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### EMPIRICAL STUDY ON RECYCLING USED PAPER BOXES FROM ONLINE SHOPPING IN CHINA

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#### ABSTRACT

Online shopping is the most popular transaction, where the estimated transaction online is approximately USD 1.9 Trillion with an average growth from 8 -12% every year. Online shopping leads to huge consumption of paper boxes. Since, when the buyers receive the goods, they normally destroyed the paper boxes, throwing them away into a dust bin, and some were kept for nothing. Those papers wasted cause environmental impacts, huge organizational costs, and unnecessary spaces are wasted. The study investigates on activities of returning the used paper boxes through online shopping among university students in China by underpinning the Theory of Reasoned Action (TRA). The survey was conducted among 24 public universities in Guangxi, China, with 401 questionnaires accepted for analysis. The study employed regression analysis to test the hypotheses. Both independent variables have a significant relationship to return the paper wasted boxes from online shopping. This paper has its methodology contribution since a rare study focuses on all the bachelor degree students in public universities in Guangxi, China.

**Keywords:** Online shopping, paper boxes, recycling intention, theory of reasoned action, environmental impacts.

## INTRODUCTION

Information Technology has reformed the business world by connecting all the people and things around the world. Consequently, the online shopping activities upon IT developed dramatically. The same situation happens in China. In China, the total population (2019) is approximately 1.4 Billion, with the penetration rates on online shopping reaching 55.8%. The estimated amount of online shopping in 2019 amounting to USD 1.9 Trillion (Statista, 2019), and the volume is increasing between 8 -12 % every year (Worldometer,2019). With the growth of the express delivery business, the derived express packaging garbage, including paper boxes, raw papers, and plastics, is growing. According to Zhao & Ma et al. 2017, the express service industry will cost paper-box 19.2 billion units. However, the actual recovery rate of paper boxes (cardboard) is less than 10% (Zhang, 2018). Wu Siyu (2017) believed that the express service cartons could be recycled two to three times. If the recovery rate of these boxes is 20%, the purchase cost of one enterprise will be reduced by more than RMB 600 million between 2012 and 2016 (Gao Ying, 2018). At the same time, because these boxes are directly reused, there is almost no additional cost, improving enterprises' profits significantly. In addition, an achievement on the recycling paper boxes also can be friendly to the environment (Gao Ying 2018). In addition, Gao also said that if one ton of waste cartons can be recycled, the felling of 16.6 trees is reduced; 417 kg of air pollutants will be reduced; 588.56kilowatt-hour electricity will be saved, 2.26 cubic meters of landfill space will be saved (Gao Ying 2018). Thus the recycling of express cartons, paper boxes are beneficial not only to enterprises but also to society. Consequently, there is an urgent need to achieve recycling paper boxes.

In solving the problem of returning the paper boxes at present, the reverse logistics activity should be adopted. In the past decades, many studies have been conducted in multiple aspects on general reverse logistics implementation and methodology, such as forecasting on the return products (Xiong et al., 2011), factors that influence the adoption of reverse logistics activity (Luo Jie, 2006), barriers to reverse logistics activity (Jindal and Sangwan, 2011), cost minimization (Wang HaiPing, 2007), value return material (Fan Guicai, 2013), designing reverse logistics network for optimal collection (transportation routes) (Kui Mingming, 2009), management between two competitive closed-loop supply chains (Das & Chowdhury, 2012), the usage of information and communication technology (ICT) (Omotayo and Melan, 2017). Although the research on reverse logistics is increasing, most of those previous studies are concentrated on the issues that arise from the company or organizational perspective. Therefore, most of the solutions and results from the studies only can solve the issues of the companies and organizations. However, in terms of the reverse logistics discussion, literature related to individual customers is still very low and rare (Dixit & Badgaiyan, 2016).

