

Understanding the Effect of e-Commerce Security Towards Loyalty

Muhamad Nur Aldiyansyah¹ Fatya Alty Amalia^{1,*} Gundur Leo¹

¹ Department of Commerce Administration, Politeknik Negeri Bandung, Indonesia

*Corresponding author. Email: fatya.alty@polban.ac.id

ABSTRACT

In this pandemic, E-Commerce becomes one of the best choices for people to fulfill their needs and wants. Tokopedia, Indonesia's largest E-Commerce application, gains benefits from the increasing number of its monthly web visitor. Unfortunately, recently it suffered from a data breach that leaked most of its user data online, but somehow its monthly web visitor is still rising. This study aims to analyze the importance of E-Commerce security for the users and broadens the understanding of the importance of E-Commerce Security. The data collection was conducted in a quantitative method using an online questionnaire. A self-administered questionnaire (5-point Likert scale) was handed to 384 Tokopedia users using online media. The data were analyzed using Structural Equation Model (SEM). This study finds that although most of the users of Tokopedia can not quite grasp the concept of E-Commerce security, they still think that it is important and it will affect their loyalty towards E-Commerce.

Keywords: E-Commerce, Cybersecurity, CIA Triad.

1. INTRODUCTION

In these recent years, the Internet has transformed itself from a tool to become our best friend. This statement does not sound exaggerated while looking at data research of the Association of Internet Service Providers Indonesia (APJII) in cooperation with PusKaKom UI. It tells that in Indonesia, the number of internet users grows to 88.1 million [1]. The Internet can be defined as the whole network that is connected [2]. Computers in this network storing files, such as web pages, can be accessed by all network computers. The networks that the internet provides make it possible for us to connect ourselves to our friends, family, and colleagues. This fast-moving information made possible by the Internet, of course, will not be missed by business players. One of the implementations of the internet in the business field is the birth of E-Commerce. According to [3], E-Commerce is "a paperless exchange of business information using electronic data interchange, electronic mail, electronic funds transfer, and any other network-based technologies".

Indonesians are no stranger to the world of E-Commerce. According to the data provided by WeAreSocial.com in 2020, Indonesia stood tall above all other countries worldwide in terms of Mobile E-

Commerce Adoption. It states that Indonesian Internet users, ranging from 16 to 64 years old, are using their mobile devices to buy something online [4]. Of course, this data does not sound very shocking if we look at the data provided in the first paragraph. The number of users of Mobile E-Commerce applications surely adds up to the total internet users in Indonesia recently. Even more, this towering number of users is again increasing as the result of the recent calamity that happens to the world, the Covid-19 Pandemic.

Although the Covid-19 pandemic affects our economy and how the business is conducted badly, the social distancing that people must do, somehow, fortunately, gives E-Commerce a boost in profit. The number of E-Commerce users increased by 38.3% during the pandemic [5]. Some significant increasing sales are seen in several sectors, such as herbal foods (200%), health products (90%), hobby products (70%), and food (350%). This increasing number of products sales during the pandemic can occur because of the support provided by E-Commerce applications which help people to conduct their businesses easily. It is stated that the pandemic gives a ray of hope to SMEs that can utilize technology [6].

One of the most used E-Commerces during this pandemic is Tokopedia. In Q1 2020, Tokopedia has

around 69 Million monthly web visitors and this far surpasses Bukalapak in second place with only 37 Million monthly web visitors [7]. Unfortunately in March 2020, Tokopedia suffered from a data breach attack from hackers, which made 91 Million data of its users was exposed and sold online for US\$5,000 [8]. This attack exposes the vulnerability of users' data in the Tokopedia application. However, the number of users of Tokopedia remains the same, even gets increased. This phenomenon, thus, raises a question on how important E-commerce security for their users is. In relation to that matter, the purpose of this research is to analyze and gain an understanding of how E-Commerce security affects loyalty, and whether it is really important for the users of E-Commerce.

