Factors Affecting Behavioral Intention of Delivery Drones During the COVID-19 Pandemic

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Abstract

Delivery of goods which is usually done by face to face is advised not to do. Physical distancing is recommended by World Health Organization (WHO). Physical distancing helps limit the spread of COVID-19 this means we keep a distance of at least 1m from each other and avoid spending time in crowded places or in groups (WHO, 2020). A possible alternative is to make deliveries using drones. It can keep the sender and receiver from seeing each other face to face. The final decision on using the drone delivery service rests with the customer. This will be closely related to customer's behavioral intention. This study aims to find out what factors influence behavioral intention to use drone delivery during the COVID-19 pandemic. The factors analyzed were function, cognition, hedonic motivation, incentive, social benefits, and health benefits. These factors are tested and analyzed which influences behavioral intention. The results obtained are function, cognition, and health benefits. The significance level in this study is 0.1 with a limit T-value of 1.29007.

Keyword : *Physical distancing, drone delivery, behavioral intention, COVID-19 pandemic*

1. Intorduction

COVID-19 massively changed many human life orders. This is evidenced by the appeal of the World Health Organization (WHO) to keep their distance from each other. This aims to limit the spread of COVID-19 (WHO, 2020). Delivery of goods which is usually done by face to face is advised not to do. A possible alternative is to make deliveries using drones. It can keep the sender and receiver from seeing each other face to face.

The tendency of customer behavior to want to use drone delivery services is commonly known as behavioral intention. The focus of this study is to look at what factors influence customer's behavioral intention to use drone delivery services. This will probably be different when the COVID-19 pandemic takes place.

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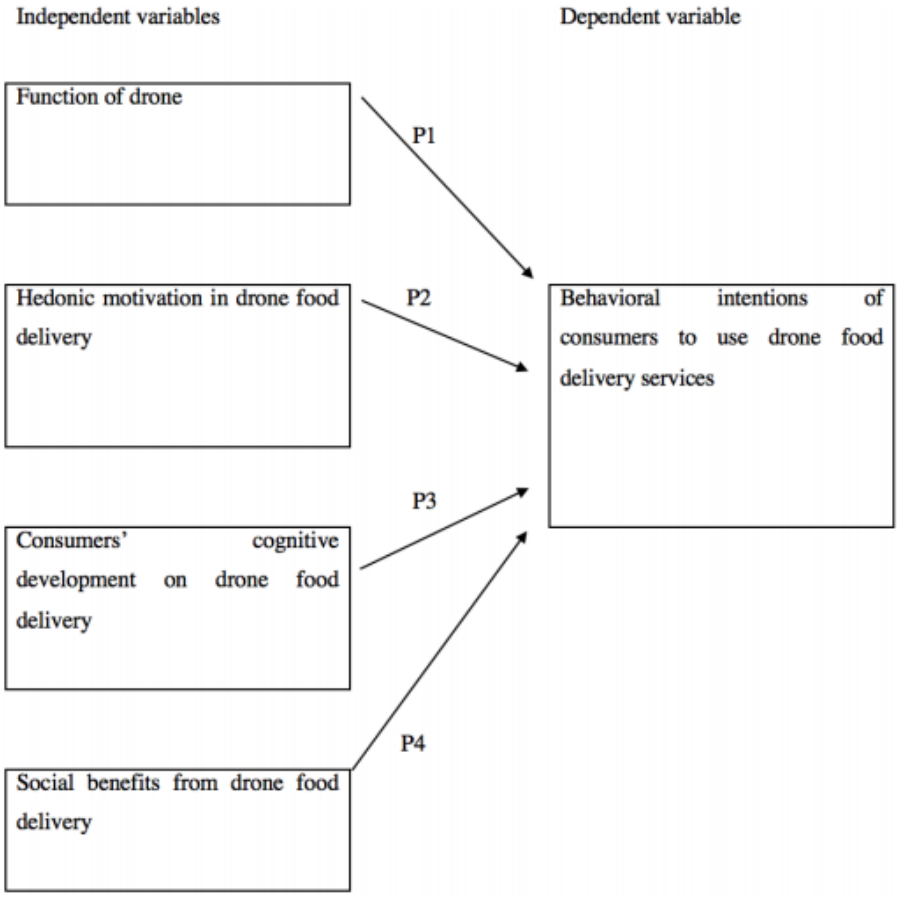
2. Previous Work

Several previous studies related to the conceptual framework regarding behavioral intentions of customers to use drone food delivery service. There are 4 factors that influence of behavioral intentions of customer to use drone food delivery service at that conceptual framework, among them function of drone, hedonic motivation in drone food, consumer's cognitive development on drone food delivery, social benefit from drone food delivery (Tom, 2020).

