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Young residents' household waste recycling intentions: extending TPB through place attachment

Kanishka Pathak
Institute of Business Management, GLA University, Mathura, India, and
Aditya Yadav, Shivani Sharma and Retu Bhardwaj
Department of Management, Faculty of Social Sciences, Dayalbagh Educational Institute, Agra, India

Abstract

Purpose – The paper aims to understand the young residents' household waste intentions through place attachment (PA) approach where place dependency (PD) and place identity (PLI) influence recycling intentions (RIs). Furthermore, the effect of norms (both subjective and moral) on residents' association with PLI was also analyzed.

Design/methodology/approach – The conceptual model, including the hypothesized relationship between variables, was established through relevant literature. The study extends the theory of planned behavior (TPB) through a place-based approach in young residents' household waste RIs. The proposed conceptual model also replaced the position of norms (subjective and moral) as antecedents to PLI in the proposed extended and modified TPB model. Partial least square structural equation modeling (PLS-SEM) has been used for the statistical analysis of the data. The questionnaires were distributed digitally. The convenience sampling approach was adopted for collecting data.

Findings – The results tenably billed the inclusion of placed-based approach in the TPB and norms (subjective and moral) in predicting PLI of young residents. All the alternative hypotheses in the proposed model were accepted. The predictive power of RIs was 41.4%.

Research limitations/implications – The research only considered the educated and financially opulent residents, among whom the waste disposal system was well established and may have led to favorable results. The study only limits to measuring intentions, and its organic nature opens vistas for future research studies where more variables could be agglutinated to achieve pronounced prediction power and also further measure actual recycling behavior and practice.

Practical implications – The study adds to pragmatic implications for local governments and municipalities where the waste collection apparatuses could capitalize on the findings to achieve efficiency in household waste collection and recycling.

Social implications – With young generation of residents at the helm for forging a cleaner environment, the study motivates environmental enthusiasts and social scientists to better understand household waste RIs. The study will help young generation to become more sensitized towards the environment by making green changes in daily disposal habits.

Originality/value – The study explored two prospects. First, PA (place dependence and place identity) was added as an external variable and precedent to RIs, and second, the norms (both subjective and moral) were taken as antecedents to place identity.

Keywords Household waste, Recycling intentions, Place attachment, Theory of planned behavior, Norms, Young residents

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1. Introduction

1.1 Recycling and household waste management

Recycling is an important element of sustainable waste management as it stops waste pollution and saves precious raw materials, the so-called "mislaid resources" (Al-Ansari, 2012; Aliu *et al.*, 2014). Household waste recycling is a key element to reduce the ever increasing chronic pollution caused by municipal solid waste (Shi *et al.*, 2021) and presently is the most critical environmental issue (Ma and Hipel, 2016). Household waste leads to harmful effects on health of residents (Wang *et al.*, 2020), which will further aggravate owing to the increasing population with urbanized industrialization (Troschinetz and Mihelcic, 2009). It was found that major portion of the municipal waste comprised household waste (Noor *et al.*, 2020), and the very composition of household waste is highly complex (Wang and Nie, 2001). It becomes pertinent to properly manage household waste as it restricts the very quality of residents' lifestyle in a particular area and stops sustainable development (Ma *et al.*, 2018). It has been brought to notice that propagation, promotion and permeation for enhancement of various recycling programs related to recycling is a future challenge and direction, and it becomes important to recruit to the knowledge of personal recycling intentions (RIs) of residents' (Tsai *et al.*, 2020).

1.2 Rationale for place attachment (PA)

Place attachment (PA) construes the association shared between the people and places (Low and Altman, 1992), and in the study, PA is a mixed representation of two constructs, namely place dependence (PD) and place identity (PLI). PA as a construct has been known to positively influence the proenvironmental behaviors or intentions (Halpenny, 2010), general environmental behaviors (Vaske and Kobrin, 2001) and increase awareness regarding environment of a place (Vorkinn and Riese, 2001). Extant literature is unable to provide empirical support for PA having a direct influence on proenvironmental behavior (e.g. RIs, especially in young individuals') through other variables (Scannell and Gifford, 2010). PA draws importance as it mandates the expression of individuals and their concerns in a place specific context (Relph, 1976), which are motivated to protect their territory that feels important to them (Manzo and Perkins, 2006; Stedman, 2002). It was suggested that PA would be useless until it is included and canvassed into a larger theoretical context (Lewicka, 2011) and shall be made more explicit in conceptual frameworks (Devine-Wright, 2009), which justifies the rationale for the inclusion of PA in the TPB.

