ROUTLEDGE

Longer Lasting Products

Alternatives to the Throwaway Society

A **Gower** Book

Edited by

Tim Cooper

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Edited by
TIM COOPER

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The cover photograph is of Paul Bonomini's design for the RSA's Weeeman Project and the image has been used with his kind permission. The robotic figure is made of scrap electrical and electronic equipment that weighs 3.3 tonnes, the average amount that each person in the UK throws away during his or her lifetime.

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Foreword

There is something odd and at the same time utterly predictable about our failure to design, produce and maintain longer lasting products.

The odd thing is that it ought to be – most of the time, at least – in our own best interests to have things that last. Appliances that don't break down at crucial moments. Laptops and phones that don't need replacing every year. Clothes that continue to sit comfortably in our wardrobes and our identities for several years. Not to mention the considerable environmental and resource benefits to be had from not filling up our atmosphere with carbon, our rivers with pollution and our landfills with junk.

The predictability stems from our implicit understanding that to keep an economy going we are required, almost obliged, to consume and throw away more and more stuff. The 'throwaway society' is not so much about thoughtless plundering. It's not just a confluence of carefree consumers with little or no concern for their own future or the future of the planet. It's a society locked into perverse consumption practices by its own ineluctable logic.

Nowhere was this more evident than in political responses to the recent recession. In the years immediately preceding the crash, consumer debt in advanced economies had reached unprecedented levels and household savings had already plummeted – below zero in some countries. Despite this fact, the almost ubiquitous call from politicians across the spectrum was for us all to 'go out shopping'. No surprise at all then to find, as Tim Cooper points out in his introductory chapter to this varied and thoughtful collection of essays, that the origins of the term 'planned obsolescence', coincided precisely with the Great Depression – an economic crisis of similar proportions.

The logic of this is critical. Fast consumption is the inevitable partner of fast production. If we don't consume, then who is going to produce? And without production who will employ us? Without jobs how will we maintain our ability to go on and on consuming? Indeed the underlying dynamic here is not just about continuing to consume, but about consuming more and more. The stability of the economy itself in the 'advanced' consumer societies calls on

us not simply to maintain our productive capacity but to pursue a strategy of continuing, exponential growth. The dynamic that feeds this strategy relies on the relentless production of novelty by firms and the relentless consumption of novelty by households. The inevitability with which this leads to a throwaway culture is patent.

In principle, of course, it's possible to decouple this rampant economic expansion from material expansion and perhaps even from the rapid proliferation of products. If our products last longer, they offer enhanced economic value. Could we not produce fewer of them, service them more effectively, invest in their continual renovation and repair and expand our economy by charging more for these longer lasting 'servicised' products? This tantalizing possibility has haunted the environmental debate about product durability for at least three decades.

But the job of achieving this vision is not to be underestimated. And, as the contributions in this excellent collection make abundantly clear, that task is not just a technical one. It's not even simply an economic one. What links expanding production to the relentless consumption is an apparently voracious appetite for novelty – embedded in the social logic of the throwaway society. Like it or not, we're all deeply implicated in that logic.

The throwaway society. How quaint that term seems now! I am old enough to remember the shock that attended its arrival as a description of modernity. The wastefulness it implied. The damage it evoked. The erosion it predicted, not just in terms of product durability but in terms of social durability, in the durability of society itself. And yet today the concept is so deeply entrenched in our cultural self-image as to be almost redundant. Very soon, I imagine, there will no longer be a generation that remembers what it was like to live in a society other than this. Was there really ever a time of make do and mend, of repair and reparability, of continuity and durability? Or was it just a dream? A figment of history books and senile imaginations?

Our children have already inherited a very different view of the world. In which it is taken for granted that things don't last. That relentless novelty is the order of the day. And for a few years they may even be able to sustain the belief that things don't need to last. That today's fashion is tomorrow's junk. Today's functionality is tomorrow's dysfunctionality. Today's beauty is tomorrow's tawdry reject.

They've also inherited a future in which society itself has fallen into a very real danger of being 'thrown away'. There is no such thing as society, trumpeted Margaret Thatcher in the 1980s, leaving us bereft of anything other than individual material dreams and aspirations. How convenient this narrow framing of human nature, of social organization! Because it provides us with exactly the kinds of people, the kinds of society that will keep us running to the shopping malls and supermarkets for more and more stuff.

