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An Integrated Self-Determination Theory and Theory of Planned Behavior towards Utilize Technology

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Abstract

Smart City is closely related to technological innovation and application. This study will analyze the individual motivation for WiFi Trash Bin in Taman Edukasi Baiman Banjarmasin, which is directly related. The purpose of this study is to describe the motivation of individuals by integrating the Self-Determination Theory (SDT) and the Theory of Planned Behavior (TPB). The method technique employed for analysis is PLS-SEM, with a sample size of 100 respondents (10% significance). Individual motivation is characterized by integrating the SDT and TPB models with the variables Intrinsic Motivation (MI), Extrinsic Motivation (ME), Subjective Norm (NS), Perceived Behavior Control (KPD), Attitude Toward Behavior (PP), Socio-Demographics (SD), Environmental Awareness (KL), and Motivation Using (MM). According to research, motivated individuals utilize WiFi Trash Bin when they are intrigued and confident in the positive outcomes resulting from internal motivation, but are unaffected by external motivation. In addition, it was discovered that an individual's intrinsic motivation is influenced by social pressure, interest, belief in the outcomes obtained, and environmental concern. As for external motivation, only sentiments of social pressure and concern for the environment influence it.

Keywords: Smart City, SDT, TPB, WiFi Trash Bin.

1 Introduction

The term "smart city" refers to an approach to the planning, design, and administration of urban areas that makes extensive and effective use of the most recent technological advancements [1]–[3]. With technology as their backbone, Smart Cities have the potential to transform cities into places that are habitable, sustainable, comfortable, and safe [1]. As an example, the city of Banjarmasin continues to make numerous improvements stemming from the application of technology. One of these breakthroughs is the utilization of technology in the waste management system. Users that dump trash into the junkyard are referred to as the WiFi Trash Bin, which is a device that generates passwords for free internet connectivity [4], [5]. The junkyard is also known as the WiFi Trash Bin.

Up to this point, the application of technology has primarily been concentrated on enabling inter-engine action, exchanging data with one another, and carrying out a variety of actions depending on the circumstances surrounding the concept of a smart city [6]. As a result, the difficulty is to identify and comprehend the interaction that takes place between people and technology. As a

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result, an understanding of user motivation and behavior is necessary as technology takes on an increasingly important role in the construction of a smart city [7].

Individual attitudes toward the use of technology reflect the complexity and diversity of the factors that influence these attitudes. By focusing on individual objectives, requirements, and motivations when utilizing technology, such as WiFi Trash Bin [1]. This is directly related to the findings of resident observations and interviews, where it was discovered that individual motivations for using WiFi Trash Bin vary. The first individual is motivated to use the technology for reasons that are already in accordance with government expectations, whereas the second individual is motivated solely by the desire for free internet access, which is inappropriate. In this way, the individual's motivation conflicts with the expectations and objectives presented by the government, as the presence of technology in the garbage can positively motivate the individual to use it.

Our study aims to find out the motivation for self-perspective to use WiFi Trash Bin, with the approach of Self-Determination Theory (SDT) and Theory of Planned Behavior (TPB). A combination of these two approaches can reveal internal and external factors in the motivation to use a technology from an individual [8]–[10]. SDT will focus on self-determined motivational orientation, while TPB will reveal motivation based on intent and behavior. SDT will focus on self-determined motivational orientation, while TPB will reveal motivation based on intent and behavior. Several studies have revealed the effectiveness of the combination of both approaches, such as the study conducted by Hagger and Chatzisarantis through meta-analysis has obtained that SDT is fully mediated by TPB in health behavior [11]. In addition, Luqman et al also integrated SDT and TPB into a cohesive model in analyzing autonomous motivations and controlled motivations against the intention to stop using social media [8]. This study was conducted by integrating the Self-Determination Theory (SDT) and Theory of Planned Behavior (TPB) that focused on the motivation to use WiFi Trash Bin, which will provide an understanding of the individual motivation in using technology.

