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The effect of college students' technology acceptance on e-commerce adoption

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Abstract

This study aims to investigate e-commerce adoption using extended technology acceptance model (TAM) by adding self-efficacy and anxiety. The research samples included 233 undergraduate students were collected using an online survey form distributed through chat groups and social media. The collected data were analysed using partial least square-structural equation modelling (PLS-SEM) to investigate the proposed hypotheses in the model. This study found that self-efficacy has no impact towards perceived usefulness, self-efficacy has positive significant impact towards perceived ease of use, anxiety has no impact on both perceived usefulness and perceived ease of use, perceived usefulness has positive significant impact towards attitude, perceived ease of use has no impact towards attitude, perceived ease of use has positive significant impact on perceived usefulness, perceived usefulness has no impact towards e-commerce adoption, perceived ease of use has positive significant impact towards e-commerce adoption, and attitude has a positive significant impact towards e-commerce adoption. These findings further confirmed that TAM not only could be used to predict e-ticketing, e-learning, e-payment, and e-commerce purchase adoption but also e-commerce entrepreneurship. This study also further confirmed that the relationship between extended variable such as self-efficacy and anxiety with TAM variables might vary according to where the investigation was being held.

Keywords: anxiety; e-commerce; intention; self-efficacy; TAM.

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INTRODUCTION

E-commerce in Indonesia has been proliferating within the past decade. In 2020, e-commerce transactions in Indonesia were predicted to reach USD 12 billion (Lingga, 2019). In addition, Indonesian digital economy was in the first position,

contributing 49% in the Southeast Asian region (Rahayu, 2019). This massive growth of e-commerce in Indonesia would not have happened without the significant contribution of e-commerce platforms, whether they were the ones that came from outside or inside Indonesia. The presence of *Tokopedia*, one of the biggest e-commerce platforms in Indonesia founded in 2009 (Balea, 2017) and *Go-Jek*, the application that has numerous on-demand features from transportation to food hailing, became the platform for the small and medium enterprises in Indonesia to market their products (Koesmawardhani, 2015).

According to statistics, the percentage of Indonesian citizens involved in e-commerce transactions still only reach 44% so the potency of e-commerce in Indonesia is still very high (APJII, 2019). In 2019, there were 6.4 million merchants who sold their product through *Tokopedia*; among those numbers were housewives, office workers and college students (Maranti, 2019). Meanwhile, *Go-Jek* reported having 2 million drivers in the same year. This showed that the existence of an e-commerce platform had a significant impact on the development of SMEs in Indonesia, especially towards reducing Indonesia's unemployment rate that was still very high. Statistics showed that the percentage of unemployment compared to the available workforce in Indonesia reached 5.28% in August 2018. Although the unemployment rate has been slowly decreasing since 2015, there were still seven million unemployed Indonesian. This showed the importance of work field creation, primarily through SMEs, to further lessen Indonesia's unemployment rate (BPS, 2019).

College students also played an important role in e-commerce success, especially in Indonesia. Not only because they were one of the most significant internet users within the population (APJII, 2017), but they also still can make venture creation their career choice in the future. Numerous previous research on the relationship between students and e-commerce mainly focused on purchasing intention instead of entrepreneurial intention (Hwang et al., 2018; McKay-Nesbitt et al., 2018; Rahman et al., 2017; Yusuf et al., 2018; Zhao et al., 2020). Nevertheless, several studies proved that the relationship between students and e-commerce as a career were still apparent (Chou et al., 2017; Farani et al., 2017; Mahajan & Agarwal, 2015).

Technology Acceptance Model (TAM) is often used in research related to several topics such as e-ticketing, e-learning and e-payment (Liang & Shiau, 2018; Moradi et al., 2017; Salloum & Al-Emran, 2018). In regards to e-commerce, previous studies mentioned the connection between TAM and consumers' e-commerce purchase adoption (Riantini, 2018; Syarifudin et al., 2018), while several other studies focused more on SME's e-commerce adoption (Hassen et al., 2019; Hussein et al., 2019). However, there were still a rare amount of research related to students' e-commerce adoption as the user, while recent studies found that they often associated students only as consumers who use the e-commerce

application to do shopping rather than (future) merchants who use the application to market their products.

