The Influence of Innovation Factor towards Smartphone Adoption within the Circle of Private College Lecturers in Bandung

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Abstract—**Nowadays, smartphones and wearable devices are parts of a broader computing offering that include connected screens in the workplace and in public spaces. User experience designs will become critically important. This phenomenon affects individual, organization lifestyle, and educational industry. The high demand from educational industries has given some influences on the academics' lifestyle, specifically the lecturers whose previous lifestyle was conservative. Their conservative lifestyle has changed to a modern lifestyle due to the high level of mobility.**

This research investigates the influence of innovation factor towards smartphone adoption, which focuses on private college lecturers in Bandung. This research exposes innovation, which is particularly related to the mobile technology (smartphone) that is accepted by the lecturers. This research is aimed to figure out whether there are relevance, observe-ability (observe-ability), compatibility, personal demographics, personal experience, internal environment, and external environment influencing the attitude of smartphone utilization.

The conceptual framework is developed from the synthesis of the literatures that are related to the innovation factor of smartphone adoption. The higher the innovation factor is when they use their smartphone, the more of the smartphone adoption takes place. This research was conducted on cross-sectional survey and convenience/accidental sampling from the lecturers of Telkom University in Bandung, Indonesia. The survey was done using questionnaire instrument, distributed using Google docs and face-to-face.

Based on the validity and reliability tests obtained from the questionnaire pre-test results, this research questionnaire is apparently valid and reliable after removing item 24 and item 25. Item 24 stated that the usage of smartphone would not improve the business development process of the institution, but the laptop does. Item 25 stated that competitor institutions did not affect the use of smartphone inside an institution. The questionnaire post-test was carried out using 25 out of 27 question items. The next target that should be accomplished is the distribution of the questionnaire for the samples of the research, 223 respondents consisting of private college lecturers. After the number of respondents has been fulfilled, data analysis using Partial Least Square (PLS) technique was executed.

Keywords— *Compatibility, External Environment, Smartphone, Internal Environment, Observe ability; Personal Demographics Relevance, Personal Experience.*

I. INTRODUCTION

The progress of global information and communication technology continues to increase as the use of the internet raises too. In 2011, the number of the Internet users in Indonesia reached 55 million people. Wahyudi [1] in his research exposed that in average, the Internet users in Indonesia access the internet using smartphones such as smartphones, tablets and notebooks. The ownership of such smartphones can be used as the example to represent the behavior of technology adoption.

Nielsen Company Indonesia conducted a survey in 2011 which encompassed everything about mobile phones in Indonesia. The graphic displaying the survey results was published in Nielsen [2] and can be seen in figure 1.

Figure 1 shows that in 2010 the ownership of *mobile phone* in Indonesia increased about 3 times compared to that in 2005, while the fixed phone ownership had fallen off by 50% since 2005. Mobile ownership had mounted up significantly, which was most likely because the price of the mobile phones continued to be cheaper and cheaper during the period, and it could make the user's mobility easier too.
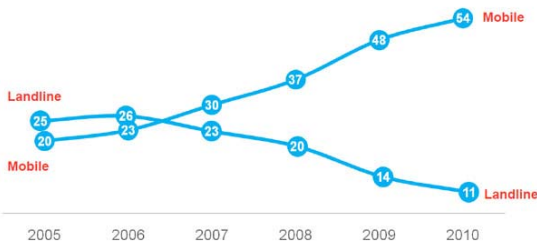
Handphone ownership triples in 5 years

Fig 1. Mobile phone ownership in Indonesia based on socio economic status.

The other survey results from Nielsen illustrate that the top position of mobile phone users was filled by the young-age groups, their number even escalated for about 3 times in 2010 compared to that of 2005. The data represents that the mobile phone users in the age group of 10-14 years old increased too in 2010. There was no significant growth in the age group of 50 years old, possibly because the group of older ages was less opened with technology and prefered old-fashioned ways.