2. LITERATURE REVIEW

2.1 E-Commerce Security

E-commerce Security, a part of the Information Security framework, is specifically applied to the components that affect e-commerce. It covers Computer Security, Data Security, and other wider realms of the Information Security framework [9]. The fast-moving data made possible by the use of the Internet, make E-Commerce prone to attack by Hackers [10]. Consequently, poor security can be fatal for the development of E-Commerce [10]. This threat gives the E-Commerce industries a challenge to overcome in order to give their users more safety and to gain their trust [11]. E-commerce security is the protection of e-commerce assets from unauthorized access, destruction, alteration, or use. Its dimensions are as follows; Integrity, Privacy, Non-repudiation, Authenticity, Confidentiality, and Availability [11]. However, some scholars and practitioners argue that confidentiality, integrity, and availability are enough to represent the dimensions of E-Commerce Security, as they see that privacy, non-repudiation, and authenticity are already represented by those three dimensions which are also known as the CIA Triad [12]. The three features that need to be considered in the Internet of Things (IoT) are the same as mentioned before [13]. Thus, those CIA Triad dimensions are used to represent E-Commerce Security in this study.

2.1.1 Confidentiality

Confidentiality is the prevention of unauthorized disclosure of user information [14]. The word "confidentiality" is derived from the Latin verb *confidere* which is translated to "Having full trust or reliance" [12]. Confidentiality is the perceived ability to carry out an external task that restricts information just for the user who has it [15]. Thus, Confidentiality is fundamental for E-Commerce because user tends to store their important information on their app in order to

make it easy for them to make a transaction. Confidentiality and data privacy are major issues for E-Commerces and they need to pay more attention to these [16]. Privacy is a fundamental human right and is defined as "an individual's right to be left alone" [14]. The importance of this privacy makes confidentiality fundamental for E-commerce applications.

2.1.2 Integrity

Integrity is defined as a guarantee that the message sent is the same as the message received, and there is no alteration in its transit [14]. Integrity has a relation with the concept of ethical integrity [12]. Ethics has been described as a process that involves systematizing, defending, and recommending the concepts of right and wrong behavior [17]. This definition makes integrity should be upheld by any E-Commerce provider as users have a right to have their data used properly in an ethical way, in which the E-Commerce provider itself held the responsibility of any misused if that were to happens. One way to defend against unethical behavior that can happen is to have training and awareness about computer security [18] as discussed in this research.

2.1.3 Availability

Availability refers to a guarantee that information will be available to the user in a timely and uninterrupted manner, as fast as possible, anywhere and anytime [14]. This definition means that data inputted to the application must be available whenever the user needs it. Availability is also related to usability [12]. In the case of security software, it is noted that usability is associated with the capacity to avoid dangerous errors and to make users reliably aware of the task they need to perform [19]. Thus, it means that availability is needed in the E-Commerce application for it to be relied upon by its users.

Based on those variables mentioned before and the risks to happen if they are not applied properly, understanding how E-Commerce Security can affect perceived risk and trust for E-Commerce users is considered beneficial for the industries and the users. To that effect, hence the hypothesis:

H1. Confidentiality positively affects consumer satisfaction.

H2. Integrity positively affects consumer satisfaction.

H3. Availability positively affects consumer satisfaction.

2.2. Consumer Satisfaction and Loyalty

Consumer satisfaction implies someone's pleasure or disappointment after comparing a product's perceived performance (or outcome) with his or her expectations [20]. More satisfied consumers will tend to

be more loyal. Consumer loyalty presents the consumer faithfulness on a certain brand, realizing into repeat purchases or advocacy, regardless of the marketing efforts by the other competing brands [20]. This statement gives us an insight into how important satisfaction and loyalty are for the company. Strengthening those statements, it is found that, first, the research on consumer loyalty and satisfaction is scarce and it is far easier to obtain information from old consumers than from a new one. Second, consumer loyalty and satisfaction have a positive effect on the profitability revenues of the company [21].

As for E-Commerce companies, to develop trust and lessen the perceived risk from users, they should look at things beyond satisfaction [22]. Because in E-Commerce settings consumers have to be guaranteed that their information is confidential and not sold to others, they need to trust that the transaction is secured [23]. It is necessary to accommodate the consumers' trust in order to get their continuous uses of e-commerce [24]. If they are satisfied by how safe their data are, their trust will be born, as trust is an outcome of consumer satisfaction [25]. When trust and satisfaction are achieved, getting loyal consumers would be easier. It is also found that consumer satisfaction and trust significantly affect consumer loyalty [23]. Thus, the hypothesis is:

H4. Consumer satisfaction positively affects consumer loyalty.