It is of course utterly predictable that this logic, however intractable, is leading us in only one direction: towards economic, social and ecological collapse. The odd thing is that it ought to be in our own best interests – and definitely in those of our children – to avoid that collapse.

In summary, this timely and provocative volume of essays is not just another academic tome in a longstanding debate – a debate to which its editor and many of its contributors have been worthy contributors for over a decade. On the contrary, the creation of product durability, a long lasting solution to our throwaway culture, emerges as an absolutely vital element in the pursuit of sustainability.

Tim Jackson
Author of *Prosperity Without Growth – Economics for a Finite Planet*
(London: Earthscan, 2009)

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Preface

There has long been awareness within industrialized nations that a throwaway culture is environmentally unsustainable and that to move onto a new path of development is inevitable at some future point in time. It has, however, taken a protracted period for this predicament to be properly addressed in depth by academic researchers or those who drive environmental policy: governments, their policy advisers and environmental campaigners. Only recently has a substantial network of researchers interested in exploring product longevity emerged and the policy community's waste agenda shifted from waste management to waste reduction.

My own work in this area began some 17 years ago as a researcher at the New Economics Foundation (NEF), a London-based think tank which has been at the forefront among philosophers, policymakers and practitioners seeking a more environmentally sustainable and socially just model of economic development. Concern at large and ever-rising volumes of household waste had, by the early 1990s, led to considerable attention being given to the potential for increased recycling. Improved waste management was clearly necessary but, in the context of long term sustainability, appeared inadequate: managing post-consumer waste is, after all, acting after much damage has already been done. The response at NEF was to embark on a research project that was intended to reconfigure the waste debate by exploring the possibility of increasing the average life-span of consumer durables and, ultimately, prevent unnecessary waste from being created.

The primary output of this project, a report entitled *Beyond Recycling*, attracted a significant amount of national media coverage when published in 1994. The Secretary of State for the Environment at the time, John Gummer MP, requested and received a personal briefing, a headline in one popular daily newspaper referred to the relatively short life-span of washing machines manufactured in Britain as a 'scandal',[1] while a leading white goods manufacturer, Miele, took the unusual step of citing the NEF report in a national advertising campaign. Nonetheless these signs of interest in product life-spans within influential circles ultimately proved to be a false

1 *Daily Mirror*, 29 November 1994.

dawn. The report made no significant impression on subsequent government policy and there was no noticeable shift in the consumer goods sector towards longer-lasting products. Similarly, environmental organizations, while welcoming the report, retained their focus on recycling and did not prioritize the theme of waste reduction through increased product longevity in their campaigning.

Beyond Recycling was published only two years after the Earth Summit in Rio de Janeiro, which in 1992 brought together over 100 world leaders to discuss the state of the planet. Since then, the need for strategies to bring about sustainable development has become far more widely recognized. In particular, the potential implications for industrialized nations have become more apparent. The World Summit on Sustainable Development held in 2002 promoted greater awareness of sustainable production and consumption and since then there has been a substantial growth in expertise in this field: networks and conferences link together hundreds, if not thousands, of researchers with the aim of developing the knowledge and evidence necessary to underpin appropriate government policies.

Meanwhile significant progress has been made within the more specific area of product longevity. One of the aims of this book, to which many of the most significant contemporary thinkers in the field have contributed, is to consolidate the growth in knowledge. Its origins lie in a series of seminars and workshops that brought together several hundred academics, policy specialists and representatives from industry and civil society organizations over a four-year period and led to the formation of a research network, the Network on Product Life-Spans. During this time it became apparent that many of the ideas, research findings and other forms of knowledge were of relevance to the broader debate on sustainable development and would be of interest to a wider audience: hence this book.

The complex range of issues associated with product life-spans demands a multidisciplinary approach and this is reflected in the contributions. The historical context, design, engineering, marketing, law, politics, consumer behaviour, technology and systems of provision are all covered, although critics will note that other fields, notably human geography, anthropology and economics, are perhaps inadequately represented in the current volume. Contributors are from three continents (North America, Europe and Australasia), highlighting the international significance of the topic, although a majority of chapters are written by authors from the UK, reflecting the origins

of the Network. Several, notably those on consumer law, relate specifically to the UK but nonetheless will, it is hoped, be of wider interest.

