Motivation and challenges for e-commerce in e-waste recycling under “Big data” context: A perspective from household willingness in China

Bin Zhang¹,²,³, Zhanjie Du¹,², Bo Wang²,³, Zhaohua Wang¹,²,³,⁴,*

¹ School of Management and Economics, Beijing Institute of Technology, Beijing 100081, China
² Center for Energy & Environmental Policy Research, Beijing Institute of Technology, Beijing 100081, China
³ Sustainable Development Research Institute for Economy and Society of Beijing, Beijing 100081, China
⁴ Collaborative Innovation Centre of Electric Vehicles in Beijing, 100081 Beijing, China

Keywords: E-waste Recycling Household behavior E-commerce Residential acceptance

Abstract

With the emerging technology and consumption modes under “Big data” context, e-commerce has arisen as a new trend for e-waste recycling. This paper conducted a questionnaire survey from 896 residents living in the cities of China, to explore the development of e-commerce in e-waste recycling. An ordered logit regression model was employed to reveal the key drivers and barriers for residents to choose e-commerce for their e-waste recycling. The results show that e-commerce in e-waste recycling does not receive a universal acceptance from residents. The perceived convenience, attitude and subjective norm are positively related to the residential intentions towards employing e-commerce for e-waste recycling. The price disadvantage of e-waste collection by e-commerce is the major barrier for taking e-commerce for e-waste recycling. However, the relationship between e-commerce recycling willingness and perceived price disadvantage is moderated by e-waste disposal subsidy. Facility accessibility also plays a moderate role in the relationship between e-commerce recycling willingness and perceived convenience.

1. Introduction

Electrical and electronic waste (e-waste) is a world-wide problem. There are over 41.8 million tons of e-wastes generated all over the world, but < 20% of e-wastes were reported as formally treated by national take-back systems and schemes (Baldé, Wang, Kuehr, and Huisman, 2015). Large amounts of e-wastes even flowed to illegal disposal plants, and were extracted precious metals (e.g. gold and silver) with rough refinement and non-environmental friendly process. China faces even more serious problem of e-wastes. Beyond the second largest e-waste producer with the generation of > 6 million tons per year, China also processed almost 70% of world’s e-wastes each year (Wang, Zhang, and Guan, 2016). Many e-wastes generated in the developed countries exported to China in the name of second hand electrical or electronic appliances. People’s lives and general health are threatened by the informal e-waste disposal, which is quite popular in China with simple treatments of disassembly, heating, acidification and incineration. A typical case of negative environmental impact is in Guiyu of Guangdong province, one of China’s largest e-waste collection and distribution centers. Due to the long exposure to inappropriate disposal of e-waste, the lead content in the blood sampled from local children aged 1–6 is as high as 15.3 g/ml, which exceeds the advised warning standard by 50% (Ogunseitan, Schoenung, Saphores, and Shapiro, 2009).

China is engaging in the development of formal e-waste disposal system. There are 109 enterprises that have accessed to government certification for getting the e-waste disposal subsidies in China. The overall annual dismantling capacity of these enterprises exceeds 150 million sets. However, the actual dismantling amount is only 75 million sets.¹ Many disposal companies cannot collect enough e-wastes to fulfill their capacity. One of major reasons for the barrier between e-waste generation and demand of formal disposal company are attributed to the unwillingness of residents delivering their e-wastes to the formal disposed company. Residents often have to spend much time to deliver their e-wastes to the certified collection sites, which cause them inconvenience and uneasy feeling (Wang, Zhang, Yin, and Zhang, 2011). Thus, peddlers who provide on-site pick-up are preferred for e-waste recovery by many residents.

Big data is emerging as a new trend and impacts household daily consumption and life mode everywhere. Big data is a huge and complex data set in information Science (Lee, Han, and Sohn, 2015). It is difficult to store, process and analyze by traditional tools, and brings some

* Corresponding author.
E-mail address: wangzhaohua@bit.edu.cn (Z. Wang).
¹ The data is from Industrial White Book of E-Waste Disposal and Reuse (2015), which can be available at http://www.sohu.com/a/143406864_745358.
smart changes in social lifestyles. Online travel recommendation system bring traditional travels with smart decision direction (Park and Kim, 2017). Shared bike system has been emerging in many big cities, after some big data technology such as GPS/GIS application can be installed in individual smart phones (García-Palomares, Gutiérrez, and Latorre, 2012). E-commerce is another changes for household shopping under big data context. Many consumers prefer online shopping to offline because of the convenience and time saving brought from big data technology (Salehi, Abdullahbeigi, Langroudi, and Salehi, 2012).

As e-commerce is increasingly popular in residents’ daily lives, e-waste recovery through e-commerce is also emerging in China. Some e-companies such as “Love Recycling” and “Yi Feng” have been focusing on e-waste recycling with the application of Internet and mobile terminals. “Love Recycling” recovered over 5 million sets of e-wastes in the year 2016, 32.3% of which were collected by on-line Internet.2 More and more residents prefer e-commerce to traditional e-waste recycling. However, traditional off-line e-waste recycling still plays dominant role particular in dumped household appliances. It is still not clear what impacts public acceptance of e-commerce in e-waste recycling. Very few studies have ever discussed the development of e-commerce in e-waste recycling and residential attitude towards it.