The relation between variables used in this study is as follows:

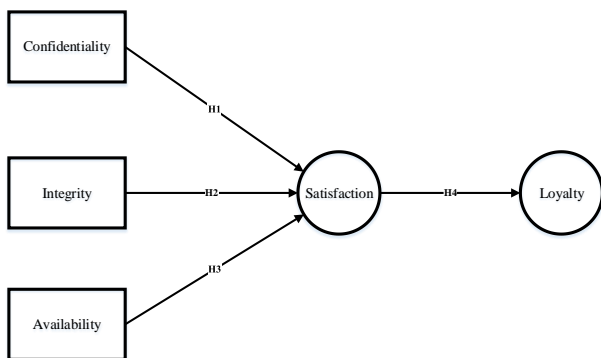


Figure 1 Research Model

3. METHODOLOGY

3.1. Variable Measurements

The study was conducted using a descriptive exploratory approach, as this approach is considered to be the most suitable approach by the researchers. The exploratory approach used secondary data which were obtained from reports and research about E-commerce. The exploration included the test of the relationship

between a variable that has been aforementioned in the literature review. The description activities were carried out by using an online questionnaire to determine consumer perceived cybersecurity risk when using Tokopedia.

3.2. Data collection Sample

In order to obtain accurate and comprehensive information, the right sample is critical. The selected sample need to at least meets the minimum requirements of 200 respondents [26, 27] and has a sample error margin of 5.24% to get good results. The researchers used 384 respondents from the population of Tokopedia users. The sample and sampling method used in the study was purposive sampling. The data collection used an online questionnaire that contained a five-point Likert scale for its measurement (scale 1 means strongly disagree; scale 5 means strongly agree).

3.3. Data Analysis

This study employed Structural Equation Model for its quantitative data analysis. To analyze it, SmartPLS was also used. The analysis consisted of Factor Loading, Composite Reliability, and Average Variance Extracted for the measurement model. For Discriminant Validity, we used the Heterotrait-Monotrait Ratio of Correlations (HTMT). As for the Structural model, we analyzed the Goodness-of-Fit (GoF), Coefficient Determination (R²), Path Coefficient, Cross-Validated Redundancy (Q²), and effect size (f²). To evaluate the descriptive statistics of the respondents, this research applied IBM SPSS.

4. RESULT

4.1 Respondent's Profile

Table 1 shows the profile of 384 respondents. The most dominant age group of the respondents is around 21-25 years old.

Table 1. Respondent's profile

	Descriptions	Frequency	Percentage
Last time using e-commerce	> 6 months ago	71	18,39%
	3-6 month ago	74	19,17%
	1-3 months ago	89	23,06%
	< a week ago	152	39,38%
Gender	Male	203	52,59%
	Female	183	47,41%
Age	17-20	46	11,92%
	21-25	202	52,33%
	26-35	74	19,17%
	36-45	46	11,92%
	>45	18	4,66%
Education	< high school	45	11,66%

Descriptions	Frequency	Percentage
High school	154	39,90%
D1/D2/D3	74	19,17%
Bachelor	88	22,80%
Postrauate	25	6,48%
Student	149	38,60%
Government employee	34	8,81%
Private employee	99	25,65%
Entrepreneur	49	12,69%
Other	55	14,45%
Income (Rp)		
<1.000.000	122	31,61%
1.000.000-2.000.000	76	19,69%
2.000.001-3.000.000	73	18,91%
>3.000.000	115	29,79%

4.2 Measurement Model

Table 2 shows the score of outer loadings, Composite Reliability, and AVE. The cut-off value of Outer loadings is 0.7, but it is still acceptable at more than 0,4 [28]. Furthermore, the Average Variance Extracted (AVE) value must be greater than 0.5; the criteria for convergent validity have been fulfilled [29]. As for the discriminant validity, as can be seen in Table 3, the indicator is the Heteroit-Monotrait Ratio of Correlations (HTMT) which can only be used if the criteria are less than 0.9 [29]. Thus, this study has fulfilled all the criteria associated with assessing the measurement model according to the previous literature.

