Validity and Reliability of Online Buyer's Anxiety Scale

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This study was designed to test the validity and reliability of buyers' anxiety scale of online buying. Data were collected from 250 respondents using self-reported anxiety questionnaires designed by researchers. The instruments tested consisted of two types of measurement scales, namely ASAOB-1 with five scales, from Never Experience with a score of 1 to Always with a score of 5. The second scale type named ASAOB-2 also uses a five-point scale to measure the level of anxiety, from Very Low (1) to Very High (5). The collected data were simulated using factor analysis to obtain the loading value as a measure of validity, while the reliability coefficient uses Cronbach's Alpha. Simulations were carried out in stages using subjects as many as 25%, 50%, 75%, and finally 100% of the total respondents. The proportion of subjects used in the simulation is determined arbitrarily. Simulation results show that there are a number of items of which the level of validity decreases when the number of cases increases. In general, the numbers of validity show fluctuations, and they are not linear with the number of cases used for testing. The Alpha Cronbach's coefficient is also not linear with the number of cases used in testing. From these findings, it is indicated that the indices of validity and reliability are not linearly related to the number of cases used.

Keyword: anxiety, risk of purchase, online shop, validity, reliability

Introduction

Nowadays, Information and Communication Technology (ICT) has been broadly used in various fields of life, including in the field of business. The use of ICT especially in business is to sell goods and services that have been growing well (Katawetawaraks & Wang, 2011; Teo, 2010). ICT-based shops, generally known as online shops, are flourishing well (Riaz & Raman, 2015). Online shops serve as an alternative for people to buy and shop for various types of goods. Their presence with their all conveniences encourages the people to shop in them. The people, especially those with modern lifestyle who are used to using the Internet and are familiar with smart-phones, tend to leave offline shops and switch to online shops (Hsiao, 2008). From time to time, the number of users of online shops grows significantly. In 2017, the number reached 1.66 billion (statista.com), with an increase of 25.76% higher than that during the previous five years period, namely 1.32 billion (Dobreva, 2018).

Such a very dramatic increasing number of digital shoppers is not without any reason. Various conveniences and flexibilities given to the shoppers are the main trigger why they tend to choose online instead

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of offline shops (Gupta, 2015). However, there are some negative sides that are impossible to avoid. The buyers are faced with some risks that might arise, because online purchase makes use of digital media (Kesici & Tunç, 2018) and such risks are impossible to happen in offline shops. Dealing with the risks, some researchers have described different components and dimensions, for instance, fraud risk, delivery risk, financial risk, process and time loss risk, product risk, privacy and information risk, product risk, personal risk and also after sales services risk, quality risk of the goods ordered, the misuse of the buyers' data by the sellers risk, delay of order risk , damage of the goods risk (Birkbeck & Xu, 2012; Widayat, 2018), and also social risk (Maziriri & Chuchu, 2017). Principally, the buyer's online risk may be chosen in terms of the financial risk, product risk, delivery and privacy risk or misuse of buyer's data information risk. In the psychological perspective, the risks may result in psychological disorders such as the symptoms of psychological disorder, anxiety, depression, or stress. This condition will worsen if it happens repeatedly or if the shoppers are addicted (Doğan Keskin & Günüç, 2017; Hasmujaji, 2016).

Buyers of online goods and services potentially may experience psychological disorders (Samantray, 2015) or tend to have psychological abnormalities (Doğan Keskin & Günüç, 2017) (Trotzke, Starcke, Muller, & Brand, 2015). In the online purchasing transactions, the buyers cannot directly meet with the sellers or the shop party, but they just do the transactions via electronic or social media the sellers apply. The anxieties the buyers feel are caused by some factors such us uncertainties, confusion, restlessness about the quality, specification, or also the improper time and address of the delivery of the goods, and even about the misuse of their personal data. Since in the online purchasing the goods that would be bought cannot be seen or soon received, the buyers might experience or feel some anxieties with the matter. This condition is worsened by the fact that it is the virtual media that play the roles in the online purchasing where misuses of personal data such as identity and data dealing with the financial matters, and the like, might happen in cybercrime.

