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Individual Upcycling Practice: Exploring the Possible Determinants of Upcycling Based on a Literature Review

Kyungeun Sung

PhD Candidate

Nottingham Trent University

Nottingham

UK

Tim Cooper

Professor

Nottingham Trent University

Nottingham

UK

Sarah Kettley

Senior Lecturer

Nottingham Trent University

Nottingham

UK

Abstract

Individual upcycling – the creation or creative modification of any product out of used materials in an attempt to generate a product of higher quality or value than the compositional elements – has recently been advocated by many as a means to reduce waste, yet is still marginal. Considering the implied benefit to sustainable production and consumption, the most relevant question at this point may be how to scale up this marginal practice into mainstream practice to make a bigger impact in society and environment. In order to generate effective scaling-up strategies for change, it is essential to understand the determinants of upcycling (i.e. what drives and facilitates it). This paper reviews relevant contemporary literature and identifies a set of determinants. The synthesized result, despite its partiality, shows possible examples of design and policy implications for scaling-up, and leads to future research suggestions.

Introduction

Upcycling is often considered as a process in which waste materials are converted into something of higher quality/value in a second life. The Oxford Dictionary (2014) defines 'upcycle' as "reuse (of discarded objects or material) in such a way as to create a product of higher quality or value than the original." The Dictionary of Sustainable Management (2014) defines it as "the process of converting

an industrial nutrient (material) into something of similar or greater value in its second life". As shown by comparing these two definitions, upcycling is being used both at product/object level and industrial material level. At both levels upcycling has been increasingly recognized as a promising means to reduce material and energy use. For example, at the product level, Szaky (2014) sees object upcycling as one of the most sustainable circular solutions in the waste hierarchy, positioned between reuse and recycling, since upcycling typically requires little energy input and can eliminate the need for a new product. At the industrial material level, McDonough and Braungart (2013; 2002), pioneers of industrial upcycling (i.e. the cradle to cradle concept), have advocated radical design innovations for perpetually circular material reuse as opposed to current recycling practice, which is considered as 'down'-cycling.

This paper considers the former perspective, product/object level upcycling, and defines it as creation or creative modification of any product out of used materials (e.g. second-hand products and waste materials) in an attempt to result in a higher quality or value product than the compositional elements. Product level upcycling has been actively promoted and practiced by some entrepreneurs as part of waste management strategy and towards sustainable production (e.g. TerraCycle, FREITAG) (Szaky, 2014), as well as by some individuals who pursue product upcycling as a lifestyle of reduction and towards sustainable consumption (Frank, 2013). Recently and arguably, there is also an increase in the overall number of upcycling practitioners aided by more readily available physical resources (e.g. Maker Faire, Hackspace, Makerspace, etc.) and digital resources (e.g. Instructables, Etsy). In the USA and the UK, most notably, an increasing number of Hackspaces/Makerspaces have become the central place for such emerging practitioners (including local small business entrepreneurs, artists, hobbyist makers, crafters, hackers and tinkerers) to get access to an affordable public workshop, to utilize used materials (more popularly referred to as hacking), and to share their skills and knowledge on hacking and upcycling, as well as fixing and making.

Despite the increasingly visible emerging practitioners, with growing resources (e.g. workshops, website), the upcycling practice is still marginal. Taking into account the potential of product upcycling as a means towards waste prevention, and sustainable production and consumption, the most relevant question to ask at this point, from the perspective of sustainable design, may be how to scale up this marginal practice into a mainstream practice to make a bigger impact on society and the environment. A logical solution to create a meaningful level of scaling-up would be to generate effective strategies and tactics for change, which requires understanding what drives and facilitates upcycling (i.e. its determinants). In this respect, noting an apparent dearth of publications dealing with the determinants of upcycling, this paper reviews relevant contemporary literature and presents the drivers and facilitators identified accordingly.

