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Assessing the determinants of intentions and behaviors of organizations towards a circular economy for plastics

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ABSTRACT

The production and consumption of plastics, although inevitable in our modern life, are predominantly unsustainable and inefficient. Hence, the concept of a circular economy for plastics has been proposed as a sustainable approach to thrive both economy and our modern life. To implement a circular economy for plastics, an understanding of both individuals' and organizations' behaviors is needed since psychological effects often undermine technical solutions. We particularly focus on organizations' behaviors since commercial plastic waste has not been thoroughly investigated compared to household plastic waste. Using the Theory of Planned Behavior (TPB) and Partial Least Squares Structural Equation Modeling (PLS-SEM), we assess the determinants of intentions and behaviors of 637 organizations in Belgium towards a circular economy for plastics. Our PLS-SEM analysis support that attitudes, subjective norms, and perceived behavioral control of decision makers positively influence organizations' intentions to implement best practices of plastic recycling. Furthermore, organizations' intentions, perceived behavioral control, pressures, and enablers positively, whereas barriers negatively, influence organizations' behaviors. Our study shows that most organizations have positive intentions, yet they seem to be failing in implementing best practices of plastic recycling due to some critical barriers. To overcome this intention-behavior gap and to attain a circular economy for plastics, our study suggests some measures.

1. Introduction

The invention of plastics has significantly facilitated our modern life. However, plastics, that were being hailed as a "*scientific wonder*" until a few decades ago, are now being reviled as an "*environmental scourge*" (Plummer, 2018). Notwithstanding increasing concern on environmental issues, the production of plastics is still increasing rather than decreasing. To illustrate, the annual production of plastics in the world and the EU have reached around 360 and 62 million tonnes respectively in 2018 and is expected to grow further in the upcoming years (PlasticsEurope, 2019). Simply put, the production of plastics is inevitable since our modern life is just unthinkable without plastics. However, the problem is that this huge production of plastics, particularly single-use plastics, ultimately turns into mountains of plastic

waste generated every year. For instance, the world spawned around 302 million tonnes of plastic waste in 2015 (Geyer et al., 2017); the EU generated around 29 million tonnes of plastic waste in 2018 (PlasticsEurope, 2019). It is worth noting that the production of plastics annually consumes 4–8% of the total crude oil extraction in the world (Huysman et al., 2017). Hence, if this huge amount of plastic waste is just disposed of rather than being recycled then it is also a huge loss of resources. To remedy such concerns, the concept of a circular economy for plastics has emerged as a promising solution.

A circular economy for plastics implies that the value of plastics in the economy should be maintained without leakage into the natural environment (Ellen MacArthur Foundation, 2017). Although several studies have demonstrated that a majority of plastics can be recovered and transformed into new products (Ragaert et al., 2020, 2017), only

9% of the total plastic waste was recycled in the world from 1950 to 2015 (Geyer et al., 2017). Despite European governments encouraging the circular economy, by 2018 the EU recycled on average only 30% of all plastic waste, and the European Parliament estimated that 95% of the value of plastic packaging material was lost to the economy after a short first-use cycle (European Parliament, 2018). Therefore, the potential to recycle plastic waste is still largely unexploited. Accordingly, the European Commission announced "*a European Strategy for Plastics in a Circular Economy*" (European Commission, 2018), and the EU set new recycling targets for plastics at a minimum of 50% by 2025 and 55% by 2030 (EU, 2018). Although some technical approaches and alternative materials have been proposed to tackle plastic waste, technical approaches alone cannot completely overcome this problem since psychological and behavioral traits often undermine the viability of technical solutions (Heidbreder et al., 2019). Simply put, both technical solutions and pro-environmental human behavior are essential to increase plastic recycling rates. In short, to develop effective policies, a better understanding of human behavior related to plastic recycling is needed.

The Theory of Planned Behavior (TPB) (Ajzen, 1985) is one of the most influential theories used to understand human behavior. A plethora of previous studies had employed TPB to predict human intention and behavior to waste recycling (Botetzagias et al., 2015; Chen and Tung, 2010; Davis et al., 2006; Khan et al., 2019a; Knussen et al., 2004; Knussen and Yule, 2008; Nigbur et al., 2010; Ramayah et al., 2012; Taylor and Todd, 1995; Tonglet et al., 2004). However, previous studies mainly considered a sample from households (e.g. heads of the family or housewives) or academic institutions (e.g. adult students) to predict individual-level outcomes (Geiger et al., 2019). Somewhat surprisingly, previous studies rarely considered a sample from organizations (e.g. managers or employees) to predict organizational-level outcomes. It is worth mentioning that previous studies overlooked organizations as a context not only in the case of waste recycling but also in the case of other pro-environmental behaviors (Yuriev et al., 2020). A few studies have employed TPB to predict managers' intentions and behaviors to other environmental concerns (Cordano and Frieze, 2000; Flannery and May 2000; Liston-Heyes and Vazquez Brust, 2016; Papagiannakis and Lioukas, 2012; Sánchez-Medina et al., 2014; Vazquez Brust and Liston-Heyes, 2010). However, to the best of our knowledge, corporate decision makers' intentions and behaviors to waste recycling, particularly plastics recycling, remains still unexplored.

To contribute to the aforementioned knowledge gap, our study specifically focuses on organizations and their decision makers for two reasons. First, organizations generate a large proportion of plastic waste commonly referred to as commercial plastic waste (Deloitte, 2017). However, this plastic waste, though technically eligible for recycling, is often not properly collected or recycled because organizations are either passive or not connected to appropriate systems. Second, decision makers are the key individuals of organizations. Here, it is worth noting that though circular economy decisions are very complex but often the perceptions, attitudes, and personal values of decision makers directly influence organizations' strategic actions towards a circular economy (Daddi et al., 2019; Gusmerotti et al., 2019). In short, both active participation of organizations and the role of decision makers are pivotal to implement a circular economy for plastics. March and Simon (1958, p. 26) stated that "*propositions about organizations are statements about human behavior*" and Liedtka (1991, p. 543) stated that "*organizations do not make decisions – individuals do*". Therefore, we can refer to decision makers' intentions as organizations' intentions and vice versa.

Our study aims to understand the intentions and behaviors of organizations in Belgium towards a circular economy for plastics. Our study contributes to the literature of both the TPB and circular economy in the following manner. First, our study empirically assesses the determinants of intentions and behaviors of organizations to implement best practices of plastic recycling by employing the Partial Least Squares Structural Equation Modeling (PLS-SEM). Notably, our study

empirically assesses some barriers to a circular economy for plastics. Accordingly, our study suggests how the intention-behavior gap may be overcome to attain a circular economy for plastics. Second, unlike previous studies on recycling behavior, our study predicts the intentions and behaviors of organizations by combining both individual-level and organizational-level characteristics. Therefore, we contribute to an outstanding gap in TPB highlighted by Yuriev et al. (2020, p. 7), who pointed out that "*identifying and assessing specific barriers associated with the workplace context could be crucial for achieving better employee engagement and a lower ecological footprint for organizations*". The rest of our study proceeds as follows. Section 2 presents the theoretical framework and accordingly formulates our research hypotheses. Section 3 describes how the constructs are measured, data is collected, and hypotheses are tested. Section 4 presents the results, whereas Section 5 discusses the main results and their implications. Finally, Section 6 concludes the discussion, highlights the limitations, and suggests some future research opportunities.