2 Literature Review

2.1 Motivation

Motivation is a need or desire that energizes a behavior and directs it toward a goal. This behavior arises in response to several forms of internal stimulation (physiological) and external (environmental). Thus motivation can also be defined as the process of activating, maintaining, and directing behavior towards a specific goal [12]. Motivation in individuals is caused by two factors, namely intrinsic motivation and extrinsic motivation. Intrinsic motivation is the motivation that comes from the work itself. While extrinsic motivation is needed materially to link individual satisfaction with work [13].

2.2 Wifi Trash Bin

WiFi Trash Bin was first implemented in India, by Raj Desai and Pratik Argawal of startup Think-Scream. WiFi Trash Bin became an innovation in a perfect way to reward humans who try and keep the environment clean with the concept of rewarding people with 15 minutes of free WiFi every time they throw something in the trash [4]. These bins use a lot of technology. The first is WiFi technology which must be optimized to ensure that all generated WiFi passwords work

properly. The second is the technology used to sense and know how garbage enters and its movement. Then, the third is the entire bridge between the motion sensor and the WiFi network to ensure that they are connected at the right time. So it is a mixture of hardware and software technology.

Figure 1: WiFi Trash Bin in Banjarmasin

In Taman Edukasi Baiman Banjarmasin there is WiFi Trash Bin (Figure 1) and is the first in Indonesia. WiFi Trash Bin at Baiman Education Park is intended to educate the public about environmental concerns to realize Banjarmasin beautiful, clean, and comfortable. The existence of the trash can is expected by the community to understand about an environment that is clean from waste, in exchange for free WiFi access. Free internet access can only be obtained when people dispose of garbage such as dry plastic bottles, and the trash can will detect with Internet of Things sensors and display WiFi passwords. WiFi access is also limited to only 15 minutes, and if people want to use it again, they must put more garbage into the WiFi Trash Bin.

2.3 Self-Determination Technology (SDT)

Self-Determination Theory (SDT) is a motivational theory of personality, development, and social processes that examines how social contexts and individual differences facilitate different types of motivation, especially intrinsic motivation and extrinsic motivation. Intrinsically motivated behavior is autonomous, that is, it is experienced as a will and comes from oneself. In contrast, extrinsically motivated behaviors can vary greatly to the extent to which they are controlled versus autonomous. SDT explains that motivation develops from within us, and is based on the basic human need to develop skills and capacities in acting of our own accord, and need to connect to others and the environment [14].

2.4 Theory of Planned Behavior (TPB)

Theory of Planned Behavior (TPB) explains that human actions are guided by 3 kinds of factors, namely beliefs about behavioral results and evaluation of behavioral results (behavior belief), beliefs about normative expectations from others, motivation to obey these expectations (normative belief), and beliefs about the presence of factors that facilitate or inhibit behavior (control belief). In TPB explains that a person's behavior will arise because of the intention to behave. TPB are focused on a person's specific behavior and for all behavior in general. A person's intention to behave can be predicted by three things, namely attitude toward the behavior, subjective norm, and perceived behavioral control [15]. In the TPB explain that attitudes towards behavior, subjective norms and perceptions of self-control will give rise to an intention to carry out behavior

[16], [17]. Intention is defined as the competence of the individual self which is based on the individual's desire to perform a certain behavior. The intention to perform the behavior can be measured using three main predictors: attitude toward the behavior, subjective norm, and perceived behavioral control.

