability (>70%). However, one indicator, STR 3 or X2.3, had a validity value below the T-Table value (0.3120) and was thus eliminated. Consequently, the IT self-efficacy variable retained 16 questionnaire items.

Using a simple random sampling method, data were collected from 89 out of a total of 109 students in semester six. IT self-efficacy was measured using a self-administered questionnaire covering the magnitude, strength, and generality of using the XAMPP software for developing a database organized at the beginning of the course. IT actual competency was assessed in the end of the courses by giving a hands-on exercise for every student to develop a database and to revise tables using the XAMPP software. The IT actual usage was measured based on every student's intensity, duration, and frequency in using the XAMPP software for learning databases during the course weeks. Finally, every student's productivity is measured at the end of the course by running a hands-on final exam and calculating two formulas: test result divided by study time and number of correctly solved questions divided by finishing time.

Evaluation of the measurement model includes validating the reflective indicators and relationships between variables. Evaluation of the indicators was performed by looking at the loading values of discriminant validity [8], the *average variance extracted* (AVE) values of convergent validity, the cross-

loading values of discriminant validity between variables, and the reliability of every variable's indicators by looking at Cronbach's Alpha and Composite Reliability values [9]. Relationships between variables were assessed using structural model evaluation by looking at their path coefficients, R^2, F^2, Q^2, and GoF values.

4. Results and Discussion

4.1. Discriminant validity of the indicators

The discriminant validity of the model's indicators can be seen from the loading factor values [8] presented in Figure 3 and Table 1. It found three invalid indicators (less than 0.5): MAG5, PRO1, and STR2.

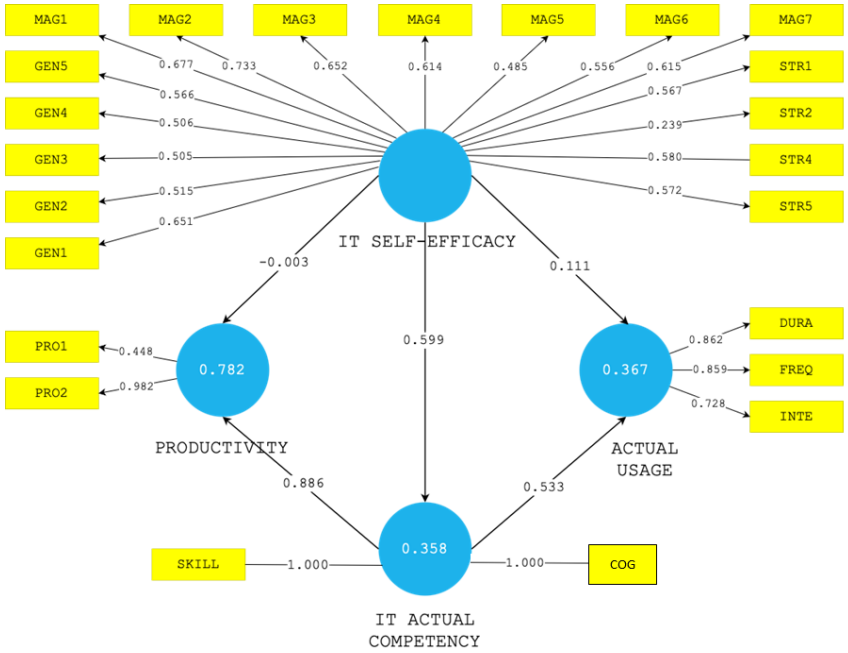

Figure 3. Results of PLS-Algorithm

Table 1. Loading Factor Values

	Actual Usage	IT Actual Competency	IT Self-Efficacy	Productivity	Notes
DURA	0.862				VALID
FREQ	0.859				VALID
INTE	0.728				VALID
GEN1			0.651		VALID
GEN2			0.515		VALID
GEN3			0.505		VALID
GEN4			0.506		VALID
GEN5			0.566		VALID
MAG1			0.677		VALID
MAG2			0.733		VALID
MAG3			0.652		VALID
MAG4			0.614		VALID

	Actual Usage	IT Actual Competency	IT Self-Efficacy	Productivity	Notes
MAG5			0.485		INVALID
MAG6			0.556		VALID
MAG7			0.615		VALID
PRO1				0.448	INVALID
PRO2				0.982	VALID
SKIL		1.000			VALID
COG		1.000			VALID
STR1			0.567		VALID
STR2			0.239		INVALID
STR4			0.580		VALID
STR5			0.572		VALID

4.2. Convergent validity of the indicators

The *Average Variance Extracted* (AVE) values of every variable's indicators are presented in Table 2.