Figure 1. Conceptual framework behavioral intentions (Tom, 2020)



Conceptual framework adopted from the model made by Kasper and Abdelrahman (2020) and from Hwang et al. (2019). Some of the underlying theories are Technology Acceptance Model (TAM) (Davis et al., 1989), Extended Technology Acceptance Model (Venkatesh and Davis, 2000), Theory of Planned Behaviour (TPB) (Ajzen, 1991), Decomposed Theory of Planned

Behaviour (DTPB) (Taylor and Todd, 1995), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), and Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) (Venkatesh et al., 2012).

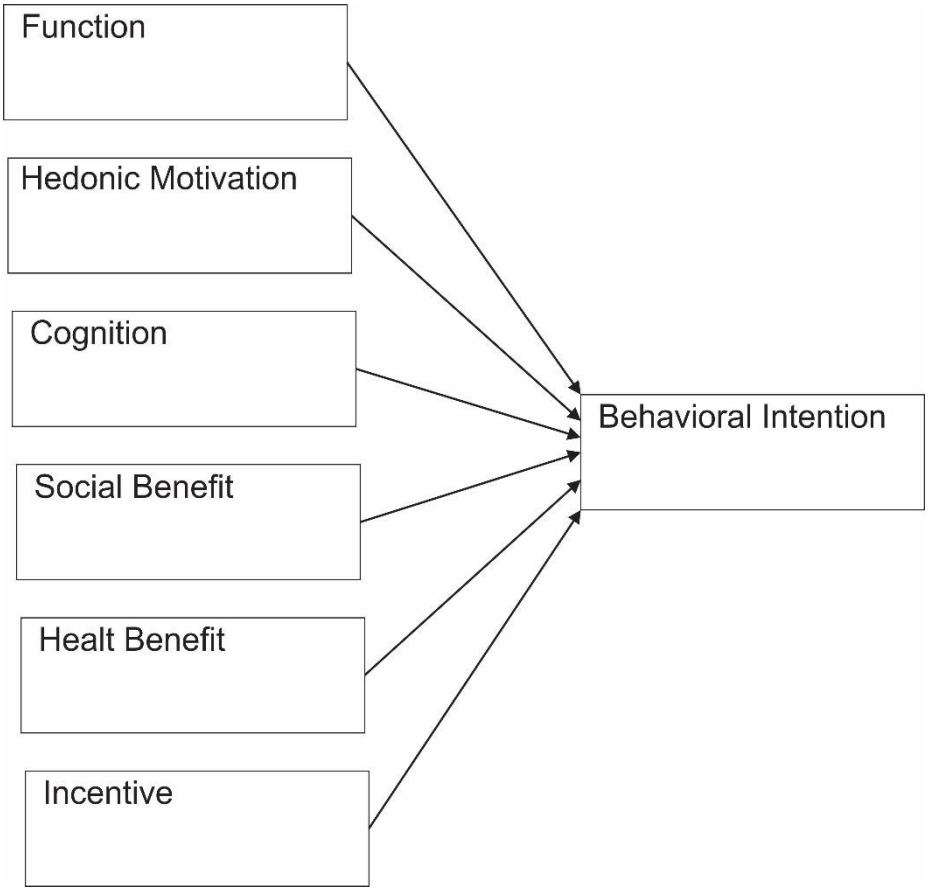
Incentive can encourage someone to be motivated to do something (Ritala et al., 2019). Giving incentives can change a person's attitude or behavior (Milne, 2007). If associated with behavioral intentions, there may be an impact. This is one thing that will be tested in this study.

The health benefit obtained by implementing physical distancing during the COVID-19 pandemic is being able to cut the spread of the SARS-CoV-2 virus (WHO, 2020). Maybe from a social point of view, this will reduce the usual social interactions. Social distancing carried out can reduce the average contact rate among individuals by 38% and the bias has an impact on the mortality rate below 0.5% (Thunstrom L et al., 2020).