2. Theoretical framework and hypotheses

Fishbein and Ajzen (1975) proposed the Theory of Reasoned Action (TRA) by assuming that human behavior can be controlled by human will. However, TRA was criticized that human behavior could not be fully explained without considering various factors that affect human intentions. As a response to overcome this shortcoming of TRA, Ajzen (1985) proposed the Theory of Planned Behavior (TPB) by including another variable into the TRA model, that is, perceived behavioral control (Ajzen, 1991). TPB postulates that attitude towards behavioral intention, subjective norms, and perceived behavioral control together shape behavioral intention as well as actual behavior. To date, TPB has received around 90,000 citations (Yuriev et al., 2020). Despite some criticism and several competing behavioral models, the TPB model is still regarded as the most effective model for designing behavioral interventions (Yuriev et al., 2020). Therefore, researchers have been increasingly employing the TPB model across various disciplines including environmental science and sustainability management (Daddi et al., 2018; Si et al., 2019).

According to TPB (Ajzen, 1985), behavioral intention towards the actual behavior is collectively influenced by attitude, subjective norms, and perceived behavioral control. Ajzen (1991, p. 188) defines attitude as "*the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question*". A positive or negative attitude of an individual towards a certain behavior respectively strengthens or weakens his/her intention to perform that certain behavior in question. Previous studies support the relationship between attitude and behavioral intention (Khan et al., 2019a; Tonglet et al., 2004). In our study, we interpret attitudes as "*the extent to which plastic recycling is valued by decision makers, whether positive or negative*". Khan et al. (2020) show that environmentally conscious decision makers successfully implemented a circular economy for plastics in their organizations. Therefore, we assume that those decision makers who hold positive attitudes towards plastic recycling are more likely to implement the best practices of plastic recycling in their organizations.

Next to attitude, Ajzen (1991, p. 188) defines subjective norms as "*the perceived social pressure to perform or not to perform the behavior*". The behavioral intention of an individual is usually influenced by the expectations of a group or society to which he/she belongs. Fishbein and Ajzen (2011) explicate norms as injunctive norms (*perceptions of what others consider to be correct behavior*) and descriptive norms (*perceptions of what others are actually doing*). Many previous studies support the relationship between subjective norms and behavioral intention (Chen and Tung, 2010; Khan et al., 2019a; Papagiannakis and Lioukas, 2012; Sidique et al., 2010). Herein, we refer to subjective norms as societal norms of plastic recycling. It is worth noting that the societal norms of plastic recycling may vary in different contexts. For instance, the following statement may be either

true or untrue for any country that a specific sector may be bound to comply with plastic recycling, whereas other sectors may not have any compelling reasons to do so. Therefore, a decision maker's intention may be influenced by the fact that whether or not the neighboring or similar organizations to his/her organization are supporting plastic recycling (Thoradeniya et al., 2015). Similarly, a decision maker's intention may also be influenced by the fact that whether or not other individuals in his/her organization are in favor of plastic recycling. In our study, we interpret subjective norms as "*the extent to which decision makers are influenced by perceived norms of plastic recycling in their organizational surroundings*". We assume that those decision makers who perceive positive societal norms of plastic recycling are more likely to implement the best practices of plastic recycling in their organizations.

Next to subjective norms, Ajzen (1991, p. 188) defines perceived behavioral control as "*the perceived ease or difficulty of performing the behavior*". The behavioral intention of an individual is dependent on his/her perceived ability or power to perform that certain behavior in question. Previous studies support the relationship between perceived behavioral control and behavioral intention (Boldero, 1995; Tonglet et al., 2004). Here, it is worth mentioning that perceived behavioral control is a determinant of both behavioral intention and actual behavior (Fishbein and Ajzen, 2011). In our study, we interpret perceived behavioral control as "*the perceived power (and knowledge) of decision makers to implement plastic recycling*". We assume that those decision makers who hold strong perceived behavioral control are more likely to implement the best practices of plastic recycling in their organizations. In light of the above discussion and taking this statement into account that decision makers' intentions can be referred to as organizations' intentions and vice versa, we propose our first, second, and third hypotheses as following (see Fig. 1):

H 1: Attitudes of decision makers positively influence organizations' intentions to implement best practices of plastic recycling

H2: Subjective norms perceived by decision makers positively influence organizations' intentions to implement best practices of plastic recycling

H3: Perceived behavioral control of decision makers positively influences organizations' intentions to implement best practices of plastic recycling

In our study, we interpret behavioral intentions as "*a perceived likelihood or subjective probability of decision makers that they will implement plastic recycling in their organizations*". We assume that those decision makers that hold positive behavioral intentions are more likely to implement best practices of plastic recycling in their organizations. In other words, it can be stated that those organizations that hold positive intentions are more likely to contribute to a circular economy by pursuing the best practices of plastic recycling. Researchers generally employ the determinants of the TPB model (attitude, subjective norms, and perceived behavioral control) to predict actual behavior as individual-level outcomes. However, in line with previous studies (Papagiannakis and Lioukas, 2012; Singh et al., 2018), we aim to predict actual behavior as organizational-level outcomes. This approach is referred to as a cross-level relationship (Cordano and Frieze, 2000; Klein et al., 1994). In our study, we interpret actual behaviors as "*the extent to which organizations have implemented best practices of plastic recycling*". As these best practices include reducing, reusing, and recycling of plastic waste, we can refer to actual behaviors as organizations' behaviors towards a circular economy for plastics. We assume that as many recycling practices an organization would successfully implement, as much that organization would contribute to a circular economy for plastics. It is worth noting that perceived behavioral control may directly influence actual behavior, but previous studies on recycling did not assess the relationship between perceived behavior control and recycling behavior (Taylor and Todd, 1995; Tonglet et al., 2004). In light of the above discussion and taking this statement into account that decision makers' intentions can be referred to as organizations' intentions and vice versa, we propose our fourth and fifth hypotheses as following (see Fig. 1):

H4: Organizations' intentions positively influence organizations' behaviors towards a circular economy for plastics

