

# Validity and Reliability Construct Tests on The Intensity Scale of Smartphone Usage

Alifiana Hildaratri, Fatwa Tentama

**Abstract:** This research aims to illustrate the intensity of smartphone usage in educational context, in order to analyze the validity and reliability construct of the intensity of smartphone usage and to determine the indicator of the intensity of smartphone usage. The data were collected using the intensity scale of smartphone usage. The intensity scale consisted of motivation, duration of activity, frequency of activity, presentation, direction of attitude, and interest. Smart PLS 3.0 program with reflective construct through 2nd Order CFA were also used to assist the research. The data comprised of 69 students of the Faculty of Psychology in University X Yogyakarta. The results show that the dimensions and indicators of the intensity of smartphone usage are valid and reliable. The most-dominant dimension reflecting the construction of the intensity of smartphone usage is the interest. The least-dominant dimension reflecting the construction of the intensity of smartphone usage is the motivation. Those things show that all the dimensions and indicators are able to reflect and form the intensity of smartphone usage. Thus, the measurement model can be accepted since the theory that illustrates the intensity of smartphone usage is in accordance with the empirical data obtained from the subject.

**Keywords:** direction of attitude, duration of activity, frequency of activity, intensity of smartphone usage, motivation

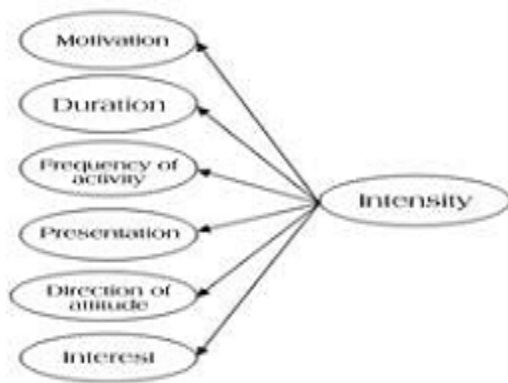
## 1 INTRODUCTION

Smartphone is one of the primary needs of modern people [1]. Initially, the smartphone was designed with a more compact size and internet connection to substitute modern computers and to facilitate its users [2],[3]. As more and more smartphone features are developed to facilitate activities such as learning, social interaction, character building, and many other services, the intensity of smartphone usage rises rapidly and the stuff is considered to become more and more important [4],[5],[6], especially with the increasingly affordable prices that make this device easy to get [7]. A smartphone offers various applications which enrich the sources of information with its extensive use and sophisticated technological capacity [8]. The smartphone comes with various models and operation systems to support the internet access which facilitates its users in the terms of learning and profession [11]. Other benefits of a smartphone are compact information storage system and advanced network management system that also acts as a vital communication channel [12]. If used positively, the smartphone can strengthen an individual's social bond with friends or families which eventually will enhance the quality of life and psychological welfare of an individual [13],[14]. The increasing spread of smartphone will deepen and expand the social implication of cellular communication technology [15]. Apart from the great benefits offered by a smartphone, some researchers reported that excessive use of smartphone can inflict negative consequences to our daily life [16], [17],[18],[19]. Excessive use of smartphone is defined as compulsive usage that leads to daily dysfunction in terms of productivity, social relations, physical health, and emotional well-being [20]. A number of researchers correlate the excessive smartphone usage with stress, boredom, and exhaustion [21].