Based on the previously mentioned data, It could be seen how huge the penetration of mobile phones in Indonesia was, It was known that, the mobile phone users did not only come from the middle-upper class only, but in fact, the middle-low class surprisingly had become the driving force of mobile phone industry in Indonesia. This phenomenon ascertained that Indonesia also took part in the phenomenon of significantly increased mobile phone usage in the global scope.

Based on the research conducted by Flurry [3], the adoption of smartphone has bursted globally and experienced the fastest growth if it is compared to any kinds of consumer technologies in the history of technology. It is known that there were more than 640 million of iOS and Android devices that had been used during July 2012.

The high demand of technology-based educations in the education industry these days has influenced the lifestyle of academics, in particular are college lecturers or instructors, which shifted from conservative to modern due to their high mobility. With reference to the background, then the problem that will be disclosed in this research is: How is the influence of *relevance*, *observe-ability*, *compatibility*, *personal demographics*, *personal experience, internal environment,* and *external environment* towards the attitude of smartphone utilization within the circle of private college lecturers in Bandung?

II. LITERATURE REVIEW

A. State of the Art of the Research

1) Technology Acceptance Model.

According to Lee [4] TAM is the most determining theory applied to figure out an individual's acceptance towards the Information System (IS) whereas TAM was adapted from the Theory of Reasoned Action (TRA). Figure 5 shows the Technology Acceptance Model according to Davis in Slatten [5].

Fig 2. Technology Acceptance Model
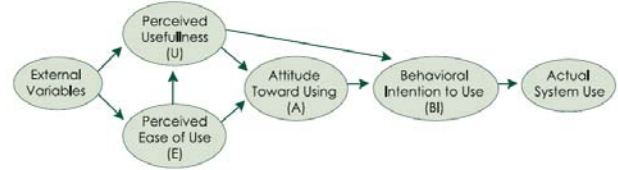
TAM in Figure 2 represents two beliefs; the Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) which are considered as the main connection of technology acceptance behaviour. The definition of PU according to Cheung [6] is the level of trustworthiness of an individual towards a technology which will increase the working skill or performance of that individual. This definition matches with the meaning of the word *usefulness* itself; usable and leads to beneficial. If it is applied in the context of organization, worker's performance boost can be accomplished by preferment, promotion, bonus, and achievement (Pfeffer [7]; Vroom [8]). A system with high value of PU in the user's trustworthiness, according to Siregar [9] will create a positive relation with the user's performance.

Cheung [6] uttered that PEOU refers to the level of how far an individual believes that the technology that they will adopt is easy to use (less effort). The definition of *ease* is lack of difficulty or extensive effort. Effort itself is the limited resource of an individual to do various kinds of activities. PU and PEOU are influenced by the external variables like thrust or pressure from other parties, changes in environment and the trends amongst the users of the technology.

2) Diffusion of Innovation (DOI) Model

The research by Sharif et.al [10] explained about DOI which was taken from Roger [11] it mentioned several basic factors as the first to investigate the theory of innovation diffusion. Rogers said, diffusion is a process where an innovation is communicated through a certain channel time by time among the members of a social system. In his research, Roger stated that innovation is an "idea, practice, or object which considered as something new by an individual or other unit of adoption."

Rogers [11] divided the characters of innovation which influenced the numbers of adoption into 5 groups:

- Relative Advantage, a level in which an innovation is considered better than an idea
- Compatibility, a level of innovation which is reckoned consistent with the values in the past experiences and the needs of potential adopters
- Complexity, a level in which the innovation is found hard to be used and understood
- Trial-ability, a level in which an innovation can be experimented restrictedly
- Observe-ability, a level in which the result of innovation is visible by the others

The conformation of the model that will be proposed in this research begun from the TAM (Technology Acceptance Model) which stated the earliest by Davis (1989) in Cheung [6] it mentioned about the subjective norm that could affect the individual's behavior related with the technology usage. In 2008, the prior model of TAM was enhanced to TAM3 by Venkatesh [12]. Another model that also used is DOI (Diffusion of Innovation), taken from Roger [11].

