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Perceived key elements of a successful residential food waste sorting program in urban apartments: stakeholder views

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ABSTRACT

A large, successful, residential food waste sorting (recycling) program in urban high-density housing was studied to elicit perceptions of the key elements of its success. An embedded mixed-methods approach was used with rigorous quantitative measures of weights and compositions of the waste to confirm the success of the program, combined with in-depth semi-structured interviews of stakeholders to reveal their opinions of the elements key for success. The program produced a 70% food waste capture rate slowly decreasing to 45% over 54 weeks, with <1% contamination. The key elements for success were found to relate to clarification of roles and responsibilities, and the usefulness of a 'broker' (here, an NGO (non-governmental organisation)) to co-develop new boundaries for stakeholder responsibilities. Residents first needed to be convinced of the serious intention of the local government to implement the policy, but then viewed waste sorting as a civic duty. This is different to the moderator of "authority' in earlier studies. The use of volunteers to demonstrate and interact on a personal level with residents was seen as a key element. The three month period of volunteer involvement was seen as key to good habit forming.

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1. Introduction

In order for mankind to learn to live more sustainably, it must change many of its behaviours. This is as true in aspects of transport and energy use as in waste generation and processing, and various foundations for those behaviour changes must be built up through new policies, legislation, and patterns of production and consumption. However, some are more prone to impacts of the behaviour of individual citizens, and one of these is source separation of residential waste in homes (Tai et al., 2011), in preparation for collection for recycling, composting or other uses. Recycling of 'dry recyclables' such as plastic bottles, cans and tins, paper and card has long been championed and developed by government authorities in developed countries around the world, and has been mainstream and reasonably successful in many for several years (Huang et al., 2014), albeit less so in high density housing in cities (Timlett and Williams, 2009). However, the successful segregation and collection of residential food waste faces many more challenges, and is still in its infancy (Boonrod et al., 2015). Unfortunately it is in the cities, and in particular in those of the less developed and quickly developing countries that the recycling of food waste is most urgent, as it comprises around 70% of residential waste (Liu and Wu, 2011). It is the category which most contributes to environmental degradation though methane production at landfill and the need for added fossil fuels in incineration (Cheng and Hu, 2010), yet which could potentially be a source of environmental benefit if converted to soil conditioners of good quality and/or biogas to substitute for fossil fuels (Levis et al., 2010).

In most cities policy makers make heavy use of information strategies to try to induce widespread recycling, but it is now recognised in a few countries that behaviour change is a complex phenomenon which has many other key determinants besides information (Eppel et al., 2013; Jackson, 2005). The metropolis of Shanghai introduced an information-based pilot program for food waste sorting in 2011, and a study of those across 5000 communities (5 million households) found no success (Dai et al., 2016). A parallel pilot program with a set of 42 communities using a 'more personal' approach produced outstanding results which were sustained even up to two years later (Dai et al.,2016). The community reported on in this paper is one of those.

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Although there are ongoing reports of failures of schemes for residential food waste separation (e.g. Seadi et al., 2013), and in some countries large-scale failures (e.g. Pariatamby and Tanaka, 2013), there are only a small number of reports of successes, and usually for very small numbers of households on pilots. Unambiguous data is difficult to find, and many reports claim success without any data or numbers at all (Seadi et al., 2013). In reviewing the generation and recovery of USA and Canadian municipal solid wastes (MSW) – which includes waste from restaurants and hotels as well as households – a capture rate of 2.6% was reported for food waste in the USA, based on 2007 EPA data (Levis et al., 2010). Across Taiwan, which has had intensive national food waste programs for a decade, a capture rate of 9.6% of food waste from MSW was reported for 2010 (Chang et al., 2013). In Thailand a trial scheme in four urban communities with a variety of housing types, using four different approaches consecutively over 20 weeks, produced a capture rate of 58%, but no longer-term results were reported (Boonrod et al., 2015). In Sweden, information and door-stepping campaigns reported food capture rates of 27% and 28% respectively after 18 months in 680 urban apartment households with 8.9% contamination levels (Bernstad et al., 2013) and another study reported 20–26% capture rates with 2–8% contamination levels. The most successful example published seems to be the town of Umea where 55,000 households in single and apartment dwellings have had high and stable capture rates, published as 27% in 2010 (www.umeva.se).