Method and theoretical framework

Acknowledging the relative newness of the term 'upcycling', and the similarity between individual upcycling (as a way of creating something by oneself) and craft, DIY (Do-It-Yourself) or making, broad literature in renaissance crafts, new ways of DIY and the emerging Maker Movement were considered for review. The literature evaluated as the most relevant and contemporary by the time of writing (as part of a literature review in the first author's PhD research) was used for synthesis. The identified drivers and facilitators were synthesized on the basis of the framework of Triandis' Theory of Interpersonal Behaviour (TIB) (Triandis, 1977). TIB was selected due to the inclusive nature of the theory: compared with other theories (e.g. Attitude-Behaviour-Context theory, expectancy-value theory, norm activation theory), TIB is the most comprehensive social psychological theory of behaviour and change (Jackson, 2005), incorporating four factors suggested by Stern (2000) for an integrated model of environmentally significant behaviour (i.e. attitudes, contextual factors, personal capabilities and habits).

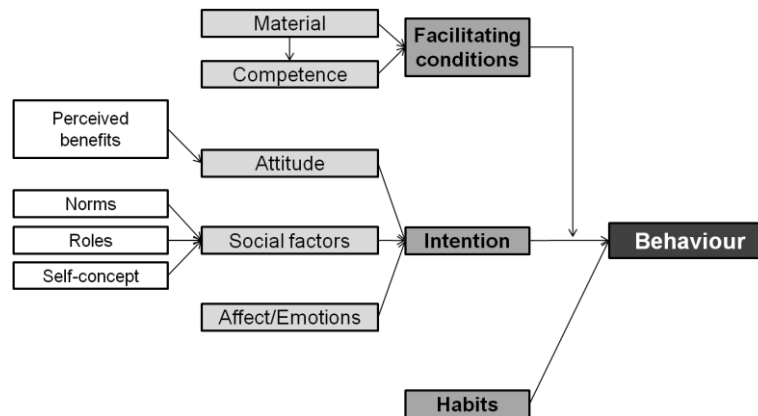


Figure 1 Modified version of Triandis' Theory of Interpersonal Behaviour

The TIB framework suggests that social factors and affect/emotions, along with attitude, play the key role in forming intentions, that past behaviours exert a significant influence on present behaviour, and that the influences from intentions and habits are moderated by facilitating conditions which can be interpreted as 'material' (e.g. infrastructure, equipment, tools, products) and 'competence' (e.g. skills, knowledge, capability) from the perspectives of social practice theorists such as Shove (2012). To put it another way, this paper is based on an understanding that "my behaviour [...] is a function partly of what I intend (influenced by social, normative, and affective factors as well as by rational deliberations), partly of my habitual responses, and partly of the situational constraints and conditions under which I operate" (Jackson, 2005, p. 111). The paper also views practice as collective behaviours, with continuity and habitualization not only triggered by individual needs and motives but also affected and shaped by social and cultural factors (Tuominen, et al., 2005).

Attitudes

Attitudes are shaped by perceived consequences and value of the consequences. 'Perceived consequences' refer to the subjective probability that certain consequences will follow a particular behaviour, and 'value of consequences' refers to the extent which one reacts to actual consequences in either good or bad way (Triandis, 1977). This paper only includes 'perceived consequences with positive value attached to the expected and experienced consequences', which can simply be translated into 'perceived benefits'.

Social factors

Triandis (1977) illustrates social factors with three elements: norms, roles and self-concept (or self-image). Norms are "beliefs that certain behaviours are correct, appropriate, or desirable", while roles are "sets of behaviours that are considered appropriate for persons holding particular positions (e.g. father, leader, salesperson) in a group" (Triandis, 1977, p. 8). Self-concept or self-image refers to "a person's ideas about who he or she is" (Triandis, 1977, p. 9).

Affect/Emotions

Affect toward a behaviour refers to "the emotions a person feels at the thought of the behaviour. [...] positive or negative and strong or weak. A behaviour may become associated with pleasant stimulation or with disgust, anxiety or distress." (Triandis, 1977, p. 9).

Habits and facilitating conditions

The habit to act is "measured by the number of times the act has already been performed by the person." (Triandis, 1977, p.10). Facilitating conditions are those such as "the ability of the person to carry out the act, the person's arousal to carry out the act, and the person's knowledge." (Triandis, 1977, p.10). This paper uses two sub-categories of facilitating conditions, 'material' (e.g. tools, products) as arousal and assistance in enhancing knowledge and ability, and 'competence' (e.g. skills, knowledge).