Buyer's anxiety or online consumers are interesting to study either in terms of the methodological aspect, especially the instrumentation as the measure, or the assessment practices in the field. Studies trying to explain and explore anxieties in general have been conducted, for example, the anxieties about the use of computer (Durndella & Haagb, 2002), and anxieties about the use of the Internet as the variable as the focus of the study (Hasmujaji, 2016). But the studies of the anxieties at online shopping are still relatively scarce. Literature and empirical studies analyzing the anxiety variable found various measures, measurement scales and forms. However, up to now, any adequate Anxiety Measurement Scale in the context of online shoppers or buyers of goods and services has not been found. Except in online shopping, many previous researchers have applied Anxiety Measurements with their own weaknesses and strengths such as *Hamilton Anxiety Rating Scale (HAM-A)* (Beck, 1999; Metzger, 1976), *Generalized Anxiety Disorder 7-Item (GAD-7) Scale* (Beck, 1999; Sousa et al., 2015; Terrill, Hartoonian, Beier, Salem, & Alschuler, 2015), *The State-Trait Anxiety Inventory* (Alem, McLean, & Vercoustre, 2005; Quek, Low, Razack, Loh, & Chua, 2004), *Social Phobia and Anxiety Inventory (SPAI), The Depression Anxiety and Stress Scale (DASS), The Computer Anxiety Scale On Educational Administrators (CAS-EA)* (Agaoglu, Ceyhan, Ceyhan, & Simsek, 2008), *State-Trait Anxiety Inventory* (L. M. Alem, A.; Vercoustre, A., K F Quek et al., 2004; Vitasaria, Muhammad Nubli Abdul Wahabb, Tutut Herawanc, Ahmad Othmand, & Sinnaduraie, 2011), *Beck Anxiety Inventory (BAI), Hospital Anxiety and Depression Scale-Anxiety (HADS-A), The Statistical Anxiety Rating Scale (STARS)* (Chew, Dillon, & Swinbourne, 2018).

Developing a reliable, valid instrument with high accuracy, stability, and consistency to measure a psychological phenomenon (Bolarinwa, 2015) about the buyer's anxiety about buying goods or services

through online shopping is in a bad need. At the best knowledge of the authors, there have been many researches on the validity and reliability of the instruments to measure anxiety, but they have not especially dealt with digital instruments, the Internet, and the like. For instance, decades ago, the studies were focused on the validity and reliability of State-Trait Anxiety Inventory (Metzger, 1976), measurement of the validity in the Foreign Language Anxiety Scale instrument (Aydin et al., 2016), measurement of the validity in the Spence Children's Anxiety Scale (SCAS) (Direktör & Serin, 2017), validity and reliability testing of the Depression, Anxiety and Stress Scale (DASS) (Basha & Kaya, 2016), and the validity and reliability screening in the depression and anxiety disorders (Marrie et al., 2018). Therefore, it is greatly necessary to have a basically adequate instrument (Bajpai & Bajpai, 2014) since it will give impacts on the generalization or scientific inferences (Hall et al., 2014; Messick, 1994) and it also may be used as the clinical assessment or as the empirical development of science. Therefore, scientific principles and rules to test the validity and reliability of a measurement scale (Bolarinwa, 2015; Clark & Watson, 1995; Messick, 1994) should be maintained.

Accuracy, validity, reliability, and stability of an instrument are necessary for social researches in general, and also for the field of psychology, especially in a research using an indirect measurement of a variable from an abstract concept into the form of indicators and items with a certain measurement scale. Items of the indicator are expressed in a questionnaire. The guaranty of the validity and reliability of the questionnaire is very important to guarantee the quality of the research results (Singh, 2017). There are many ways and measures that are usually used as the standard to determine whether an instrument is valid or not and to show the regularity, consistency, and stability of an instrument to measure psychological aspects. The third aspect inherent in a measurement instrument cannot be applied to all subjects or objects of studies. A measurement instrument should also possess the fourth dimension, subject groups, or other groups and dimensions. For example, Tadeu, Kaya, Arslan, and Demir (2013) investigated validity and reliability of a problem solving scale in Portuguese version, and Hall et al. (2014) studied the validity and reliability of an assessment instrument of mental health problems for children and adolescents in Somalia.

Cronbach's Alpha is a research constancy instrument measure which is well known and widely used. This instrument is considered to be more superior than others such as split half, alternate form, or test-retest method (Bajpai & Bajpai, 2014; Singh, 2017). The discussion of reliability and the existing reliability measure is not the property of such instrument test, but is that of a test score (Junker, 2012; Messick, 1994). Most studies of reliability refers to a Classical Test Theory (CTT) or usually known as Classical True Score Theory. Therefore, a statistical condition, such as the number of sample, becomes important in testing an instrument reliability. Besides, the reliability test known so far has been based on the data variance used and the high or low index of reliability is not caused by the measured uni-dimensional concept stated in the instrument. Debates on this matter are still interesting to study, especially those dealing with the instrument measuring the psychological aspects and impacts of the online shopping phenomenon which is developing at the present time.

Besides reliability, another interesting debate dealing with the development of the questionnaire instrument is validity. The existing studies have discussed and applied validity better which are in terms of internal aspects measured using statistical approach (Junker, 2012). Traditionally, validity is divided into content, criterion, and construct, since the division is not a property of a questionnaire or test instrument, but is that of a test score (Messick, 1994). As a result, the test results many researchers have used to measure such an instrument validity are the testing of the test score which is not under the test dimension or uni-dimension used.