3. Method and Result

Based on several factors from the discussion, the following is a model that will be tested:

Figure 2. The initial model to be tested



The form of a test questionnaire to see what factors influence the Behavioral Intention of using drones is as follow:

Tabel 1. Test questionnaire

Behavioral Intention	Does the technology in the delivery drone increase comfort, accessibility, and in accordance with what you need so that it affects your willingness to use the service?	Technology	P1	(Tom, 2020)
Function	Does the convenient and efficient technology to shorten the delivery time on the delivery drone service affect your willingness to use the service?	Time	P2	
	Do the lower shipping costs on a freight drone service affect your willingness to use the service?	Cost-efficiency in mind	P3	
	Does the noise from delivery drones affect your willingness to use the service?	Human Factor	P4	
Hedonic Motivation	Does the environmentally friendly energy used by the delivery drone (electricity) affect your willingness to use the service?	Green Energy	P5	
	Does the voice control system on the delivery drone create excitement and excitement for life that influences your willingness to use the service?	Excitement	P6	
	Do security issues affect your willingness to use the drone delivery service?	Security	P7	
Cognition	Will the work of the delivery drone affect your willingness to use the service?	How it work	P8	
	Does the existence of rules (regulations) from the government affect your willingness to use the service?	Regulation	P9	
	Does the issue of land rights and jurisdiction through which the drone delivery of goods affects your willingness to use the service?	Land Rights and Jurisdiction	P10	
Social Benefit	Do social benefits affect your willingness to use the service? For example, by using this service you will be considered cool.	Social Benefit	P11	
Health Benefit	Do health-related benefits affect your willingness to use drone delivery services? For example, by using this	Social Distancing	P12	(WHO, 2020)

	service you can implement social distancing to break the chain of COVID-19.			
	Will using a delivery drone affect your stress level because you feel safer not interacting directly with the person sending it?	Stress Level	P13	(Thunstrom et al., 2020)
Incentive	Does the discount incentive (can it be free) that the cost of sending goods using drones affects your willingness to use these services during the COVID-19 pandemic?	Motivation	P14	(Milne, 2007)

This questionnaire was filled out by 100 people randomly in Indonesia. The questionnaire data that has been obtained are used to test the initial model created. Here's the process:

3.1. External Model Evaluation (Outer Model)

There are several stages in this calculation process. There are three things that are calculated, namely convergent validity, discriminant validity and reliability.

3.1.1. Convergent Validity

Convergent validity was measured by determining the loading factor value and AVE. According to Latan & Ghozali (2012), an indicator is said to be valid if the loading factor value is > 0.70 and the AVE must be > 0.50. Based on this, the indicators with a loading factor value less than 0.70 are invalid indicators so they are removed from the model. After the indicator with a loading factor value <0.70 is removed, the path diagram is run (calculate) again, so that a path diagram with a valid indicator (loading factor> 0.70) is obtained.