Results

Attitudes: Perceived benefits

Economic benefits: (1) fulfilling needs with less financial resources and (2) 'long tail' market opportunity.

Frank (2013) describes upcycling as a way of saving money and creating something useful and inexpensive or even free. Reuse and upcycling were common practices for thousands of years before the Industrial Revolution and are still common in developing countries for financial reasons (Szaky, 2014). Starting a new business is another potential economic benefit of upcycling (and making/crafting). There are thousands of emerging entrepreneurs who are "industrializing the 'DIY spirit'" (Anderson, 2012). Some such entrepreneurs find their niche and play in their 'long tail'¹ market (Lang, 2013; Frank, 2013).

Creativity benefits: (1) production of something pleasing, useful, authentic and personal, (2) creative self-expression as a mark on the world, and (3) simply being creative.

The process of MUC (Making, Upcycling and Crafting) may be rewarding because something pleasing and useful is produced and homemade things carry the authentic and personal touch of the creator, which makes the creation special (Gauntlett, 2011). End products are for both practical use and creative self-expression (Frank, 2013; Gauntlett, 2011; Parker, 2012). They are expressive of a personality, and of a presence in the world; MUC has been described as a means by which individuals are able to make their mark in the world (Gauntlett, 2011). Parker (2012) has highlighted the importance of craft for women as a space for personal thought and self-expression. Soule (2008, p. 5) correspondingly says "Being creative is important [...] because I feel myself to be a more complete person when my creativity is expressed." One interviewee of Levine and Heimerl (2008) pointed out the importance of being creative in the process, saying "I don't think our generation really likes to be told what to do. We really like to have a lot of wiggle room for experimenting and being creative" (p. 94).

Experience benefits: (1) a meaningful journey and (2) learning experience.

Some authors see MUC as a journey or adventure in which process is often more valuable and meaningful than the outcome (Frank, 2013; Lang, 2013; Gauntlett, 2011). The journey through self-discipline, discovery, failure, doubt, experimentation, exposure, change and the unknown is the real reward (Frank, 2013). Similarly, Turney (2009) mentions that craft/making is a journey in which the travelling is more important than arrival at the destination. MUC also allows participants to learn new skills and knowledge (Frank, 2013; Lang, 2013). In fact, the learning efficiency is higher when people are doing and making things than merely being taught about them (Gauntlett, 2011). Lang's formulae of 'making (fail) = crappy thing + learning + story' in contrast with 'buying (fail) = crappy thing' highlights the value of even unfinished/unsuccessful projects (Lang, 20)

Empowerment benefits: (1) self-reliance and (2) unlocking potential and becoming more capable.

Self-reliance is viewed as another positive consequence of MUC (Lang, 2013; Frank, 2013; Gauntlett, 2011). Lang (2013) says that he personally wanted to become more self-reliant and self-sufficient: he felt that craftspeople built their lives on more stable ground and were better prepared for the world than he was. MUC can also unlock people's potential (Frank, 2013), which helps to cultivate a sense of the self as an active, creative agent (Gauntlett, 2011) and offers a means of confidence in one's own ability to do things (Turney, 2009). Making is even considered as a 'weapon of resistance' to the constraints associated with the idea of femininity, enabling women to actively produce things in the world (Parker, 2012, p. ix).

A sense of a team/community.

MUC has team and community perspectives, too. Several authors portray making as a team activity and often Do-It-Together (DIT) rather than Do-It-Yourself (Lang, 2013; Gauntlett, 2011; Levine & Heimerl, 2008). One interviewee of Levine and Heimerl (2008) said "I feel very connected to people

¹ 'The theory of the Long Tail is that our culture and economy is increasingly shifting away from a focus on a relatively small number of hits at the head of the demand curve and toward a huge number of niches in the tail.' (Anderson, 2014)

whom I have never met in person. [...] it is a really wonderful sort of collaborative, supportive, non-competitive network” (p. 50).