A survey in 2017 showed that some individuals tend to waste their time, lack of sleep, and postpone or even leave their work when playing with their smartphones [22]. Individuals with high intensity of smartphone usage are found to be addicted to smartphones in daily life [23]. The smartphone intensity is a condition where an individual uses his smartphone in a relatively long time that makes him unable to control himself [24]. The smartphone intensity refers to the excessive use of smartphone which may disturb the daily life [25]. Smartphone intensity is an individual's habit of using his phone repeatedly that it brings negative effect on the welfare of its user [26]. The smartphone intensity illustrates an excessive and uncontrollable use of smartphone that leads to a series of negative consequences of the user's daily life, such as dysfunction in daily activities, insomnia, lack of physical activities, stress, decrease of academic performance, and changes in the social relations [27]. Nuraini [28] stated that intensity has several dimensions such as motivation with an explanation of the basic understanding of motivation is the internal state of an organism (both human and animal) that drives it to do something. Here, motivation is like the power supply to behave or act in a directed manner. There are two kinds of motivation, intrinsic and extrinsic motivation. Intrinsic motivation is a state coming from within an individual who can take action, that includes his love and needs of materials. Meanwhile, extrinsic motivation is the state that drives action due to external stimulation such as compliments, rewards, rules, role model from parents, teachers that encourage a student to get better academic achievements. The second is duration of activity. It is the duration of the ability of carrying out an activity. From this indicator, it can be inferred that motivation can be observed from someone's ability in using his time to do an activity. The third is the frequency of activity, which is the frequency of an activity carried out in a certain period. For example, the frequency of smartphone usage by students both inside and outside the campus. The fourth is the presentation, that is related to the great passion, will, or expectation to achieve what is being dreamt of through the activities that someone carries out. It can be seen from a student's will to keep using smartphone to get what he/she wants. The fifth is the direction of attitude as someone's readiness to take specific actions in responding positive or negative things. In negative forms, someone tends to keep distance, avoid, hate and even detest certain objects.

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Meanwhile, in positive forms, someone tends to approach, like, and expect certain objects. The sixth is the aspect of interest, which emerges if an individual is attracted to something because it suits his needs or he feels that something to be cultivated has a meaning for himself. The interest is strongly related to the personality and it always contain affective, cognitive, and determination elements. This gives the understanding that the individual is attracted to and tends to an object continuously, that his other psychological experiences are ignored. Previous research that discussed about the intensity of smartphone usage has been conducted by Farida [29], which subjects were the 7<sup>th</sup> grade students of SMP Negeri Kembang bahu Lamongan. The research showed an alpha cronbach score of 0.756. On the other hand, this research aims to test the validity and reliability construct on the variable of smartphone usage intensity with different variations of subject and dimension compared to the previous research mentioned above.



**Fig 1.** Conceptual Framework of the Intensity of Smartphone Usage

Based on the above explanation, it can be concluded that the intensity of smartphone usage is crucial in an organization. Considering the importance of the intensity of smartphone usage, the problem statements of this research will be: 1). Is the intensity of smartphone usage valid and reliable? And 2). Do the indicators of motivation, duration, frequency of activity, presentation, direction of attitude, and interest form the construct/variable on the intensity of smartphone usage?

This research aims to illustrate the intensity of smartphone usage in educational context, to analyze the validity and reliability construct of the intensity of smartphone usage, and to determine the indicators that form the intensity of smartphone usage.

### 3 RESEARCH METHOD

The participants in this research were 69 students of Faculty of Psychology of University X Yogyakarta. The data collection tool used in this study is the intensity of smartphone use which refers to aspects of the intensity of smartphone usage according to Nuraini's theory [28] that consist of motivation, duration of activity, frequency of activity, presentation, direction of attitude and interest. Likert scale is used in this research. The research scale is prepared based on a modified Likert model. The Likert scale has 4 alternative answers: strongly agree (SA), agree (A), disagree (D), strongly disagree (SD). The scale used is the intensity of smartphone usage.

The example of the items on the aspect of motivation are "following the latest smartphone trends" and "smartphone makes me more up to date". The example of the items on the aspect of duration are "feeling anxious when I go out without a smartphone" and "feeling worried if my smartphone goes low-battery". Next, the example of the items on the aspect of duration of activity are "seeing the notification on my smartphone once every 5 minutes" and "limitting smartphone usage". The example of the items on the aspect of presentation are "imitating someone's trendy style of dress on social media" and "being ignorant to what happens on social media". The example of the items on the aspect of direction of attitude are "I never post my activities on social media" and "I am more interested in other activities than playing online games". Last, the example of the items on the aspect of interest are "I find it easier to channel my hobbies on social media by smartphone" and "I'd rather shop directly than shop online".