2.5 SDT-TPB Integrated

Self-Determination Theory (SDT) is a paradigm of human motivation directly related to the personality approach, which focuses on individual psychological needs and how those needs interact with self-motivation [11]. SDT offer opportunities for comparison and integration with the Theory of Planned Behavior (TPB), as SDTs have a dominant intrinsic focus, whereas SDGs maintain an extrinsic focus [18]. The integration of SDT and TPB was used in researching the feasibility of a multi-theory model to explain the influence on intention and motivation. Support for this integration is found in several studies. Study by Barkoukis et al found that psychological variables of basic satisfaction needs (autonomy, competence, and relatedness) are uniquely predicted autonomous motivations in physical education and leisure. It also foretells two antecedents of intention, namely attitude and perceived behavior control. Three variables of basic needs satisfaction also mediate the effect of autonomy support on autonomous motivation in physical education [19]. Other studies by Luqman [8] found a relationship between Intrinsic Motivation and Extrinsic Motivation and belief systems that underpin the proximal antecedents of intention: attitudes, subjective norms, and perceived behavior control can improve our understanding of cessation intentions towards social media use.

3 Method

3.1 Respondents

The sample consisted of 100 respondents who were residents of Banjarmasin. Socio-Demographics is a description of the identities of respondents based on five indicators: age, gender, employment status, length of stay, and user experience. It was determined that there were 29 respondents aged 20 or younger, 68 respondents aged 21 to 30 years, and 3 respondents aged 41 to 50 years. There are as many as 64 men and 36 women in the male population. There are 82 people in the employment status has not worked category, and 18 people in the employment status has worked category. There were 4 respondents with a duration of stay of less than 1 year, 21 respondents with a duration of stay of 1-3 years, 24 respondents with a duration of stay of 3-5 years, 7 respondents with a duration of stay of 5-10 years, and 44 respondents with a duration of stay of more than 10 years. As many as 97 respondents who have never used WiFi Trash Bin, and as few as 3 respondents who have used WiFi Trash Bin.

3.2 Research Model

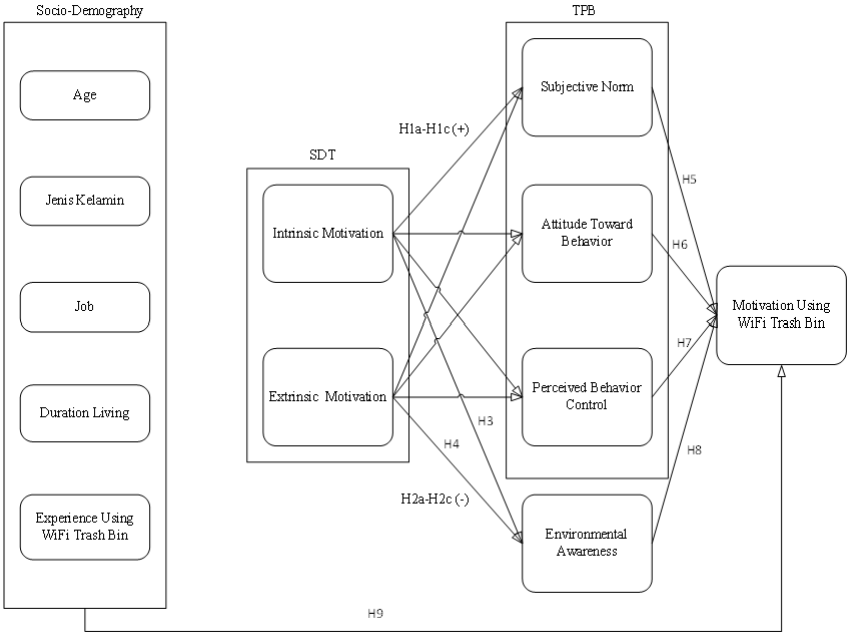

Figure 2: Research Model

The research model integrates Intrinsic Motivation and Extrinsic Motivation from Self-Determination Theory and Subjective Norms, Attitude Toward Behavior, Perceived Behavior Control and Motivation Using WiFi Trash Bin from Theory of Planned Behavior. There are external factors, specifically Socio-Demographics, which, according to previous research, can influence the intention to engage in particular behaviors [17]. In addition, there are other external factors, namely environmental awareness, that influence environmental cleanliness-related behavior [20].