Table 2. *Average Variance Extracted*/AVE Values

Variable	AVE Values	Notes
Actual Usage	0.670	VALID
IT Actual Competency	1.000	VALID
IT Self-Efficacy	0.330	INVALID
Productivity	0.582	VALID

It can be seen in Table 2 that there is one invalid variable, which is IT self-efficacy with an AVE value of less than 0.5. Therefore, to follow up on this, several low-value indicators were removed to increase the AVE value of IT self-efficacy [20]: GEN2, GEN3, GEN4, GEN5, MAG4, MAG5, MAG6, PRO1, STR1, STR2, STR3, and STR4. The AVE values and loading factor values after removing the indicators is shown in Table 3 and Table 4.

Table 1. Average Variance Extracted/AVE Values After Deletion

Variables	AVE Values	Notes
Actual Usage	0.672	VALID
IT Actual Competency	1.000	VALID
IT Self-Efficacy	0.512	VALID
Productivity	1.000	VALID

Table 2. Loading Factors Values After Deletion

	Actual Usage	IT Actual Competency	IT Self-Efficacy	Productivity	Notes
DURA	0.862				VALID
FREQ	0.859				VALID
INTE	0.728				VALID
GEN1			0.651		VALID
MAG1			0.677		VALID
MAG2			0.733		VALID
MAG3			0.652		VALID
MAG7			0.615		VALID
PRO2				1.000	VALID
SKIL		1.000			VALID
COG		1.000			VALID

4.3. Discriminant Validity of the Variables

The discriminant validity between variables indicated by the cross-loading factor values in Table 5 is valid.

Table 3. Cross Loading Values between variables

Variables	Actual Usage	IT Actual Competency	IT Self-Efficacy	Productivity	Notes
Actual Usage	0.820				VALID
IT Actual Competency	0.598	1,000			VALID
IT Self-Efficacy	0.480	0.643	0.716		VALID
Productivity	0.512	0.911	0.552	1,000	VALID

4.4. Reliability of every variable's indicators

Based on Cronbach's alpha and Composite Reliability values, every variable's indicators are reliable, as shown in Table 6.

Table 4. Cronbach's Alpha Values & Composite Reliability

Variables	Cronbach's Alpha	Composite Reliability	Notes
Actual Usage	0.760	0.859	VALID
IT Actual Competency	1.000	1.000	VALID
IT Self-Efficacy	0.758	0.837	VALID
Productivity	1.000	1.000	VALID

4.5. Structural Model Evaluation

Structural model evaluation assesses the relationships between variables, focusing on measurement points such as the path coefficient (>1.663), R^2 value, F^2 value, Q^2 value, and GoF value. Figure 4 and Table 7 present the results of the path coefficient values.

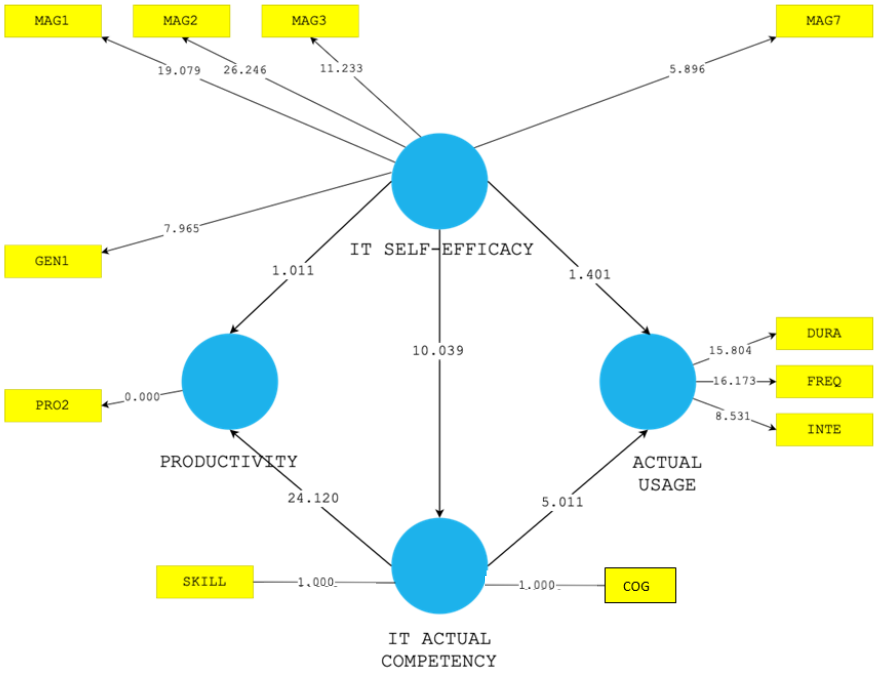

Figure 4. Structural model

Table 5. Path Coefficient Values

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics	P Values
IT Actual Competency –> Actual Usage	0.492	0.496	0.098	5,011	0.000
IT Actual Competency –> Productivity	0.948	0.946	0.039	24,120	0.000
IT Self Efficacy –> Actual Usage	0.164	0.168	0.117	1,401	0.081
IT Self Efficacy –> IT Actual Competency	0.643	0.646	0.064	10,039	0.000
IT Self Efficacy –> Productivity	-0.057	-0.052	0.056	1,011	0.156