**TABLE 1**  
THE BLUE PRINT OF THE INTENSITY OF SMARTPHONE USAGE

Dimension	Indicators	Item No.		Σ
		Favo	Unfavo	
Motivation	a. Feeling of love and need towards the materials or lifestyle.	1	3	2
	b. The urge to take actions because of external stimulus, compliments, and rewards.	2	4	2
Duration of activity	The duration of needed to carry out activities (smartphone).	5, 6	7, 8	4
Frequency of activity	The frequency of carrying out the activity within a certain period of time	9, 10	11, 12	4
Presentation	The great passion, will, or expectation to achieve what is being dreamt of through the activities	13, 14	15, 16	4
Direction of attitude	a. Positive behaviors; the tendency to approach, like, and expect certain objects.	17	19	2
	b. Negative behaviors; the tendency to keep distance, avoid, hate and even detest certain objects.	18	20	2

Interest	Gives the understanding that the individual is attracted to and tends to an object continuously, that his other psychological experiences are ignored		
	21, 22	23, 24	4
Frequency	14	12	26

**3.1 Validity and Reliability**

This research used the outer model in testing the validity and reliability of the intensity of smartphone usage scale using PLS 3.0 program with reflective construct. The construct validity test is confirmatory to show how well the results obtained from the use of measuring instruments are, based on the theoretical references used in defining a construct. The construct validity test conducted is convergent validity by observing the factor loading >0.5 average variance extracted value (AVE)> 0.5 and discriminant validity by comparing the root average variance extracted (AVE) of a construct that must be higher than the correlation between aspects. Next, the reliability test is done to show the internal consistency of the measuring tool, by observing the composite reliability and cronbach's alpha according to Copper which has to be <0.7, and according to Hair et al. [31], 0.6 value is still acceptable [30].

**4 RESULT**

Based on the outer model test on the construct, the intensity of smartphone usage can be described as follows.

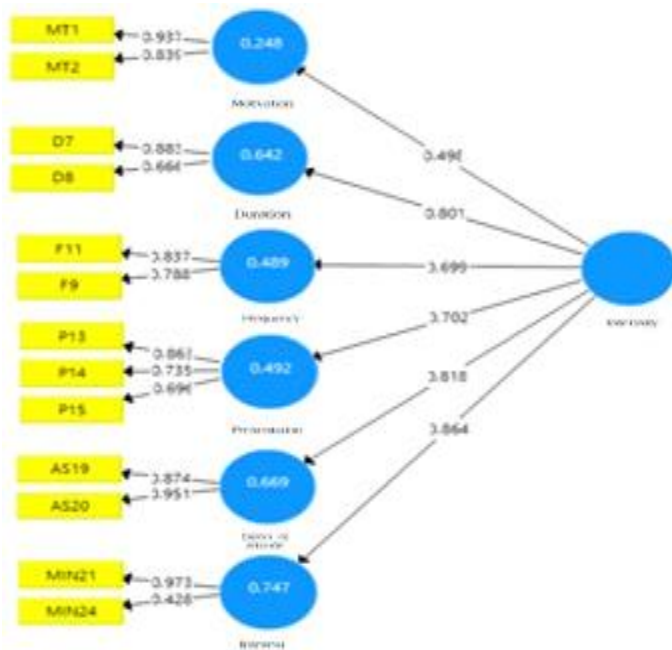


Figure 2. Output of outer Model

Based on the convergent validity test, it can be concluded that the value of the factor loading has met (aspect of variable) >0.5 and it can be seen in the following table.

**TABLE 2**  
THE VALUE OF FACTOR LOADING (aspect of variable)

Aspect	Factor of loading values	Information
AS	0.878	Valid
D	0.747	Valid
F	0.600	Valid
MIN	0.878	Valid
MT	0.521	Valid
Interest	0.605	Valid

Based on the convergent validity test, it can be concluded that the value of the factor loading (Aspect of indicator) has mettelahmemenuhi> 0,5and it can be seen in the following table.

**TABLE 3**  
THE VALUE OF FACTOR LOADING (ASPECT OF INDICATOR)

items	Factor Loading Score	Information
MT1	0.937	Valid
MT2	0.839	Valid
D7	0.883	Valid
D8	0.666	Valid
F11	0.837	Valid
F9	0.788	Valid
P13	0.863	Valid
P14	0.735	Valid
P15	0.969	Valid
AS19	0.874	Valid
AS20	0.951	Valid
MIN21	0.978	Valid
MIN24	0.428	Valid
MT1	0.937	Valid
MT2	0.839	Valid

**AVE Values**

Based on the discriminant validity test, it can be concluded that AE has met a score of > 0.5.The AVE values of the intensity of smartphone usage are