The primary focus of the book is on consumer durables such as vehicles, kitchen appliances, audio-visual equipment and other domestic electrical products, furniture and floor coverings, hardware, garden tools, clothing and footwear, household textiles, recreational goods and DIY goods, although the reuse of packaging is also addressed. The life-span of buildings, infrastructure and industrial goods are, of course, of considerable environmental (and social) significance, but beyond the scope of this particular book. Even within its limited remit, readers will be mindful of the risk of generalization, both in terms of geographical location and type of product.

The book is structured in five parts. The first of these, **Overview**, comprises an introductory chapter by Tim Cooper, 'The Significance of Product Longevity'. Starting from a premise that sustainable development will only be possible if the throwaway culture is challenged and there is an overall increase in the life-span of consumer products, Cooper provides a conceptual and theoretical overview of the topic, reviewing the influences upon product life-spans, the case for (and against) longer lasting products, and possible implications of increased product longevity for industry and consumers. Noting that product longevity is influenced not only by the intrinsic durability of products but by consumer behaviour, Cooper concludes that progress away from a throwaway culture will require change across society: in public policy, design and marketing, consumer attitudes and behaviour, and socio-cultural norms.

The second part comprises six chapters on the theme **Design for Longevity**. Chapter Two, 'Re-evaluating Obsolescence and Planning for It', by Brian Burns, focuses on the end of the product life-span, the point at which 'obsolescence' becomes reality. The end of a product's life, he argues, represents an opportunity to assess the value derived from utilization during its useful life against the costs of manufacture and use and against environmental and social impacts. Contrasting the life expectancy of products such as stainless steel dining forks with products based on fast-changing technologies, Burns explores the state of obsolescence with the aim of supporting more effective and sustainable product development.

Waste may be seen as a symptom of a failed subject/object relationship. In Chapter Three, 'Subject/Object Relationships and Emotionally Durable Design', Jonathan Chapman considers the potential role of design in the creation of longer

user:product relationships. Sustainable design methodologies, he argues, have attended almost exclusively to the bodily survival of manufactured objects, to 'after-effects rather than causes'. Chapman proposes strategies for emotionally durable objects, including new, alternative genres of objects, which engage users on deeper levels and over longer, more rewarding, periods of time. This, he suggests, will demand models of sustainable design capable of empowering consumers to transcend the 'superficial urgencies' of conventional consumerism and forge deeper connections with their possessions.

In Chapter Four, 'Defying Obsolescence', Miles Park considers a range of product attributes, consumer behaviours and societal factors associated with prolonged product life-spans in order to identify lessons from design and consumer behaviour that might enable products to defy obsolescence. He presents a collection of examples, mostly drawn from the consumer electronics sector, and notes that these were often informal responses to impending obsolescence and not planned or anticipated by the designer or manufacturer. Park concludes that new and collaborative approaches between designers and users are needed in order to meet the challenge of engaging with obsolescence effectively.

The fact that many products are still functional when discarded means that to understand the determinants of product life-spans it is necessary to investigate replacement decisions. In Chapter Five, 'Understanding Replacement Behaviour and Exploring Design Solutions', Nicole van Nes reports on qualitative and quantitative research aimed at a better understanding of replacement decision making. Van Nes argues that people's motives for replacing goods are diverse but in essence what they want are well-functioning and up-to-date products that meet their changing needs. She suggests that this will require the development of products that are dynamic and flexible and proposes strategies that include designing products for reliability and robustness, repair and maintenance, upgradeability, product attachment and variability, illustrating these through practical examples.

Chapter Six, 'Adjusting our Metabolism', by Alastair Fuad-Luke, discusses the emergence of a new movement of 'slow activists' and its implications for design. Fuad-Luke examines 'slow design' activities and considers how slowing the metabolisms inherent in product:user relationships might generate improved relationships and experiences for the user while helping to create positive social, environmental and economic change. He concludes that slow design and co-design offer fresh approaches for revitalizing thinking about

product life-spans and novel ways of designing, making and producing that could encourage new visions of enterprise and improved human flourishing.