There are many studies of different recycling schemes and tens of parameters which might provide the key to planning further successful schemes. The approaches vary depending on the discipline: in waste management the operations are the focus, with emphasis on factors such as facilities provided, frequency of collection (Williams and Cole, 2013), and extent of stakeholder involvement (Zhuang et al., 2008) and information provision (Read, 1999). In behaviour change literature with a psychology basis there is emphasis on psychological factors such as attitude (Refsgaard and Magnussen, 2009; Schultz and Oskamp, 1996) and beliefs, social norms (Abrahamse and Steg, 2013; Thomas and Sharp, 2013) and self-efficacy (Tang et al., 2010). In public policy there is consideration of legislation and enforcement (Chao, 2008; Huang et al., 2014), especially based on rational actor theory (Vatn, 2005). As repeated recently in integrative reviews of pro-environmental behaviour, new types of studies are needed which systematically evaluate the effects of interventions, preferably including monitoring of changes in behavioural determinants (Steg and Vlek, 2009). Many studies exist which show that a particular program *was* successful (Bernstad et al., 2013): very few provide evidence as to *why* it was successful (Abrahamse et al., 2005), although one recent study did that using a 'theoretical domains' framework approach (Dai et al., 2015). Outside of academia many planners and change agents are not making use of those approaches for planning purposes but following their own instincts, biases and pragmatics because the academics have not yet proven a reliable and operational approach to analysing and predicting success of such behaviour change programs.

Set against this background, the research reported here was designed to study, as observers, a successful food waste recycling programme in a contained residential community in Shanghai, designated Community #12, using a mixed-methods approach. Over 5000 communities in Shanghai have been involved in pilot food waste sorting programs implemented by the district governments which focussed on information delivery to residents as their main strategy, with negligible success (Dai et al., 2016). The delivery of this food waste sorting programme was led by a non-governmental organisation (NGO) which at that point had already shown its approach to be successful in two other communities, albeit self-identified as 'green'. The NGO did not use any particular framework of concepts or design approach other than to try to make the program implementation 'more personal' to residents (their own words). In the next tranche the NGO was allocated two communities to work with deemed 'ordinary' by the commissioning government body (their words: no demographic data are commonly available). Our research team was aware of the unhelpful diversity of academic concepts about such behaviour change, and thus set out to elicit perceptions from the main stakeholders in a grounded way, rather than work from more restrictive frames from academia which were not being used in practice. The main objective of our methodology: to explore local perceptions of *why* the program was successful – accepting that different points of view and approaches would see things differently and partially.

2. Background

Shanghai is a metropolis built of 24,500 communities composed of several walled and informally gated apartment buildings with communal gardens, parking areas and waste stations, and dedicated cleaners of communal areas. No formal classification system exists for Chinese urban communities, but apartment blocks range from six floors high and no elevators for those classified as 'older' ones by government officers, to those termed 'newer' with 30–50 floors and elevator provision. Community #12 is very typical of the 'older' type, with six-floor buildings without elevators, and 2 communal waste stations on campus. Residents typically placed household waste into small bags in their apartments and brought them down to the communal bins when en route elsewhere. Prior to the new program the residents brought down mixed waste in one bag. Valuable recyclables such as plastic bottles were typically not included as they were sold directly by residents to passing informal collectors who regularly visited.

The food waste sorting programme led by the NGO had one guiding principle: in their words, "to make 'more personal'" the policy implementation to residents. It involved pre-launch questionnaires delivered and picked up by block leaders which included questions asking residents if they would like to be visited to be given more information, if their household was willing to participate in food waste sorting, and for phone numbers of those interested in becoming volunteers for the program. The lowest branch of the government is the Community Committee, whose activities are based in such communities, and the NGO liaised with this and the higher tier government branch which commissioned the work (known as the Street/Ward Committee), as well as the Housing Association which was responsible for the management of the community estate and facilities, and hiring and supervision of the cleaners of the communal areas. Prior to the program launch the NGO held several meetings to facilitate these institutions to self-clarify their roles for the new activity of food waste separation into separate communal bins. They also held an 'Open Space' meeting for all stakeholder types including residents and volunteers to co-establish common visions and identify potential problems and solutions. A small number were taken to visit the local incinerator which has to add fossil fuels to the waste to burn it as it is so wet from the food waste. Volunteers were recruited, and trained over 3 sessions by the NGO, who also set up schedules for their shifts: to stand in pairs in the vicinity of the waste stations wearing bright tabards every morning 7–9 am and every evening 6–8 pm to encourage, demonstrate, and inform residents in a positive and friendly way about the waste separation. These shifts continued for three consecutive months – an innovation not previously seen by the researchers.

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