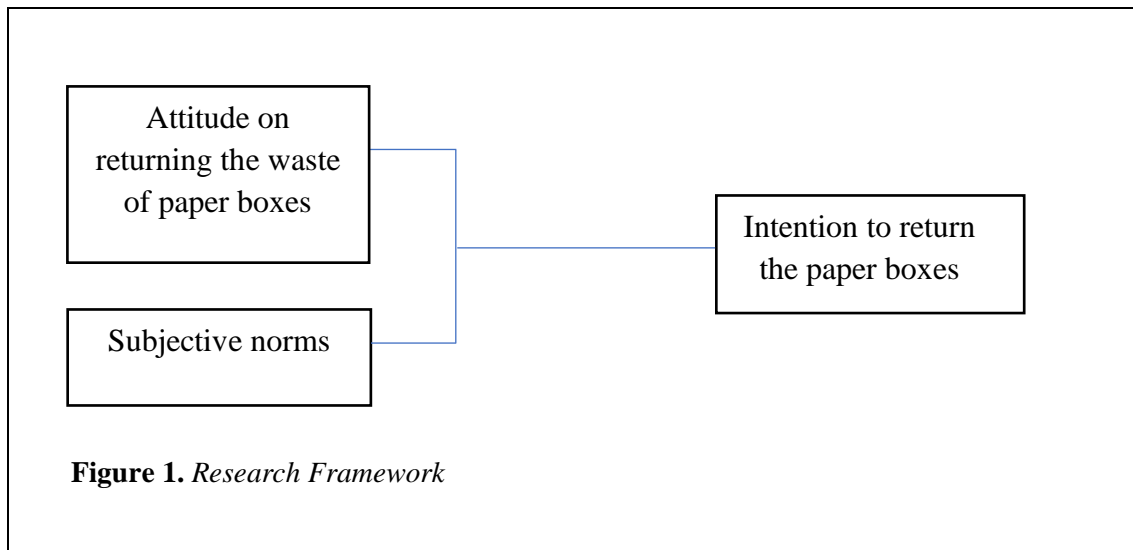
Meanwhile, Changcheng et al. (2017) hold that recycling systemic mechanism structure of express papers boxes should be built up and should be guided by the state, coordinated by enterprises, and participated by residents; however, this study still not focus on what factor will affect the recycling behavior of individual customers. Since the research specific on individual customers on recycling, a box is limited and rare, and it is the first process of whole recycling paper-boxes process. Meanwhile express service industry costs around 19.2 billion paper boxes (Zhao & Ma, 2018), the actual recovery rate of paper boxes (cardboard) is less than 10% (Zhang, 2018). Thus, the study on improving the rate of returning the paper-box from individual customers is significant. Therefore, a framework should be developed and tested for an in-depth understanding of consumers' intention to return the paper boxes from online shopping.

### Framework on Intention Towards Returning the Paper Boxes from Online Shopping

In developing an in-depth understanding of consumers' intention toward returning the paper boxes from online shopping, a framework (Figure 1) was built up based on previous research on the intention of recycling behavior. The core construct of the framework underpins the Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1975).

This theory has been applied by many scholars in many fields, and has successfully explained many manifestations of human behavior (Zhang Huan, 2019). It explains why and how people make a certain behavior under its premise that people are rational (Zhang Huan, 2019). It means that before individuals perform a certain behavior, they need to comprehensively analyze the significance and results brought by taking action according to various information (Zhang Huan, 2019).

The model assumes that most behaviors are under volitional control. It means that the intention to perform a specific behavior is the best and immediate predictor on that behavior. According to TRA, the intention was determined by two basic determinants: attitude towards the behavior and subjective norm. Generally, people will have strong choices to perform a specific action when they evaluate that behavior positively and when they believe that important others think they should perform that behavior.



### Intention on returning the paper boxes from online shopping

According to Ajzen (1991), environmental behavior is self-interested behavior. Consequently, this behavior can rely on rational choice models, which include TRA. In detail, TRA holds that intention will lead the behavior. Meanwhile, the intention is influenced by (1) individual attitude towards performing a particular behavior and (2) subjective norms the individual perceives. The next paragraphs will discuss and test how these two factors will affect the intention to return the paper boxes from online shopping.

### **Attitude toward returning the paper box wasted**

Attitude can refer to "good", "bad", "positive", "negative", "favorable," and "unfavorable" evaluation on consequences of performing the particular behavior (Chu and Chiu, 2013; Tang, Chen and Luo, 2011). Based on the literature reviews relating to pro-environmental behavior in the context of recycling behavior, there is evidence that a positive attitude towards behavior may cause a positive intention towards the behavior in a high possibility level (Aini et al., 2002; Sidique, Lupi, & Joshi, 2010; Latif & Omar, 2012; Wan et al., 2012; Ramayah et al., 2012; Botetzagias et al., 2014; Echegaray & Hansstein, 2017). However, some studies argue that a positive attitude towards behavior would not cause a positive intention towards the behavior significantly (Aini et al., 2002; Mahmud and Osman, 2010). Thus, there is some inconsistency in this field. Consequently, it is worth finding out whether there is a relationship between attitude toward returning the paper boxes wasted and intention among the public university bachelor degree students in Guangxi, China. Thus, the Hypothesis is:

H1: Attitude towards returning paper box waste has a significant relationship with returning intention on the paper wasted box from online shopping.