In the final chapter of this part, 'Durability, Function and Performance', Walter Stahel explores the potential for product durability and longevity as economic objectives in a 'functional service economy' focused on selling performance. He argues that the traditional industrial economy, is focused on producing goods for sale and in such an economy producers operating in saturated markets may regard durability as an undesirable quality, as it represents an obstacle to replacement sales. By contrast, in a functional service economy product ownership remains with supply-side actors, which will provide an economic incentive to the prevention of waste. Producers will exploit the existing stock of goods in order to make more money with less resource input. Meanwhile the 'consumer' becomes a 'user' as ownership is replaced by stewardship.

The third part of the book, **Public Policy and Product Life-Spans**, reviews the current state of legislation in the United Kingdom relating to product life-spans and considers a range of measures that governments might take in order to encourage product longevity.

In Chapter Eight, 'Durability and the Law', Cowan Ervine explores the contribution which the law makes to the durability of goods. He argues that it has become clearer that durability is a characteristic consumers may expect from goods as a result of an amendment in 1994 of the law relating to the quality standards implied in contracts for the supply of goods. He notes, however, that the limited case law on the reform does not suggest that in practice it has made a dramatic difference. The chapter's main focus is the role of contract law in relation to durability, although Ervine also addresses the role of tort law and safety legislation.

In Chapter Nine, 'The Law on Guarantees and Repair Work', Christian Twigg-Flesner analyses the law relating to guarantees and repair work. Although recent legal changes have the effect of introducing repair as a consumer right, its availability is restricted and consumers are more likely to be given a replacement or refund when goods are faulty. If a product is under a guarantee consumers may ask for a repair, but there is no legal requirement to provide a guarantee nor to include repair as one of the remedies offered. Twigg-Flesner argues that obtaining repair is made difficult by the absence of any legal requirement on a retailer or manufacturer to stock spare parts or

to make available appropriate servicing facilities. He concludes that the law on repair work is unsatisfactory and examines the approach taken in other jurisdictions in considering possible ways forward.

The next chapter, 'Policies for Longevity', by Tim Cooper, addresses possible options for governments to promote increased product longevity, most of them applicable to any industrialized nation. The case for public policy intervention to optimize product life-spans is based on potential benefits to the economy, the environment and consumer satisfaction. Cooper argues that the policy measures necessary to transform a throwaway culture have not been introduced because it has hitherto been politically expedient for governments to succumb to the electorate's apparent desire for more (and newer) consumer goods. He presents a framework within which to assess specific measures to encourage longer lasting products and, drawing upon policies advocated by past and present critics of planned obsolescence, proposes a range of potential regulatory, market-based and voluntary measures.

The fourth part comprises three chapters on **Marketing Longer Lasting Products**. Chapter Eleven, 'Rethinking Marketing', by Ken Peattie, sets the context by proposing that the quest to develop longer lasting products will demand changes in how people think about marketing. Although marketing has been under pressure to become more environmentally orientated, materially efficient and sustainable for most of the last 20 years, the conventional marketing paradigm has proven resilient, acting as a barrier to change. In order to progress towards a more sustainable economy, it is necessary to address systems of consumption and production, which are driven in part by the management discipline of marketing. Peattie concludes that what is needed is a new, sustainable marketing paradigm.

In order to select products with life-spans that are environmentally optimal and appropriate for their requirements, shoppers need to be adequately informed about the design life of their prospective purchases. The findings of a research study that assessed the quality of information on product life-spans available in retail environments are presented in Chapter Twelve, 'Marketing Durability', by Tim Cooper and Kirsty Christer. The study included visits to retail outlets that revealed few specific examples of life-span labelling but uncovered a variety of means by which consumers might predict the durability of products. A review of information available on the design life of 10 types of product was undertaken and an assessment made of the potential value of life-span labels. Cooper and Christer's conclusion is that the quality of information

on product life-spans currently available is inadequate. They propose a range of measures to address this, including an increase in life-span labelling.