Table 2. Loading, Composite Reliability, and AVE

Construct	Loadings	CR	AVE
Availability		0,834	0,561
Convenience	0,843		
Efficient	0,819		
Effective	0,697		
Update	0,704		
Confidentiality		0,903	0,700
Confidentiality	0,835		
Access Control	0,784		
Special features	0,835		
Privacy	0,889		
Integrity		0,817	0,531
Ethics	0,608		
Protection	0,747		
Accountability	0,813		
Permissions	0,731		
Costumer satisfaction		0,919	0,791
Satisfied	0,897		
Exceeding	0,892		

Construct	Loadings	CR	AVE
expectations			
Fun	0,879		
Costumer loyalty		0,879	0,709
Continued use	0,874		
Recommendation	0,859		
Making the Primary Choice	0,790		

Table 3. Heterotrait-Monotrait Ratio of Correlations (HTMT)

	AB	CF	CS	IG
AB				
CF	0,366			
CS	0,439	0,842		
IG	0,467	0,852	0,756	
CL	0,499	0,452	0,547	0,425

4.3 Structural Model

After analyzing the measurement model, the next thing was to measures the structural model. The Goodness-of-Fit (GoF) was used. GoF is divided into three categories, Small (0,1), Moderate (0,25), and Large (0,36) [29]. As seen in Table 4, the GoF value of this study is 0,505; therefore, it belongs in the large category. Thus, this model has a good quality. Meanwhile, the model quality assessment is taken from its capability to figure out endogenous constructs through R^2 , Q^2 , path coefficients, and f^2 .

Table 4. Goodness-of-Fit (GoF)

Variable	AVE	R^2	Q^2
CF	0,700		
IG	0,531		
AB	0,561		
CS	0,791	0,571	0,443
CL	0,709	0,204	0,140
Average	0,658	0,388	
$AVE \times R^2$		0,255	
$GoF = \sqrt{AVE \times R^2}$		0,505	

In scientific research 0,731n marketing subject, The R^2 value are divided into three; Substantial (0,75), Moderate (0,50), and Weak (0,25) [29]. The table above shows that Confidentiality, Integrity, and Availability can only predict Consumer Satisfaction by 57,1% ($R^2=0,571$), meaning that the prediction is moderate. Meanwhile, Consumer Satisfaction can only predict loyalty by 20,4%, meaning that it is weak [29]. Afterward, the Q^2 value needs to be above zero to know that a construct has predictive relevance [29]. As can be seen, the Q^2 value of the construct is above zero, meaning it is indeed has a predictive relevance.

Finally, the effect size was used to measure the substantive impact of the independent variable on the dependent variable. The effect size of variables can be divided into small (0,02), medium (0,15), and large (0,35), and the effect value of less than 0,02 indicates that it has no effect whatsoever [29]. Table 5 shows that Availability and Integrity have a small effect on Consumer Satisfaction, while Confidentiality has a large effect. Also, Consumer Satisfaction has a medium effect on Consumer Loyalty.

Table 5. Effect Size

	CS	CL
AB	0,035	
CF	0,396	
CS		0,260
IG	0,039	
CL		

To measure path coefficients, bootstrapping method with 5000 samples was used [28]. Critical t-values for the two-tailed test are 1.65 (significance level = 0.1), 1.96 (significance level = 0.05), and 2.58 (significance level = 0.01) [29]. As can be seen in Table 6, all of the hypotheses were accepted. H1 is accepted because Confidentiality has a positive impact on Consumer Satisfaction ($\beta = 0,569, p = <0,01$). H2 is accepted because Integrity has positive impact on Consumer Satisfaction ($\beta = 0,180, p = < 0,01$). H3 is also accepted because Availability positively impacts Consumer Satisfaction ($\beta = 0,130, p = < 0,01$). Lastly, H4 is accepted because Consumer Satisfaction positively impacts Consumer Loyalty ($\beta = 0,454, p = < 0,01$). The results on the relationship between variables were illustrated in Figure 2.

Table 6. Path analysis results

Hypothesis	β	t-value	p-value	Result
CF \rightarrow CS	0,569	12,385	0,000	Accepted
IG \rightarrow CS	0,180	3,611	0,000	Accepted
AB \rightarrow CS	0,130	3,524	0,000	Accepted
CS \rightarrow CL	0,454	10,763	0,000	Accepted