3.3 Hypothesis

Hypothesis there are:

H1 : Intrinsic motivation has influence on (a) subjective norms, (b) attitude toward behavior, and (c) perceived behavioral control when using the WiFi Trash Bin

H2 : Intrinsic motivation has influence on (a) subjective norms, (b) attitude toward behavior, and (c) perceived behavioral control when using the WiFi Trash Bin

H3 : Intrinsic motivation has influence on environmental awareness when using WiFi Trash Bin

H4 : Extrinsic motivation has influence on environmental awareness when using WiFi Trash Bin

H5 : Subjective norms has influence on motivation using WiFi Trash Bin

H6 : Attitude toward behavior has an influence on motivation using WiFi Trash Bin

H7 : Perceived behavioral control has influence on motivation using WiFi Trash Bin.

H8 : Environmental awareness has influence on the motivation to using WiFi Trash Bin

H9 : Socio-demographic has influence on motivation using the WiFi Trash Bin

3.4 Indicator Initial

There are 7 different variables, and each indicator is included in one of them. Table 1 shows the indicator initial.

Table 1: Variable Indicators

Variable	Variable Types	Initial	Indicator Items
Intrinsic Motivation	Independent Variable	MI	4
Extrinsic Motivation	Independent Variable	ME	4
Subjective Norm	Independent Variable	NS	3
Perceived Behavior Control	Independent Variable	KPD	3
Attitude Toward Behavior	Independent Variable	PP	3
Environmental Awareness	Independent Variable	KL	4
Motivation Using WiFi Trashbin	Dependent Variable	MM	4

3.5 Analysis Technique

This investigation employed the PLS-SEM analysis method. PLS-SEM analysis is employed to estimate complex models with numerous constructs, indicator variables, and structural trajectories without imposing distribution assumptions on the data. PLS-SEM is a causal-predictive approach to SEM that emphasizes prediction in estimating statistical models designed to provide causal explanations.

4 Result

4.1 Outer Model

The Outer Model is used to measure the validity and reliability of indicators by looking at the output values of Outer Loading, Cross Loading, AVE, Composite Reliability, and Cronbachs Alpha.

Table 2: Outer Loadings (>0,5)

Indicator	*Outer Loadings*	Validity
MI1	0,823	Valid
MI2	0,853	Valid
MI3	0,822	Valid
MI4	0,802	Valid
ME1	0,247	Invalid
ME2	0,352	Invalid
ME3	0,801	Valid
ME4	0,880	Valid
NS1	0,897	Valid
NS2	0,943	Valid
NS3	0,914	Valid

Indicator	*Outer Loadings*	Validity
KPD1	0,792	Valid
KPD2	0,793	Valid
KPD3	0,863	Valid
PP1	0,928	Valid
PP2	0,935	Valid
PP3	0,957	Valid
KL1	0,661	Valid
KL2	0,829	Valid
KL3	0,912	Valid
KL4	0,848	Valid
MM1	0,927	Valid
MM2	0,914	Valid
MM3	0,888	Valid
MM4	0,946	Valid

There are two indications that do not satisfy the necessary value, which is why those indicators have been deemed invalid. ME1 and ME2 of the Extrinsic Motivation variable might be referred to as these indications. Both of these indicators will therefore be supplied for further measurement.