### **Subjective norms**

According to Ajzen (1991), Subjective norms are related to social factors, and social norms referred to the perceived social pressure by the individual to perform or not to perform the specific behavior. In TRA, subjective norm also can be considered as an important predictor of behavioral intention. TRA assumes that subjective norm is a direct determinant toward the individual behavioral intention, which can finally affect real behavior. There are many previous studies on the subjective norm. Most of them can support this statement. For example, studies relating to pro-environmental issues have indicated a positive and significant relationship between subjective norm and behavioral intention (Conner & Armitage, 1998; Moons & De Pelsmacker, 2015). However, some studies argue that positive subjective norms would not cause a positive intention towards the behavior significantly (Knussen et al., 2004; Rhodes et al., 2015). Thus, there is some inconsistency in this field. Consequently, it is worth finding out whether there is a relationship between subjective norms and intention among public university bachelor degree students in Guangxi, China. Thus, the Hypothesis is:

H2: Subjective norms have a significant relationship with returning intention on the paper wasted box from online shopping.

## **RESEARCH METHODOLOGY**

The survey explores the intention of university students to return paper boxes from online shopping in Guangxi, China. The questionnaires used in the survey towards the intention are adapted from different scholars (Nduneseokwu et al., 2017; Moons and De Pelsmacker, 2015; Khatimah, 2016). Meanwhile, the independent variables (attitude and subjective norms) are adapted from Chu and Chiu (2003). Therefore, the main data collection technique applied in this research is questionnaires. A seven-point scale is used in this study to calculate the variables. A total of 411 questionnaires were distributed from 23<sup>rd</sup> September 2019 until 11<sup>th</sup> July 2020 in 24 public universities in Guangxi, China. In the end, a total of 401(97.5%) questionnaires were valid and accepted for the analyses.

### A. Reliability Analysis

Reliability analysis ensures the accuracy and the precision of a given measurement to meet standard (Thorndike, Cunningham, Thorndike & Hagen, 1991). Based on Nunnally (1970), each evaluation criterion has fulfilled the threshold (Coefficient Alpha>0.6) as shown in table 1.

Table 1

#### *Summary of Reliability Test*

No	Variables	Cronbach's Alpha	No. of Items	Item Deleted
1	Attitude toward Recycling Intention on Paper-box	0.939	6	Nil
2	Subjective Norms	0.911	9	Nil
3	Recycling Intention on Paper-box	0.909	6	Nil

### B. Convergent Validity

The main idea about convergent validity is to explain the level to which indicators of a particular construct can converge or share a common variance in proportion. Convergent validity shows the extent, to which two measures of the same concept correlate, and validate the absence of multicollinearity (Cooper & Schindler, 2003; Sekaran, 2003; Pallant, 2011). Convergent validity can confirm that all factor loadings of manifesting observed items have converged substantially into their family or vice versa (Hair et al., 2006). Thus, by convergent validity test, it can be proved that the constructs are strongly interrelated (Brown, 2006). In this section, the exploratory factor analysis (EFA) is used to assess this validity to determine whether the items converge satisfactorily or contrary.

Table 2

#### *KMO and Bartlett's Test for All Variables*

<b>KMO and Bartlett's Test</b>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.877
Bartlett's Test of Sphericity	Approx. Chi-Square	8024.801
	df	210
	Sig.	.000

Table 2 shows the KMO and Bartlett's Test for all variables. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is .877. Meanwhile, in the Bartlett's Test of Sphericity, the significant value is

approximately zero. Since the Kaiser-Meyer-Olkin Measure of Sampling Adequacy is higher than a threshold, which is 0.5 (Kaiser, 1958), the significant value for the Bartlett's Test of Sphericity is lower than 0.05. Thus, the data is suitable for process factor analysis.