2. Literature review, hypothesis development and framing proposed model

2.1 Theory of planned behavior (TPB)

Recycling, one of the proenvironmental behaviors, is known to have high sensitivity and is heavily reliant on a specific place (PA); hence, it becomes important to analyze RIs of young residents for household waste using a place-based approach. The TPB has been used in many studies relating to waste management, like waste classification behavior (Razali *et al.*, 2020; Lou *et al.*, 2020), recycling attitude (RA), intentions and behavior (Wan *et al.*, 2014; Zhang *et al.*, 2020), composting behavior (Mamun *et al.*, 2020) and so on. The investigation mandates to analyze social interactions of everyday life in a specific place (Clayton *et al.*, 2016), which is completely new compared to the traditional aspects of studies relating to proenvironmental behavior where universal predictors were unaffected by the effects of place-based sensitivity, like PLI and PD (Vorkinn and Riese, 2001). The theory of planned behavior (TPB) is a robust model used for measuring proenvironmental intentions and behavior (Armitage and Conner, 2001), and the study makes an attempt to gel PA approach to measure intentions to recycle household waste among young residents. The place-based approach is a highly confusing psychological process, and its effect on specific proenvironmental behaviors shall be factored in the literature of RIs (Clayton *et al.*, 2016). Figure 1 is the original TPB model proposed by Ajzen (1991).

2.2 Place dependence (PD) and place identity (PLI) {place attachment}

Both PD and PLI are highly individualized constructs (Raymond *et al.*, 2011) and have been validated in the literature forming the conceptual zygote denoted as PA (Lewicka, 2011). Research was limited when place-based RIs of young residents were analyzed and demands more attention. PA was an important precursor to the development of attitude, perceived behavioral control and intentions to adopt a proenvironmental behavior, like recycling of household waste. PLI instills a positive effect towards proenvironmental behavior and intentions, like recycling household waste, a worrisome concern for a place with which an individual associates self (Bricker and Kerstetter, 2000) and attitude towards a place protective program (Kyle *et al.*, 2003). Place-based identity attachment propagates self-reported beneficial intentions, like recycling, in a natural resource setting (Vaske and Kobrin, 2001). It has also been noted that PI positively relates to PBC and RAs, which later ensconces RIs (Stedman, 2002). PA has been related to proenvironmental intentions of natural park visitors (Walker and Chapman, 2003). Recently, PA has been linked to forge proenvironmental behaviors or intentions (Daryanto and Song, 2021). According to the above discussion, the alternative hypotheses were proposed:

H1. PD positively and significantly influences young residents' PLI in household waste recycling.

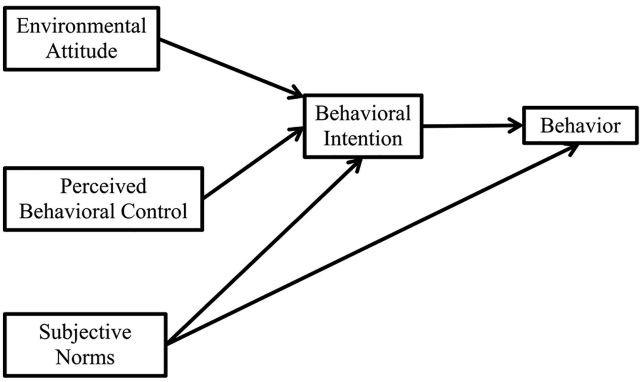
H2. PLI of young residents positively and significantly influences their recycling intentions (RIs) of household wastes.

H3. PLI of young residents positively and significantly influences their PBC for household waste RIs.

H4. PLI of young residents positively and significantly influences their RA of household wastes.

2.3 Recycling attitude (RA) and perceived behavioral control (PBC)

Many studies have contributed to the literature ascribing to environmental attitude (e.g. recycling household waste) having a positive and significant impact on proenvironmental behavior (Han *et al.*, 2017; Ru *et al.*, 2019). In a study conducted using the TPB in waste classification intentions and waste classification behavior out of 584 residents in Chengdu as a pilot city for waste



Source(s): Ajzen, I. (1991). The theory of planned behavior. Organizational behavior and human decision processes, 50(2), 179-211

Figure 1.
Original TPB model proposed by Ajzen (2002)

management in China using structural equation modeling (SEM), results demonstrated that RA ($\beta = 0.65$, $p < 0.001$) and PBC were significantly related to RIs of residents of Chengdu (Zhang *et al.*, 2021). In another study using Azjen's TPB where pro-recycling and pro-environmental behaviors were analyzed, it was seen that respondents tend to depict an increased positive and significant attitude towards recycling with increased PBC, which later were found to be significant predictors of RIs (Lakhan, 2018). In a study conducted on 250 university students using PLS-SEM, it was found that both RA and PBC had a positive and significant impact on RIs (Effendi *et al.*, 2020). Based on the lucid discussion, the following alternative hypotheses ere postulated:

H5. RA of young residents positively and significantly impacted the RIs of household wastes.

H6. PBC of young residents positively and significantly impacted the RIs of household wastes.

2.4 Subjective norms (SN)

Social bonding has been empirically analyzed as a sub-dimension of PLI in the past literature (e.g. Kyle *et al.*, 2005; Ramkissoon *et al.*, 2013). Subjective norms (SN) has proven to be an effective antecedent to both moral norms (MN) and PA as for individuals who depict an elevated level of attachment to a place through personal identity have known to be influenced more by social pressures in their decision-making processes (Han *et al.*, 2019) leading to an increased level of cohesion to place-based identity through group subjective and MN conformity (Hernandez *et al.*, 2010).