**TABLE 4**  
AVERAGE VARIANCE EXTRACTED (AVE) VALUES OF RESILIENCE CONSTRUCT

items	Factor Loading Score	Information
Direction of attitude	0.834	Valid
Duration of Activity	0.612	Valid
Frequency of Activity	0.660	Valid
Interest	0.565	Valid
Motivation	0.791	Valid

Presentation 0.590 Valid

The discriminant validity test has been met by comparing the value of average variance extracted (AVE) roots. The first aspect, which is the direction of attitude, with 0.913 value is higher than the aspect of duration of activity, which is 0.532; the interest, with 0.702 value, is higher than the motivation, which only has 0.438 value; the presentation, which has 0.700 value, is higher than the frequency of activity, which only has 0.418.

**TABLE 5**  
**THE VALUES OF AVE RESILIENCE CONSTRUCT**

Aspect	AS	D	MIN	MT	P	F
AS	0.913	0.532	0.702	0.438	0.700	0.418
D	0.532	0.782	0.628	0.198	0.585	0.774
MIN	0.702	0.628	0.752	0.348	0.491	0.600
MT	0.438	0.198	0.348	0.889	0.265	0.155
P	0.700	0.585	0.491	0.265	0.768	0.380
F	0.418	0.774	0.600	0.155	0.380	0.813

The reliability test on the composite reliability and Cronbach's alpha table have met the requirements, with a value of >0.7, even though 0.6 is still acceptable (Hair et al, 2008).

**TABLE 6**  
**THE VALUE OF COMPOSITE RELIABILITY AND CRONBACH'S ALPHA OF RESILIENCE CONSTRUCT**

Variable	Composite reliability	Cronbach alpha	Information
Intensity	0.860	0.800	Reliable

#### 4 DISCUSSION

The dominant indicators that influences the intensity of smartphone usage are direction of attitude and interest with the same factor loading of 0.878. The most dominant aspect reflecting the intensity of smartphone usage is interest, where its main indicator is that the users feel anxious if they go out without bringing smartphones and they feel worried if their smartphones go low-battery. Based on the results of the analysis of the validity and reliability construct, all aspects and items that make up the intensity of smartphone usage are declared valid and reliable, so all aspects and indicators are able to reflect and shape the intensity of smartphone use. Nuraini [28] stated the intensity has several dimensions such as motivation. Motivation is the internal state of the organism (both human and animal) that drives it to do something. Considering that in this study, it is proven that the highest indicator compared to the other four indicators, i.e. duration of activity which factor loading is 0.747; frequency which factor loading is 0.600; motivation which factor loading is 0.521; and presentation which factor loading is 0.605. The dimension that reflects the lowest intensity of smartphone usage is motivation, which main indicator is the feeling of love and need toward materials, or lifestyle, as well as the encouragement to take action because of the external stimulation, compliments, praises, and rewards. The factor

loading is 0.521. The specific behavior is that the users follow the latest smartphone trends and smartphones make the users more up-to-date. Supriani and Iqbal's research [32] entitled "The Influence of Smartphone Usage Intensity on Spouse Intimacy" correlated the effect of the intensity of smartphone usage on partners' intimacy. The results of their research supported the theory or concept explained which proved that the intensity of smartphone usage met the reliability requirements with an alpha cronbach's value of 0.361. Meanwhile, in this research, the results show that the intensity of smartphone usage fulfills the reliability requirements with an alpha cronbach's value of 0.800. The results of this research are expected to give an illustration of the validity and reliability construct of the intensity of smartphone usage of the students of Faculty of Psychology, University X Yogyakarta in order to be used as a reference for further researches on the intensity of smartphone usage.

#### 5 CONCLUSION

The construct of the intensity of smartphone usage meets the good validity and reliability. All the elements and indicators are significantly able to form variables of the intensity of smartphone usage, where the indicators having dominant influence on the intensity of smartphone usage are the direction of attitude and interest with equal factor loading of 87.8%. Thus, the results of this research are able to provide theoretical implication for the development of the intensity of smartphone usage and the practical implications of taking the future of teenagers. In addition, the results of this research are also able to test the model of the intensity of smartphone usage in relation to other variables, expand the research units, or use the context of the intensity of different smartphone usages so that the research results can be generalized.

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