Table 3

*Rotated Component Matrix for All Variables*Rotated Component Matrix<sup>a</sup>

	Component		
	1	2	3
att1	-.096	.913	.193
att2	-.087	.834	.201
att3	-.064	.812	.117
att4	.032	.813	-.021
att5	-.084	.918	.200
att6	-.024	.913	.100
sn1	.903	-.077	.200
sn2	.879	-.061	.063
sn3	.763	-.031	.316
sn4	.745	.212	.049
sn5	.594	-.224	.135
sn6	.539	-.364	.303
sn7	.477	-.141	.549
sn8	.679	-.213	.407
sn9	.755	.083	.414
itt1	.211	.239	.820
itt2	.492	.369	.488
itt3	.425	.386	.640
itt4	.192	.127	.862
itt5	.255	.130	.764
itt6	.145	.168	.853

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Table 3 shows that factor loading value on all items is higher than a threshold, which is 0.3 (Hair et al., 2006). Thus, all the loading factors are accepted. Meanwhile, all the loading factors are located at Component 1 to Component 3 separately, which means the data should be separated into three groups. It indicates that the data should present three different variables. Thus, it matches the construct of the current theory in this paper. Thus, the Convergent validity test is passed. Further data analysis can be continued.

### C. Discriminant Validity

According to Nunnally (1970), discriminant validity is able to indicate the extent to which the scale correlates positively with the measures of the same construct and is distinct from those that do not belong to what it is measuring. Discriminant validity reveals the extent to which each predictor differs from another (Byrne, 2010). In other words, discriminant validity is measuring each distinct construct in the theoretical model (Byrne, 2010). Thus, it can infer that the constructs should not interrelate (Compeau, Higgins & Huff, 1999). In order to find out the relation effect of each construct, the discriminant validity in this study is calculated through the Pearson correlation values. Mayer (1999) suggested that a moderately weak correlation of 0.2 to 0.8 or -0.8 to -0.2 can be accepted for any variables. Table 4 shows that all the Pearson Correlation Values are in the accepted area. Thus all the constructs have passed the discriminant validity test.

Table 4

*Pearson correlation among the variables*

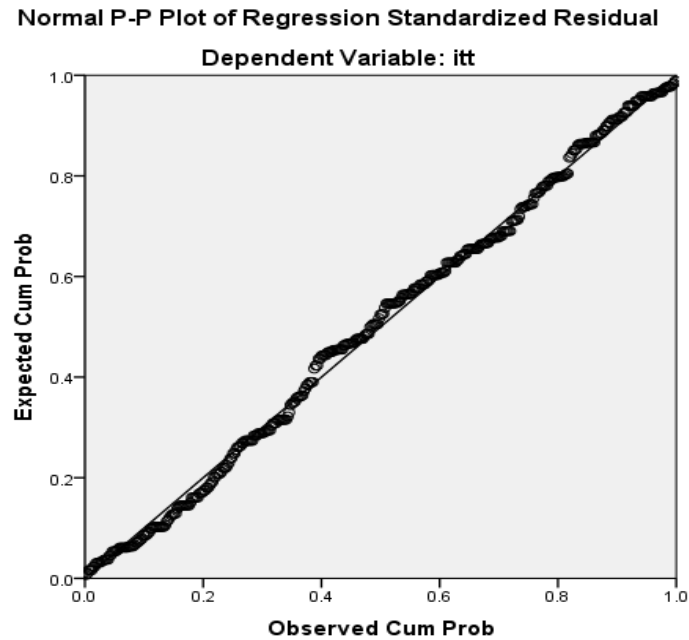
Correlations		att	sn	itt
att	Pearson Correlation	1	-.104*	.360**
	Sig. (2-tailed)		.037	.000
	N	401	401	401
sn	Pearson Correlation	-.104*	1	.573**
	Sig. (2-tailed)	.037		.000
	N	401	401	401
itt	Pearson Correlation	.360**	.573**	1
	Sig. (2-tailed)	.000	.000	
	N	401	401	401

\*. Correlation is significant at the 0.05 level (2-tailed).

