

# **A Comparative Study of the Plastic Recycling Systems in the US and China**

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On my honor as a University Student, I have neither given nor received  
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### **Fable of Tomorrow**

Pick it up throw it away, it is as simple as that, but is it really that simple? Where does it go? Does it travel the sea, does it soar through the sky? Or does it simply vanish before our very eyes? You might ask what is it, well that's easy it is what we call trash, waste, or any other synonym you might want to call it. As long as it is out of sight it is out of mind. That is until our negligence is brought to the light when we are surrounded by mountains of trash as far as the eye can see shadowing any remnants of light.

There is still hope as there is still the common saying and that is there are two sides to every story. I guess in this narrative those sides can be boiled down to us versus the environment. Everyday our story is told, but who will tell the story of the stoic Earth, as it suffers at our hands being martyred by humankind without a second thought. Will the whispers of the whistling wind be boisterous enough to tell us to stop soiling its ground with trash? Will the booming voice of thunder warn us to stop littering the Earth with plastics that won't simply go away but will drown us within our own needs of convenience and wit? It is unclear what the future holds, but it should be noted that history is written by the victor. In the end who will be victorious in this war between human and nature? It may seem trivial or even laughable to some that a war like this even exists but slowly we are losing the Earth to the whims of our own waste. You might say in that case mankind is the victor because we are driving the narrative of how to save or hurt the earth. In hindsight, that is no victory because as we hurt our home, we hurt ourselves in the process. Overall, the greatest hope to win this war is to conquer our weapon of mass destruction...plastic.

### **Introduction**

When walking the aisles of any store or browsing online we are presented with hundreds to thousands of buying options. Our purchases are driven by a number of factors including but not limited to price and aesthetics to name a few, but when buying, how many stop to think of how the items they buy affect the environment, especially when they are disposed of? Before answering this question, it is important to put into context the considerable role of the consumer in shaping the waste management system.

As China has significantly reduced importing trash from the United States there has been a call for action to manage waste in a new way. It is important to mention the root cause behind the exportation of trash to begin with; this practice can be attributed to the Not in My Backyard (NIMBY) syndrome (Shin & Strohm, 1993). This sentiment is the ideology that while it is simpler and more cost effective to dump trash in a landfill no one would want their trash to be in close proximity to them so it is more favorable overall not only to dump waste products but also have it as far away as possible. This system persisted because there was a market; this market was particularly popular in countries with developing economies because compensation for importing trash helped to stimulate economic growth (Shin & Strohm, 1993). Historically environmental responsibility has been placed on companies through legislation that has mirrored the

sentiments of a growing consumer base that is increasing their demand while having an increase in environmental consciousness (Shin & Strohm, 1993). Though this has been the case in the past, it would be important to look into the role of the consumer in current recycling practices. This thesis will seek to establish a comparative study between China and the city of Charlottesville with specifics from University of Virginia prospective included to analyze the role of the individual in the recycling system.

## **Literature Review**

It is important to first begin outlining work that has already been presented in similar subject areas. As mentioned before there is a growing concern about the health of the environment. This sentiment has brought about an increase in the importance of recycling. Though recycling may seem to be a step in the right direction in preserving resources, it should be looked at as a last resort. There are many misconceptions in what can and can't be recycled and it may come as a surprise to many. It would seem that recycling methods are not as refined to handle the volume that is recycled; therefore, a lot more ends up in landfills than perceived. This in turn highlights the importance of reduction of waste products starting with focusing on consumer behavior. As mentioned before, although there has been an increase in environmental consciousness by consumers, consumer purchases do not align with this sentiment. This disconnect between consumers supporting green products and actually making purchases that reinforce these ideas is known as the "green purchasing inconsistency" or "green attitude behavior gap" (Joshi and Rahman, 2015). To bridge the gap this same study by Joshi and Rahman (2015) sought to look into factors that caused this behavior based on two different criteria, green purchasing intention and behavior. Intention can be defined as a consumer's want to purchase green products while the latter focuses on the decisions the consumer actually makes. This study yielded a number of variables in which they could identify as independent variables for future studies.

Another study by Young, Hwang, McDonald, and Oates (2009) suggested studying the green consumer behavior when purchasing products in the United Kingdom. That is, they sought to investigate what was the thought process of those that were already engaging in favorable purchasing behavior to establish a model to guide others to this behavior. Through in-depth interviews which led to them finding relevant factors to consider when making a green purchase they were able to devise a green purchasing model. This model consists of five elements: general green values and knowledge, Green criteria for purchase, barriers and facilitators, product purchase, and feedback (Young et al., 2009). The model basically outlined in order for one to be a green purchaser they first needed to begin with that as a value, then look for green qualities such as high efficiency, then consider things that would stop them from making the purchase such as price, eventually buy the product and finally reflect on the feeling the consumer got from the purchase which would in turn influence their next purchase.

While The first two studies mentioned a focus on the consumer behavior Cronin, Smith, Gleim, Ramirez, & Martinez (2010) looked at the supply side in studying the implementation of green marketing strategies. This study suggested that the gap stems from a misunderstanding between green consumers and what is actually being offered

by companies. This suggested that companies should consider their stakeholders and implement green innovation, greening their organization, and form green alliances (Cronin et al., 2010). That is companies should create greener products, try to produce products in a more environmentally friendly way or partner with green organizations that may help better achieve the prior suggestions. This would in turn help encourage the consumer to make a green purchase in the sense that they are offered more in that area and have potentially a better understanding and trust in companies to provide environmentally friendly products.

Another facet that was investigated was an approach by the Swedish government. This article set forth a plan where the state and municipal government sought to bridge the green attitude behavior gap (“Strategy for sustainable consumption”, 2016). This article outlined focus areas such as: increasing knowledge, encouraging sustainable ways of consuming, and many more to then proceeded to list bullet points that can be seen as a cross between the norms and values that they wish to achieve.

A final study by Chan and Lau (2002) that will be considered is one that is a comparative study between China and the United States that uses the behavioral model of the theory of planned behavior to explain green purchase behaviors. This study was a particularly relevant study to consider because it attempts to normalize the environmentally conscious attitude of the east and west by taking into consideration cultural differences. It does this normalization by not jumping to the conclusion that eastern societies are particularly less environmentally conscious but because some westerners apply western standards to the east this may seem to be the case. The study then goes into the cultural aspects from which the standards come from. This is pertinent because it derives the hypothesis of the outcome when applying the theory. By juxtaposing the collective nature of China to the individualist nature of the west, the stage is set for showing what will drive individuals in each culture to exhibit green purchasing behavior and for those in China this is expected to be social norms while in America this will be attitude. This study helps to set the stage for the cultural differences and that drive the differences. Although this study emphasizes the cultural difference it only focuses on the effects of social factors and not how people/societies can be shaped by technologies as well, leading to a need for further analysis to be done will an alternate framework.

## **Framework and Methodology**

This study will utilize Latour’s actant network theory to unpack the system of recycling to establish the variance in recycling in terms of the different actors and actants established by each of the areas. This study will also investigate how the actants and actors in each of the locations help to unpack fundamental cultural differences and shape certain behaviors. Using the actant network theory will help to not simply just show how human/actors shape the recycling system, but how actants created by certain powerful actors simultaneously shape consumer behavior and how that in a grand scheme then molds the recycling system. This will be achieved by conducting interviews with of Chinese students to juxtapose their experience to the personal experience of a University of Virginia student. Another method for acquiring the necessary information for the analysis is to perform

extensive document analysis to support, verify, and/or supplement information from interviews and to provide further background on specific actants and actors in the two locations.

## **Data Analysis**

To begin the analysis, it is important to first outline the recycling systems in both China and Charlottesville.