III. HYPOTHESIS

Based on the proposed conceptual model, the research hypothesis becomes like these:

H1: *Compability* affects significantly towards the attitude of smartphone usage among Private College Lecturers in Bandung

H2: *Observe-ability* affects significantly towards the attitude of smartphone usage among Private College Lecturers in Bandung

H3: *Relevance* affects significantly towards the attitude of smartphone usage among Private College Lecturers in Bandung

H4: *Personal demographic* affects significantly towards the attitude of smartphone usage among Private College Lecturers in Bandung

H5: *Personal experience* affects significantly towards the attitude of smartphone usage among Private College Lecturers in Bandung

H6: *Internal environment* affects significantly towards the attitude of smartphone usage among Private College Lecturers in Bandung

H7: *External environment* affects significantly towards the attitude of smartphone usage among Private College Lecturers in Bandung

IV. METHODS

Fig. 3 encompasses the flowchart of this research in the form of Ishikawa diagram (fishbone diagram). It contains the research that had been done and the research that will be conducted within the next 2 years. The fishbone diagram of this research is displayed in Fig. 3.
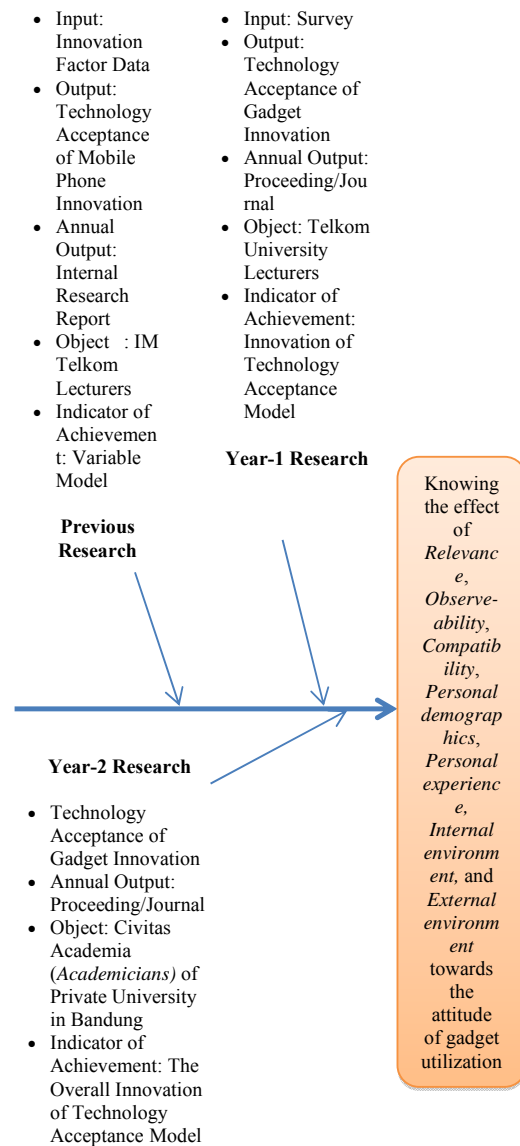
Previous Research

- Input: Innovation Factor Data
- Output: Technology Acceptance of Mobile Phone Innovation
- Annual Output: Internal Research Report
- Object : IM Telkom Lecturers
- Indicator of Achievement: Variable Model

Year-1 Research

- Input: Survey
- Output: Technology Acceptance of Gadget Innovation
- Annual Output: Proceeding/Journal
- Object: Telkom University Lecturers
- Indicator of Achievement: Innovation of Technology Acceptance Model

Year-2 Research

- Technology Acceptance of Gadget Innovation
- Annual Output: Proceeding/Journal
- Object: Civitas Academia (*Academicians)* of Private University in Bandung
- Indicator of Achievement: The Overall Innovation of Technology Acceptance Model

Knowing the effect of *Relevance, Observe-ability, Compatibility, Personal demographics, Personal experience, Internal environment,* and *External environment* towards the attitude of gadget utilization

Fig 3. Fishbone Diagram of the Research

V. RESULTS AND DISCUSSION

Before distributing the questionnaires to the required samples, the validity and reliability test need to be done first in order to make sure that the questionnaire that will be used is valid and reliable. The number of respondents required in validity and reliability test were 30 respondents. Those 30 respondents were acquired from direct questionnaire distribution (offline), the validity and reliability test was done by using the SPSS ver. 20 software and the result was stated below.