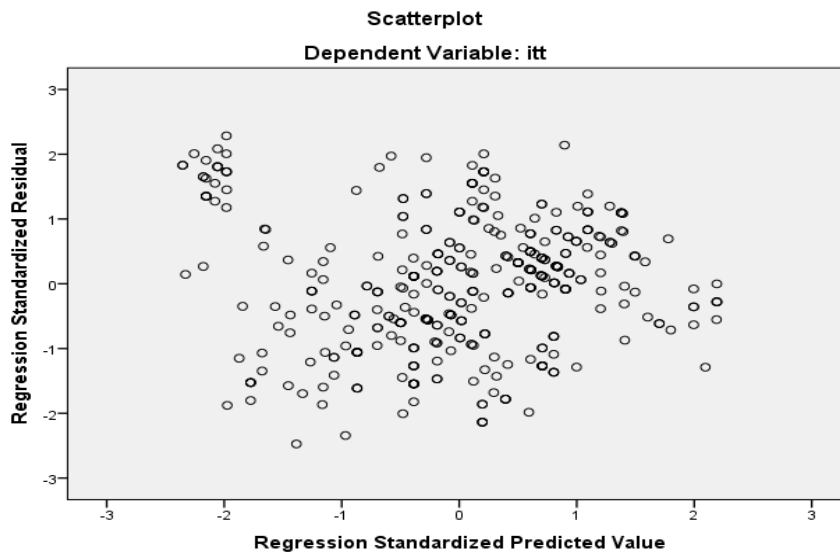
\*\*. Correlation is significant at the 0.01 level (2-tailed).

#### D. Regression Analysis

To determine whether the residuals are normally distributed, a normal Predicted Probability (P-P) plot was examined. Figure 2 shows the Normal Predicted Probability (P-P) Plot of Regression Standardized Residual for IVs and DV. The graph can be seen to conform to the diagonal normality line indicated in the plot. Thus, the residuals are normally distributed.



**Figure 2.** Normal Predicted Probability (P-P) Plot of Regression Standardized Residual for IVs and DV



**Figure 3.** Scatterplot for IVs and DV



The test for homoscedasticity (scatter plot of ZPred on ZResid) would reveal any variance of errors in analysis across all the levels in the predictor variables (Hair et al., 2006). Figure 3 shows no obvious pattern for the scatter plots in the regression standard scatterplot between IVs and DV. Thus, there is no heteroscedasticity.

The Statistics Solutions (2020) stated that linearity should be accepted when the residuals are normally distributed and homoscedastic. Statistics Solutions (2020) stated that if VIF values for each value are below 10, the assumption of no Collinearity is met. Thus, Non-Multi-collinearity in this current model also should be accepted since the result in Table 5 indicates that VIF for all values is lower than 10.

Table 5

*Coefficients and collinearity for Hypotheses Test Among IVs and DV*

Coefficients <sup>a</sup>							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	.969	.215		4.512	.000		
att	.355	.030	.425	12.013	.000	.989	1.011
sn	.546	.031	.618	17.462	.000	.989	1.011

a. Dependent Variable: itt

Table 6

*ANOVA<sup>a</sup> Test for Hypotheses Test Among IVs and DV*

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	148.404	2	74.202	204.950	.000 <sup>b</sup>
	Residual	144.096	398	.362		
	Total	292.500	400			

a. Dependent Variable: itt

b. Predictors: (Constant), sn, att

Table 6 shows the ANOVA test for hypotheses test among IVs and DV. The result shows the p-value is 0.000, which is less than 0.05. This means at least one of the two predictor variables can be used to model *itt* (intention).

From table 5 above, the significant value for *att* (attitude) is 0.000, which is lower than 0.05; meanwhile, t-value is 12.013, which is higher than 1.96. Thus, attitude toward returning paper box waste has a significant positive relationship with return intention on paper wasted boxes from online shopping. Furthermore, since the Unstandardized Coefficients B is 0.355, thus for every unit increase in *att* (attitude), *itt* (intention) will go up by 0.355 units, provided other variables, *sn* (subjective norms) remains unchanged.

From the same table, the *sn* (subjective norms) shows that the significant value is 0.000, which is lower than 0.05; meanwhile, the T value is 17.462, which is much higher than 1.96. Thus, the Subjective norm has a significant positive relationship with return intention on paper wasted boxes from online shopping. Furthermore, since the Unstandardized Coefficients, B is .546, thus for every unit increase in *sn* (subjective norms), *itt* (intention) will go up by .546 units, provided other variables, *att* (attitude) remains unchanged.

Table 7 shows the model summary for the hypothesis test among IVs and DV. The result shows that the R-square value is 0.507. This means 50.7% of the variation in *itt* (intention) can be explained by (or accounted for by) the variation in *att* (attitude) and *sn* (subjective norms).