### ***Recycle policy and Practice in China***

Since the People's Republic of China was founded, China's recycling system has undergone pivotal shifts before it has reached its current operation. With its start in 1949 the recycling system, a combination of state-run supply and marketing cooperatives (SMC) controlled the supply and disposal of commodities in villages (Huang, 2019). This system was characterized by the practice of dividing household waste into two categories recyclable and non-recyclable (Huang, 2019). This system was then replaced with complete privatization of recycling with the introduction of market economy reforms by Deng Xiaoping in 1978 (Huang, 2019). Under this new system merchants would collect waste from households to sort, sell recyclables and then discard items of little value at the outskirts of urban areas (Huang, 2019). This system was later replaced due to its wasteful nature as many recyclables were neglected because of their low economic return. In the 2000s the central government regained control of the recycling system to explore waste sorting schemes in the wake of rapid urbanization (Huang, 2019). This waste sorting effort was made mandatory in 46 Chinese cities as of March 2017 (Xinhua, 2017). In these Chinese cities today the waste system follows a quadrant method, that is it is organized into four categories being: perishable(kitchen) waste, other waste, recyclable waste and harmful waste (Hangzhou Daily, 2019). This current state-run system (one controlled by central/local governments) emphasizes waste sorting by everyday individuals. This particular waste sorting process became standardized in late 2019 in order to increase recycling rates and reduce waste in major city such as Shanghai (Huang, 2019). This system in order to facilitate sorting behaviors by individuals takes a "carrot and stick" approach. The "carrot" in this system comes in a wide variety of incentives such as small deposits of cash on the order of 0.1 yuan or 1.45 cents per day to an e-wallet through apps such as WeChat, Baidu or Alipay (Liao, 2019). Another incentive is individuals that sort waste in the correct bins can earn more social credit scores (Chen, 2019). The "stick" or punishment that is in place is a series of fines that scale with the order of offence. The first offence, littering, has a fine of 200-yuan (28.22 usd) for individuals and the unit (community) will be fined 500 to 5,000 yuan (70.54 to 705.45 usd) (Hangzhou Daily,2019). The second offence, poor management, is punishable by a fine between 500 to 5,000 yuan (70.54 to 705.45 usd) (Hangzhou Daily,2019). The third offence, garbage mixing, has two tiers the first that is imposed on domestic garbage collection and transportation units is punishable between 5,000 and 30,000 yuan (705.45 to 4,232.69 usd) and for more serious cases fines are between 30,000 and 100,000 yuan (4,232.69 and 14,108.95 usd) (Hangzhou Daily,2019).

As China is a large country with a massive population, a “stick and carrot” approach may seem unfathomable. This approach is made obtainable through the infrastructure that supports it. This infrastructure includes in some cases the use of QR codes on trash bags that allow the government to track where trash comes from (China Daily, 2017). Other infrastructure examples include the use of facial recognition systems in Beijing to identify individuals throwing away waste (Chen, 2019). Also as mentioned before the use of apps, which has to not only provide incentives, but these have also provided resources to educated individuals on how to recycle correctly (Liao, 2019). Another aid to this “carrot and stick” method is the establishment of the social credit system in China. The social credit system is a ranking system that was first announced in 2014 that awards points to citizens that display good behavior and subtracts points for undesirable behaviors (Ma, 2018). This system does allow for individuals’ ranks to change (go up and down) overtime and overall encourages a particular ideal behavior. This ideal behavior is geared by punishments that are associated with low social credit scores.

### ***Recycle policy and Practice in Charlottesville/Virginia***

In Charlottesville there are two major options of waste classification the first option being any combination of single stream recycling, composting and/or trash (that which goes to the landfill). The second option which is present at the university is any combination of trash, composting and recycling with further subcategories. These recycling subcategories are divided into mixed (dry) paper and the other being a combination of plastics 1-7, metal, and glass. For Charlottesville there are several private companies that run the recycling system such as the Ivy Convenience Center, McIntire Recycling Center, Rivanna Solid Waste Authority (RSWA), County Waste, and Time Disposal (Castro, 2019). At the University of Virginia there is one facility, UVA Recycling, in charge of the collection of recyclables. The recycled materials from UVA Recycling is then transported to Sonoco Recycling and then sent to mills in Raleigh, North Carolina (Harris, 2020).

A key practice in this recycling system that should be highlighted in retrospect is single-stream recycling. This recycling method is characterized by the practice of having all recycle put into one bin, for example a bin might contain cardboard with plastic and paper all alike. Due to privatization of the recycling industry it can be seen that there are inconsistencies in the categorizations in Charlottesville. Waste disposal classifications in Charlottesville are not specifically uniform in the sense that since there are several private companies that handle waste in Charlottesville such as Time Disposal and County Waste (Castro, 2019) to name a few, it can be seen that different companies accept different things in terms of what is recyclable and what is trash. Even in terms of the university where there is a clear definition of what fits in what category there is still a disconnect in terms of what container is present in different areas. To further explain that point it is a common experience that while in some buildings one might see the landfill, plastic/metal recycle and composting bins, if you walk outside you will see a very different bin that resembles the single stream recycling bin as well as an adjacent trash bin.