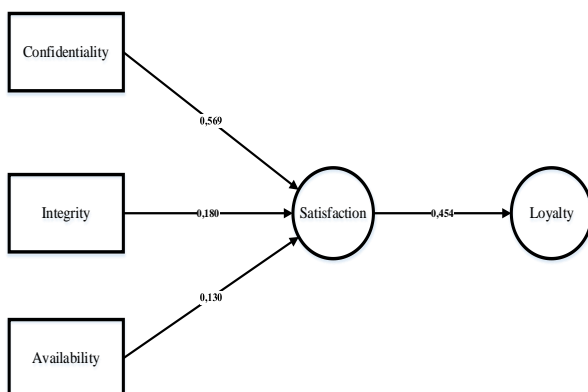


Figure 2 The summary of the Relationship between Variables

5. DISCUSSIONS

This study aims to measure the effect of E-Commerce Security on Loyalty in an E-Commerce platform. The results of this study show that E-Commerce Security indeed has an impact on loyalty through Consumer satisfaction. The one that gives the biggest influence is Confidentiality. More detail regarding the findings of this study will be discussed in the following paragraphs.

First, this study finds that Availability and Integrity have a positive impact on consumer satisfaction, though the effect is not that critical. It can happen because the users of E-Commerce applications do not quite understand what significance that Availability and Integrity give them when they are using the E-Commerce platform. This is in line with the findings of [30] which state that Indonesian people do not quite understand E-Commerce security. However, this finding proves that Availability and Integrity indeed play a role in consumer satisfaction which later leads them to be loyal. Therefore, to make the consumer even more satisfied, it is suggested for the E-Commerce platforms to provide education for their users on the importance of Availability and Integrity.

Second, from the three E-commerce security indicators, the one that gives the biggest impact is Confidentiality. This finding states that the user of E-Commerce platforms indeed care about their data privacy. Meaning that the safer their data are, the more satisfied they are with the E-Commerce platforms. It is in line with a study of [1] which states that confidentiality is one of the factors that affect the satisfaction and trust of E-Commerce users. This finding suggests that in order to gain the trust and satisfaction of their consumers, E-Commerce platforms need to be more serious about their security and strengthen it in order to overcome any challenges in the future. It is important because for their users to be satisfied, they need to feel safe.

Last but not least, this study also finds that consumer satisfaction positively impacts consumer loyalty. It means that in order to gain loyal consumers, E-Commerce providers need to ensure that their users are safe from any attacks that can damage their security. It is needed because consumers who trust their E-Commerce will feel satisfied, and if they are satisfied there is a higher chance for them to become loyal users [1]. This finding suggests E-Commerce providers focus more on their users so that they can understand the needs of their own users.

6. CONCLUSIONS

This study has empirically tested the relationship between E-Commerce Security and Consumer

Satisfaction, and also their effect on Consumer Loyalty. From this study, it is known that Confidentiality is the most essential factor in e-commerce security that can affect the satisfaction and yield the loyalty of E-Commerce users. Availability and Integrity also play a role in the satisfaction of E-Commerce users. This research has filled the gap and provided a broader knowledge regarding Cybersecurity in E-Commerce platforms for other researchers, practitioners, and related industries. It is hoped that this study can give consumers a better understanding of their privacy so they can play a bigger role in the industrial world.

As for practitioners, the findings give an insight into how E-Commerce security can affect loyalty. The results show that E-Commerce security is still seen as a strange concept for the users. It is quite ironic since it is fatal for them. However, these users still think that E-Commerce Security is important and it can lead them to loyalty towards the E-Commerce itself.

With these results, it is hoped that this study can give an insight for the practitioner of E-Commerce of the importance of E-Commerce Security for their users. They can provide knowledge for their users to understand the risk that haunts them and also make them feel safer, and thus, makes them loyal E-Commerce users.