Based on the ongoing discussion, the following alternative hypothesis was proposed:

H7. SN of young residents positively and significantly influence their MN.

2.5 Moral norms (MN)

PA is considered to be a consequent of MN, which ascribes to influencing of individuals' MN in order to frame intentions for a certain task like RIs. PA is a direct function of norm activation within an individual and has a direct and proportional correlation with an individual's sense of PI (Mesch, 1996). It has been observed that the more place-based identity attachment an individual ascribes to, more would be the awareness with respect to human activity on the environment (Stedman, 2003). It has been seen that individual norms affiliate strongly to PA through identifying self and socializing with others with whom they are contingent upon and inevitably relate on those events which later affect the environment, which is more valued to them (Williams *et al.*, 1992; Vorkinn and Riese, 2001).

Based on the flow of discussion, the following alternative hypothesis was proposed:

H8. MN of young residents positively and significantly influence their PLI.

The final proposed hypothesized conceptual model is given in Figure 2.

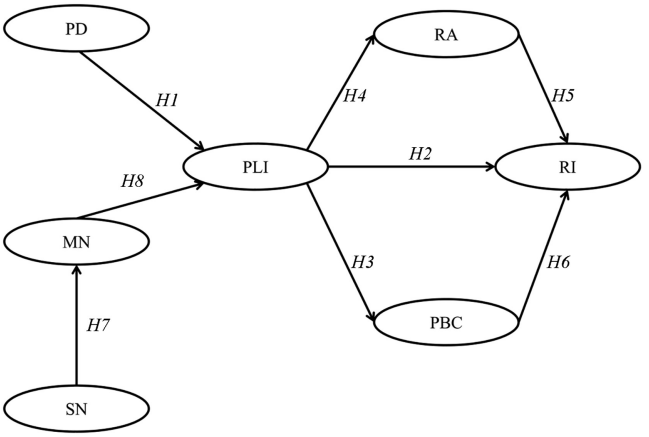
3. Research methodology

3.1 Measurement instrument

The data were collected by sending a questionnaire through online links, which was then distributed on digital gadgets. The questions comprised both objective type (for socio-demographic details) and five-point Likert's type scale (containing questions pertaining to the constructs of the proposed model).

3.2 Data collection

Before the distribution of questionnaires on a full scale, a pilot test was conducted on 30 respondents to acknowledge any impediments regarding filling of the questions. The pilot



Note(s): SN = Subjective norms, MN = Moral norms, PD = Place dependence; PLI = Place identity, RA = Recycling attitude, PBC = Perceived behavioral control, RI = Recycle intentions

Figure 2.
Proposed conceptual model

study results obviated any concerns while filling delivering confidence in full-scale distribution of the questionnaire. Using the convenience sampling approach, the questionnaire links were disbursed among the young residents who were university students and maintaining residence in Agra urban region. Agra city was chosen for two reasons: first, it lies under the governments' flagship programme of Smart Cities Mission with a population of more than 10 lakhs, and second, it ranks 16th position in the Swachch Sarvekshan Report 2020, which highlights the importance of the research in the city for further development. Also, Agra is a famous tourist attraction due to presence of the Taj Mahal, which makes the city an area of heightened interest for waste management and further beautification of the city. The other advantage of using the convenience sampling method was to not generalize the results as the target population was only young residents. Convenience sampling has been used prevalently by many researchers in similar fields relating to proenvironmental behavior among the youth, like Yadav and Pathak (2017), Khare and Kautish (2021), Sadiq *et al.* (2021), which generates confidence in using the method. A total of 200 links were disbursed, and 118 responses were received, which when computed gave a response rate of 59%. The collected data were then scrutinized for constant, increasing or decreasing scale responses, and using the method, 18 responses were removed from the database, which precipitated to 100 responses as the final sample size.

3.3 Sample size justification

The justification of sample size was supported by the 10 rule of thumb proposing the greatest number of arrows that point towards an antecedent construct should be determined and then multiplied by the factor 10, which provides the minimum number of sample size required for the statistical analysis (Barclay *et al.*, 1995). Using this rule, the sample size of 100 was approved for further statistical analysis. Also, partial least squares structural equation modeling (PLS-SEM) is capable to counter small sample size (Karahanna and Agarwal, 2006) (see Table 1).

3.4 Sociodemographic analysis

Variable	Classification	Percentage
Gender	Male	58
	Female	42
Age	15–18	12
	19–22	30
	23–26	42
	27–30	16
Education pursuing	Intermediate	22
	Undergraduation	46
	Postgraduation	20
	Ph.D	12
Household income (Monthly) (INR)	Below 30,000	0
	30,000–60,000	39
	60,000–90,000	29
	90,000 and above	32

Table 1. Socio-demographic table

3.5 Designing the questionnaire

The entire constructs and the measuring items (indicator variables) were adopted from germane literature. All the constructs are measured on a five-point Likert's type scale. Standard questionnaires were used, which were both validated and reliable. PD was measured using four items (Raymond *et al.*, 2011), PLI using five items (Raymond *et al.*, 2011), MN using five items (Chen and Tung, 2010), SN using four items (Tonglet *et al.*, 2004), RA using five items (Tonglet *et al.*, 2004), PBC using five items (Tonglet *et al.*, 2004) and RI using three items (Wan *et al.*, 2017).