This research investigates college students' intention on venture creation through e-commerce, based on their user experience on the respective platform. Several previous types of research on the further developed version of TAM (extended TAM) usually included self-efficacy and anxiety as an external factor that influences intention (Bailey et al., 2017; Gumussoy et al., 2018; Isaac et al., 2017). Hence, this research also included both external factors mentioned above to investigate their effect on TAM, especially in e-commerce applications.

Technology Acceptance Model (TAM)

Several previous studies proved that TAM is an essential theoretical framework that could predict technology acceptance behaviour (Abdullah et al., 2016; Al-Gahtani, 2016; Hoque et al., 2015). TAM was initially used in research related to computer usage. After that, it became widely used research related to the intention of an individual towards technology usage. TAM consisted of four variables, perceived usefulness, perceived ease of use, attitude, and intention. The main purpose of TAM was to explain any factors that could determine the acceptance of computer usage, which then became widely used to explain technology usage behaviour in general (Davis, 1989).

Perceived Usefulness

Perceived usefulness is defined as how far someone's belief towards using a system is in their favour (Davis et al., 1989). This variable depicted that although an application was considered beneficial, the benefit will be overshadowed by the hardship and effort exerted if it is hard to use. This statement came from a theory that if a system could not help someone with their work, then it would not be accepted, regardless of any given effort (Robey, 1979). Previous studies stated positive relation between perceived usefulness and technology adoption, which is specific to e-commerce usage (Abdullah et al., 2016; Al-Gahtani, 2016; Hoque et al., 2015; Suryawirawan, 2019).

Perceived Ease of Use

Perceived ease of use is defined as someone's belief towards the effort they need to give to some extent on using a particular system. This variable showed that an individual's tendency towards using (or not using) an application was based on their belief that it could improve their performance on a specific task. If a technology felt challenging to use, it would negatively affect their performance (Davis et al., 1989). Consistent with the previous statement regarding the relationship between TAM and technology usage intention, there is also a strong positive relationship between perceived ease of use and technology adoption (Abdullah et al., 2016; Al-Gahtani, 2016; Hoque et al., 2015; Suryawirawan, 2019).

Attitude

Attitude is defined as an individual tendency to respond positively or negatively towards an idea, object, person or situation. It was stated that an intention, affected by attitude, on a specific behaviour could become a strong indicator towards the actualization of that behaviour (Fishbein & Ajzen, 1975). However, some previous studies chose to exclude attitude from the model due to the weak role found (Abdullah et al., 2016; Bhatiasevi, 2011). Several recent studies found a strong relationship between the two variables (Almaimouni et al., 2014; Bennani & Oumlil, 2014; Hoque et al., 2015; Isaac et al., 2017; Suryawirawan, 2020). Thus, the relationship between attitude and e-commerce future adoption would still be further investigated.

Intention

The intention is defined as a belief function connected with the followed behaviour (Fishbein & Ajzen, 1975). Intention to perform a specific behaviour, which in this research related to technology usage in the form of e-commerce, came from the resources and opportunity that an individual has, in a sense that whether within the process of performing such behaviour, was followed by available resources, technology and infrastructure required (Sohail & Shanmugham, 2003). In this research, the intention was related to becoming an entrepreneur through e-commerce adoption.

Self-efficacy

Self-efficacy defined how a person felt that they could achieve a specific performance. In this study, the impact of self-efficacy was investigated towards perceived ease, usefulness, and ease of use. In the absence of self-efficacy, there would not be enough motivation to perform a specific action or persist in a difficult situation (Bandura, 2002). Previous studies also provided positive results on the relationship between self-efficacy, perceived usefulness and perceived ease of use (Abdullah et al., 2016; Hoque et al., 2015).

Anxiety

Anxiety, or in the context of TAM expressed as computer anxiety, is defined as an individual's apprehension or fear of facing the possibility of a need to use a computer (Simonson et al., 1987). Although in this research's context, computer anxiety in its operational term, leaned more towards the fear to use e-commerce applications, as previous researches had investigated various forms of technology usage in this context, such as e-mail), e-learning and e-portfolio (Abdullah et al., 2016; Alenezi et al., 2010; Elasmar & Carter, 1996; Ndubisi, 2021; Saade & Kira, 2006).

Figure 1 outlines the theoretical model that guides this research. As in Figure 1, the following hypothesis is proposed:

H1: Self-efficacy has a positive impact on perceived usefulness.