Table 3: Cross Loadings

	KL	KPD	ME	MI	MM	NS	PP
KL1	0,660	0,284	0,014	0,261	0,221	0,053	0,301
KL2	0,831	0,369	-0,022	0,295	0,327	0,053	0,488
KL3	0,912	0,408	-0,172	0,300	0,221	-0,178	0,543
KL4	0,847	0,325	-0,142	0,318	0,258	-0,174	0,462
KPD1	0,405	0,791	0,153	0,409	0,414	0,114	0,341
KPD2	0,238	0,795	0,410	0,426	0,443	0,397	0,319
KPD3	0,404	0,862	0,177	0,484	0,520	0,192	0,604
ME3	0,018	0,344	0,864	0,392	0,450	0,546	0,253
ME4	-0,203	0,183	0,868	0,205	0,184	0,644	0,026
MI1	0,232	0,426	0,314	0,823	0,555	0,323	0,413
MI2	0,258	0,399	0,280	0,853	0,652	0,275	0,528
MI3	0,257	0,394	0,418	0,822	0,579	0,380	0,379
MI4	0,409	0,540	0,158	0,802	0,559	0,206	0,582
MM1	0,283	0,516	0,335	0,685	0,927	0,272	0,605
MM2	0,336	0,522	0,285	0,642	0,914	0,259	0,544
MM3	0,217	0,466	0,335	0,626	0,888	0,371	0,448
MM4	0,304	0,568	0,285	0,656	0,946	0,275	0,556
NS1	-0,097	0,263	0,335	0,331	0,233	0,897	0,161
NS2	-0,116	0,246	0,285	0,278	0,260	0,943	0,116
NS3	-0,029	0,293	0,586	0,362	0,380	0,913	0,246
PP1	0,530	0,408	0,106	0,501	0,478	0,116	0,928
PP2	0,471	0,495	0,181	0,568	0,576	0,219	0,935
PP3	0,571	0,564	0,158	0,578	0,597	0,192	0,957

All indicators that passed the Outer Loadings measurement are deemed valid because all Cross Loadings values of indicators against their variables are greater than those against other variables.

Table 4: AVE, Composite Reliability, Cronbachs Alpha

Variable	Average Variance Extracted (AVE) (>0,5)	Composite Reliability (>0,7)	Cronbachs Alpha (>0,6)
KL	0,669	0,889	0,831
KPD	0,667	0,857	0,750
ME	0,750	0,857	0,667
MI	0,681	0,895	0,845
MM	0,844	0,956	0,938
NS	0,843	0,941	0,907
PP	0,884	0,958	0,935

All variables in the research model have AVE values greater than 0.5, indicating that all variable indicators are valid. The Composite Reliability is greater than 0.7 for all variables. So that the variables comprising the estimation model are trustworthy. All variables satisfy the reliability criterion because their Cronbach's Alpha values exceed 0.6.

4.2 Inner Model

Table 5: R-Square

Variable	*R-square*
KL	0,190
KPD	0,308
MM	0,479
NS	0,487
PP	0,346

The inner model is evaluated using the R-square value as the endogenous variables' coefficient of determination. A excellent inner model has an R-square greater than 0.67, a moderate inner model has an R-square greater than 0.33, and a poor inner model has an R-square less than 0.33.

4.3 Hypothesis Result

Table 6: Hypothesis Testing

Hypothesis		T Statistic (>0,1)	Threshold	Result
H1a	MI - > NS	1,907	1,662	accepted
H1b	MI - > PP	7,259	1,662	accepted
H1c	MI - > KPD	4,743	1,662	accepted
H2a	ME - > NS	9,362	1,662	accepted
H2b	ME - > PP	0,542	1,662	rejected
H2c	ME - > KPD	1,398	1,662	rejected
H3	MI - > KL	3,696	1,662	accepted
H4	ME - > KL	2,902	1,662	accepted
H5	NS - > MM	1,444	1,662	rejected
H6	PP - > MM	7,259	1,662	accepted
H7	KPD - > MM	3,091	1,662	accepted
H8	KL - > MM	0,890	1,662	rejected
H9	SD - > MM	1,065	1,662	rejected

According on Table 5 it was determined that five of the hypotheses proposed in this study were not supported. Because, according to the results of bootstrapping and the T test, the hypothesis

does not surpass the predetermined critical T value. These hypotheses were dismissed: H2b, H2c, H5, H8, and H9.

5 Discussion

The discussion refers to path coeeficients and hypothesis testing of bootstrapping results. The output path coefficients can be seen in Table 6 below.