4. Analysis

PLS-SEM was used for the statistical analysis for the data as it is not dependent on strict assumptions of data distribution (Vinzi *et al.*, 2010) and preferable to covariance-based sequential equation modelling with certain riders (Bacon, 1999; Hwang *et al.*, 2010; Wong, 2010). PLS-SEM has higher capabilities to deal with small sample size and removes normality of data to be established prior to analysis. PLS-SEM is known to be supreme when it comes to tackle the virgin nature of variables in highly complex models consisting of formative and reflective measures. Bootstrapping method is used to analyze and test the hypotheses of the proposed conceptual model in PLS-SEM (Hair *et al.*, 2012). With all the assumptions, PLS-SEM was considered best for the analysis of the data.

4.1 Model assessment in PLS-SEM

In PLS-SEM, statistical analysis and testing was undergone under two phases. The first phase consisted of testing the outer measurement model comprising reliability and validity testing. This was followed by tests for analyzing the indicator reliability, internal consistency and finally convergent and discriminant validity. The second phase consisted structural model measurement where hypotheses were tested using the bootstrapping method with 5,000 sub-samples (Hair *et al.*, 2012). Any issues of collinearity were also analyzed followed by the measurement of β-coefficients, p-values for significance and adjusted R^2 for prediction power of the proposed model (see Figures 3 and 4).

4.1.1 Assessment of the measurement model (outer model). 4.1.1.1 Reliability testing. *4.1.1.1.1 Indicator reliability.* It can be seen from Table 2 that the indicator reliability ranged from 0.543 to 0.857, which is comfortably above 0.4 as mandated by Hulland (1999).

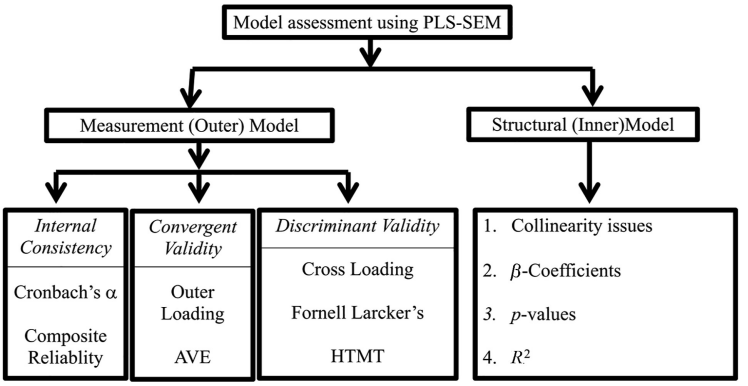


Figure 3.
Flowchart of model assessment using PLS-SEM

Note(s): First phase consisted of measurement of outer model and second phase of structural (inner) model in order to decipher β-coefficients, p-values and prediction power of the model

4.1.1.1.2 Internal consistency reliability. The internal consistency reliability was established through composite reliability ranging from 0.861 to 0.954 and greater than the mandated norm of 0.7 (Bagozzi and Yi, 1988; Hair *et al.*, 2012). Cronbach's α is known to be a refined measure than composite reliability for establishing internal consistency, and its value shall be more than 0.7 for social psychological studies (Hair *et al.*, 2012). The Cronbach's α ranged from 0.760 to 0.940. Overall, after analyzing the values of composite reliability and Cronbach's α, it was facile to suggest that internal consistency reliability was established. The values are depicted in Table 2.