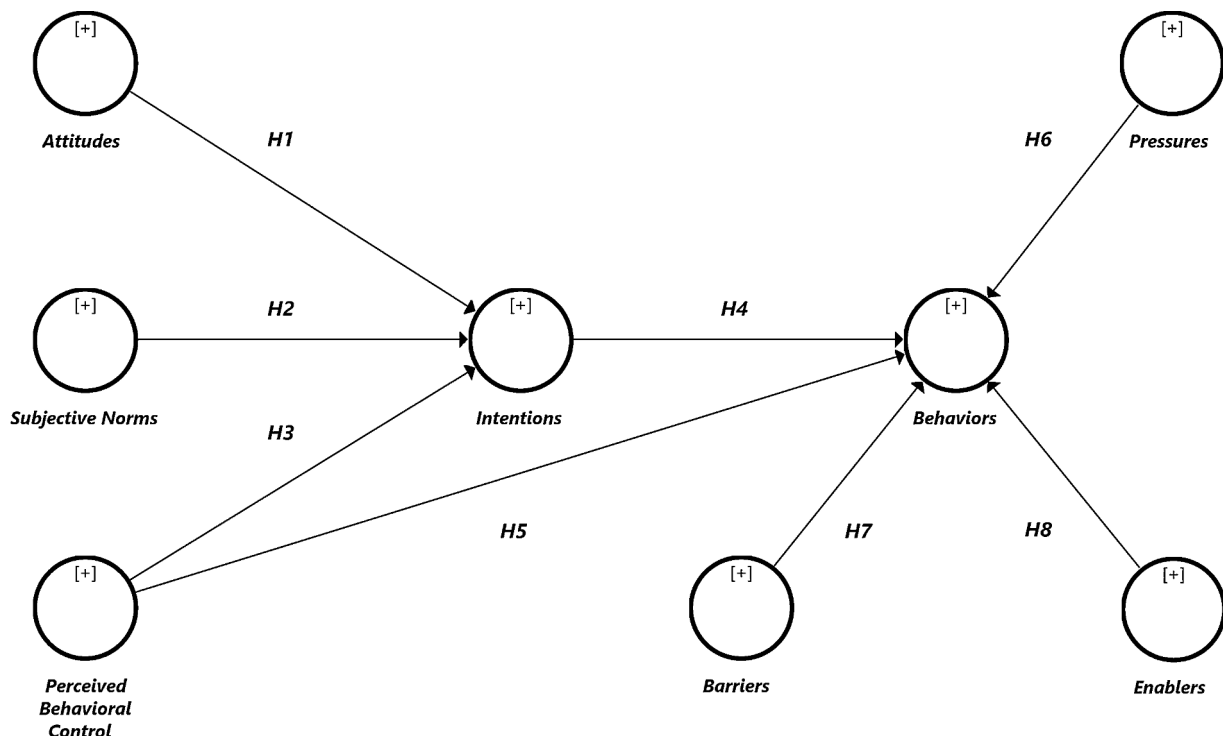H5: Perceived behavioral control of decision makers positively

Fig. 1. Research Model (Hypotheses).

influences organizations' behaviors towards a circular economy for plastics

Although the traditional components of the TPB model (attitude, subjective norms, and perceived behavioral control) have been successful in predicting human intentions and behaviors, many researchers argue that additional variables should be incorporated into the TPB model to enhance its explanatory power (Botetzagias et al., 2015; Chen and Tung, 2010; Geiger et al., 2019; Khan et al., 2019a; Singh et al., 2018; Tonglet et al., 2004). Ajzen (1991, p. 199) points out that "*the theory of planned behavior, is, in principle, open to the inclusion of additional predictors*". Thus, TPB allows researchers to extend the TPB model considering the context and objective of their studies. It is worth noting that the traditional components of the TPB model do not directly influence organizations' behaviors. Furthermore, although decision makers' intentions influence organizations' behaviors, other factors may also influence organizations' behaviors. So, we argue that the TPB model should be extended with variables that capture factors that are more outside the scope of decision makers. Yuriev et al. (2020) point out that researchers should focus on factors that influence behaviors rather than just explaining factors that influence intentions. They suggest that researchers should aim to overcome the intention-behavior gap. Therefore, we modify the TPB model by incorporating three variables namely, pressures, barriers, and enablers as direct factors that may influence organizations' behaviors. For incorporating additional constructs into the TPB model, we followed the guidelines of Whetten et al. (2009).

We refer to pressures as regulatory and market pressures. We interpret pressures as "*the perceived push on organizations, to implement best practices of plastic recycling, from regulatory bodies, competitors, and customers*". Some studies point out that such pressures directly improve organizations' environmental performance (Daddi et al., 2016; Phan and Baird, 2015; Singh et al., 2018). Jain et al. (2020) point out that such pressures influence organizations' intentions toward recycling. It is worth noting that though regulatory pressure may be the same, market pressure on each organization or sector may be different. We assume that those organizations, whose decision makers perceive stronger pressures on their organizations, are more likely to implement best practices of plastic recycling. That is, those organizations are more likely to contribute to a circular economy for plastics. It is worth mentioning that we differentiate between subjective norms and pressures mainly in terms of construct operationalization. Suppose neighboring organizations have already implemented a specific technology, yet an organization may decide not to implement that technology because of financial burdens. However, if there are any regulatory pressures, an organization would have to implement that technology sooner or later. Thus, we specify a direct relation between pressures and actual behaviors.

We refer to barriers as factors that hinder an organization to implement best practices of plastic recycling. In our study, we interpret barriers as "*lack of requisite resources and/or appropriate opportunities*". We assume that those organizations that encounter substantial barriers are very unlikely to implement best practices of plastic recycling. In contrast, we refer to enablers as factors that may facilitate an organization to implement best practices of plastic recycling. In our study, we interpret enablers as "*necessary actions or potential solutions, if introduced or implemented, may motivate organizations towards plastic recycling*". We assume that if organizations are properly facilitated then they will enthusiastically contribute to a circular economy for plastics. In light of the above discussion, we finally propose our sixth, seventh, and eighth hypotheses as following (see Fig. 1):

H6: Pressures on organizations positively influence organizations' behaviors towards a circular economy for plastics

H7: Barriers negatively influence organizations' behaviors towards a circular economy for plastics

H8: Enablers positively influence organizations' behaviors towards a circular economy for plastics

3. Methodology

3.1. Data collection

We developed our questionnaire as per the recommended guidelines (Churchill, 1979). First of all, we shortlisted relevant previous studies. Next, we identified indicators related to the constructs in question from those previous studies. This step involved compilation and adaptation of indicators considering the context and objective of our study. Then, we drafted a trial questionnaire, which was reviewed by four academicians and practitioners. Consequently, we further improved our questionnaire. Afterward, we translated our questionnaire into regional languages to facilitate the target audience. We assumed that questionnaire in regional languages may increase the response rate. Then, we preliminary tested our questionnaire with some local organizations. The obtained data satisfied the psychometric properties as described in Section 4.1. That is, the aforementioned step confirmed the suitability and validity of our questionnaire.