A way to burn stress and relax.

For some people, MUC may be a way to combat stress, since the activity can solve a problem or make an improvement, crossing off the ‘to-do’ list (Frank, 2013). Even if it does not work out as planned, it may still provide a good way to relax and curb anxiety (Gauntlett, 2011).

Clutter clear-out.

Home-based upcycling may be a means to get rid of clutter, thus meeting a need within the home: it has been described as a lifestyle course in which one can learn to create with the purpose of clearing out unwanted clutter and minimizing maintenance (Frank, 2013).

Facilitating conditions

Physical workshops: (1) community workshops to share tools/equipment and meet with others and (2) school workshops for future generations.

There are estimated to be nearly a thousand Hackspaces/Makerspaces with shared tools and equipment in the world, and the number of such spaces is growing rapidly (Anderson, 2012), mostly as grassroots, co-operative style organisations (Lang, 2013). In the USA, they have attracted the attention of the Obama administration, which launched a school workshop programme in 2012, bringing Makerspaces into schools in order to create a new generation of designers and innovators (Anderson, 2012).

Internet: internet platforms as communities and marketplaces and for learning materials.

The Internet has made it easier for people to share any MUC outcome with others, while at the same time expressing one’s emotions and ideas (Gauntlett, 2011). Such shared online projects (through, e.g. Instructables) have become inspirational for some people, offering opportunities for collaboration and allowing individual practitioners to be globally connected, resulting in a Maker Movement (Anderson, 2012). The Internet does not only provide a community but also a new marketplace. The rise of Etsy, a web marketplace for makers, allowed nearly a million users to sell more than \$0.5 billion worth of products in 2011 (Anderson, 2012), suggesting that such platforms can create a new economic infrastructure for the 21st-century artisans (Lang, 2013). The Internet also plays a role in providing learning materials: Google and YouTube alone hold the answers to many of the burning questions of MUC practitioners (Lang, 2013; Gauntlett, 2011).

Personal fabrication technology.

Emerging personal (digital) fabrication technology such as laser cutters, 3D printers and other computer numerical control (CNC) machines is now increasingly affordable for a small group of people, able to create consumer-ready products, and easy to learn without a design or engineering degree (Lang, 2013). The new technology is giving individuals power over the means of production, allowing for bottom-up entrepreneurship and distributed innovation (Anderson, 2012).

Teachers, companions, and collaborators.

Through personal observation of making (upcycling/crafting), Lang (2013) concluded that participants were active in seeking out teachers, creating or joining like-minded groups, collaborating with strangers, and co-creating together (DIT), often through social media, community workshops and Maker Faires.

Affect/Emotions

‘Everyday creativity’ activities such as MUC arouse a range of emotions such as excitement and frustration, but most especially a feeling of joy, according to Gauntlett (2011). The following emotions have been explicitly described in the literature.

Inherent pleasure.

Inherent pleasure in ‘making and doing’ has been identified, along with understanding/learning, as a primary reason why craft (making) has been able to survive in the modern era (Gauntlett, 2011). It is a sense of being ‘alive’ during the process of making and being participants, instead of being mere

viewers and relying on outside stimulants (e.g. multimedia entertainment) (Frank, 2013; Gauntlett, 2011).

Sense of accomplishment and pride.

Frank (2013) claims that MUC offers a sense of accomplishment, self-fulfilment and pride from the tangible outcome. It is not only the end result that is satisfying, but the learning process of developing one's interests and talents, which is considered to bring satisfaction and pride (Frank, 2013).

Happiness from goal-oriented activities and autonomy.

MUC are goal-oriented activities that participants intentionally choose to engage in. They have been found to be a major contributor to happiness through meta-analysis and comparative studies (Lyubomirsky, et al., 2005; Sheldon & Lyubomirsky, 2009).

Social factors

Environmental and social sustainability concerns (norms).