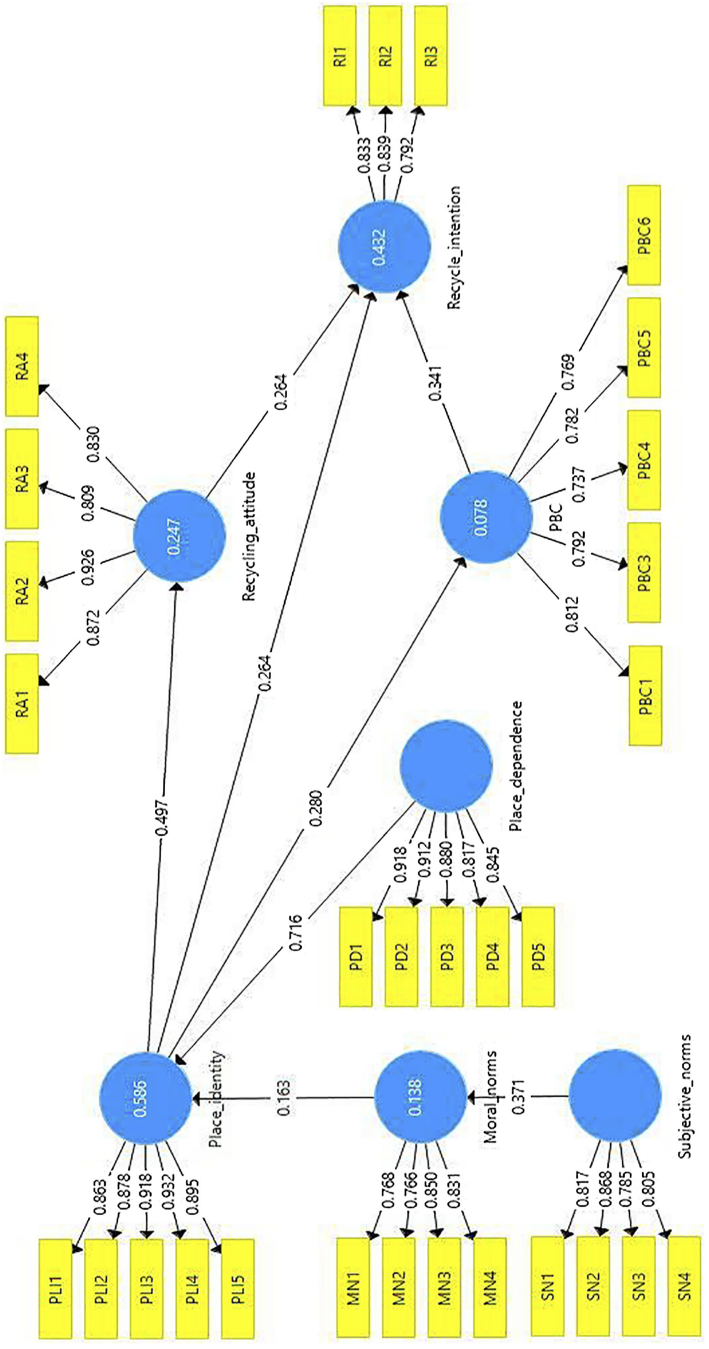
4.1.2 Validity testing. 4.1.2.1 Convergent validity. The outer loadings (factor loadings) and average variance explained (AVE) were analyzed to analyze convergent validity. The factor loading values are in the range of 0.737–0.976, and all values were well above the value of 0.7 (Hulland, 1999). The values of AVE fell between range 0.607–0.806, well above the mandated range of 0.5 (Chin *et al.*, 1997; Bagozzi and Yi, 1988). Hence, all indices approved convergent validity.

4.1.2.1.1 Discriminant validity.

4.1.2.1.2 Cross-loadings. Cross-loadings mean that the factors should have the highest loading on the parent construct in order to establish discriminant validity, and Table 3 shows the same.

4.1.2.1.3 Fornell and Larcker's criterion (1981). The emboldened figures in Table 4 are the square root of the AVE values for each latent variable and were found to be greater than the correlation among the latent variables. This establishes discriminant validity using Fornell and Larcker's criterion for the data. The same was further approved by Chin *et al.* (1997) that the square root of the AVE of each construct shall be greater than its correlation value for establishing discriminant validity.

4.1.2.1.4 Heterotrat–monotrait (HTMT) ratio of correlation criterion. The Heterotrat–monotrait (HTMT) ratio of correlation is a new criterion that nurtures the advances of PLS-SEM in establishing discriminant validity (Henseler *et al.*, 2015), and Henseler *et al.* (2015) propagated it to be a more superior method using Monte Carlo simulation study with higher degree when compared to cross-loading and Fornell–Larckers' criterion. Table 5 provides HTMT values, which were found to be less than 0.9 (Gold *et al.*, 2001; Teo *et al.*, 2008; Kline, 2015; Hamid *et al.*, 2017).



Note(s): PBC2 was obliterated due to low factor loadings; the blue circles have values of R^2, The arrows connecting blue circles with yellow rectangles contain factor loading values which shall be more than 0.7 as the norm appropriate for studies in socio psychological fields (Hair *et al.*, 2012)

Figure 4.
Proposed conceptual model after running PLS algorithm

LV	IV	FL	IR	Cronbach's α	CR	AVE	Rho a
AT	AT1	0.872	0.760	0.883	0.919	0.740	0.892
	AT2	0.926	0.857				
	AT3	0.809	0.654				
	AT4	0.830	0.688				
MN	MN1	0.768	0.589	0.820	0.880	0.647	0.839
	MN2	0.766	0.586				
	MN3	0.850	0.722				
	MN4	0.831	0.690				
PBC	PBC1	0.812	0.659	0.845	0.885	0.607	0.893
	PBC3	0.792	0.627				
	PBC4	0.737	0.543				
	PBC5	0.782	0.611				
	PBC6	0.769	0.591				
PD	PD1	0.918	0.842	0.924	0.942	0.766	0.947
	PD2	0.912	0.831				
	PD3	0.880	0.774				
	PD4	0.817	0.667				
	PD5	0.845	0.714				
PLI	PLI1	0.863	0.744	0.940	0.954	0.806	0.941
	PLI2	0.878	0.770				
	PLI3	0.918	0.842				
	PLI4	0.932	0.868				
	PLI5	0.895	0.801				
RI	RI1	0.833	0.693	0.760	0.861	0.675	0.767
	RI2	0.839	0.703				
	RI3	0.792	0.627				
SN	SN1	0.817	0.667	0.840	0.891	0.671	0.859
	SN2	0.868	0.753				
	SN3	0.785	0.616				
	SN4	0.805	0.648				