Our study focuses on Belgium which has been under-represented in the previous literature. Belgium is highly influential in EU decision making as it hosts the European parliament. The plastic generation per inhabitant in Belgium is the same as the average of EU-28. However, the plastic recycling rate of Belgium is moderately above compared to EU-28 and significantly lower compared to the Netherlands (European Parliament, 2018). We extracted a huge list of organizations through the ORBIS database. Then, we randomly selected a sample of 5000 organizations. Finally, we invited those organizations through emails to participate in our study - the online survey which remained active from January to February 2020. We explicitly requested organizations that the online survey should be completed by a decision maker (Owner/CEO/Director/General Manager/Environmental Manager). Nevertheless, in the online survey, we asked respondents to specify their designations in case their designation is even other than the listed designations. We asked only one respondent per organization to complete the online survey. Although we sent reminder emails in due time, we just received data responses (observations) from 730 organizations through Qualtrics (an online survey tool). However, to ensure the reliability of our dataset, we followed very strict criteria of data screening. That is, we deleted observations with more than 15% missing values (Hair et al., 2017), retaining 637 observations in our dataset for further analysis. The majority of organizations that participated in our study are small size organizations though they belong to various sectors (see Table 1).

3.2. Constructs and measures

The original TPB model is based on five constructs namely, attitudes (ATT), subjective norms (SUN), perceived behavioral control (PBC), behavioral intentions (INT), and actual behaviors (BEH) (Ajzen, 1991). We extended the TPB model by incorporating three constructs namely, pressures (PRE), barriers (BAR), and enablers (ENA) as per the context and objective of our study. Thus, our proposed model, having reflective indicators, is an extended version of the TPB model (see Fig. 2). It is worth mentioning that our proposed model is a mixed-determinants model, incorporating concepts on individual-level (ATT, SUN, PBC) as well as on organizational-level (INT, BEH, PRE, BAR, ENA) (Klein et al., 1994). Accordingly, we operationalized each construct on its own-level. To measure each construct, we mainly adapted indicators from previous studies (Abdulrahman et al., 2014; European Commission, 2016; Khan et al., 2019b; Nigbur et al., 2010; Phan and Baird, 2015; Sánchez-Medina et al., 2014; Sidique et al., 2010; Simpson, 2012; Taylor and

Table 1
Description of Sample.

Variable	Description	Number of Organizations
NACE Sector	Administrative and Support Services	50
	Construction	68
	Education	7
	Electricity, Gas, and Water Supply	3
	Information and Communication	22
	Manufacturing	84
	Others	222
	Transportation and Storage	24
	Wholesale and Retail Trade	157
Number of Employees	1-49, 50-249, 250-999, 1000-4999, More than 5000	499
		101
		26
		8
		3
Annual Income	Less than 1000,000 euro	235
	1000,001 - 2000,000 euro	104
	2000,001 - 10,000,000 euro	138
	10,000,001 - 50,000,000 euro	91
	Higher than 50,000,000 euro	38
	Undisclosed	31

Note: NACE Sector: https://data.be/en/nace

Todd, 1995; Thoradeniya et al., 2015; Tonglet et al., 2004).

For attitudes (ATT), subjective norms (SUN), perceived behavioral control (PBC), and behavioral intentions (INT), we asked respondents to rate on a Likert scale (*1. strongly disagree, 2. disagree, 3. undecided, 4. agree, 5. strongly agree*) whether they agree or disagree with the listed statements (see Table 2). For actual behaviors (BEH), we asked them to rate on a Likert scale (*1. not considering it, 2. considering it, 3. planning it, 4. initiating implementation, 5. implementing successfully*) whether they have been considering or implementing the listed practices (see Table 2) in their organizations. For pressures (PRE), we asked them to

rate on a Likert scale (*1. strongly disagree, 2. disagree, 3. undecided, 4. agree, 5. strongly agree*) whether they agree or disagree that the listed factors (see Table 2) push their organizations towards recycling plastic waste. For barriers (BAR), we asked them to rate on a Likert scale (*1. strongly disagree, 2. disagree, 3. undecided, 4. agree, 5. strongly agree*) whether the listed factors (see Table 2) cause hindrance in recycling plastic waste. Finally, for enablers (ENA), we asked them to rate on a Likert scale (*1. unhelpful, 2. slightly helpful, 3. moderately helpful, 4. very helpful, 5. extremely helpful*) to what extent the listed actions (see Table 2), if introduced or implemented, may help their organizations in recycling plastic waste.

3.3. Data analysis

To analyze our dataset, we employed structural equation modeling (SEM) since it is regarded as a very robust and powerful statistical tool in various disciplines (Hair et al., 2012a). To conduct SEM, two main approaches are known as covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM). PLS-SEM is advised when the research is rather exploratory, the focus is on predicting the phenomena, rather than on understanding relationships between phenomena and the model is rather complex (Hair et al., 2011). Moreover, PLS-SEM may exhibit higher statistical power compared to CB-SEM (Wetzels et al., 2009) and most researchers have employed PLS-SEM in related studies on recycling and TPB (Khan et al., 2019a). For these reasons, we opted for PLS-SEM and used SmartPLS 3 to test our proposed research model (Ringle et al., 2015).

It is worth noting that the sample size of our study comfortably met the recommended rule of thumb, that is, ten times to the number of indicators of the construct with the highest number of indicators (Hair et al., 2012b). So practically, as barriers (BAR) has 8 indicators, a sample of 80 respondents should already be sufficient to test our model. Interestingly, the sample size of our study, 637 observations, is relatively high in comparison with the sample size of most other studies who used PLS-SEM, both in management (Hair et al., 2012a) as well as in most other studies on similar topics (Khan et al., 2019b, 2019a; Nigbur et al., 2010; Papagiannakis and Lioukas, 2012; Sidique et al., 2010;
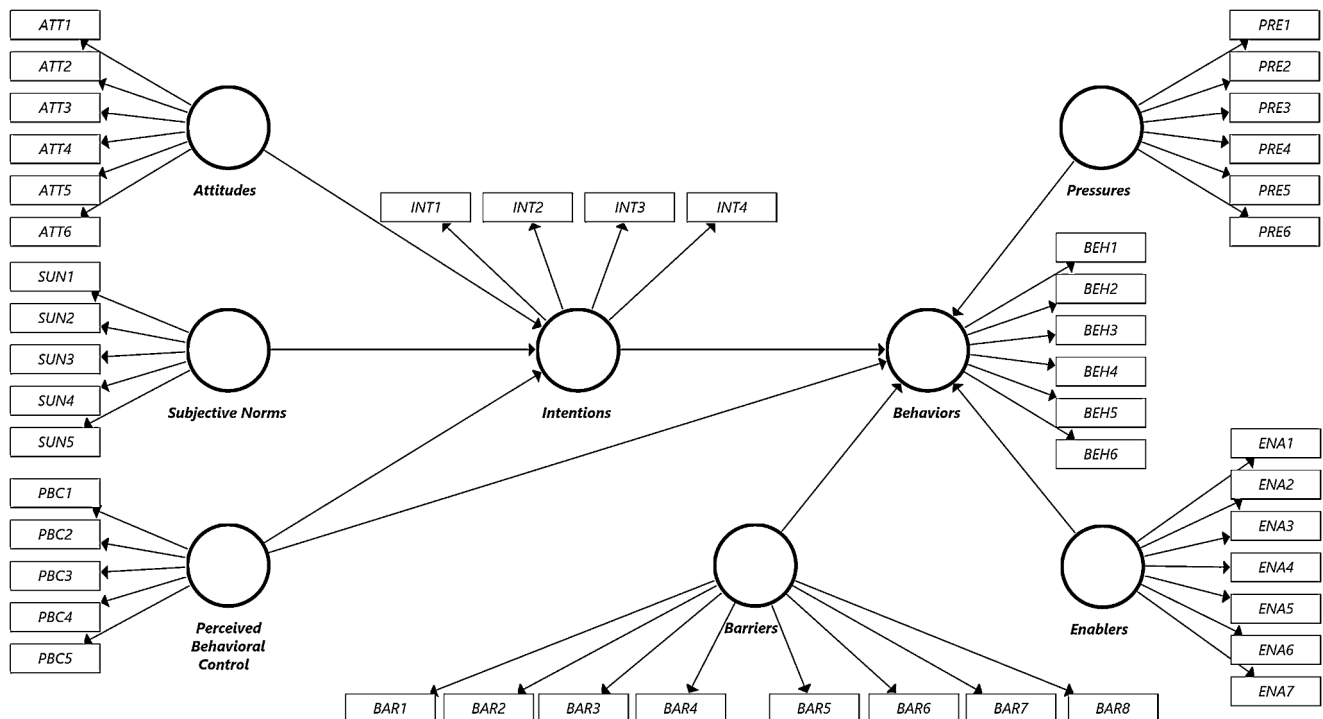