H2: Self-efficacy has a positive impact on perceived ease of use.
H3: Low degree of anxiety has a positive impact on perceived usefulness.
H4: Low degree of anxiety has a positive impact on perceived ease of use.
H5: Perceived usefulness has a positive impact on attitude.
H6: Perceived ease of use has a positive impact on attitude.
H7: Perceived ease of use has a positive impact on perceived usefulness.
H8: Perceived usefulness has a positive impact on e-commerce adoption.
H9: Perceived ease of use has a positive impact on e-commerce adoption.
H10: Attitude has a positive impact on e-commerce adoption.

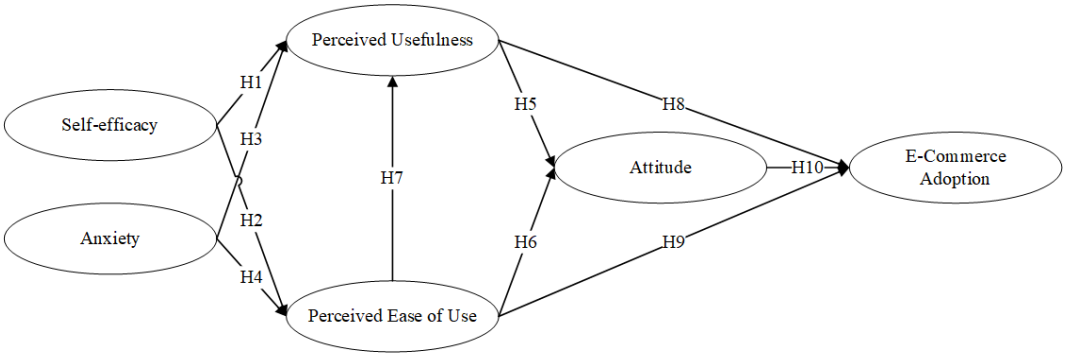

Figure 1. Conceptual Framework

METHODS

In this study, the samples were collected by online means through a Google form. Students were asked for their e-mail addresses and student numbers to ensure they only filled the questionnaire once. The samples were collected using non-probability purposive sampling through questionnaires. To further investigate future venture creation by adopting e-commerce, the questionnaires were explicitly given to male and female college students in Surabaya with ages ranging from 18 to 30 (some of the employee classes students were older than average college students) and have been using online shopping applications. According to statistics, college students were also significant users of the internet (APJII, 2017).

Some of the questions were purposively written in reverse to ensure that each participant read the questions and answered them carefully. Perceived usefulness, perceived ease of use, self-efficacy, anxiety and e-commerce adoption were measured using indicators adopted from previous research about self-efficacy and TAM towards e-portfolios (Abdullah et al., 2016). The attitude was measured using indicators adopted from previous research about the theory of planned behaviour towards intention to continue online shopping (Hsu et al., 2006).

To avoid central tendency, scales were modified to 4 scales to eliminate the weakness of 5 scales since it has a middle or neutral point, which respondents often used when they were unsure about their answers. Thus, the direction of respondents' answers would be determined clearly (Kulas, 2008; Tsang, 2012). Several previous studies also stated that respondents might select a middle point even though their

actual opinion is anything but neutral (Chyung et al., 2017; Kulas & Stachowski, 2009). Scales that were modified to 4 scales instead of 5 scales could also be used to ensure that participants were not intentionally avoiding what they perceived as socially unacceptable answers nor giving their answers with the sole purpose of pleasing the interviewers (Garland, 1991).

Previous researches stated that an R^2 of 0.25 is enough to explain a variable (Chin, 1998; Cohen, 2013; Falk & Miller, 1992; Hair et al., 2014). Based on previous research, the amount of sample-sized needed to reach statistical power of 80%, in a research which has at most three arrows pointing at a construct, in order to reach R^2 of 0.25 with a significance level of 0.01, is 84 (Hair et al., 2014). Thus, a minimum of that amount will be used in this research. This study used Partial Least Square as a statistical analysing tool using SmartPLS software.

RESULTS AND DISCUSSION

Respondent's Profile

There are 233 respondents who filled the questionnaire correctly, 69.9% of them were female, while 30.1% were male. 62.2% respondents are 1921 years old; 32.6% respondents are 22-24 years old; 3.9% respondents are 25-27 years old; 1.3% respondents are 28-30 years old. Meanwhile, 45.1% respondents use *Shopee*; 24.5% respondents use *GrabFood*; 21.5% respondents use *Go-Food*, 6% respondents use *Tokopedia*, 2.1% respondents use OLX; 0.9% respondents use *Bukalapak*. The detail of respondent's details can be seen in Appendix 1.