Note(s): LV: latent variable, IV: indicator variable, FL: factor loadings, IR: indicator reliability (Factor loadings); CR: composite reliability, AVE: average variance extracted and AVE calculated as *S* Squared multiple correlation/(Σ squared multiple correlation + Σ standard measurement error)

a. All factor loadings >0.7, which is favorable (Hulland, 1999)

b. All indicator reliability loadings >0.4, which indicated indicator reliability (Hulland, 1999)

c. All Cronbach's $\alpha > 0.7$ indicates indicator reliability (Nunnally, 1978; Hair *et al.*, 2012)

d. All composite reliability >0.7 and indicates internal consistency (Bagozzi and Yi, 1988; Gefen *et al.*, 2000; Hair *et al.*, 2012)

e. All average variance extracted >0.5 and indicates convergent reliability (Chin *et al.*, 1997; Bagozzi and Yi, 1988)

Table 2.
Table containing measures of convergent validity

4.2 Assessment of the structural model

4.2.1 Collinearity statistics. Multi-collinearity issues were addressed by analyzing the variation inflation factor (VIF) values (outer and inner) with the norm indicating VIF values to be less than 5 (Ringle and Sarstedt, 2016) referred in Table 6.

The next step was to analyze the prediction power of the model and then test the hypotheses using the bootstrapping method (5,000 sub-samples) (Hair *et al.*, 2012).

4.2.2 Path coefficients. The proposed conceptual model was tested using the bootstrapping method, and β-coefficients were analyzed in order to decipher the influence on dependent variables and values are depicted in Table 7. The analysis helps to predict the criterion for alternative hypothesis rejection or acceptance with *p*-values.

Variables	AT	MN	PBC	PD	PLI	RI	SN
AT1	*0.872*	0.426	0.198	0.159	0.401	0.466	0.434
AT2	*0.926*	0.505	0.291	0.242	0.459	0.415	0.523
AT3	*0.809*	0.403	0.288	0.215	0.329	0.361	0.505
AT4	*0.830*	0.454	0.296	0.260	0.497	0.468	0.502
MN1	0.496	*0.768*	0.435	0.111	0.252	0.365	0.230
MN2	0.285	*0.766*	0.317	0.148	0.285	0.189	0.162
MN3	0.474	*0.850*	0.564	0.192	0.250	0.387	0.381
MN4	0.410	*0.831*	0.509	0.190	0.224	0.384	0.370
PBC1	0.451	0.517	*0.812*	0.329	0.336	0.537	0.518
PBC3	0.254	0.450	*0.792*	0.188	0.175	0.391	0.380
PBC4	0.112	0.481	*0.737*	0.241	0.165	0.249	0.217
PBC5	0.107	0.479	*0.782*	0.216	0.150	0.282	0.228
PBC6	0.111	0.324	*0.769*	0.324	0.177	0.345	0.303
PD1	0.311	0.258	0.338	*0.918*	0.754	0.420	0.520
PD2	0.274	0.215	0.309	*0.912*	0.787	0.450	0.462
PD3	0.197	0.104	0.294	*0.880*	0.617	0.388	0.424
PD4	0.134	0.115	0.219	*0.817*	0.516	0.241	0.318
PD5	0.153	0.163	0.331	*0.845*	0.523	0.272	0.427
PLI1	0.588	0.427	0.294	0.553	*0.863*	0.547	0.481
PLI2	0.378	0.218	0.252	0.699	*0.878*	0.410	0.470
PLI3	0.425	0.270	0.213	0.637	*0.918*	0.397	0.367
PLI4	0.404	0.244	0.275	0.741	*0.932*	0.439	0.438
PLI5	0.422	0.211	0.214	0.734	*0.895*	0.398	0.433
RI1	0.350	0.303	0.346	0.374	0.442	*0.833*	0.392
RI2	0.421	0.376	0.508	0.486	0.419	*0.839*	0.431
RI3	0.464	0.355	0.352	0.145	0.349	*0.792*	0.283
SN1	0.543	0.344	0.318	0.328	0.394	0.388	*0.817*
SN2	0.459	0.351	0.348	0.332	0.326	0.335	*0.868*
SN3	0.463	0.233	0.365	0.528	0.534	0.450	*0.785*
SN4	0.390	0.259	0.511	0.522	0.401	0.333	*0.805*

Note(s): The emboldened numbers indicate the highest loading on the parent construct establishing discriminant validity

Table 3. Tableaux containing cross loading numbers

Variables	AT	MN	PBC	PD	PLI	RI	SN
AT	*0.860*						
MN	0.522	*0.805*					
PBC	0.411	0.581	*0.779*				
PD	0.256	0.203	0.343	*0.875*			
PLI	0.497	0.309	0.280	0.749	*0.898*		
RI	0.502	0.422	0.497	0.418	0.491	*0.821*	
SN	0.570	0.371	0.460	0.499	0.489	0.452	*0.819*

Note(s): The emboldened numbers in the diagonal represent the square root of the AVE of each construct and were greater than its correlation value both in rows and the columns, which established discriminant validity

Table 4. Table containing numbers for establishing Fornell–Larcker's criterion

4.3 R^2 *adjusted: prediction power*

After bootstrapping and analyzing the hypothesis after path coefficient analysis, the prediction powers were analyzed (see Table 8).