Fig. 2. Hierarchical Measurement Model.

Table 2
Reliability and Validity of Measurement Model.

Constructs	Indicator Code	Indicators	Loadings[1]	Cronbach's Alpha[2]	CR[3]	AVE[4]
Attitudes (ATT)	ATT1	Recycling plastic waste is good	0.785	0.877	0.906	0.618
	ATT2	Recycling plastic waste is useful	0.818			
	ATT3	Recycling plastic waste is rewarding	0.824			
	ATT4	Recycling plastic waste is sensible	0.854			
	ATT5	Recycling plastic waste would give our organization great satisfaction	0.702			
	ATT6	It is our organization's responsibility to recycle plastic waste	0.723			
Subjective Norms (SUN)	SUN1	Most people who influence our decisions think that our organization should recycle plastic waste	0.830	0.841	0.884	0.605
	SUN2	Most people inside our organization think that our organization should participate in recycling plastic waste.	0.838			
	SUN3	Most people outside our organization think that our organization should participate in recycling plastic waste.	0.773			
	SUN4	Many organizations similar to our organization participate in recycling plastic waste	0.755			
	SUN5	Our neighboring organizations participate in recycling plastic waste	0.684			
Perceived Behavioral Control (PBC)	PBC1	Our organization knows what items of plastic waste can be recycled	0.815	0.772	0.842	0.526
	PBC2	Our organization knows where to take plastic waste for recycling	0.821			
	PBC3	Our organization knows how to recycle plastic waste	0.850			
	PBC4	Whether or not our organization recycles plastic waste is entirely up to us	0.469			
	PBC5	Whether or not our organization recycles plastic waste effectively is completely within our control	0.593			
Intentions (INT)	INT1	Our organization intends to recycle plastic waste	0.859	0.897	0.928	0.763
	INT2	Our organization plans to recycle plastic waste	0.868			
	INT3	Our organization is willing to put efforts to recycle plastic waste	0.896			
	INT4	Our organization is willing to participate or continue plastic recycling	0.869			
Behaviors (BEH)	BEH1	Utilizing eco-friendly packaging	0.621	0.699	0.807	0.518
	BEH2	Segregating plastics from other waste	0.833			
	BEH3	Handing over generated plastic waste to a waste management company	0.817			
	BEH4[5]	*Selling generated plastic waste to other organizations*	*N/A*[6]			
	BEH5[5]	*Reusing generated plastic waste within our organization*	*N/A*[6]			
	BEH6	Reducing the generation of plastic waste	0.569			
Pressures (PRE)	PRE1	International trade regulations	0.809	0.846	0.886	0.565
	PRE2	EU regulations on plastic recycling	0.843			
	PRE3	Local regulations on plastic recycling	0.734			
	PRE4	Threat of future environmental regulations	0.689			
	PRE5	Green strategies of competitors	0.713			
	PRE6	Environmental awareness of customers	0.708			
Barriers (BAR)	BAR1	Lack of funds for recycling plastic waste	0.724	0.867	0.895	0.519
	BAR2	Lack of enough time to sort plastic waste	0.737			
	BAR3	Lack of skilled personnel to sort plastic waste	0.708			
	BAR4	Lack of enough space to store plastic waste	0.753			
	BAR5	Lack of easy access to recycling facilities	0.810			
	BAR6	Lack of convenient transport to handover plastic waste	0.801			
	BAR7	Lack of an environmental expert at management level	0.604			
	BAR8	Lack of information about potential buyers of plastic waste	0.596			
Enablers (ENA)	ENA1	Government enforcing more strict regulations	0.659	0.852	0.887	0.530
	ENA2	Government providing economic incentives	0.745			
	ENA3	Institutions advising funding possibilities	0.697			
	ENA4	Institutions organizing training programs	0.806			
	ENA5	Institutions establishing a networking platform to facilitate selling or reuse of plastic waste	0.800			
	ENA6	Waste management companies providing necessary guidelines and facilities	0.740			
	ENA7	Waste management companies providing better quotes or charging an affordable fee	0.632			

Note:

[1] Indicator Loadings > 0.5 indicates the indicator reliability (Hulland, 1999, p. 198).

[2] Cronbach's Alpha > 0.7 indicates the internal consistency of a set of indicators (Nunnally, 1978).

[3] Composite Reliability (CR) > 0.7 indicates the internal consistency of a set of indicators (Gefen et al., 2000).

[4] Average Variance Extracted (AVE) > 0.5 indicates the convergent reliability (Bagozzi and Yi, 1988; Fornell and Larcker, 1981).

[5] These indicators were deleted due to low loadings in order to achieve AVE > 0.5.

[6] The loadings of BEH4 and BEH5 were respectively 0.475 and 0.476, while the AVE was 0.398 before deleting these indicators.

Tonglet et al., 2004). Chin (2010) recommends a two-step approach to examine and interpret PLS-SEM. Accordingly, firstly, we assessed the measurement model. For that, we applied the recommended settings by using a PLS algorithm with 300 iterations. Secondly, we estimated the structural model to examine our proposed hypotheses by using bootstrapping with 5000 subsamples (Hair et al., 2012b). We carefully followed the recommended rules and guidelines while conducting PLS-SEM analysis and reporting the results (Chin, 2010; Hair et al., 2019).

4. Results

4.1. Measurement model

We estimated the indicator reliability, internal consistency, convergent validity, and discriminant validity for evaluating the measurement model (Hair et al., 2019). According to Hair et al. (2011), indicator loadings should ideally be higher than 0.70. Nevertheless,

indicator loadings between 0.40 and 0.70 are also acceptable if the average variance extracted (AVE) of the construct is higher than 0.50 (Hair et al., 2012b; Hulland, 1999). We found that all the indicator loadings are ranging between 0.469 and 0.896 (see Table 2), except the two indicators of actual behaviors (BEH) construct. For convergent validity, the AVE of each construct should be higher than 0.50 (Hair et al., 2011). However, we found that the AVE of actual behaviors (BEH) construct was 0.398, while indicator loadings of BEH4 and BEH5 were 0.475 and 0.476 respectively. Thus, after the deletion of two indicators of actual behaviors (BEH) construct, our study satisfied the criteria of indicator reliability and convergent validity (see Table 2).

For internal consistency, Cronbach's alpha (α) and composite reliability (CR) values should ideally be higher than 0.70 (Ali et al., 2018; Hair et al., 2011). Even though both Cronbach's α and CR are measures of internal consistency, Hair et al. (2019) point out that Cronbach's α is a less precise measure. We found that both Cronbach's α and CR values were above the recommended cut-off values, CR values ranging between 0.807 and 0.928 while Cronbach alpha values ranging between 0.699 and 0.897 (see table 2). Hence, we may conclude that our study satisfied the criteria of internal consistency. For convergent validity, we found that AVE values of all the constructs are ranging between 0.518 and 0.763 (see Table 2). Thus, our study satisfied the criteria of convergent validity.

To assess the discriminant validity, we tested the Fornell-Larcker criterion (Fornell and Larcker, 1981) as well as the Heterotrait-Monotrait Ratio of Correlations (HTMT) criterion (Henseler et al., 2015). The Fornell and Larcker criterion stipulates that the square root of the AVE of each construct should be greater than its correlation with other constructs (Chin, 2010). We found that the measurement model satisfied the Fornell-Larcker criterion (see Table 3). Henseler et al. (2015) pointed out the Fornell-Larcker criterion may not be sufficient to assess discriminant validity. Therefore, the HTMT criterion should accompany the Fornell-Larcker criterion (Ali et al., 2018). According to Hair et al. (2019), the HTMT value should ideally be less than 0.85, we found that the measurement model also satisfied the HTMT criterion (see Table 4). Hence, our study satisfied the criteria of discriminant validity. Also, we checked the variance inflation factor (VIF) of constructs and indicators. We did not find any multicollinearity issue since VIF values of all constructs were less than 3.0 (Hair et al., 2019). In short, the measurement model of our study is appropriate. Thus, we may proceed to evaluate the structural model.

4.2. Structural model

Firstly, we checked the R^2 values, which indicate in-sample predictive power, of the endogenous constructs. The R^2 values for behavioral intentions (INT) and actual behaviors (BEH) were 0.350 and 0.286 respectively which confirmed that the estimations fit the data well. According to Cohen (1992), the R^2 values of 0.02, 0.13, and 0.26 are respectively considered as small, medium, and large. Thus, the R^2 values of behavioral intention (INT) and actual behavior (BEH) indicate

Table 3
Discriminant Validity (Fornell-Larcker Criterion).

	ATT	BAR	BEH	ENA	INT	PBC	PRE	SUN
ATT	**0.786**							
BAR	−0.243	**0.721**						
BEH	0.320	−0.340	**0.719**					
ENA	0.279	0.055	0.187	**0.728**				
INT	0.490	−0.187	0.339	0.243	**0.873**			
PBC	0.425	−0.393	0.461	0.105	0.476	**0.726**		
PRE	0.226	−0.013	0.214	0.432	0.154	0.168	**0.751**	
SUN	0.512	−0.267	0.350	0.226	0.468	0.527	0.290	**0.778**

Note: The diagonal values (in bold) are the square root of the AVEs of latent variables and indicates the highest in any column or row.

Table 4
Discriminant Validity (HTMT Criterion).

	ATT	BAR	BEH	ENA	INT	PBC	PRE	SUN
ATT								
BAR	0.255							
BEH	0.366	0.390						
ENA	0.313	0.123	0.237					
INT	0.517	0.197	0.397	0.268				
PBC	0.477	0.433	0.538	0.136	0.554			
PRE	0.244	0.083	0.291	0.504	0.161	0.193		
SUN	0.530	0.302	0.452	0.256	0.510	0.606	0.328	

Note: HTMT < 0.85 is a threshold limit (Hair et al., 2019).

that in-sample predictive power is satisfactory. Next, we checked the predictive relevance through Stone-Geisser's Q^2 value using the blind-folding procedure with an omission distance of eight (Ringle et al., 2015). According to Hair et al. (2019), the Q^2 values greater than the values of 0, 0.25, and 0.50 respectively depict small, medium, and large predictive relevance. The Q^2 values of behavioral intention (INT) and actual behavior (BEH) in our study were 0.247 and 0.113 respectively which confirmed the predictive relevance of the structural model. Hair et al. (2017) suggest that the SRMR value should be less than 0.08 to achieve model fit. We found the SRMR value equal to 0.071. Hence, our study satisfied the overall model fit criteria of PLS-SEM.

Finally, we computed the PLS algorithm with bootstrapping to assess path coefficients (standardized beta), significance levels, and t-values (Ringle et al., 2015). We found that the direct effects of attitudes (ATT), subjective norms (SUN), and perceived behavioral control (PBC) on behavioral intentions (INT) respectively have significant values of 0.287, 0.189, and 0.257 (each $p < 0.01$). Thus, hypotheses 1, 2, and 3 are found to be empirically supported (see Table 5). The direct effects of behavioral intentions (INT) and perceived behavioral control (PBC) on actual behaviors (BEH) respectively have significant values of 0.120 ($p < 0.05$) and 0.294 ($p < 0.01$). Thus, hypotheses 4 and 5 are found to be empirically supported (see Table 5). The direct effects of pressures (PRE), barriers (BAR) and enablers (ENA) on actual behaviors (BEH) respectively have significant values of 0.106 ($p < 0.1$), −0.209 ($p < 0.01$) and 0.098 ($p < 0.1$). Thus, hypotheses 6, 7, and 8 are found to be empirically supported (see Table 5).

5. Discussion and implications

We focused on a research gap, that is, the intentions and behaviors of organizations to plastic recycling. On one hand, our study substantiates that both individual-level and organizational-level determinants contribute to the prediction of organizational behavior. On the other hand, our study contributes to research gaps that Yuriev et al. (2020) identified in their meta-analysis on pro-environmental behaviors. We contribute to TPB by measuring both intentions and behaviors which usually most researchers fail to do so, and by incorporating factors to investigate the causes of the intention-behavior gap (Yuriev et al., 2020). Our findings indicate that the attitudes, subjective norms, and perceived behavioral control of decision makers are significant determinants of organizations' intentions to implement best practices of plastic recycling. Furthermore, organizations' intentions are significant determinants of organizations' behaviors towards a circular economy for plastics. In short, our PLS-SEM analysis shows that attitudes are the strongest predictor of organizations' intentions, whereas perceived behavioral control and barriers are the strongest predictors of organizations' behaviors (see Fig. 3).

Our study shows that attitudes are a significant determinant of behavioral intentions. This finding is consistent with previous studies (Botetzagias et al., 2015; Cordano and Frieze, 2000; Khan et al., 2019b; Papagiannakis and Lioukas, 2012; Singh et al., 2018; Thoradeniya et al., 2015). It is worth noting that in our study attitudes yielded the strongest relationship with behavioral intentions as compared to subjective norms

Table 5
Hypothesis Testing (Bootstrapping).

Hypotheses	Relationships	Std Beta	Std Error	t Values	p Values	Findings	95% CI LL	95% CI UL
H1	ATT → INT	0.287	0.041	6.940***	0.000	Supported	0.219	0.355
H2	SUN → INT	0.189	0.043	4.316***	0.000	Supported	0.119	0.261
H3	PBC → INT	0.257	0.043	5.892***	0.000	Supported	0.183	0.327
H4	INT → BEH	0.120	0.043	2.824**	0.004	Supported	0.049	0.190
H5	PBC → BEH	0.294	0.047	6.241***	0.000	Supported	0.214	0.369
H6	PRE → BEH	0.106	0.041	2.513*	0.012	Supported	0.038	0.173
H7	BAR → BEH	−0.209	0.036	5.709***	0.000	Supported	−0.270	−0.150
H8	ENA → BEH	0.098	0.045	2.077*	0.038	Supported	0.025	0.171

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$;
The t Values around 1.65, 1.96, and 2.58 are considered with the significance level of 10%, 5% and 1%, respectively (Two-Tailed Test).

and perceived behavioral control. This finding corroborates the finding of previous studies (Ajzen, 1991; Cordano and Frieze, 2000; Papagiannakis and Lioukas, 2012; Singh et al., 2018). In our study, 91% of respondents showed a positive aggregative attitude. Although 83% of respondents agreed that plastic recycling is the responsibility of their organizations, only 76% of respondents agreed that plastic recycling would give great satisfaction to their organizations. This finding suggests that the government should further stimulate the attitudes of decision makers to attain a circular economy for plastics.

Some previous studies found an insignificant relationship between perceived behavioral control and behavioral intentions (Chen and Tung, 2010; Cordano and Frieze, 2000; Khan et al., 2019a; Papagiannakis and Lioukas, 2012; Singh et al., 2018). Yet, in our study perceived behavioral control yielded a positive and strong relationship with behavioral intentions. It is worth mentioning that respondents in our study are decision makers who have greater control over organizations' operations than other managers or employees. Therefore, the difference in a sample may explain why some studies, like our study, find a positive and strong relationship between perceived behavioral control and behavioral intentions (Ajzen, 1991; Botetzagias et al., 2015; Khan et al., 2019b; Thoradeniya et al., 2015), whereas other studies did not find such a relation. In our study, 67% of respondents showed a

positive aggregative perceived behavioral control. However, 12% of respondents reported that they do not know how their organizations can contribute to plastic recycling. This finding suggests that the government should further disseminate knowledge, particularly in small size organizations, to attain a circular economy for plastics.

Botetzagias et al. (2015) and Tonglet et al. (2004) found an insignificant relationship between subjective norms and behavioral intentions towards recycling. In contrast, and consistent with many other studies, our study shows that subjective norms are a significant determinant of behavioral intentions (Chen and Tung, 2010; Cordano and Frieze, 2000; Khan et al., 2019a; Papagiannakis and Lioukas, 2012; Singh et al., 2018). However, in our study subjective norms yielded a less strong relationship with behavioral intentions compared to attitudes and perceived behavioral control. It is worth noting that though 52% of respondents agreed that aggregative subjective norms are positive for plastic recycling, yet only 32% of respondents perceive that their neighboring organizations participate in plastic recycling. In contrast, 72% of respondents agreed that most people within their organizations are in favor of participating in plastic recycling. These findings suggest that the government should take appropriate measures to develop momentum, that is, fostering pro-active sociocultural norms towards plastic recycling.
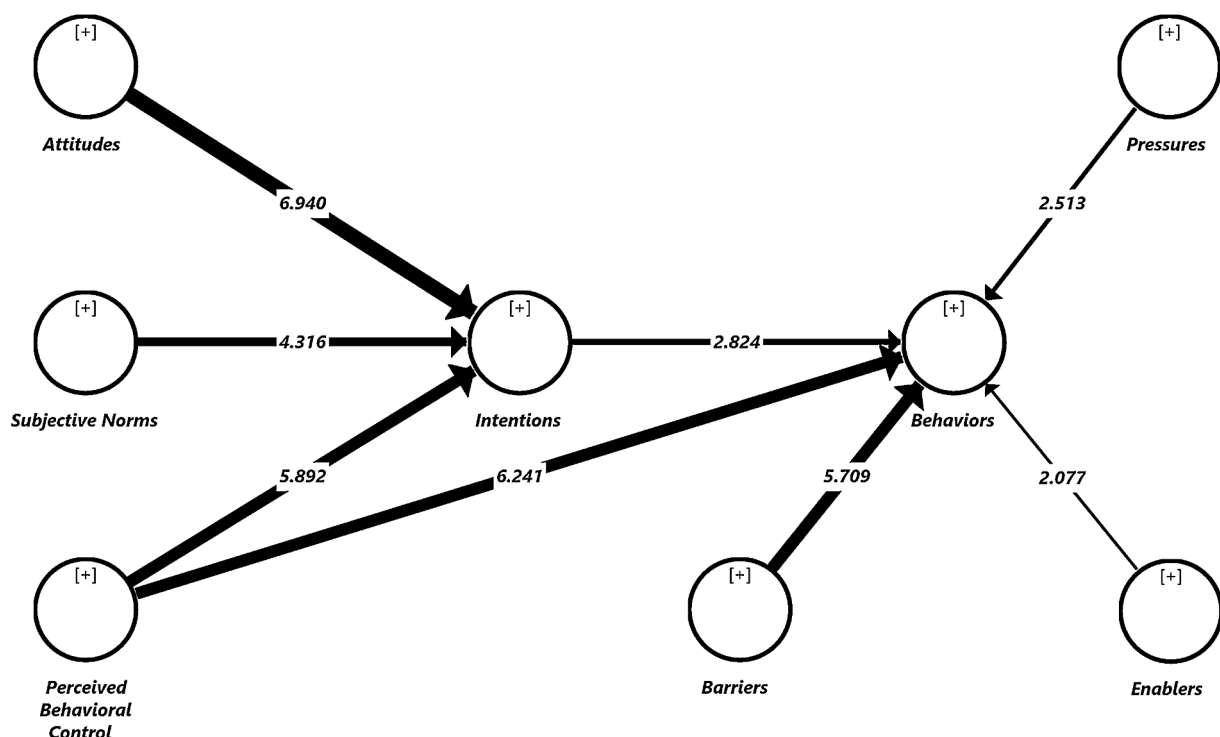

Fig. 3. Summary of Findings.