Figure 3. Model with test data, Outer Model calculation results

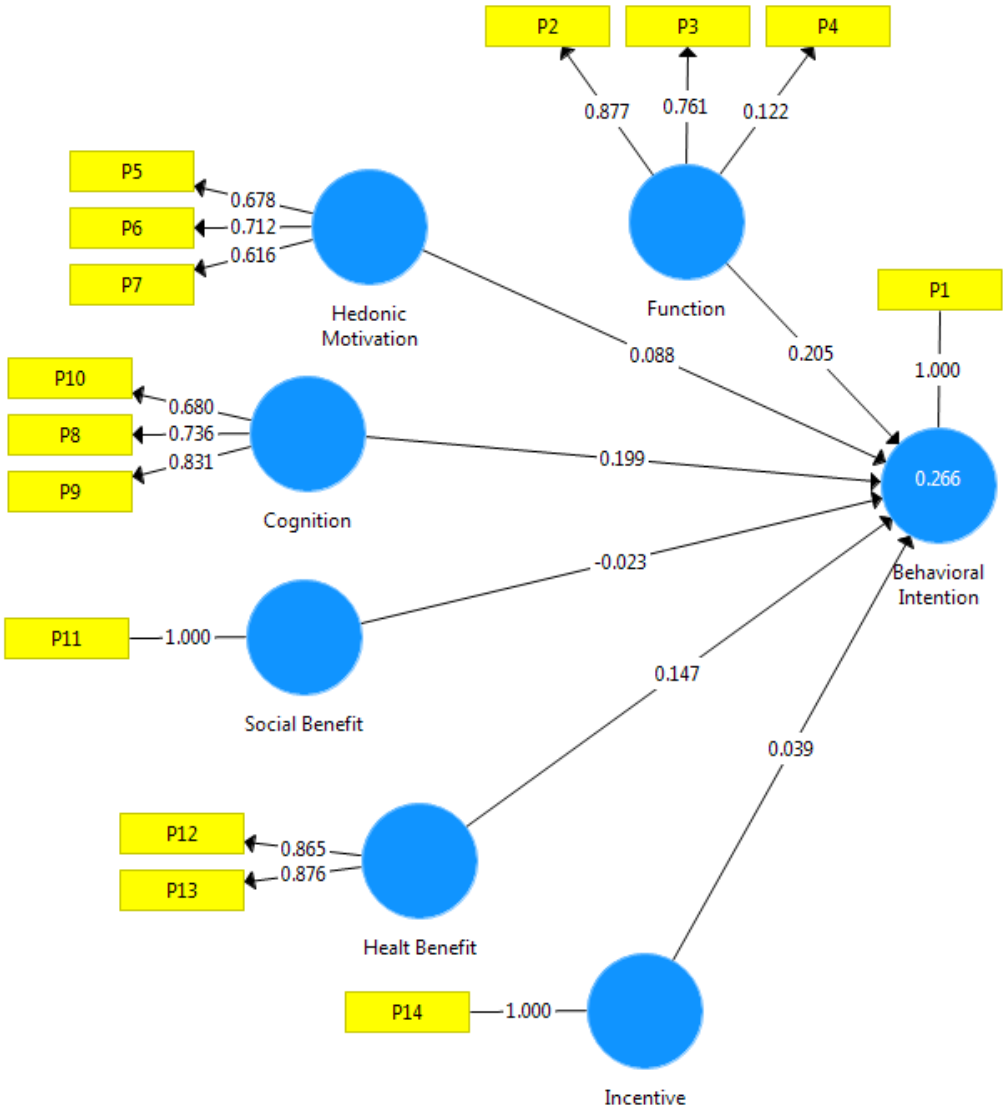


Figure 4. Model after deletion of variable P4, P5, P7, and P10. The Outer Loading score must be > 0.7000.