REFERENCES

- [1] Dhiranty, A., B. Suharjo, and G. Suprayitno, *AN ANALYSIS ON CUSTOMER SATISFACTION, TRUST AND LOYALTY TOWARD ONLINE SHOP (A CASE STUDY OF TOKOPEDIA.COM)*. Indonesian Journal of Business and Entrepreneurship, 2017: p. 102.
- [2] Judi, S., A. El-Anshary, and R. Frost, *E-Marketing*. 2003, USA: Prentice-Hall.
- [3] Bhalekar, P., et al., *THE STUDY OF E-COMMERCE*. 2014. **4**.
- [4] Wearesocial *Digital 2020*. Wearesocial, 2020.
- [5] Exabytes, *Exabytes: Jumlah E-Commerce Naik 38,3%*, in *Techbiz.id*. 2020.
- [6] Amri, A., *DAMPAK COVID-19 TERHADAP UMKM DI INDONESIA*. JURNAL BRAND, 2020: p. 123-130.
- [7] Ipriceinsights *The Map of E-commerce in Indonesia*. 2020.
- [8] Eloksari, E. *Tokopedia data breach exposes vulnerability of personal data*. The Jakarta Post, 2020.
- [9] Niranjnamurthy and D. Chahar, *The study of E-Commerce Security Issues and Solutions*. International Journal of Advanced Research in Computer and Communication Engineering, 2013.
- [10] Khan, S., *Cyber Security Issues and Challenges in E-Commerce*. Proceedings of 10th International Conference on Digital Strategies for Organizational Success, 2019: p. 1197-1204.
- [11] Gupta, P. and A. Dubey, *E-Commerce- Study of Privacy, Trust and Security from Consumer's Perspective*. International Journal of Computer Science and Mobile Computing, 2016: p. 224 - 232.
- [12] Samonas, S. and D. Coss, *THE CIA STRIKES BACK: REDEFINING CONFIDENTIALITY, INTEGRITY AND AVAILABILITY IN SECURITY*. Journal of Information System Security, 2020: p. 21-45.
- [13] Sammy, V., *A survey on CIA triad for cloud storage services*. 2016.
- [14] Agarwal, A. and A. Agarwal, *The Security Risks Associated with Cloud Computing*. International Journal of Computer Applications in Engineering Sciences, 2011: p. 257-259.
- [15] Dholakia and Zwick, *Whose identity is it anyway? Consumer representation in the age of database marketing*. Journal of Macromarketing., 2004: p. 31-43.
- [16] Fienberg, S., *Privacy and Confidentiality in an e-Commerce World: Data Mining, Data Warehousing, Matching and Disclosure Limitation*. Statistical Science, 2006: p. 143-154.
- [17] Fieser, J., *Ethics, The Internet Encyclopedia of Philosophy*. 2014.
- [18] Sipior, J.C., B.T. Ward, and G.R. Roselli, *The Ethical and Legal Concerns of Spyware*. Information Management, 2005: p. 39-49.
- [19] Padayachee, *Taxonomy of compliant information security behavior*. Computers & Security, 2012: p. 673-680.
- [20] Kotler, P. and K.L. Keller, *Marketing Management. 14EEdition*. New Jersey: Prentice Hall, 2012.
- [21] Rosenberg, J.L. and A.J. Czepiel, *A marketing approach customer retention*. Journal of Consumer Marketing, 2017.
- [22] Ranaweera, C. and J. Prabhu, *Prabhu, J.: The influence of satisfaction, trust and switching barriers on customer retention in a continuous purchasing setting. International Journal of Service Industry Management 14(4), 374-395*. International Journal of Service Industry Management, 2003. **14**: p. 374-395.
- [23] Kassim, N. and N.A. Abdullah, *Emerald Article: The effect of perceived service quality dimensions on*. Asia Pacific Journal of Marketing and Logistics, 2010: p. 351 - 371.

- [24] Wang, C., et al., *Critical success criteria for B2B E-commerce systems in Chinese medical supply chain*. International Journal of Logistics Research and Applications, 2016: p. 105-124.
- [25] Kassim, N. and N. Abdullah, *The effect of perceived service quality dimensions on customer satisfaction*. Journal of Marketing and Logistics, 2008: p. 351-371.
- [26] Burns, A.C., R.F. Bush, and A. Veeck, *Marketing Research*. 2017: Pearson.
- [27] Nunan, D., D.F. Birks, and N.K. Malhotra, *Marketing Research: Applied Insight, 6th Edition, 6th Edition*. 2020: Pearson Higher Education.
- [28] Hair, J.F., C.M. Ringle, and M. Sarstedt, *PLS-SEM: Indeed a silver bullet*. Journal of Marketing theory Practice, 2011. **19**(2): p. 139-152.
- [29] Hair Jr, J.F., et al., *A primer on partial least squares structural equation modeling (PLS-SEM)*. 2016: Sage publications.
- [30] smail, F. *Pakar: Orang RI Tak Tahu Bahaya dari Kebocoran Data Tokopedia*. 2020; Available from: <https://mediakernels.com/2020/05/11/pakar-orang-ri-tak-tahu-bahaya-dari-kebocoran-data-tokopedia/>.