Based on the goodness of fit test shown in Table 1, indicators within variables with loading values below 0.70 had been eliminated, and all the $\sqrt{\text{AVE}}$ has higher values than their correlation (Table 2). Thus, this model has good discriminant validity. The composite reliability of each variable was above 0.70, so the model is considered reliable. The AVE of all the variables is above its threshold values. R^2 of perceived usefulness is identified at 0.455, which means perceived usefulness could be explained by self-efficacy, anxiety, and perceived ease of use by 45.5%. R^2 of perceived ease of use is identified at 0.287, so the variable can be explained by self-efficacy and anxiety by 28.7%. R^2 of attitude is identified at 0.622, so attitude can be explained by perceived usefulness and perceived ease of use by 62.2%. R^2 of e-commerce adoption is identified at 0.547. It means e-commerce adoption is influenced by perceived usefulness, ease of use, and attitude by 54.7%. In table 1, * stands for original value, ** stand for after elimination of loading < 0.70, and *** stand for loading < 0.70.

Based on the path coefficient result in Table 3, self-efficacy (SE) has no impact toward perceived usefulness (PU). In table 3, * stands for significant result at t-statistic ≥ 2.58. However, self-efficacy significantly influences perceived ease of use with t-statistic value 8.38 or ≥ 2.58, so H1 is not supported, but H2 is supported. Furthermore, a low degree of anxiety (ANX) has no effect on both perceived usefulness and perceived ease of use, so H3 and H4 are not supported.

Perceived usefulness positively impacts attitude (ATT) with a path coefficient value of 0.720, and the impact was significant with the t-statistic value of 11.77 or ≥ 2.58, so H5 is supported. Perceived ease of use has no impact toward attitude, so H6 is not supported. Perceived ease of use has a positive effect on perceived usefulness with a path coefficient value of 0.606.

Table 1. Goodness of Fit

Goodness of Fit	Loading*	Loading**	AVE**	$\sqrt{AVE}$	Composite Reliability**	R^2
SE: SE1	0.789	0.788	0.652	0.808	0.849	
SE2	0.787	0.787				
SE3	0.845	0.846				
ANX: ANX1	0.874	0.870	0.809	0.900	0.927	
ANX2	0.909	0.911				
ANX3	0.915	0.917				
ATT: ATT1	0.822	0.823	0.707	0.841	0.906	0.622
ATT2	0.864	0.864				
ATT3	0.844	0.844				
ATT4	0.833	0.833				
EA: EA1	0.924	0.924	0.810	0.900	0.927	0.547
EA2	0.913	0.913				
EA3	0.861	0.861				
PEOU: PEOU1	0.821	0.820	0.642	0.801	0.915	0.287
PEOU2	0.794	0.793				
PEOU3	0.833	0.833				
PEOU4	0.774	0.775				
PEOU5	0.757	0.758				
PEOU6	0.823	0.824				
PU: PU1	0.788	0.797	0.683	0.826	0.928	0.455
PU2	0.844	0.856				
PU3	0.849	0.845				
PU4	0.815	0.821				
PU5	0.833	0.838				
PU6***	0.544					
PU7	0.789	0.801				

Table 2. Latent Variable Correlations Matrix

	ANX	ATT	EA	PEOU	PU	$\sqrt{AVE}$
ATT	0.347					0.841
EA	0.387	0.714				0.900
PEOU	0.194	0.575	0.568			0.801
PU	0.244	0.785	0.623	0.662		0.826
SE	0.213	0.423	0.368	0.529	0.409	0.808
$\sqrt{AVE}$	0.900	0.841	0.900	0.801	0.826	

H7 is supported with significant results with a t-statistic of 9.36 or ≥ 2.58. Perceived usefulness has no effect on e-commerce adoption (EA) or H8 is not supported. Perceived ease of use has a positive effect on e-commerce adoption with

t-statistic value of 3.25 or ≥ 2.58 or H9 is supported. Lastly, the attitude has a positive and significant impact on e-commerce adoption, with a path coefficient value of 0.552 and a t-statistic value of 6.85 or ≥ 2.58. Thus, H10 is supported.