Table 7

*Model Summary<sup>b</sup> for Hypotheses Test Among IVs and DV*

<b>Model Summary<sup>b</sup></b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.712 <sup>a</sup>	.507	.505	.60171

a. Predictors: (Constant), *sn*, *att*

b. Dependent Variable: *itt*

## DISCUSSION

This research provides and tests a framework that may help scholars understand the psychological factors that will affect the intention to return paper boxes from online shopping. This research tests two factors from TRA, which are attitude and subjective norms. Although TRA claims that attitude and subjective norms will have a positive effect to the intention toward behavior, some researchers have some inconsistent comments on attitude (Aini et al., 2002; Mahmud and Osman, 2010) and subjective norms (Knussen et al., 2004; Rhodes et al., 2015). Concerned about these two factors, they already showed different effects on the intention for pro-environmental activities in different contexts. Thus, it is worth testing whether these two variables can increase intention level to solve recycling paper boxes from online shopping among bachelor degree students in Guangxi, China.

In this study, hypothesis 1 is accepted that attitude towards returning paper box waste has a significant relationship with returning intention on the paper wasted box from online shopping. It matches the TRA and many studies related to pro-environmental activities (Aini et al., 2002; Sidique, Lupi, & Joshi, 2010; Latif & Omar, 2012; Wan et al., 2012; Ramayah et al., 2012; Botetzagias et al., 2014; Echegaray & Hansstein, 2017). In addition, hypothesis 2 is accepted that subjective norms have a significant relationship with returning intention on paper wasted box from online shopping. It matches the TRA and previous studies related to pro-environmental activities (Conner & Armitage, 1998; Moons & De Pelsmacker, 2015). Of the two variables, subjective norms are a more powerful predictor than attitude since its coefficient is 0.546, which is higher than 0.355 of attitude.

### **Implication**

The result shows the subjective norms play a more important role in returning intention on paper wasted boxes from online shopping. Consequently, the authors suggested that the university should provide a university atmosphere that students recycle paper boxes. Of course, it is not easy to require everyone to recycle paper boxes at the beginning. However, the university can request the communist students who have willing to listen to the university. After they attend those activities, their intimate friends, boyfriends, girlfriends, or good friends will be affected. Then those people will affect other people. The trend of recycling activities will form up.

Besides the subjective norms, attitude also will affect the intention significantly. Thus, improving students' attitude toward returning paper boxes is necessary. Ministry of education and universities should put the knowledge related to benefits of recycling into ideological and political education (that is compulsory course for every university student in China) to help form up the attitude toward returning paper boxes.

### **Limitation**

As with any conceptual model, this model also has its limitations. Although the current framework is on a combination of results from many different studies relating to pro-environmental activities, there can always be psychological factors, which can affect consumers' intention to perform pro-environmental activities, which are not included in the literature to date, or which is addressed in other literature studies. Thus, the number of previous researches which were discussed in this study may also be limited. The second limitation of the current paper is that this framework is that the result only has been tested on university students in Guangxi, China. This implies that caution should be taken in applying this finding to other groups of people.

### **Contributions**

This study has made a further theoretical and methodological contribution on the theory of reasoned action since this article has studied university students recycling the paper box in Guangxi, China. Meanwhile, for practical contribution, this study will help express operation centres and government universities make more precise decisions regarding the improvement rate of recycling paper boxes from online shopping.

### **Suggestion for Further Study**

This study is underpinning on the theory of reasoned action but limited to the intention. TRA holds that intention is viewed as a direct predictor of the actual behavior. Thus, future researchers should extent the theory proposed in the study to the behavior. Future studies can identify what other factors will affect the actual behaviors and can identify which factors can moderate or mediate the relationship between intention and actual behaviour.

### **CONCLUSION**

While many customers in China frequently used online shopping, it leads to lots of waste paper boxes. Meanwhile, recycling the wasted paper boxes is very row, which makes a serious organizational cost, environmental problems, and social costs. In order to solve these problems, this research has developed and tested a coherent model that combined factors (attitude and subjective norms) that have been tested in different background studies. This study confirms attitude and subjective norms have a significant relationship with the intention to recycle paper boxes for university students in Guangxi, China. The result of this study examined the variables; it has made a further theoretical contribution by highlighting and testing conceptual issues related to the theory of reasoned action since those factors are inconsistent in various backgrounds of studies. Therefore, this study provides further theoretical understanding in TRA under the context of university students in Guangxi, China. Meanwhile, this study will help express operation centers and government universities make more precise decisions regarding the improvement rate of recycling paper boxes from online shopping.

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