4.4 Hypothesis testing results and interpretations

All the alternative hypotheses in the proposed model had been failed to be rejected. PD ($\beta = 0.716$, $t = 8.393$, $p < 0.05$) relates positively and significantly with PLI for RIs in

young consumers, and the alternative hypothesis H1 was accepted. Place identity (PLI) ($\beta = 0.264, t = 2.705, p < 0.05$) was found to be positively and significantly associated with young consumers' RIs, and the alternative hypothesis H2 was accepted. PLI was found to

Table 5. Heterotrait–monotrait (HTMT) of correlation criterion ratio

Variables	AT	MN	PBC	PD	PLI	RI	SN
AT							
MN	0.604						
PBC	0.305	0.673					
PD	0.269	0.219	0.371				
PLI	0.534	0.354	0.285	0.785			
RI	0.606	0.518	0.565	0.469	0.577		
SN	0.657	0.415	0.509	0.581	0.565	0.568	

Note(s): HTMT values with value less than 0.85 (Gold *et al.*, 2001; Teo *et al.*, 2008; Kline, 2015; Hamid *et al.*, 2017)

Table 6. Collinearity statistics (VIF)

Variables	AT	MN	PBC	PD	PLI	RI	SN
AT						1.388	
MN					1.043		
PBC						1.133	
PD					1.043		
PLI	1.000		1.000			1.360	
RI							
SN		1.000					

Note(s): VIF < 5.0 which obviates the data for any issues of multi-collinearity (Ringle and Sarstedt, 2016)

Table 7. Path coefficients

Path	β (O)	M	STDEV	T	p-v	LB	UB
AT—RI	0.264	0.253	0.106	2.500	0.012	0.043	0.454
MN—PI	0.163	0.175	0.078	2.085	0.027	0.034	0.343
PBC—RI	0.341	0.349	0.096	3.532	0.000	0.170	0.546
PD—PLI	0.716	0.704	0.085	8.393	0.000	0.508	0.844
PLI—AT	0.497	0.506	0.095	5.228	0.000	0.315	0.682
PLI—PBC	0.280	0.294	0.090	3.094	0.002	0.118	0.470
PLI—RI	0.264	0.269	0.098	2.705	0.007	0.088	0.472
SN—MN	0.371	0.401	0.093	3.981	0.000	0.233	0.577

Note(s): β (O): original sample mean or β coefficients, M: sample mean, STDEV: standard deviation, T: t-statistics, p-v: p-values, LB: lower bound confidence interval and UB: upper bound confidence interval

Table 8. R^2 statistics of proposed model

Variables	R^2	R^2 adjusted
AT	0.247	0.240
MN	0.138	0.129
PBC	0.078	0.069
PLI	0.586	0.578
RI	0.432	0.414

Note(s): The R^2 adjusted is taken in the study for prediction power measurement of the variables

be positively and significantly associated with young residents' PBC ($\beta = 0.280$, $t = 3.094$, $p < 0.05$) for RIs, and the alternative hypothesis H3 was accepted. PLI ($\beta = 0.497$, $t = 5.228$, $p < 0.05$) was found to be positively and significantly impacting RA of young residents, and the alternative hypothesis H4 was accepted. RA ($\beta = 0.264$, $t = 2.500$, $p < 0.05$) was found to positively and significantly influence RIs of young residents, and the alternative hypothesis H5 was accepted. The PBC ($\beta = 0.341$, $t = 3.532$, $p < 0.05$) of young residents was found to positively and significantly impact theRIs, and the hypothesis H6 was accepted. SN ($\beta = 0.371$, $t = 3.981$, $p < 0.05$) was found to be positively and significantly influencing MN of young residents' with respect to RIs, and the alternative hypothesis H7 was accepted. MN ($\beta = 0.163$, $t = 2.085$, $p < 0.05$) had a positive and significant impact on young residents' PLI, and the alternative hypothesis H8 was accepted. Hence, all the alternative hypotheses of the proposed conceptual model were accepted.

5. Discussion

The results established the fact that the young residents' RIs could be predicted by PA using the TPB model. The results seem to be in line with the findings of Manzo and Perkins (2006), which stated that PA has a positive and significant impact on RIs of young residents. The study also justified the morale for including PA (PD and PLI) in the TPB model with prediction power of RIs (RI) of 41.4% (R^2 adjusted = 0.414). Literature had found that SN and MN were not impressive antecedents in studies pertaining to RI of young residents through PLI (for, e.g. Thogersen, 1994; Armitage and Conner, 2001), but the study found SN to have an influence on MN ($\beta = 0.371$, $t = 3.981$, $p < 0.05$), and MN ($\beta = 0.163$, $t = 2.085$, $p < 0.05$) was unable to forge an impressive relation with PLI of young residents' intentions to recycle household waste. This finding may draw a coherent with the fact that the residents of the place where the study was conducted may not be highly influenced by neighbors or friends recycling waste habits, which is contradictory to the findings of Park and Ha (2014). The MN is a riling concern, and the study highlights its low influence on PLI. The other probable reason for such low influence of norms on PLI for RI of household waste could be the norms formation through the thought process among residents that household waste recycling to be an exclusive domain of local governments only (Vidanaarachchi *et al.*, 2006). For norms to be more influential, public participation and awareness is necessary (Struk, 2017).