Based on the descriptions of the debates on instrument reliability and validity above, especially those dealing with the risks and psychological aspects the buyers might face, and the urgency of formulating the online shopper's anxiety measurement scale, it is interesting to create an anxiety measurement scale, especially in online purchase. This present article is design to explain the testing results of the validity and reliability of two anxiety measurement types. The researchers presume that different forms of instrument might also result in different validities or reliabilities when they are tested for the same respondents. Moreover, it is thought that validity and reliability deals with the number of cases used in testing, as shown in the classical testing theory. Therefore, the objective of this present article is to prove the correctness of the classical testing theory.

Research Method

Approach and Design

A quantitative approach was employed in this present research. To reach the intended research objective, some designs were applied. The first instrument is Anxiety Self-Assessment Online Buyer (ASAOB), consisting of two types namely ASAOB-S and ASAOB-2 with five-Liker scale each. The range of the scale in the first form (ASAOB-1) is from Very Low (1) to Very High (5), while the range of the scale of the second form (ASAOB-2) is from Never Experience (1) to Always Experience (5). Each form of the instrument was directly circulated to the chosen respondents and was distributed via google.doc. To measure the validity and reliability, some scenarios (simulations) were established from 30, 50, 150, and 200 to 250 respondents. The data used in the simulation were randomly determined by the computers with the aid of software SPSS.

Population and Sample

The buyers of goods, of which the purchase was conducted via online shopping, served as the population of this present research. The number and the residence of the population were not certainly known. Therefore, this research was conducted to the sample of the chosen respondents who unintentionally responded to the questionnaires distributed through either by online or offline. The number of the sample was 250 respondents who were determined with the consideration of the analysis adequacy without considering the representativeness since the number and the condition was not clearly identified.

Technique of Data Collection

The data were collected by online and offline whereby online the written questionnaires were distributed through google.com, and by offline, the printed questionnaires were administrated to the chosen respondents met in campuses in Malang city. Each sample of the respondents was given questionnaires consisting of two types of anxiety measurement with seven items each. In the first instrument (ASAOB-1) the anxiety is measured using from the scale from always (5) to never (1), while in the second instrument (ASAOB-2) the response starts from Very Low (1) to Very High (5).

Method of Data Analysis

The data collected were analyzed using some methods. Validity was analyzed using internal validity, confirmatory factor analysis, and factor analysis, while reliability was analyzed using Cronbach's Alpha. All data processing was conducted with the aid of the Software SPSS version 21. Before the levels of the validity and reliability were compared between the questionnaires model 1 and 2, they were compared with the existing standard, meaning that the comparison was made with valid and reliable questionnaire items.

Results and Discussion

The descriptions above show that these research data were collected by offline through the printed questionnaire instrument and by online via google.doc. The respondents were self-reported. From the 250 respondents were considered to be feasible to be used for the testing simulation. The testing simulation was conducted in some stages from the simulation with 25%, 50%, 75%, and 100% or all the existing respondents. The percentage was determined arbitrarily by the researchers. Based on the proportion, a staged simulation was conducted, wherein the first simulation 25% responses or 74 cases from a total of 250 responses were used. The case or respondent as the simulation material was randomly chosen by the computer program SPSS version 21. The simulation was made to obtain the loading factor value used as the validity measure for each item, and then it was continued with the calculation of the Cronbach's Alpha reliability coefficient for each questionnaire model (ASAOB-1 and ASAOB-2). The results of the simulation are presented from Table 1 to 3.

Table 1

Validity of Model ASAOB-1

Anxiety item		% Number of sample (n)			
		25	50	75	100
1	Being anxious that the ordered goods will not arrive on time.	0.516	0.534	0.598	0.600
2	Being anxious that the quality of the ordered goods is not good as intended.	0.696	0.608	0.417*	0.457*
3	Being anxious that the ordered goods are damaged or cannot be used.	0.774	0.708	0.750	0.754
4	Being anxious that the goods are sent to the wrong address.	0.693	0.653	0.424*	0.452*
5	Being anxious that the number of the ordered goods is not appropriated.	0.851	0.779	0.794	0.804
6	Being anxious that the money paid is not received by the shop.	0.763	0.684	0.733	0.728
7	Being anxious that his/her personal data were misused by the sellers.	0.663	0.727	0.674	0.660

Note. * valid at cut-off 0.4.