Table 6: Path Coefficients

Variable relationship	*Original Sample*	T Statistic	Threshold
MI - > NS	0,131	1,907	1,662
MI - > PP	0,603	7,259	1,662
MI - > KPD	0,495	4,743	1,662
ME - > NS	0,642	9,362	1,662
ME - > PP	-0,048	0,542	1,662
ME - > KPD	0,133	1,398	1,662
MI - > KL	0,450	3,696	1,662
ME - > KL	-0,263	2,902	1,662
NS - > MM	0,111	1,444	1,662
PP - > MM	0,397	7,259	1,662
KPD - > MM	0,354	3,091	1,662
KL - > MM	-0,085	0,890	1,662
SD - > MM	0,147	1,065	1,662

Based on the study's proposed hypothesis, it was determined that H1a was acceptable. According to the table of path coefficients, the statistical T value for the MI variable versus NS is greater than the critical T value (1,662), which is 1,907. This explains why MI's influence on NS proved to be significant. The MI coefficient at the output path coefficients has a value of 0.13. This indicates that the MI variable positively influences the NS variable by 13%. The greater an individual's internal motivation, the greater will be the impact on his or her perception of environmental pressure to comply or not.

Based on the study's proposed hypothesis, it was determined that H1b was accepted. According to the path coefficients matrix, the statistical T value for the MI variable to PP is greater than the critical T value (1.662), i.e. 7.259. This demonstrates that MI's influence on PP has proved to be significant. The MI coefficient at the output path coefficients has a value of 0.60. This indicates that the MI variable positively influences the PP variable by 60%. The greater the influence of an individual's internal motivation on his or her positive or negative evaluation of a behavior, the greater the individual's internal motivation.

Based on the study's proposed hypothesis, it was determined that H1c was accepted. According to the table of path coefficients, the statistical T value for the MI variable against KPD is greater than the critical T value (1.662), i.e., 4.743. This explains why MI's influence on KPD has proved to be significant. The MI coefficient at the output path coefficients has a value of 0.495%. This indicates that the MI variable has a 49.5% positive effect on the KPD variable. The individual's perception of his capacity to exhibit a particular behavior will be influenced by the individual's internal motivation.

Based on the study's proposed hypothesis, it was determined that H2a was accepted. On the basis of the table of path coefficients, it is known that the statistical T value for the ME variable against NS is greater than the critical T value (1,662), which is 9,362. This explains why ME's influence on NS proved to be significant. The ME coefficient at the output path coefficients has a value of 0.64. This indicates that the ME variable positively influences the NS variable by 64%. The greater the external motivation, the greater the impact on the individual's perception of environmental pressure to comply or not.

Based on the study's proposed hypothesis, it was determined that H2b was invalid. According to the path coefficients table, the statistical T value for the ME variable versus PP is less than the critical T value (1,662), namely 0.542. This demonstrates that ME's impact on PP is negligible. The ME coefficient at the output path coefficients has a value of -0.05. This indicates that the ME variable has a 0.5% negative effect on the PP variable. An individual's positive or negative evaluation of a behavior will be unaffected by motivation from outside the individual.

Based on the study's proposed hypothesis, it was determined that H2c was invalid. According to the table of path coefficients, the statistical T value for the ME variable against KPD is less than the critical T value (1.662), which is 1.398. This demonstrates that ME's impact on KPD is negligible. The ME coefficient at the output path coefficients has a value of 0.13. This indicates that the ME variable positively influences the KPD variable by 13%. Motivation from outside the individual will oppose the influence on the individual's perception of his capacity to exhibit a particular behavior.

Based on the study's proposed hypothesis, it was determined that H3 was accepted. According to the path coefficients table, the statistical T value for the MI variable against KL is greater than the critical T value (1.662), i.e. 3.696. This demonstrates that MI's influence on KL has proved to be significant. The MI coefficient at the output path coefficients has a value of 0.45. This indicates that the MI variable has a 45 percent positive effect on the KL variable. Individual concern for the environment is influenced by internal motivation to a greater extent the more a person is internally motivated.