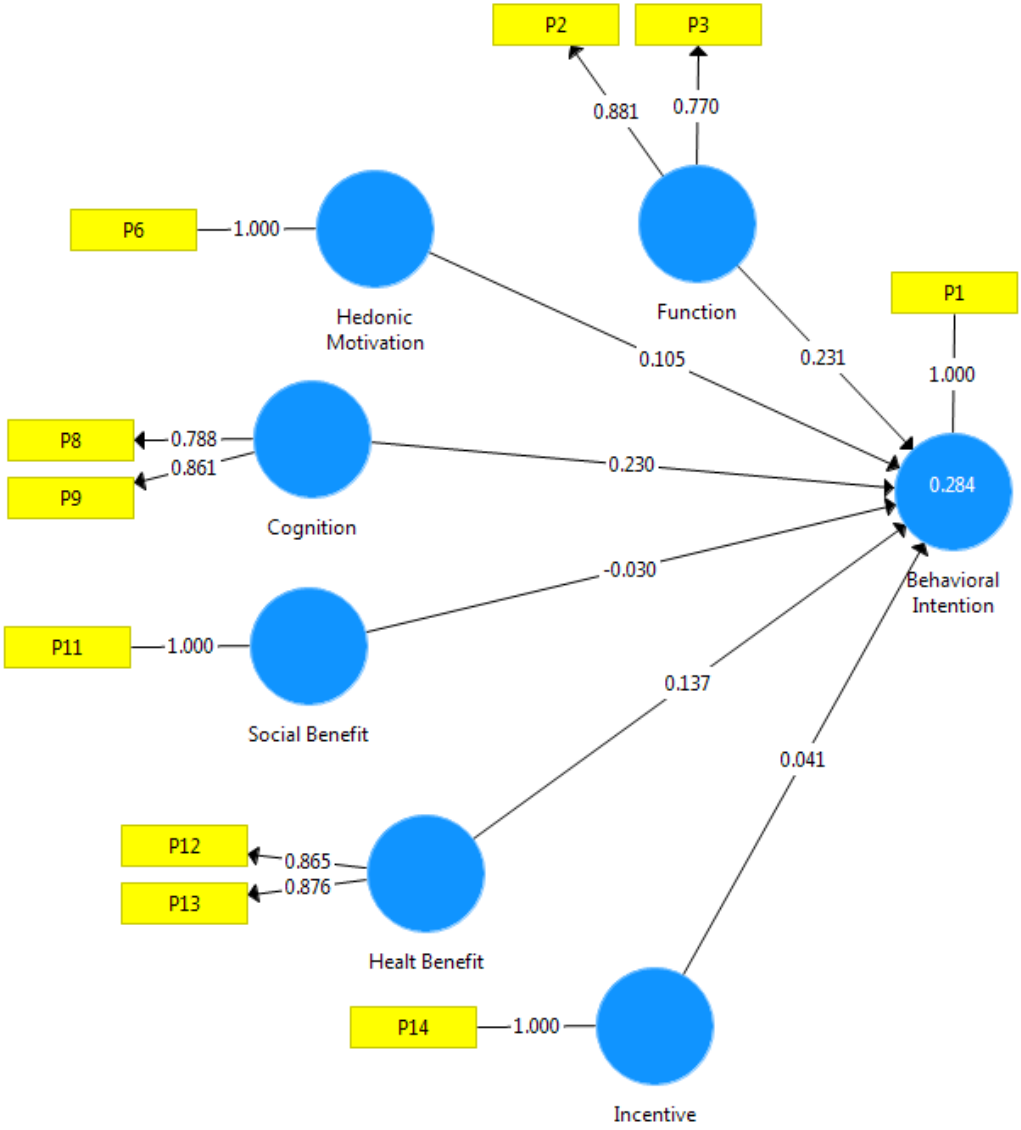
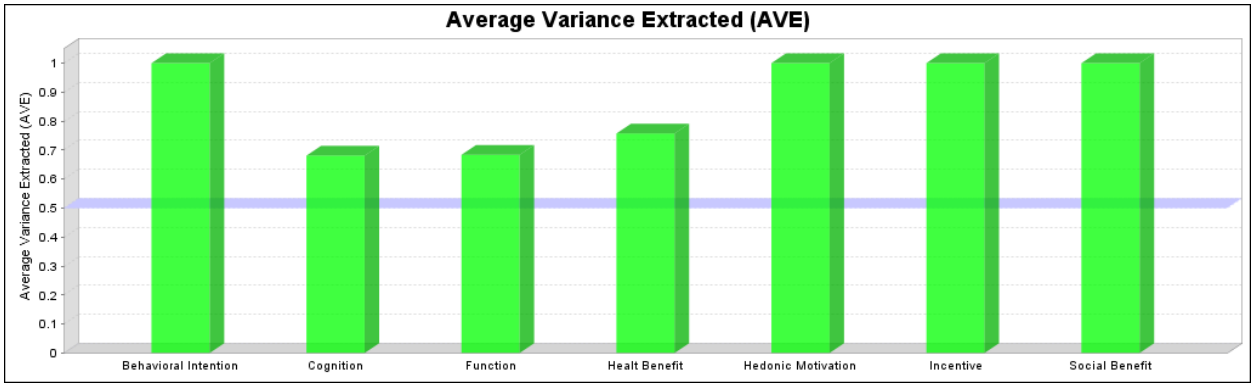


Figure 5. Average Variance Extracted (AVE). All indicators have AVE > 0.50.



3.1.2. Discriminant Validity

According to Latan & Ghozali (2012), discriminant validity is carried out by paying attention to the cross loading value of each valid variable indicator, provided that the value is> 0.70.

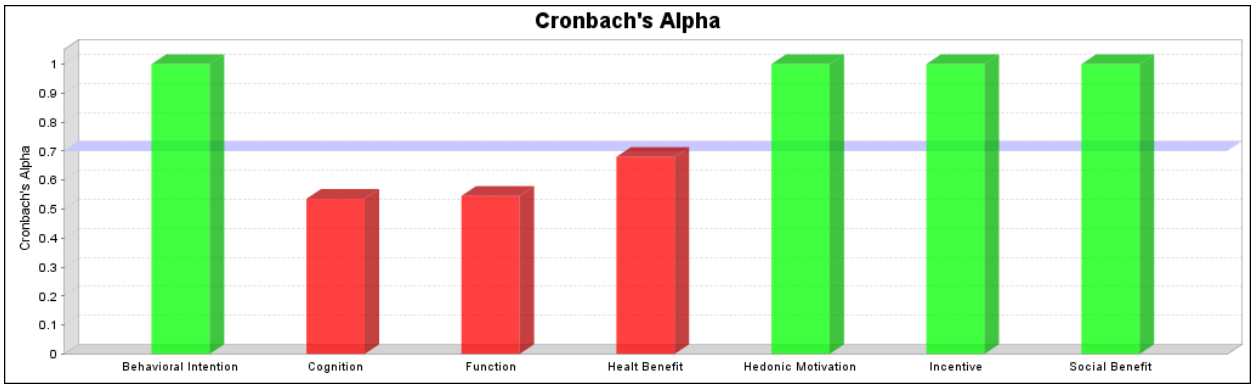
Tabel 2. Cross Loading. All variables on each indicator have a value > 0.07