People have frequently been encouraged to reduce their consumption and find new ways to reuse/upcycle in response to environmental concerns (Gauntlett, 2011; Szaky, 2014). Some prefer to make/upcycle something rather than purchase a mass-produced product, as their ethical and political choice, since certain industries (e.g. clothing) are notorious for the lack of corporate social responsibility (e.g. bad working conditions) (Gauntlett, 2011).

DIY spirit and maker mentality (self-concept).

The 'DIY spirit' may be viewed as a self-concept of MUC practitioners (Szaky, 2014; Frank, 2013; Gauntlett, 2011). This DIY spirit helps people to be more willing to learn new skills and reduce their dependency on commercial services (Frank, 2013). Without it, far fewer people might be willing to separate and clean waste for upcycling purposes (Szaky, 2014). The underlying DIY culture encourages people to engage in MUC that draws upon their creativity and character in contrast with seeking a generic, 'expert' solution (Gauntlett, 2011). Slightly different from the DIY spirit, maker mentality is often regarded as universal human nature (Lang, 2013; Anderson, 2012). "We are all makers. We are born makers: just watch a child's fascination with blocks, Lego, etc. It's not just about workshops, garages, and man caves. If you love to cook, you are a kitchen Maker and your stove is your workbench. If you love to plant, you are a garden Maker. Knitting and sewing, scrap-booking, beading, and cross-stitching – all Making." (Anderson, 2012, p. 13).

Habits

The importance of childhood making as an important influence on whether people ultimately become an adult maker has been recognized in the field of innovation. One of the leading voices in this field, AnnMarie Thomas, carried out an extensive research into the childhoods of famous inventors looking for the early signs of making and found that great innovations and inventions were almost always correlated with childhood making experiences (Lang, 2013).

Discussions and conclusion

The synthesized results, mapped above on the TIB framework, indicate that attitude (perceived benefits) and facilitating conditions (mostly materials rather than competence) appear more frequently as drivers and facilitators than emotions, social factors and habits. The different frequency may suggest relative importance of each element: the more frequently it appears, the more likely that it is perceived to be significant as a driver or a facilitator by people. If so, this implies that effective service design for community workshops (for example) may be more successful when focusing on the ways to reinforce the perceived benefits and facilitating materials. To give more details on this, such workshops may be able to attract more non-practitioners and better retain existing practitioners by providing (1) a design guide for upcycling with less time, efforts and money; (2) opportunities for semi-professional practitioners to generate income, linking with local businesses; (3) top tips to become micro sellers in Etsy, Folksy, etc.; (4) a regular marketplace for bartering, lending, trading, renting, gifting and swapping materials/products; and (5) a matching system in which people can readily find suitable teachers, companions and collaborators. If the effective service design for community

workshops is the best answer for successful scaling-up, convincing local authorities to allow people to have sufficient access to such workshops may be a prerequisite for improving the service.

This example is, however, unlikely to be either the only or most effective way for successful scaling-up of upcycling in the UK, given the following limitations to this study. First, about half of the cited literature is from the USA and might not be applicable to the UK. Secondly, the review is at a preliminary stage and neither comprehensive nor conclusive. Thirdly, the literature reviewed relies mostly on personal experiences and opinions (Anderson, 2012; Frank, 2013; Lang, 2013; Szaky, 2014; Soule, 2008) or limited empirical evidence (Gauntlett, 2011; Levine & Heimerl, 2008; Parker, 2012; Turney, 2009). Finally, most of the literature does not focus specifically on upcycling. A more comprehensive literature review as well as empirical research on drivers and facilitators for upcycling in the UK is thus required. In order to be able to propose upcycling scaling-up strategies and tactics confidently, further studies are suggested, as follows: (1) determining relative importance among identified UK-specific drivers and facilitators; (2) identifying and prioritizing barriers for non-practitioners; (3) learning from best practice in other fields; and (4) strategizing based on (1), (2) and (3).

Despite these limitations, this short study could be informative and inspirational for academics, designers, entrepreneurs, government officers or social workers interested in developing a charity, social enterprise or other type of organisation aiming to involve local communities in learning and sharing how to effectively utilize second-hand products or waste materials for social, economic, and environmental benefits, whether at individual or community level.

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Sustainable Innovation 2014

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