There were 27 items in the questionnaire for this research and after the pre-test was conducted to 30 respondents, the numbers of the items became 25.

A. Validity Test

Pearson's correlation was used in order to do this validity test. If the instrument was valid, then the interpretation criteria of its correlation index (r) would be:

Between 0.800-1,000 = Very High
Between 0.600-0.799 = High
Between 0.400-0.599 = Moderate
Between 0.200-0.399 = Low
Between 0.000-0.199 = Very low (invalid)
The employed criteria were:
Valid if the value of $r_{count} \geqslant r_{table}$ value
Invalid if the value of $r_{count} < r_{table}$ value

The value of r_{table} with the significant level of (a) as 5%, and N= 30, r_{table} value obtained was 0,361. Therefore, there were 2 question items which did not pass the validity test which can be seen in Table 1.

TABLE I.   VALIDITY TEST

Item No	Statement	Dimension	r_{count}
24.	Using the smartphone will increase the process of business development of the institution	INTERNAL ENVIRONMENT	0.257 (Invalid)
25.	Smartphone usage in an institution is affected by the competitor institutions.	EXTERNAL ENVIRONMENT	0.128 (Invalid)

Based on Table 1, there are two items with smaller r_{count} than r_{table} were obtained, they are item 24 (with r_{count} 0.257) and item 25 (r_{count} 0,128) therefore, item 24 and item 25 did not pass the validity test (invalid).

Item 25 became invalid because the usage of smartphone in an institution was not affected by the competitor institutions. Since item 25 got the smallest r_{count}.

TABLE II.   VALIDITY TEST (REMOVING ITEM 25)

Item No	Question	Dimension	r_{count}
24	Using the smartphone will increase the process of business development of the institution	INTERNAL ENVIRONMENT	0.252 (Invalid)

As seen in Table 2, item 24 has a smaller r_{count} than the r_{table} (its r_{count} was 0.252), therefore item 24 did not pass the validity test either (invalid). Item 24 was invalid because the use of smartphone would not improve the business development process of the institution, but laptop did. Since item 24 got the smaller r_{count} and there were still other items to represent the Internal Environment (item 21, 22 and item 23),

then item 24 could be removed from the questionnaire and the second validity test was performed. Eventually, all items were managed to get r_{count} larger than r_{table}, therefore all items passed the validity test (valid). Then the process could be moved on to the reliability test.

The question in item no.24, using the smartphone will increase the process of business development of the institution, but it was, in this study, declared invalid because it can be concluded that the usage of smartphones at the private college in Bandung is only to support personal interests and convenience and not for work that related to the institution.

B. Reliability test

The instrument of reliability test of this research was using reliability analysis with Cronbach's Alpha technique. The closer reliability coefficient to 1.0 is better. In general, a reliability which is less than 0.60 is considered poor, reliability around 0.70 is acceptable and more than 0.80 is good. The reliability of every statement items can be seen in Table. 3.

TABLE III.   RELIABILITY TEST

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.938	.941	25

Based on Table 3, the derived value of Cronbach's Alpha Based on Standardized Items was 0.941, in conclusion, the questionnaire of this research passed the reliability test (reliable).

VI. CONCLUSION

With reference to the validity and reliability test, the questionnaire of this research had provided a valid and reliable result after removing item 24 and item 25. Questionnaire Post-Test distribution was continued with the total number of 25 out of 27 question items.

Through the Bernoulli formula, it is stated that the minimum quantity of respondents that must be acquired are 385 people. The next target which should be accomplished is the questionnaire distribution to the samples of the research for the lecturers of Private Colleges in Bandung. Once the number of respondents has been fulfilled, then the step will move on to the data analysis by using Partial Least Square (PLS) technique.

Acknowledgement

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