	Behavioral Intention	Cognition	Function	Healt Benefit	Hedonic Motivation	Incentive	Social Benefit
P1	1.000						
P11							1.000
P12				0.865			
P13				0.876			
P14						1.000	
P2			0.881				
P3			0.770				
P6					1.000		
P8		0.788					
P9		0.861					

3.1.3. Reliability

Reliability can be assessed by paying attention to the value of Cronbach's Alpha and Composite reliability. According to Latan & Ghozali (2012) a construct is said to be reliable if the value of Cronbach's Alpha and Composite reliability is > 0.70. According to Hinton, Brownlow and McMurray (2004), Cronbach's alpha for values < 0.5 have low reliability, values 0.5 - 0.7 have moderate reliability, 0.7 - 0.9 have high reliability, and above 0, 9 has perfect reliability.

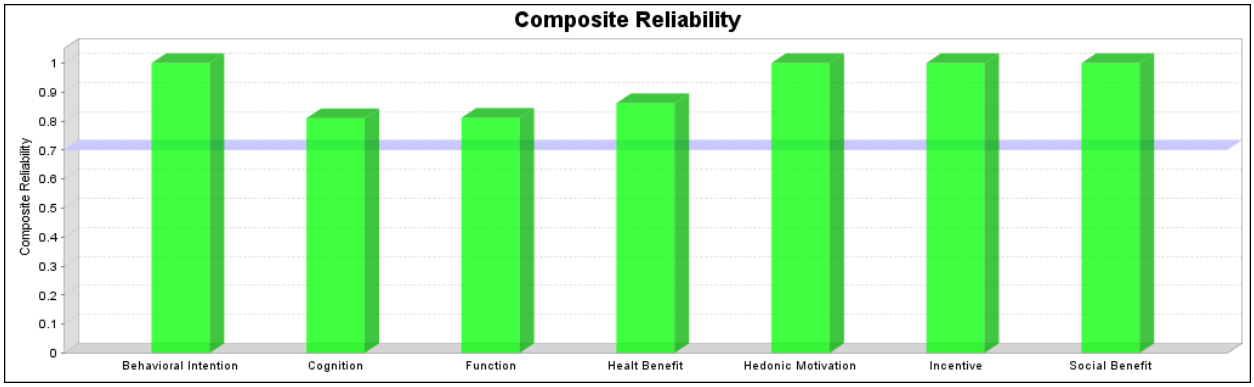
Figur 6. Cronbach's Alpha. Terdapat tiga buah indicator yang memiliki nilai Cronbach's Alpha moderat, yaitu Fungtion, Cognition, dan Health Benefit.



Tabel 3. Cronbach's Alpha Tabel

	Behavioral intention	Fungtion	Cognition	Health Benefit	Hedonic Motivation	Incentive	Social Benefit
Cronbach's alpha	1	0.535	0.546	0.68	1	1	1

Figure 7. Composite Reliability. All indicators show a value> 0.70.



3.2. Hypothesis Test

Research hypothesis testing is measured by T-Statistics. According to the T-table, for many samples of 100 and a significance level of 0.1, the hypothesis will be accepted if the T-statistic value is> 1.29007.

Tabel 4. Hypothesis test

	Original Sampl...	Sample Mean (M)	Standard Devia...	T Statistics (|O/STDEV|)	P Values
Function -> Behavioral Intention	0.231	0.236	0.110	2.111	0.037
Cognition -> Behavioral Intention	0.230	0.255	0.117	1.956	0.053
Healt Benefit -> Behavioral Intention	0.137	0.136	0.106	1.292	0.199
Hedonic Motivation -> Behavioral Intention	0.105	0.096	0.087	1.213	0.228
Incentive -> Behavioral Intention	0.041	0.035	0.088	0.463	0.645
Social Benefit -> Behavioral Intention	-0.030	-0.025	0.079	0.381	0.704

After the factors are tested and analyzed which influences behavioral intention. The results obtained are function, cognition, and health benefits. The significance level in this study is 0.1 with a limit T-value of 1.29007.

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