This paper empirically studies residential willingness in e-waste recycling through on-line e-commerce. We explore how different psychological and contextual variables influence residential acceptance for employing e-commerce in e-waste recycling. Questionnaire survey covering 895 samples in China was taken as the data source of our study. Through our study, we would like to answer the following questions:

- General acceptance of residents in e-commerce of e-waste recycling;
- What are the motivations and barriers behind public acceptance of e-commerce in e-waste recycling?

The reminder of this paper was organized as follows. The next section reviews the relevant literature to construct our hypothesis model. Then, we describe the data used for this study, specify our empirical tests, and report the results. In the last section, we conclude remarks including managerial implications.

2. Conceptual model and hypotheses

In order to identify the key indicators that impact residential decision on choosing e-commerce for the e-waste recycling, we employed Theory of Planned Behavior (TPB) as well as Theory of Interpersonal Behavior (TIB) to construct our hypothesis model. According to TPB, individual behavioral intention is a function of personal attitudes, subjective norm and perceived behavioral control (Cordano and Frieze, 2000). Attitudes derive from the beliefs and evaluation about the outcomes of target behavior. Positive attitudes towards a behavior help strength the intention to act in the given behavior (Abrahamse, Steg, Gifford, and Vlek, 2009). Subjective norm derives from the beliefs of other people who are important or familiar to the individual. Perceived behavioral control reflects individual belief as to how easy or difficult performance of the behavior is likely to be. Moreover, the TIB highlights the role of habit and past behavior in the decision making of individual behavior. Sometimes, the actual performance of the task requires very little cognitive effort, but acts from habit and routine. Additionally, Expectancy-Value Attitude Theory assumes that individual behavioral intention results from an evaluation of expected utilities or values (Youjae, 1989). Higher benefits from e-commerce of e-waste recycling will attract more residents to join in the action. Comprehensively integrated the above theories, we develop the following framework for our further hypotheses (see Fig. 1).

Convenience should be one of the major advantages of e-commerce in e-waste recycling. E-commerce provides easier channels for residents to get access to formal e-waste recycling. Comparing to the traditional ways, residents do not have to spend much time on finding formal e-waste collection sites. All the related information is available at the e-commerce website and easy to find. Moreover, on-site collection is often provided after residents make their e-waste recycling orders on the Internet or the Apps of cellphones. Residents can also choose to deliver their e-waste by post in the e-commerce of recycling. These convenient services by e-commerce make residents feel easy to conduct e-waste recycling. From the perspective of perceived behavioral control, residents will more likely to choose e-commerce in e-waste recycling due to the perceived convenience. Thus, we can conjuncture the following hypothesis:

H1. -1. Perceived convenience is positively related to residential willingness of e-commerce in e-waste recycling.

In the recent years, China is engaging in building formal e-waste recycling system. Many e-waste recycling facilities such as e-waste recycling bins have been built in residential communities. Many formal e-waste collection sites are also emerging nearby residential quarters. These e-waste collection facilities make the delivery of e-waste more convenient. Residents do not have to walk too far to conduct e-waste recycling. The convenience of e-commerce for e-waste recycling might be offset by the increasing e-waste recycling facility. Thus, the popularity of e-waste recycling facility, to some extent, would substitute certain demand of e-waste recycling through the e-commerce. From this point, we can conjuncture the following hypothesis:

H1. -2. The relationship between perceived convenience and willingness of e-commerce in e-waste recycling is weaken as there is a better facility of e-waste recycling.

E-commerce habit may play another important role in the willingness of e-waste recycling by an online order. Habit plays an important role in residential daily behavioral decision (Amoroso and Lim, 2017; Belanche, Flavíán, and Pérez-Rueda, 2017). If an individual gets used to the online shopping, he/she will easily choose e-commerce for their e-waste disposal without much rational cognitive effect and heuristic cues. Otherwise, for those residents who rarely use internet for shopping will hardly dispose their e-wastes by e-commerce. Habits lie close to the automatic end, because everyday lives are full of repetitive actions. Some e-wastes are often discarded as normal waste by residents’ routine trash dumping. Thus, we conjuncture the following hypothesis:

H2. Habits of online shopping is positively related to residential willingness of e-commerce in e-waste recycling.

A broad class of studies are based on the idea that behavior is motivated by the expectations we have about the consequences of our behavior and the values we attach to those outcomes (Liobikiené and Juknyš, 2016; Mencarelli and Lombart, 2017). E-waste recycling can bring economic revenue for residents, since there are valuable and reliable materials such as heavy metals contained in e-waste. At present in China, most e-waste collecting channels would offer a payment to residents for collecting their e-wastes. The relative price deviation between e-commerce and traditional e-waste collecting channels would impact the decision of residents, particularly for those who are price sensitive. In China, the price offered by informal e-waste collecting channels are often higher than formal channels including e-commerce channel (Qu, Zhu, Sarkis, Geng, and Zhong, 2013; Wang, Tian, Zhu, and Zhong, 2017). The price disadvantage of e-commerce in e-waste recycling would hinder the motivation of residents. Thus, we conjuncture the following hypothesis:

H3. The price disadvantage is negatively related to residential willingness of e-commerce in e-waste recycling.

---

2 The data is available at http://tech.ifeng.com/a/20170105/44526871_0.shtml.
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات