

# An Exploratory Study on the Consequences of Individual Upcycling: Is It Worth Making People Feel Attached to Their Upcycled Products?

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## ABSTRACT

Product attachment, the emotional bond experienced with a product, is an emerging concept for sustainable production and consumption. The logic behind it is that when people are attached to any product, they are more likely to postpone its replacement or disposal. Some types of product have been studied regarding product attachment in past research but the focus has been on manufacturers' perspectives rather than on consumers' 'everyday creativity' activities such as 'individual upcycling'. Individual upcycling, creation or modification out of used materials resulting in a higher quality or value product than the compositional elements, is particularly relevant to product attachment. This is because upcycling, as a creative, engaging user activity, may offer the experiences of self-expression, group affiliation, special memories and pleasure, all of which are possible product attachment determinants. In the meantime, recent evidence suggests that the number of people who upcycle things has increased, possibly as a response to the contemporary 'Maker Movement' and aided by physical and digital resources. Despite this growth, individual upcycling has not been investigated extensively, especially its relation to product attachment and product longevity. Acknowledging this, this study investigated the consequences of individual upcycling with respect to product attachment and the product longevity of upcycled products, and compared the results with mass-produced products with the same functions through an exploratory questionnaire with 23 UK-based upcycling practitioners. The results demonstrated that the attachment to upcycled products is positively correlated with irreplaceability, and irreplaceability with product care and expected product longevity. The results also showed that the expected product lifetime years of the upcycled product with attachment are longer than the estimated average product lifetime years of the mass-produced products with the same functions.

**Keywords:** individual upcycling, product attachment, product longevity, sustainable consumption, sustainable production.

## INTRODUCTION

Product attachment, the emotional bond experienced with a product (Schifferstein & Pelgrim, 2003), is an emerging concept with the potential to engender sustainable consumption (Cooper, 2005; Mugge, et al., 2004; Van Hinte, 1997). The logic behind it is that so long as people are attached to any product, they might be more likely to handle the product with care, to postpone its replacement or disposal, and to repair it when it breaks down (Cramer, 2011; Ramirez, et al., 2010; Mugge, 2007; Van Hinte, 1997), while not necessarily requiring people to commit themselves to pro-environmental behaviour (van Nes, 2010). Some types of product have been studied regarding product attachment: for example, consumers' favourite or most cherished possessions such as family heirlooms and jewellery (Schultz, et al., 1989; Wallendorf & Arnould, 1988), and mass-produced, ordinary consumer durables (Mugge, et al., 2010; 2006a; 2006b;

2005). Past studies have shown interest in product personalisation, mass customisation and participatory design as design strategies to increase product attachment (i.e. strengthening the person-product relationship) and therefore for sustainable consumption (Cramer, 2011; Mugge, et al., 2009a; 2009b; Fletcher, 2008; Chapman, 2005). Despite such emphasis on consumer involvement in design, past studies have not yet paid attention to ‘everyday creativity’ activities (Gauntlett, 2011) without involving manufacturers, such as consumers’ individual making, crafting or upcycling at the household level.

Individual upcycling, creation or modification of any product out of used materials (e.g. second-hand products or waste materials) in an attempt to generate a product of higher quality or value than the compositional elements (Sung, et al., 2014) at the household level, is particularly relevant to product attachment since practitioners may often utilise old products with which they have already developed an emotional bond. Upcycling, as a creative, engaging user activity, may offer the experiences of self-expression, group affiliation, special memories and pleasure, all of which are possible product attachment determinants (Mugge, et al., 2006a). In other words, individual upcycling is likely to create strong product attachment and lead to product longevity.

**The evidence suggests** that the overall number of people who upcycle has increased or at least, they have become more visible in developed countries, possibly as a response to the contemporary Maker Movement (Anderson, 2012; Lang, 2013) and more readily available physical resources such as Hackspaces and Makerspaces, and shared digital resources (for example, Instructables and Etsy). Despite this apparent growth and its **potential as a strategy for product longevity** and sustainable consumption, individual upcycling has not yet been fully investigated, especially in terms of its relation to product attachment and product longevity.

The main aims of the paper, therefore, are twofold. The first is to compare product attachment, its change over time, expected/estimated product lifetime years and end-of-life options of upcycled products with attachment to mass-produced products with the same functions. The second aim is to address how attachment to upcycled products might be correlated with product attachment consequences, including product longevity.

## **RESEARCH METHODOLOGY**

A questionnaire was administered to 23 UK-based consumers with upcycling experiences. The data was collected between April and July 2014.

### **Procedure**

The respondents were first asked to select up to three products to which they had the most emotional attachment from a list of upcycled products. They were then asked to fill in up to three identical questionnaires based on their selection.

The questions addressed (1) product attachment and its change over time for the upcycled products with attachment; (2) product attachment consequences (disposal tendency, product care, expected product longevity, irreplaceability and expected product lifetime years) of the upcycled products with attachment; (3) product attachment, its change over time and average product lifetime years of mass-produced products with the same functions; and (4) end-of-life options for both upcycled products with attachment and mass-produced products. Measures for the variables of product attachment and product attachment consequences were obtained on seven-point Likert scales (1=“strongly disagree”, 7=“strongly agree”), whereas nine-point scales (1=“not at all”, 9=“to a great extent”) were used for measuring the degree of product attachment

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at different time points. Other questions provided different number of answer options. See Appendix A. for the questions and options of answers.

### **Sampling**

Hackspace was considered to be an appropriate starting point for the recruitment of people who have experience in upcycling based on its facilities and services,<sup>1</sup> and on the growing number of such spaces in the UK.<sup>2</sup> Ten workshops in ten different cities of nine different regions in England were selected.<sup>3</sup> An advertisement was posted on Google groups or forums of the ten workshops to recruit respondents. Thirteen people directly answered the advertisement and another ten were identified by snowball sampling.

### **Respondents**

The 23 respondents came from nine different cities and were aged between 24 and 66 years old. 17 (74%) were British and 6 (26%) were non-British. 15 (65%) were male and 8 (35%) were female. 12 (52%) worked in science and engineering, 7 (30%) in art and design, and 4 (17%) in other areas (health service, business and management) or were unemployed.

### **Analysis**

44 questionnaires completed by the respondents were analysed by employing descriptive statistics and correlational analysis (Spearman's Rank Order Correlation), using SPSS (Statistical Package for the Social Sciences) version 22.0.

## **RESULTS**

### **Descriptive Statistics**

When respondents selected certain products as those they felt most emotional attachment to after upcycling ( $M=5.41$ ,  $SD=1.59$ ), they reported high mean values of product care ( $M=5.09$ ,  $SD=1.36$ ), expected product longevity ( $M=5.37$ ,  $SD=1.53$ ), and a low mean value of disposal tendency ( $M=1.45$ ,  $SD=.92$ ). Irreplaceability showed slightly lower mean value with a larger standard deviation ( $M=3.61$ ,  $SD=2.34$ ). Expected lifetime years ranged between 1 year and over 50 years, resulting in the mean value of 11.67 years ( $SD=13.23$ ).

When respondents chose the degree of product attachment (PA) on the scale of 1 to 9 at the point of upcycling project completion, they reported high mean value ( $M=7.39$ ,  $SD=1.56$ ). But then 20.5% ( $n=9$ ) of PA faded away whereas 68% (30) PA stayed the same and 11.5% (5) PA got stronger over time. As a consequence of such change in PA over time, the PA at the point of responding to the questionnaire was slightly lower than PA at the point of upcycling completion and with a larger standard deviation ( $M=6.64$ ,  $SD=2.29$ ) (Table 1).

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<sup>1</sup> Hackspaces provide local residents (e.g. craft hobbyists, hackers, makers, tinkerers, artists, entrepreneurs, etc.) with a membership including the access to tools, materials and expertise.

<sup>2</sup> Hackspaces have increased in numbers since 2009 and are now available in 53 different locations (UK Hackspace Foundation, 2015).

<sup>3</sup> The selected workshops included (1) Nottingham Hackspace (Nottingham, East Midlands); (2) Makespace (Cambridge, East of England); (3) London Hackspace (Greater London); (4) MakerSpace (Newcastle upon Tyne, North East England); (5) HACMan (Manchester, North West England); (6) Build Brighton Hackspace (Brighton, South East England); (7) Reading Hackspace (Reading, South East England); (8) OxHack (Oxford, South West England); (9) Potteries Hackspace (Newcastle-under-Lyme, West Midlands); and (10) Leeds Hackspace (Leeds, Yorkshire and the Humber). The selecting criteria were accessibility to and activeness of the Hackspace members.

16 out of 44 (36%) upcycled products with attachment turned out to be also purchased for the same functions by respondents. Most of the inside-the-home furniture made by upcycling had never been purchased before (n=8; 89%); nor had the experimental and/or artistic projects (10; 77%). About half of garden, shed, workshop and/or outdoor products by upcycling, and small home products and/or decorations by upcycling were never purchased: 57% (4/7) and 50% (4/8) respectively. Other personal belongings showed a relatively lower percentage (29%; 2/7) for the answer ‘never purchased before’. See Appendix B. for the list of upcycled products with attachment, purchase experience, and the description of product categorisation in this study.

Table 1. Comparisons between the upcycled products with attachment (UPWA) and mass-produced products (MPP) with the same functions for the degree of product attachment (PA), its change over time, expected or estimated lifetime years and end-of-life options

		Upcycled products with attachment (n=44)	Mass-produced products with the same functions (n=16)
<b>PA degree at the point of upcycling completion or purchase of the product (1-9)</b>	<i>M</i>	7.39	3.25
	<i>SD</i>	1.56	2.08
<b>PA change over time (% (n))</b>	Faded away	20.5% (9)	13% (2)
	Stayed the same	68% (30)	81% (13)
	Got stronger	11.5% (5)	6% (1)
<b>PA degree at the point of responding to the questionnaire (1-9)</b>	<i>M</i>	6.64	3.06
	<i>SD</i>	2.29	1.61
<b>Expected lifetime years of UPWA and estimated average lifetime years of MPP (years)</b>	<i>M</i>	11.67	7.06
	<i>SD</i>	13.23	11.59
<b>End-of-life options (% (n))</b>	Sell it to someone	7% (3)	19% (3)
	Give it to someone	55% (24)	31% (5)
	Donate it somewhere	9% (4)	31% (5)
	Disassemble and separate different materials for recycling	11% (5)	0% (0)
	Upcycle it for a/nother project	14% (6)	19% (3)
	Keep it somewhere at home	2% (1)	0% (0)
	Other	2% (1)*	0% (0)

\* disassemble and put them for reuse, upcycle and recycle

When the mass-produced products with the same function (n=16) have been purchased, the respondents reported the lower mean value of product attachment (PA) with a larger standard deviation ( $M=3.25$ ,  $SD=2.08$ ) on the scale of 1 to 9. Mostly, PA from the mass-produced products stayed the same over time (81%; 13) whereas 13% (2) faded away and 6% (1) got stronger. As a consequence, the PA at the point of responding to the questionnaire was slightly lower with a smaller standard deviation ( $M=3.06$ ,  $SD=1.61$ ). The mean value of estimated average lifetime years for these mass-produced products was 7.06 with the standard deviation of 11.59 (Table 1).

Regarding the options for the end of life of the upcycled products with attachment, 55% (24) would be given to someone; 14% (6) would be upcycled again for another project; 11% (5) disassembled and separated for recycling; 9% (4) donated somewhere; 7% (3) sold to someone; and 2% (1) kept somewhere at home. In the case of mass-produced products with the same functions, 31% (5) would be given to someone; another 31% (5) donated somewhere; 19% (3) sold to someone; another 19% (3)

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upcycled for a project; and no answer for ‘disassemble and separate different materials for recycling’ or ‘keep it somewhere at home’ (Table 1).

### Correlational Analysis

Spearman’s Rank Order Correlation showed that product attachment is positively correlated with irreplaceability ( $r=.516, p<.001$ ) but there is no statistically significant correlation of product attachment with disposal tendency, product care, expected product longevity, or expected product lifetime years. Irreplaceability, however, is positively correlated with product care ( $r=.44, p<.001$ ) and expected product longevity ( $r=.48, p<.001$ ) besides product attachment. Expected product longevity is also positively correlated with expected product lifetime years ( $r=.45, p<.001$ ) (Table 2).

*Table 2. Spearman’s rho between product attachment (PA) and PA consequences based on the upcycled products with attachment*

	<b>DT</b>	<b>PC</b>	<b>EL</b>	<b>I</b>	<b>EY</b>	<b>PA</b>
<b>Disposal tendency (DT)</b>	-					
<b>Product care (PC)</b>	-.343	-				
<b>Expected product longevity (EL)</b>	-.365	.679**	-			
<b>Irreplaceability (I)</b>	-.122	.442**	.479**	-		
<b>Expected product lifetime years (EY)</b>	-.363	.252	.445**	.237	-	
<b>Product attachment (PA)</b>	-.274	.371	.364	.516**	.363	-

\*\* $p<.001$  (2-tailed)

### DISCUSSION

The comparisons between the upcycled products with attachment and mass-produced products with the same functions clearly showed that when people are attached to their upcycled products, the degree of product attachment at the point of upcycling completion (7.39) is much stronger than the one with mass-produced products at the point of purchase (3.25). The attachment to the upcycled products, however, presented slightly higher tendency to fade away over time (20.5%) than to the mass-produced products (13%). But then the attachment to the upcycled products also presented a higher tendency to increase in strength (11.5%) compared to the mass-produced products (6%). Taking into account such changes over time, the degree of product attachment of the upcycled products at the point of responding to the questionnaire (6.64) was still much higher than the one with mass-produced products (3.06). Corresponding to the difference between the product attachment degrees, the mean value of the expected lifetime of the upcycled products with attachment (11.67) was 4 years longer than the estimated average lifetime of the mass-produced products (7.06).

Considering the highest percentage of the end-of-life option, ‘give it to someone,’ (55%) and much lower percentages of ‘sell it to someone’ (7%) and ‘donate it somewhere’ (9%) for the upcycled products with attachment, along with the relatively higher percentages of the two options, ‘donate it somewhere’ (31%) and ‘sell it to someone’ (19%) for the mass-produced products with the same functions, it might be the case that the respondents think their upcycled products are not good enough (in terms of quality and value) to be sold or donated and/or that the upcycled products are too

special to be given to any random person by selling or donating. Considering 11% of the option, ‘disassemble and separate different materials for recycling,’ for the upcycled products with attachment, but 0% of the same for the mass-produced products, it may be also the case that the respondents are more willing to disassemble and separate different materials for the upcycled products as they feel responsible for what they have produced, but then they are less willing to do so for the mass-produced products.

The correlation between product attachment and product attachment consequences in this study is limited, unlike findings from other existing studies (i.e. irreplaceability, product care, expected product longevity, etc.) (Ramirez, et al., 2010; Mugge, 2007; Govers & Mugge, 2004). Only one significant correlation was found between product attachment and irreplaceability. Taking into account the positive correlation between irreplaceability and product care, and between irreplaceability and expected product longevity, however, it might be the case that irreplaceability for makers/upcyclers mediates the effect of product attachment on product care and expected product longevity. Irreplaceability as a crucial condition for a long-lasting relationship was also pointed out by Mugge and her colleagues (2005).

## **CONCLUSION**

This exploratory study described how the degree of product attachment, its change over time, expected/estimated product lifetime, and end-of-life options differ between the upcycled products with attachment and the mass-produced products with the same functions, and how the extent of product attachment appears to correlate with the consequences of product attachment. These results are, however, based on a limited sample. Even more critically, more than half of the upcycled products with attachment (64%; 28/44) had never been purchased before by the respondents, which may undermine the validity and meaningfulness of the comparisons between the upcycled and the mass-produced products, especially due to the different proportions of product categories in the two data sets. Moreover, as respondents were not asked questions about every upcycled product, potentially interesting areas have not been addressed, such as identifying the proportion of all upcycled products that exhibit meaningful levels of product attachment. Future research should also take into account the possible rebound effect (e.g. using more materials and energy for the purpose of upcycling) and the actual environmental impact accordingly (that is, in terms of total materials and energy involved, and waste and emissions produced during the process of upcycling). Notwithstanding these limitations, this study has demonstrated that individual upcycling has the potential to contribute towards sustainable production and consumption at the household level through strengthening product attachment. Ergo, is it worth making people feel attached to their upcycled products? Yes, it probably is.

## **ACKNOWLEDGEMENTS**

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<sup>4</sup> Centre for Industrial Energy, Materials and Products

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## APPENDIX A. QUESTIONS AND ANSWER OPTIONS

### Product attachment and its change over time for the emotionally attached upcycled products

To what extent do you agree or disagree with the statement provided below?

1. This product has special meaning to me and I have an emotional bond with this product (Product attachment).

1	2	3	4	5	6	7
Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

2. How much emotional attachment did you feel when you just finished making and saw the completed project? (Degree of product attachment at the point of upcycling project completion)

1	2	3	4	5	6	7	8	9	
Not at all									To a large extent

3. Has the emotional attachment faded away, stayed the same, or got stronger over time since you finished making? (Change of degree of product attachment over time)

Faded away	Stayed the same	Got stronger
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4. If the degree of emotional attachment now is different from the initial attachment, how would you rate the degree of present emotional attachment? (Degree of product attachment at the point of responding to the questionnaire)

1	2	3	4	5	6	7	8	9	
Not at all									To a large extent

### Product attachment consequences of the emotionally attached upcycled products

To what extent do you agree or disagree with the statement provided below?

1. I would like to get rid of this product (Disposal tendency).
2. I take good care of this product (Product care).
3. I hope that this product will last for a long time (Expected product longevity).
4. This product is irreplaceable to me (Irreplaceability).

1	2	3	4	5	6	7
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Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
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5. For how many years would you like to use the product? (Expected product lifetime years)

Less than 1 yr	About 1 yr	About 2 yrs	About 3 yrs	About 4 yrs	About 5 yrs	More than 5 yrs – specify ( )
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**Product attachment, its change over time and average product lifetime years for the mass-produced product with the same functions**

1. How much emotional attachment did you feel when you just bought the product? (Degree of product attachment at the point of purchase)

1	2	3	4	5	6	7	8	9	
Not at all								To a large extent	

2. Has the emotional attachment faded away, stayed the same, or got stronger over time since you purchased it? (Change of degree of product attachment over time for the mass-produced product with the same functions)

Faded away	Stayed the same	Got stronger
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3. If the degree of emotional attachment now is different from the initial purchase, how would you rate the degree of present emotional attachment? (Degree of product attachment at the point responding to the questionnaire for the mass-produced product with the same functions)

1	2	3	4	5	6	7	8	9	
Not at all								To a large extent	

4. For how many years do you use this type of product on average?

Less than 1 yr	About 1 yr	About 2 yrs	About 3 yrs	About 4 yrs	About 5 yrs	More than 5 yrs – specify ( )
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**End-of-life options for both upcycled products and mass-produced products**

1. If you did not want this product any more, what would you most likely do with the product? (end-of-life option for upcycled products)

Sell it to someone	Give it to someone	Donate it somewhere	Dispose of it	Disassemble and separate different materials for recycling	Upcycle it again for another project	Keep it somewhere at home	Other – specify ( )
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2. What do you most likely do with this type of product when you did not want it anymore? (end-of-life option for mass-produced products with the same functions)

Sell it to someone	Give it to someone	Donate it somewhere	Dispose of it	Disassemble and separate different materials for recycling	Upcycle it again for another project	Keep it somewhere at home	Other – specify ( )
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**APPENDIX B. EMOTIONALLY ATTACHED, UPCYCLED PRODUCTS LIST WITH THE PURCHASE EXPERIENCE AND PRODUCT CATEGORISATION**

*Table 3. Emotionally attached, upcycled products list with the purchase experience*

	Product category	Number (n)	Products
Never purchased before	Experimental and/or artistic projects	10	Raspberry pi project Tour robot Pedal power generator Sculpture Black box Trebuchet Henk, the god of technology (art piece) Eye of the internet (art piece) RevSmoker (art piece) Log-carved

	Inside-the-home furniture	8	Nest of tables Side board Cyber bed (bed decorated with computer components) Jigsaw table Bed CD rack TV stand Alcove bookshelves
	Garden, shed, workshop and/or outdoor products	4	Bug box Patio and path Bird box Compost bin
	Small home products and/or decorations	4	Cyber wall (wall decoration with computer components) Recycling bin Record bowls Wind chimes
	Other personal belongings	2	Prom dress Bike
Purchased before	Other personal belongings	5	Jumper Jewellery iMac G4 Bike USB portable battery charger
	Small home products and/or decorations	4	Lamp Cushions CD clocks Kettle
	Experimental and/or artistic project	3	IKEA lamp drone Canon hack development kit Relay sockets
	Garden, shed, workshop and/or outdoor products	3	Climbing plant tripod Block plane Flower pot
	Inside-the-home furniture	1	Piano shelf

The first criterion for categorisation was the key aim of the creation: (1) experimental and/or artistic projects (for experiments, one-off demonstration, or artistic expression) and (2) functionally useful products (including decoration purposes). Functionally useful products were again categorised on the basis of personal or communal/shared products. Communal/shared products for functional usefulness were further categorised by where the product is used: (1) inside-the-home and (2) garden, shed, workshop and/or outdoor. Furniture is separated from other small home products and/or decorations among the inside-the-home products for its relatively large number. See Figure 1 below.

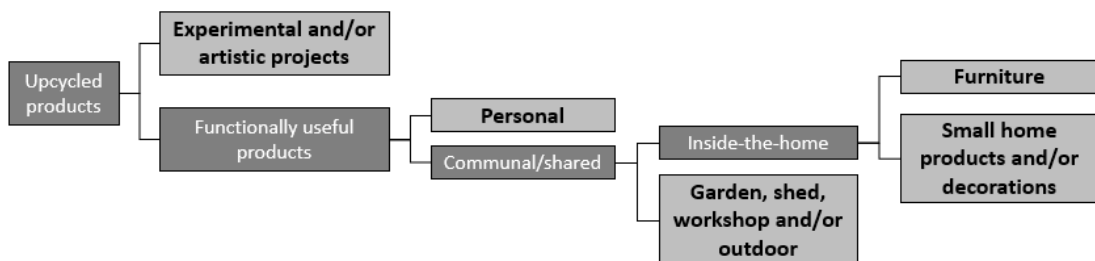


Figure 1. How the emotionally attached, upcycled products were categorised