In Table 1, the validity loading value of the first type of the instrument Model ASAOB-1 is presented. This instrument used a five-point measurement scale from Never (1) to Always (5) for the anxiety felt after buying goods or services via online shops. As a whole, the anxiety scale items are indicated to be valid with the loading validity value of more than 0.4, when the standard applied is at least 0.4. But, if the standard as the validity cut-off is 0.5, not all items are valid. The fourth item dealing with "the address of the goods sent" and the second item concerning the "the quality of goods ordered" are shown to be valid if the data used are 50% or 125 cases and 25% or 75 cases, even when the cases used were 75% or about 187 cases, and even 250 cases.

Table 2

Validity of Model ASAOB-2

Anxiety item		% Number of sample (n)			
		25	50	75	100
1	Being anxious that the ordered goods will not arrive on time.	0.636	0.649	0.640	0.643
2	Being anxious that the quality and the types of the ordered goods is not good as intended.	0.593	0.558	0.527	0.567
3	Being anxious that the ordered goods are damaged or cannot be used.	0.732	0.654	0.721	0.724
4	Being anxious that the goods are sent to the wrong address.	0.758	0.699	0.762	0.752
5	Being anxious that the number of the ordered goods is not appropriated.	0.758	0.758	0.816	0.813
6	Being anxious that the money paid is not received by the shop.	0.740	0.647	0.744	0.729
7	Being anxious that his/her personal data were misused by the sellers.	0.705	0.604	0.669	0.662

In Table 2, it is presented the loading values showing the validity levels of items in the second type of the instrument, namely Model ASAOB-2. The instrument employs a five-point scale, from the lowest level to the highest one. From the data, it is shown that as a whole the items are valid; even when the threshold number is increased into 0.5, the validity number is still good or shows valid items. But other items have some fluctuated values and do not show any symptoms that when the number of the data is higher, their validity number will be higher, moving away from the threshold number and approaching the value of one.

Table 3

Instrument Reliability of ASAOB-1 and ASAOB-2 in Some Simulations

No.	Instrument type code	Percentage of case used in simulation (% of n)			
		25%	50%	75%	100%
1	ASAOB-1	0.832	0.796	0.673	0.702
2	ASAOB-2	0.830	0.776	0.673	0.702

In the reliability aspect, as shown in Table 3, the two instrument types, ASAOB-1 and ASAOB-2, show adequate reliability values with the Alpha Value of 0.6. Related to the number of the sample data used of 74 or 25% from the number of respondents, the reliability value is very high, namely 0.900. But, the higher the number of the data, the lower the value will be, although it still indicates that the value is still reliable since the reliability index of the Cronbach's Alpha is still above the reliability threshold. This finding strongly indicates that reliability is a score property which is viscous of statistics, which does not directly deal with dimension, uni-dimensionality of the components tested or measured as indicated by Junker (Junker, 2012). This indicates that the consistency of a scale is reflected by the reliability number, wherein this Cronbach Alpha is determined by the variation of scale, instead of by the content of an item in the scale. At the scale of the first type, the statement items show the frequency of the buyers' experiences dealing with the risks they face when they buy goods or services via online shops. Meanwhile, in the scale of the second type, the statement items show levels of anxieties the buyer's experience. The statements and answers are different between the first and the second types of the measurement scale instruments, but they use a five-scale response, but after they are tested, they result in almost the same reliability coefficients. Therefore, the researchers should be really careful and not be presumptuous in drawing any conclusions when testing the reliability with an instrument scale for the measurement aspects that are unobservable where the items measured are derived from abstract concepts. Any carelessness in testing may potentially cause some measurement bias and also any testing bias may give impacts on the scientific power or generalization power of an instrument. The instrument as a tool for data collection is important, as the starting point of the occurrence of any bias in research and in the conclusion drawing, and in recommendations of research results.

Conclusion

From the descriptions above, some conclusions may be drawn. Validity or reliability levels are indicated to be correlated with the number of data used in testing. Moreover, at a certain condition, this might be caused by incomplete data that will give impact on stability or consistency of the validity or reliability levels. There is no guarantee that the higher the number of the data used, the better the validity and reliability will be. Equivalent measurement scale will result in equivalent validity and reliability measure.

Research Limitation

It is simulation research using the data from 252 data. The simulation process was conducted using the data which were randomly chosen using the computer with the aid of the software SPSS. The researchers merely determined the percentage of the sample used in the simulation, and the computer chose the sample randomly. This selection process did not see any existence of a missing value in each case. The missing value was treated using "replace with mean". Moreover, in the simulation from the first to the fourth stages all existing cases were used, wherein the selection of the case, sampling with replacement technique was employed. In the simulation, it might that one case or some cases were chosen again in the next simulation so that this may give impacts on the data variation which is not relatively different. Therefore, it might be that the results of the validity and reliability are stable or do not change due to either consistent or changeable samples. Then, the data were directly obtained from the questionnaires distributed via online and were directly distributed in the form of printed questionnaires, where the respondents complete the by themselves, and this may enable to cause some respondents.

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