Based on the study's proposed hypothesis, it was determined that H4 was accepted. According to the table of path coefficients, the statistical T value for the ME variable versus KL is greater than the critical T value (1,662), which is 2,902. This demonstrates that MI's influence on KL has proved to be significant. The MI coefficient at the output path coefficients has a value of -0.26. This indicates that the MI variable has a 26% negative effect on the KL variable. The greater the external motivation, the greater the influence on individual concern for the environment.

Based on the study's proposed hypothesis, it was determined that H5 should be rejected. According to the path coefficients matrix, the statistical T value for the NS variable against MM is less than the critical T value (1,662), i.e. 1.444. It is. The NS coefficient at the output path coefficients has a value of 0.11. This indicates that the NS variable has an 11% positive impact on the MM variable. An individual's perception of environmental pressure to conduct or not conflicts with their motivation to use the WiFi Trash Bin.

Based on the study's proposed hypothesis, it was determined that H6 was accepted. According to the path coefficients table, the statistical T value for the PP variable against MM is greater than the critical T value (1.662), i.e. 7.259. This demonstrates that PP's influence on MM is significant.

The PP coefficient at the output path coefficients has a value of 0.40. This indicates a 40% positive influence of the PP variable on the MM variable. The greater a person's positive or negative evaluation of a behavior, the greater their motivation to use the WiFi Trash Bin.

Based on the study's proposed hypothesis, it was determined that H7 was accepted. According to the path coefficients table, the statistical T value for the KPD variable against MM is greater than the critical T value (1,662), which is 3,091. This demonstrates that KPD's influence on MM is significant. The KPD coefficient at the output path coefficients has a value of 0.35. This indicates that the PP variable has a 35% positive effect on the MM variable. The greater a person's perception of his or her capacity to exhibit a particular behavior, the greater that person's motivation to use the WiFi Trash Bin.

Based on the study's proposed hypothesis, it was determined that H8 should be rejected. According to the table of path coefficients, the statistical T value for the KL variable versus MM is less than the critical T value (1,662), which is 0.890. This explains why the influence that KL has on MM is negligible. The KL coefficient at the output path coefficients has a value of -0.085. This indicates that the KL variable has a 0.8% negative effect on the MM variable. Individual environmental concern will conflict with individual motivation to use WiFi Trash Bin.

Based on the study's proposed hypothesis, it was determined that H9 should be rejected. According to the table of path coefficients, the statistical T value for the SD variable against MM is less than the critical T value (1,662), i.e. 1.065. This indicates that the impact that SD has on MM is negligible. 0.147 is the SD coefficient value at the output path coefficients. This indicates that the SD variable has a 15% positive effect on the MM variable. Sociodemographic characteristics will conflict with an individual's motivation to utilize WiFi Trash Bin.

6 Conclusion

Individual motivation to utilize WiFi Trash Bin is solely influenced by intrinsic motivation as well as sentiments of interest and confidence in the positive outcomes obtained. While motivation from outside the individual has no effect on individual motivation to use the new technology, motivation from within the individual does. Individual motivation is characterized by sentiments of social pressure, interest, belief in consequences, and environmental consciousness. In contrast, external motivation is only described as sentiments of social pressure and environmental concern.

An individual's age, gender, employment status, length of stay in Banjarmasin, and prior experience with WiFi Trash Bin have no effect on their motivation to use the technology. Individual motivation to use the WiFi Trash Bin is not mediated by all variables of the Theory of Planned Behavior and the Self-Determination Theory. According to the output of the total indirect effect and the specific indirect effect, only sentiments of attraction (Attitude toward the behavior) and belief in fixed positive consequences (Perceived Behavior Control) mediate motivation in the motivation to use the WiFi Trash Bin.

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