The study further propagates the findings that PD ($\beta = 0.716$, $t = 8.393$, $p < 0.05$) had the highest influence on young residents' PI. The findings seem to be similar to studies of Devine-Wright (2009), which postulated that PD is a strong antecedent to PLI of residents engaged in household waste recycling. Also, PLI was being able to be predicted by SN, MN and PD with an impressive prediction power of 57.8% (R^2 adjusted = 0.578). The findings resonate with the research of Ru *et al.* (2019) and Effendi *et al.* (2020) that RA and PBC have a positive and significant impact on RI of residents. The findings add to the positive literature that RA and PBC play a major role in influencing RIs and also the PA-based approach could be added to the TPB in order to understand RIs.

6. Implications

6.1 Implications for researchers and academicians

The study imposes that PA approved the addition to the TPB for analyzing RIs in young residents. The findings add to the literature of proenvironmental intentions and behavior of residents with a place-based approach. The research entails how norms (SN and MN) lead to

PLI, which further could help predict RI through RA and PBC. The study had taken SN, which was the major precedent to intentions in the TPB, as an external variable to predict MN and later PLI because the previous literature had apparently argued that SN was not a good predictor of intentions with respect to intentions to recycle household waste (e.g. in a study by Mannetti *et al.*, 2004, the β-coefficient for RI by SN was a smidgen 0.16). The study recruits a new stream of thought of how SN and MN could be antecedents to PLI and influence intentions to recycle household waste. The study has implications for researchers and academicians where the place-based approach of household RIs could be analyzed using the malleable TPB and second, add to the knowledge of norms framing place based identities.

6.2 Implications for local government/municipalities and environmental enthusiasts

The local governmental bodies could garner from the findings of the study to speed up the awareness programs so that norm building through PA could lead to better RIs and practices among residents. PA in the study has implications for waste collectors, which could target waste collection mechanisms in a more efficient way in order to reduce carbon footprints like "drop-off sites" (Struk, 2017) and "door-to-door recycling scheme" of household waste collection systems, which are prevalent in countries like Canada (Derksen and Gartrell, 1993), Japan (Zheng *et al.*, 2017), Germany (Nelles *et al.*, 2016) and the USA (Saphores and Nixon, 2014). The cost cutting techniques through greater citizen participation (Ramsey and Rickson, 1976; Struk, 2017) shall be achieved by changing household waste recycling mindset among local residents that recycling is considered to be an expensive business and is limited by huge costs in investments, spatial limitations and the need for trained workers to cater supplies and logistics. Proactive citizen behavior regarding environmental welfare could be enhanced further by awareness programs to educate residents on fronts like what, why and how aspects of recycling (Struk, 2017; Williams and Taylor, 2004) in a place-based approach. The findings add to implications for all stakeholders engaged in the activity of safeguarding environment, like recycling household waste.

7. Conclusions and limitations of the study

The TPB has been a useful model for the study of proenvironmental behavior and PA (PD and PLI) addition to the model was a nascent attempt to measure RI on a place-based approach among young residents in a developing nation, like India. The study concluded that PA was an important variable that could be infused with the TPB in order to measure the RIs of residents. The norms (SN and MN) served as antecedents to PLI, and PLI served as an antecedent to RA, PBC and RI of young consumers. Overall, the model was billed certified for inclusion of PA variables in the TPB with studies pertaining to RIs of residents' on a place-based approach. The predictive power of PLI was an impressive 57.8% (R^2 adjusted = 0.578), and overall for RI was 41.4% (R^2 adjusted = 0.414).

The study was not free of hiccups and witnessed some limitations. The study was limited to only the educated strata of society comprising young populace who may have been motivated to mark a more socially desirable response rather than veracious intentions (Kaiser *et al.*, 2008). Further, only the RIs were only measured through a place-based approach, and it would be interesting for further researchers to measure actual behavior. The prediction power of the model for RI was 41.4%, which signifies that the model was open for further research where more variables, like waste sorting at source point, awareness consequences, cost incurred for waste disposal and more, could be added for providing a better rendition of recycle intentions of household waste among residents on a place-based approach. Influence of social media for RIs would be a recommended addition to the model with PA and help understand the online waste RIs. Finally, the study could not be generalized due to two reasons: First, the population was a

place-based approach meaning that the results would significantly vary with geographical change and second, the population only consisted of educated young population living in developed places was not considered to be an issue. It would be interesting if the study could be replicated in rural areas of India with an enriched sample size and variety where waste collection and management systems are hitherto not systematic.

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Corresponding author

Kanishka Pathak can be contacted at: kanishkapathak1989@gmail.com