The path coefficient results reveal that two relationships fall below the minimum threshold of 1.663: IT self-efficacy on productivity (1.011) and IT self-efficacy on actual usage (1.401). All other values surpass the threshold. These values indicate the strength of the respective relationships or hypotheses. From these results, we can infer that IT actual competency has a significantly positive impact on actual usage (5.011) and productivity (24.120). The relationship between IT self-efficacy and IT actual competency is also significantly positive at 10.039.

However, the relationship between self-efficacy on productivity shows a value of 1.011, signifying insignificance, and -0.057, indicating a negative relationship. Conversely, IT self-efficacy on actual usage has a value of 1.401, signifying insignificance, but a positive relationship of 0.164.

The R^2 values in Table 8 tell us how well these variables explain each other. For actual usage, IT actual competency and IT self-efficacy together explain 37.3%, which is moderate by one standard (Chin) and weak by another (Hair). For IT actual competency, IT self-efficacy explains 41.3%, also seen as moderate by Chin and weak by Hair. Finally, when it comes to productivity, IT self-efficacy and IT actual competency together explain a strong 83.2% [22].

Table 6. R^2 Values

Variables	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics	P Values
Actual Usage	0.373	0.394	0.070	5,357	0.000
IT Actual Competency	0.413	0.421	0.081	5,086	0.000
Productivity	0.832	0.836	0.038	22,052	0.000

Based on the F^2 values in Table 9, it can be understood that IT actual competency has a moderate impact of 0.227 on actual usage but a strong impact on productivity with a value of 3.130. On the other hand, IT self-efficacy has a weak influence on actual usage (0.025) and on productivity (0.011), but it has a strong impact on IT actual competency, with a value of 0.705.

Table 7. F^2 Value

Variables	Actual Usage	IT Actual Competency	IT Self-Efficacy	Productivity
Actual Usage				
IT Actual Competency	0.227			3.130
IT Self-Efficacy	0.025	0.705		0.011
Productivity				

Furthermore, the Q^2 values in Table 10 reveal that actual usage exhibits a moderate value of 0.210. In contrast, both IT actual competency and productivity demonstrate strong values, surpassing the 0.35 threshold, with values of 0.392 and 0.830, respectively. The GoF value, calculated by taking the square root of the product of the average AVE and average R^2, yields a value of 0.655. This GoF value aligns with vulnerability criteria, where values of 0.02, 0.15, and 0.35 correspond to weak, moderate, and strong, respectively. Therefore, with a GoF value of 0.655, we can confidently categorize it as strong.

Table 8. Q^2 Values

Variables	SSO	SSE	$Q^2 \leq$ (=1-SSE/SSO)
Actual Usage	267,000	210,932	0.210
IT Actual Competency	89,000	54,126	0.392
IT Self-Efficacy	445,000	445,000	
Productivity	89,000	15,135	0.830

4.6. Final Model and Discussion

The research model can be accepted with minor adjustments, as it has successfully passed the validity and reliability tests, albeit with the removal of 12 indicators. These excluded indicators consist of one from the productivity variable and eleven from the IT self-efficacy variable. The evaluation of the five proposed hypotheses yields diverse outcomes. Hypotheses 2, 3, and 5 reveal positive and significant relationships, while Hypotheses 1 and 4 indicate insignificant relationships, as shown in the final model in Figure 5.