Table 3. Path Coefficient and T-statistic Result

Hypothesis	Variable	Path Coefficient	T-Statistic	Result
H1	SE → PU	0.064	0.85	Not supported
H2	SE → PEOU	0.511	8.38*	Supported
H3	Anx →PU	0.112	1.75	Not supported
H4	Anx → PEOU	0.086	1.58	Not supported
H5	PU → Att	0.720	11.77*	Supported
H6	PEOU → Att	0.099	1.50	Not supported
H7	PEOU → PU	0.606	9.36*	Supported
H8	PU → EA	0.043	0.42	Not supported
H9	PEOU → EA	0.222	3.25*	Supported
H10	Att → EA	0.552	6.85*	Supported

Discussion

Self-efficacy has no impact towards perceived usefulness. Although this finding has proven to be inconsistent with several previous researches that found a positive significant impact of self-efficacy towards perceived usefulness (Abdullah et al., 2016; Hoque et al., 2015), previous study also found no significant effect of self-efficacy toward perceived usefulness, which then provided support towards the result (Thakkar & Joshi, 2018). Another previous study that worked on the meta-analysis of factors affecting perceived usefulness also found that among 71 publications, only 24 studies that showed significant impact of self-efficacy towards perceived usefulness (Baki et al., 2018). This finding implied that regardless of how capable an individual felt towards the usage of an application, they did not feel any benefit from it. Most of the students involved in this study by far, have been using the application only to buy things while none actually ever used them to actually sell things, thus provided no sense of benefit to them especially in the entrepreneurial context. The previous statement also implied that the future usage of e-commerce as one of the means of venture creation, might produce different result from what had been found in this study.

This study found that self-efficacy has positive significant impact towards perceived ease of use. This finding has proven to be consistent with several previous researches that found a positive significant impact of self-efficacy towards perceived ease of use (Abdullah et al., 2016; Hoque et al., 2015; Thakkar & Joshi, 2018). This finding implied that the more an individual felt capable of using an application, the easier it was for them to use. This result also implied that the easiness they felt from using the application as consumer, carried over into their perception of easiness they felt towards using the application as a seller or entrepreneur. Further development of an e-commerce application that easy to use not only would, increase the number of existing entrepreneurs in general, but also increase the amount of e-commerce partner the application has, thus provided more

benefit to the company that developed the application. The previous meta-analysis on the relationship between self-efficacy and perceived ease of use also found 58 out of 71 confirmed positive significant result, which further supported this finding (Baki et al., 2018).

The result above showed that low degree of anxiety in this study has no impact towards perceived usefulness. Although this finding has proven to be inconsistent with previous studies that found a negative significant impact of anxiety (high degree) towards perceived usefulness (Purnomo & Lee, 2013; Park et al., 2012), several others studies showed no significant impact (Chen & Tseng, 2012; Mohamed & Abdul Karim, 2012), provided further support to this result. This finding implied that the fear towards using e-commerce application failed to provide any effects towards the usage. The fact that none of the student used the e-commerce application to sell things yet, once again might contributed to this result, further implying that the future actual usage of the application might have produced totally different result. In the end, this finding provided contradicting insight for further studies. Future studies could either confirm this finding by further examining the relationship between anxiety and perceived usefulness, or drop this external factor entirely as what had been done by previous research (Abdullah et al., 2016). Creating an application that could provide a sense of usefullnes would still become a determinant factor to this dilemma nonetheless.

Low degree of anxiety proven to have no impact towards perceived ease of use. Although this finding was inconsistent with several previous studies that found positive significant impact of anxiety towards perceived ease of use (Al-Gahtani, 2014; Calisir et al., 2014; Park et al., 2012), several other studies supported this finding (Abdullah et al., 2016; Agudo-Peregrina et al., 2014; Purnomo & Lee, 2013). This result not only implied that either low or high degree of fear towards an application failed to influence the ease of use of the aforementioned application, but also implied that among the relationship between the antecedents of perceived ease of use, self-efficacy played a bigger role than anxiety in defining whether using an application was easy or hard. Again, future studies might be needed to confirm this finding by further examining the relationship between anxiety and perceived ease of use.