Overall, the recycling process in Charlottesville can be summarized in a few simple steps: disposal, collection, sorting, processing and remanufacturing. The disposal can be described as the everyday individual throwing away their recyclable into the respective

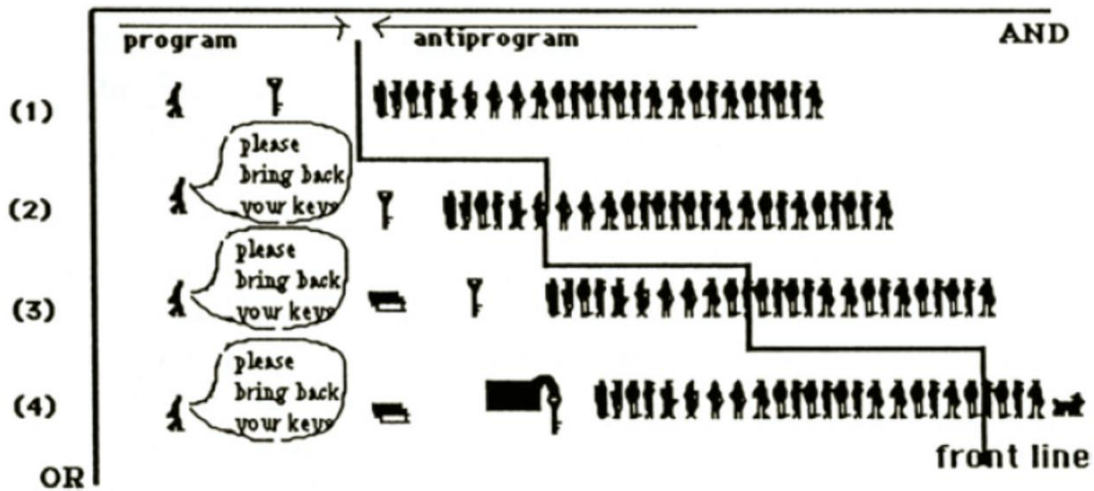
recycling receptable. These recyclables are then collected by a private company. After the private company collects the recyclables it is then hand sorted to ensure like objects are processed together and at this time anything that is not a recyclable is discarded as trash. The like recyclables are then baled and sent to be processed. After processing, recyclables can be sent to companies as raw material in order to be remanufactured as consumer products.

## **Discussion**

In this section Latour's actant network theory will be used to compare the recycling systems of the US (Charlottesville) and China by identifying the relevant actors and their actants to outline fundamental cultural differences that drive the systems' discrepancies. These actors will be those in charge of the recycling system and those that directly affect the structure of it. Starting with those in charge of the recycling system, in the case of Charlottesville this responsibility falls on the private companies. The actors themselves establish certain actants that encourages or discourage certain behaviors. In the case of the private companies in Charlottesville that have provided curbside pick-up for recyclables there is an encouragement of the practice of single stream recycling through the actant of a bin for your own personal use at home. This actant (the bin) provides convenience thus driving more people to be content with doing such. While other centers in Charlottesville such as going to McIntire would encourage adverse practices that would push towards self-sorting. In this case the actant is the very policy that in order to turn in recyclables you need to follow certain procedures. In China the government is the actor where its actant is policy but more specifically fines that may be attached. The Government wanted people to begin sorting out their recyclables and in order to get this preferred behavior the government in one example in Shanghai enforced a fine of approximately \$30 with those that are not in compliance with the policy (Edmond 2019). This actant- actor relationship can be applied without much resistance because of the underlying collectivist culture that exists in China (Chan and Lau, 2002). While at the University of Virginia a direct contrast exists. An example of this goes back to how even though one entity is in charge of recycling there is still non-uniformities that exist such as different bins in different places this can be accustomed to in the US there is more of an individualist view which may cause push back. This push back from certain individuals will cause some places that are complacent to change bins while others that are resistant to not conform to the change. Therefore, from this lack of participation different non-uniform bins will be present in different locations. Another actant that the Chinese government uses to influence the recycling habits is for example the use of QR codes on waste disposal bags that had been distributed to the general public in Hangzhou (China Daily, 2017). This was put into place to allow for mitigation of errors in sorting because the QR codes could be scanned and the household information could be relayed to the government to later result in people coming to that house and teaching proper methods for waste sorting. Another actant mentioned before was the use of facial recognition technology in China to monitor individual sorting practices. This allowed for the government to directly alter social credit scores to influence a behavior. Although this actant exists in China it would be a rarity to see this actively executed in the United States. This system in the US would be expected to see push back