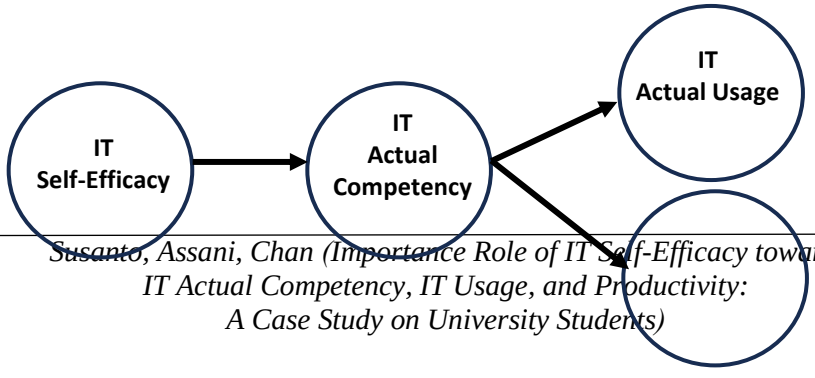

Figure 5. Final model

The final model suggests that the role of IT self-efficacy towards IT actual usage and productivity is mediated by IT actual competency. When someone uses software, his/her confidence in using it (IT self-efficacy) doesn't directly affect their productivity. Whether his/her confidence is high or low doesn't change how productive they are. In fact, his/her confidence in using the software will improve his/her actual competency in using the software. This finding support previous study by Shih [15] on assessing the effects of self-efficacy of IT students to their competence on individual satisfaction with computer use in Taiwan. Further, if someone becomes more competent in using software (IT actual competency), their productivity goes up. The better they use the software, the more they get done. Since IT actual competency affects productivity, it means that IT self-efficacy indirectly affects productivity by boosting IT actual competency.

Additionally, the model also suggests that IT self-efficacy does not exert a direct effect on actual usage. It implies that fluctuations in user confidence levels in using a technology (IT self-efficacy) does not correlate with variations in technology utilization (actual usage). Conversely, the level of IT actual competency among software users demonstrates a positive and significant relationship with actual usage. In other words, since IT actual competency influences actual usage, we deduce that IT self-efficacy also indirectly impacts IT actual usage through its intermediary effect on IT actual competency. This finding is also relevant to a previous study on self-efficacy by Bandura [8]. Based on the final model, IT actual competency has a greater effect on increasing productivity and technology use than IT self-efficacy. However, IT self-efficacy is an important predictor of IT actual competency.

4.7. Theoretical Contributions

This research has yielded a model illustrating the relationship between IT self-efficacy and actual IT competency concerning the utilization of IT and productivity. It extends existing models about IT self-efficacy suggested by previous studies that have not covered relationships between the 4 factors. This model can serve as a foundational framework for future research aimed at how to motivate students to learn new technology skills and to use the technology on real tasks leading to their productivity. Such investigations would encompass a broader exploration of the influence of IT self-efficacy and IT actual competency, with the ultimate goal of enhancing organizational effectiveness and efficiency. Moreover, this research contributes significantly to understanding individual attitudes and behaviors towards information technology, which represents added value for organizations as they formulate strategic approaches to boost their productivity.

4.8. Practical Implications

For IT practices in schools/universities, the findings of this study suggest an important role of IT self-efficacy towards IT usage and productivity of students. To improve technology usage and productivity of an individual or a group of students in a university, the lecturer may start by improving their confidence to use the technology. Based on empirical evidence, it is proven that there is no significant disparity between beliefs and actual competencies; both exhibit the potential to bolster technology adoption. While getting IT actual competency usually needs longer time and effort to practice using the technology, IT self-efficacy can be improved by simple programs with shorter time and less effort such as tutorial videos, short training, certification, awards, incentives, or appreciation. Once they have been confident in using

the technology, it is more likely they learn and practice to improve their actual competency in using the technology.

4.9. Limitation and Future Research

This research has several limitations. Firstly, it is focused on a specific technology among university students (the use of XAMPP software by university students) as the object of the investigation. For future research, a more comprehensive approach could involve general technology measurements, encompassing multiple types of technology, rather than concentrating solely on one particular technology, in multiple environments including universities and business companies. Secondly, this research is limited in terms of productivity measurement, primarily relying on time productivity as the sole indicator. Future research has the potential to incorporate a broader range of productivity indicators drawn from various productivity theories. Lastly, this research is confined to measuring competence predominantly in terms of skills. Future research could enhance its scope by including knowledge and/or attitude as variable indicators, thereby yielding more comprehensive and insightful results.

5. Conclusion

This study has examined the important role of IT self-efficacy towards IT actual competency, IT actual usage, and productivity by validating the relationships between the four factors in the case of university students. It is found that IT self-efficacy significantly influences IT usage and productivity indirectly via IT actual competency. IT actual competency is a direct predictor of IT usage and productivity, while IT self-efficacy is an important factor in improving IT actual competency. It suggests that the more confident a student uses technology, the higher his/her actual competency to use the technology, the more often he/she uses the technology, and the more his/her productivity. This finding recommends any lecturer who wants to improve IT real competencies, IT usage, and IT-related productivity among his/her students should start with any program to improve their IT self-efficacy.

6. References

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