E-Waste Collection Channels and Household Recycling Behaviors in Taizhou of China

1. In China the informal sector dominates the collection of household e-wastes. Nearly 60% of the domestically generated e-waste is passed into informal recycling processes, which has been argued as the major reason for the extensive supply deficiency in the formal recycling sector
2. More than 90% of Chinese citizens are reluctant to pay for the recycling fee ([Liu et al., 2006a](http://www.sciencedirect.com.ulm.idm.oclc.org/science/article/pii/S0959652614005332?via%3Dihub" \l "bib16)). Most collected e-wastes are either being sold to less developed regions after simple maintenance, or being dismantled and treated in unqualified workshops to recover components and materials ([He et al., 2006](http://www.sciencedirect.com.ulm.idm.oclc.org/science/article/pii/S0959652614005332?via%3Dihub" \l "bib8)). Therefore, China cannot fully duplicate the European e-waste system due to the characteristics of e-waste flow, the availability of cheap labour, and its current recycling practices. How to divert more e-waste from the informal to the formal sector and how to formalize the informal sector through regulations and standards thus becomes a key issue.
3. Currently 90% of e-wastes in Taizhou come from imports ([Chan et al., 2007](http://www.sciencedirect.com.ulm.idm.oclc.org/science/article/pii/S0959652614005332?via%3Dihub" \l "bib2)), largely oversea e-wastes entering Taizhou's border illegally through the Haimen port by smuggling, mixing with other legally-permitted wastes, or disguising as scrap metals
4. Around 35% come from the United States and Western Europe, including motor scraps, obsolete transformers and cable wires (then quote U.S of excess)
5. At present, around 30 villages and 384 households in Wenqiao are heavily involved in unauthorised e-waste handling ([Zhao et al., 2010](http://www.sciencedirect.com.ulm.idm.oclc.org/science/article/pii/S0959652614005332?via%3Dihub" \l "bib46)). Low entry barriers, insufficient control from local authorities plus the unawareness of environmental impacts encourage the informal recycling economy in this area.
6. dismantled electrical and electronic appliances and parts such as printed circuit boards are privately resold to unauthorised e-waste traders and processors, ending up in the informal sector
7. 38% of e-wastes were sold to the informal collection sector, out of which 22.6% was sold to peddlers, 10.3% was sold to salvage stations, 3.1% was sold to second-hand shops, 1.6% was sold to home appliance repairers, and 0.4% was sold to other informal collectors. The formal sector received only a small part (12.1%) of household e-wastes, implying the pressing need of further development of formal collection channels, and a rethink of their collection strategies as well as business models
8. Above all, economic benefit and convenience of recycling service make vital impacts on households' disposal preference. As expected, “appropriate collection price”, with the weight of 23.8%, is a major determining factor in choosing collectors. At the same time, the convenience of service also attaches great importance to households' recycling behavior: being able to “collect other municipal wastes” (23.5%) and to provide “free door-to-door collection” (20.4%) was viewed as crucial by many respondents. Comparatively, “collect during non-working time” (14.1%) and “easy access to collectors” (13.4%) are less significant reasons, and “provide repairing and cleaning service” was least considered when choosing collection channels, at only 4.8%.
9. Efficient reverse logistic networks must be established in the formal sector to facilitate take-back service, as the survey found out that 52.9% of the large household appliances (e.g. TVs, air-conditioners and washing machines) were picked up by buyers at disposal, as compared with 38.2% of being delivered by owners to collectors' sites, and 8.9% of being delivered by third parties at owners' costs
10. China launched the “Old-for-New” home appliance trade-in program whereby consumers receive a 10% price discount of five types of new appliances, namely: TVs, refrigerators, washing machines, air-conditioners and computers, by returning the old appliances to designated retailers/collectors. By launching the “OFN” program China tested a third model of funding formal e-waste recycling: relying on government subsidy.
11. 15.8% of respondents believed that the “OFN” subsidy was almost the same as the amount paid by other collection channels, whereas 60.7% of respondents did not know about the price differences, implying that many consumers might not have tried “OFN”, or might not have compared the economic benefits obtainable from different collectors.
12. “OFN” proved to be an effective way to collect e-waste from Chinese consumers. Nevertheless, relying on government subsidy is a temporary solution, and sustainable funding sources must be secured through other approaches if such a program is to be carried out on longer run.
13. But as the survey found out, selling to peddlers or second-hand markets remains the prevalent practice of dealing with e-waste, because of the higher prices and convenient services offered by these channels. Therefore, although many consumers realize that it is important to recycle e-waste safely, at this stage providing certain incentives to consumers may still be necessary for diverting e-waste flows to the formal sector.
14. It is also important to increase the number of professional collection spots so consumers can hand over e-waste more easily. Meanwhile, public education through the media, community events and company take-back campaigns will also help to encourage public participation in green e-waste recycling.
15. The result of this study shows that economic benefit and convenience of recycling are the key determinants of choosing disposal channels. Compared with formal counterparts, informal collectors are better equipped in the market due to advantages in accessibility, collection scope, door-to-door pickup service, and flexible collection time.
16. Recently, an integrated system which combines informal collection, manual separation and formal refining has been proposed as an optimal approach to maximize the collection and recycling rates of e-waste whilst minimizing the environmental concerns in China ([Chi et al., 2011; Chi, 2012](http://www.sciencedirect.com.ulm.idm.oclc.org/science/article/pii/S0959652614005332?via%3Dihub" \l "bib4)). In the system, the collection, dismantling and reuse can still be managed by the informal sector, providing income for those disadvantaged informal workers; meanwhile, metal recovery and final disposal should be done by the formal sector, which includes Best Available Techniques (BATs) ([Reuter and Van Schaik, 2012; Reuter et al., 2013](http://www.sciencedirect.com.ulm.idm.oclc.org/science/article/pii/S0959652614005332?via%3Dihub" \l "bib26)) to ensure the efficiency and environmental soundness of treatment processes while leveling the global recycling field.