from citizens as a question of impinging on privacy and other individual freedoms. This difference brings into question the very definition of security, and privacy between the two countries. Overall, the two Countries may differ in these practices due to different levels of trust in the powerful actors and different definitions of common terms such as privacy as a result of varying cultural backgrounds.

Another powerful actor that exists are privately owned businesses. In China there has been efforts made by businesses to promote greener behaviors in consumers. For example, companies such as Taobao have added infrastructure such as green points that can be redeemed for discounts and other benefits such as planting trees to create an incentive through mobile applications (Chou, 2019). On the other hand, companies have passively controlled behavior by changing their own practices such as reusing packaging boxes (Chou, 2019). In Charlottesville it seems that these incentives don't exist, but the private entities try to focus on educating the public to have them make better choices for themselves which links back to the individualistic nature of the individuals in the United States. This displays the individualism by focusing more on the importance of the individual decision.



In accordance with Latour's actant network theory different powerful actors impose an ideal behavior through enlisting a loyal actant in these various cases. To further clarify this theory the above diagram helps illustrate how this might work in the case of the varying recycling systems. A particular example to parallel this visual guide to the recycling system would be in the case of China using facial recognition technology. The actor the Chinese government would act as the person in the image saying "please bring back your key" but instead this would be substituted by having them mandate people to sort their waste. The line of people in the image will represent those that follow this behavior. At first in the image it can be seen that a vertical line is in front of all the people (when viewing from left to right) before the policy is announced and this represents people are not exhibiting this ideal behavior yet nor is it required of them. The second line of the schematic signifies that now that the Chinese government in the example requires this ideal behavior there will be some early adopters. These early adopters without incentive or punishment will be compliant, but since they are the minority this will require further persuasion. The persuasion would be to enlist an actant to help drive the ideal behavior. This would now lead to the third line on the schematic where the first actant is introduced



this may come in the example as a fine. As a result, to this fine being introduced there will be yet more people willing to comply to the ideal behavior, but this yet again might not be sufficient enough so an even greater actant might be necessary. This leads to the fourth line in the cartoon where more often than not people are practicing the ideal behavior. In this example this might be people are now actively sorting their waste because of the combination of a new actant the facial recognition technology in conjunction with the fines that were introduced before. From this example it should be deduced that the powerful actors can successfully drive the recycling system through controlling individuals' behaviors primarily through the aid of a loyal actant.

## **Conclusion**

Pick it up, throw it away but not in my backyard has been the same song that we've sang for years. Can this same song be sung for years to come as we are faced with the repercussions of our negligence on our very own front porch? This is a sentiment shared across the globe, but how each culture approaches this problem can be worlds apart. There is a plethora of solutions that arise, but is one greater than the next? This is by no means a simple yes or no because the scale of which we measure this progression is highly affected by each individuals' background. A more general divide that occurs is that which is east versus west. What is acceptable for the east might not work for the west so it is imperative that when doing an analysis of the recycling system and more specifically the consumer within and its affects within this system one must consider the inherent cultural discrepancies. In order to do this Latour's actant network theory which takes the powerful actors and their loyal nonhuman actant partner into consideration to identify these underlying cultural differences. This theory was used as a lens in order to view this argument between the east and west within the scope of a comparative study between the recycling systems of China and the US using Charlottesville and Virginia as a case study. The major takeaways from the present analysis is that the primary differences in the infrastructure that makes up the recycling systems stem from the underlying cultural differences between the US and China. This can be seen through the actants that stem from the powerful actors that are emplaced in each system. As many innovative technologies have been implemented in China to drive rapid rates of waste sorting these same measures have not been mirrored in the US. In the US there is more of a slow progression towards waste sorting in limited areas primarily through the increase if education to incite public awareness. It should be noted that one method is not particularly better than the other, but that the methods differ because different actors impose varying values determined by what is culturally acceptable based on social constructs within the individual countries.

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