Among the two variables, only perceived usefulness that has a positive significant impact on attitude while perceived ease of use showed no impact at all. The positive significant impact of perceived usefulness towards attitude was proven to be consistent with previous study (Hoque et al., 2015; Yadav et al., 2016), while the lack of impact on the relationship between perceived usefulness and attitude was proven to be consistent with other studies (Kala, 2017; Liébana-Cabanillas, 2017). This would still imply that only the degree of usefulness of an application that dictated the attitude of an individual towards it. Thus, it was also implied that perceived usefulness played a more significant role than perceived ease of use in defining a person's positive (or negative) attitude towards e-commerce applications.

In other words, to shape a positive attitude of the user, developer of applications needs to first ensure that an application could successfully fulfil its purposes.

The results shows that perceived ease of use has a positive impact on perceived usefulness. Consistent with previous research (Almaimouni et al., 2014; Bennani & Oumlil, 2014; Isaac et al., 2017; Suryawirawan, 2019), perceived ease of use played a significant role in defining perceived usefulness, where the degree of usefulness on an application relied on the easiness of using it. The previous statement implied that towards individuals, an application would only feel useful if it was easy to use. This also implies that towards the developer of application, the only way to ensure that their application would become useful for the user, they need to consider the easiness of the application.

Lastly, among the antecedents of e-commerce adoption in this study, only perceived usefulness produced insignificant result, while perceived ease of use and attitude showed significant impact towards e-commerce adoption. This finding was consistent with the previous research that showed the positive significant impact of perceived ease of use and attitude towards e-commerce intention (Almaimouni et al., 2014; Bennani & Oumlil, 2014; Hoque et al., 2015; Isaac et al., 2017; Suryawirawan, 2019). Although the result on perceived usefulness found to be inconsistent with the aforementioned extant corpus, some of the previous findings still showed similar results (Letchumanan & Muniandy, 2013; Suryawirawan, 2019). This result implied that rather than the usefulness of an application, the easiness of it and attitude towards it were the variables that determined its adoption. In other words, even if an application was provided to be useful, as long as it was hard to use or ignited a negative attitude, no one would want to use it. The varying results between this study and several past studies also could further implied that in the presence of students, who have not indulged in entrepreneurial activities, the usefulness of e-commerce application for entrepreneurial purposes proven to be non-existing. Hence, future studies regarding to this relationship should be done to further confirm this notion.

It is possible to use extended TAM to predict student's future intention on venture creation through e-commerce adoption. These findings also provided some insight to students that doing business is not as hard as how it was in the past. It was also proven that providing easy-to-use e-commerce applications would further increase the chance of adoption by current SME's and students in the future. Thus, might further increase the number of entrepreneurs in general and the number of current entrepreneurs who would use e-commerce applications to market their products. Towards university and other institute of higher education, this study hoped to be able to make them consider focusing the direction of their entrepreneurship student not only towards the blooming trends of digital start-ups at the moment, but also conventional business which greatly accommodated by the existing digital platform.

CONCLUSION

This study concluded that (extended) TAM not only could predict numerous electronic services usages as what had been found in the extant corpus but also successfully predicted e-commerce adoption, specifically related to future usage by college students as users. Increasing one's self-confidence toward technology usage, especially e-commerce application is very important, as it would affect not only their attitude but also the perception of usefulness and ease of use towards the application, which then further increased their intention to adopt e-commerce application as a means of venture creation in the future.

Based on the conclusion above, this study would give recommendations for further studies on the related subject. Although it was proven that the extended TAM model could also predict the use of e-commerce related explicitly to future usage by college students' entrepreneurial activities. It was also proven that the relationship of not only among external variables and TAM, but also among original TAM variables themselves, varied from one research to another. Hopefully, more research related to student's future usage could be done to confirm these findings even further. This research was conducted limited samples; future research could be done to larger samples to better represent the population and samples. Lastly, this study was conducted on several e-commerce applications. It would have been better if future research focused on only one of the applications to produce a specific result.

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Appendix 1. Respondent Profile

Characteristics		**Amount**	**Percentage**
Gender	Female	163	69.9%
	Male	70	30.1%
Age	19 – 21	145	62.2%
	22 – 24	76	32.6%
	25 – 27	9	3.9%
	28 – 30	3	1.3%
Most Used Apps	*Shopee*	105	45.1%
	GrabFood	57	24.5%
	Go-Food	50	21.5%
	Tokopedia	14	6%
	OLX	5	2.1%
	Bukalapak	2	0.9%
Total		233	100%