As anticipated that behavioral intentions and perceived behavioral control are significant determinants of actual behaviors (Ajzen, 1985), our PLS-SEM analysis shows that both organizations' intentions and perceived behavioral control yielded a positive and strong relationship with organizations' behaviors towards a circular economy for plastics. In our study, 82% of respondents showed positive aggregative intentions to implement best practices of plastic recycling. Overall, our study substantiates the application of TPB by combining individual-level and organizational-level characteristics (Cordano and Frieze, 2000; Khan et al., 2019a; Singh et al., 2018). Previous studies substantiated that institutional pressures influence organizations' behaviors, practices, and environmental strategies (Daddi et al., 2020, 2016). In line with that, our study shows that pressures are also a significant determinant of organizations' behaviors to plastic recycling. This finding seems to support Singh et al. (2018) who point out that regulatory pressure coupled with positive attitudes positively influences organizations in circular economy adoption. However, this finding may not be generalized since pressures are based on the culture and/or regulations of a respective country (Heidbreder et al., 2019). A majority of respondents perceive that regulatory pressure is stronger than market pressure. For instance, only 38% of respondents agreed that they encounter pressure from their competitors, though 55% of respondents acknowledged that they encounter aggregative pressures for plastic recycling. This finding substantiates that all institutional pressures do not induce the same effect (Daddi et al., 2020).

A circular economy for plastics refers to reducing, reusing, and recycling of plastic waste. Although 82% of respondents showed positive aggregative intentions to implement best practices of plastic recycling. However, our findings show that majority of organizations are mainly involved in practices such as source-separation and handing over plastic waste. In other words, the majority of organizations are not yet involved in practices such as reusing and reducing plastic waste. Indeed, only 14% and 23% of respondents reported that their organizations are successfully implementing reusing and reducing plastic waste respectively. It implies that the majority of organizations are far away from contributing to a circular economy for plastics. Our study shows that barriers are a significant determinant of organizational behavior. Our PLS-SEM analysis indicates that barriers yielded a very strong (and negative) relationship with organizations' behaviors compared to other constructs. It implies that barriers are the factors that cause the gap between intentions and behaviors of organizations towards a circular economy for plastics.

These barriers in order of importance are as follows. The foremost barrier is that organizations do not have easy access to recycling facilities. Second, organizations cannot transport plastic waste to recycling facilities. Third, organizations do not have enough space to store plastic waste. Fourth, organizations do not have enough time to sort plastic waste. Fifth, organizations do not have sufficient funds to pursue plastic recycling. Sixth, organizations do not have skilled personnel to sort plastic waste. Seventh, organizations do not have an environmental expert at the management level. Lastly, organizations do not know about potential buyers of plastic waste. These findings imply that prominent barriers are physical factors rather than knowledge. Overall, these findings contribute to the literature on the barriers of a circular economy (Liu and Bai, 2014; Ormazabal et al., 2018; Ritzén and Sandström, 2017).

Our study shows that enablers are just a slightly significant determinant of organizational behavior. Our PLS-SEM analysis indicates that enablers yielded a moderately strong (and positive) relationship with organizations' behaviors. It implies that the confluence of pressures and enablers may compensate (or overcome) the aforementioned barriers. These enablers in order of importance are as follows. The foremost enabler is that government or relevant institutions should organize training programs. Second, government or relevant institutions should establish a networking platform to facilitate selling or reusing plastic waste. Third, the government should provide economic

incentives. Fourth, waste management companies should provide the necessary guidelines and facilities to organizations. Fifth, relevant institutions should advise funding possibilities. Sixth, the government should enforce more strict regulations. Lastly, waste management companies should provide better quotes or charge an affordable fee from organizations. In short, our study indicates that if the aforementioned actions are implemented then organizations may enthusiastically contribute to a circular economy for plastics.

6. Conclusion

The main objective of our study was to empirically assess the determinants of intentions and behaviors of organizations towards a circular economy for plastics. We found that though most decision makers or organizations have positive intentions to implement best practices of plastic recycling, yet most organizations seem to be failing in implementing best practices of plastic recycling. This intention-behavior gap mainly occurs due to the aforementioned barriers. Nevertheless, we conclude that the confluence of pressures and enablers may compensate (or overcome) the aforementioned barriers. Therefore, to overcome the aforementioned intention-behavior gap and to attain a circular economy for plastics, the government or relevant institutions should aim to facilitate organizations by taking appropriate measures such as the aforementioned enablers. Moreover, the government should stimulate attitude and/or enhance perceived behavioral control of corporate decision makers. The government may do so by providing incentives, disseminating knowledge, and creating networking platforms for collaboration among decision makers.

Our study, besides its merits, has some limitations. Previous studies on recycling suggest the inclusion of moral norms in the TPB model (Botetzagias et al., 2015; Chen and Tung, 2010; Tonglet et al., 2004). However, our study did not consider moral norms. Unlike previous studies (Thoradeniya et al., 2015), our study did not assess indirect determinants (antecedents of ATT, SUN, and PBC) such as behavioral, normative, and control beliefs (Ajzen, 1991). We assessed only direct determinants since we wanted to focus on the intention-behavior gap. If we had added questions related to moral norms and indirect determinants, then it would have made the questionnaire too long. We followed the recommended guidelines to ensure the quality of the data. However, social desirability bias which is commonly found in surveys could not be ruled out. In other words, the respondents' perceptions may not coincide with the objective and rational reality. We measured the behaviors of organizations through their self-reported data. Our study is cross-sectional. Moreover, our study is limited to the sample size of 637 organizations, and the survey was conducted in Belgium. Therefore, the findings of our study may only be generalized to other countries with caution. We wanted to get data from more organizations, but we could not do so. We had to close our survey considering a lack of responsiveness from organizations after the COVID-19 pandemic.

Our study suggests some opportunities for future research too. For instance, a similar study could be replicated in other countries to get more valuable insights. Future studies may also investigate whether or not pressures, barriers, and enablers moderate the relationship between organizations' intentions and organizations' behaviors. Lastly, future studies may conduct a qualitative or longitudinal study to better understand the intentions and behaviors of organizations towards a circular economy for plastics.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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