As consumer societies have evolved over the past century, many products have been sold less on the basis of their functional characteristics alone and more on the strength of an image, association or lifestyle preference. A shift towards longer lasting products would demand a reappraisal of this trend and require marketers to identify strategies by which to promote products on the basis of durability. Chapter Thirteen, 'Can Durability Provide a Strong Marketing Platform?', by Dorothy Mackenzie, Tim Cooper and Kenisha Garnett, presents a range of marketing platforms through which the durability of products could be highlighted as a positive attribute. These would need to be attractive to consumers in order to add to brand strength. The authors identify some potential risks and opportunities in adopting such a strategy.

The fifth and final part addresses **Product Use and Reuse** from a variety of perspectives. In Chapter Fourteen, 'Consumer Influences on Product Life-Spans', Siân Evans and Tim Cooper present results from research on the influence of consumer behaviour on the life-span of three types of household product: everyday footwear, large household appliances and upholstered chairs. Their findings demonstrate that consumers exert considerable influence upon product life-spans but reveal substantial differences in behaviour between the three types of product and across the different stages of consumption. Evans and Cooper classify factors affecting consumer behaviour and create a theoretical framework within which to explore the influence of consumers in order to identify barriers to optimizing product life-spans from a consumer perspective and propose possible solutions.

In contrast with the previous chapter, Chapter Fifteen, 'Product Life Cycle Management through IT', by Matthew Simon, focuses on the potential role of technology in optimizing product life-spans. Simon describes a research project which sought to explore some technical, economic and social aspects of life cycle management, an element of producer responsibility, and draw conclusions on its future. Life cycle management enables producers of electrical and electronic products to intervene to educate users, persuade them to behave in a particular way, monitor products and their usage, advise consumers on positive action and receive their feedback. Results from two project trials are used to illustrate the potential value of product life cycle information, both for understanding user behaviour and aiding repair and design.

The focus of Chapter Sixteen, 'There are Times and Places', by Janet Shipton and Tom Fisher, is on the reuse of packaging by consumers. Shipton and Fisher use the findings of a research study to explore how ideas, actions and objects together result in the reuse of packaging items. Their study identifies examples of when and where this happens in people's homes and draws out the principles behind reuse practices. These principles are then tested in practice as the basis for packaging design that may facilitate extending the life of packaging and thus reduce domestic waste.

The final chapter, 'Extending Product Life-Spans', by Anthony Curran, provides an overview of household bulky waste disposal and reuse activities in the UK and, specifically, the contribution made by furniture and appliance reuse to extending product life-spans. Curran considers different methods for discarding bulky household items and assesses the potential to increase the number of items diverted for reuse, with particular reference to the role of furniture and appliance reuse projects in the voluntary and community sector. He highlights the social dimension to reuse, noting that, while reuse helps to tackle increasing waste generation and virgin resource consumption, these environmental benefits are often regarded within the sector as secondary to the social benefits to volunteers employed by reuse organizations and low income households provided with essential furniture and appliances.

PART 1

Overview

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1

The Significance of Product Longevity

Tim Cooper

Abstract

Consumption patterns across the industrialized world are widely considered to be unsustainable, not least because they demand an excessively fast throughput of materials and energy. It follows that sustainable development will only be possible if the throwaway culture is challenged and there is an overall increase in the life-span of products such as vehicles, appliances, furniture, clothing and footwear. This introductory chapter traces the origins of the debate on planned obsolescence and identifies a recent revival of interest in the life-span of consumer products: their longevity. After providing a conceptual and theoretical overview, it reviews the many influences upon product life-spans, the case for (and against) longer lasting products, and possible implications of an increase in product longevity for industry and consumers. Although the intrinsic durability of products is the result of design and manufacturing decisions, product longevity is also influenced by consumer behaviour such as the discarding of functional items. Progress away from a throwaway culture thus requires change across society: in public policy, design and marketing strategies, consumer attitudes and behaviour, and socio-cultural norms.

Introduction

Consumption is rapidly changing as increasing numbers of people throughout the world strive to acquire the ever-greater number and range of products that are available. Some of these products are less environmentally destructive than in the past: they are more energy efficient, easier to recycle or contain fewer

toxic materials. One attribute, however, has improved little, if at all. Few of today's products will last longer than those of an earlier era. A century ago most products were designed and manufactured to last as long as possible within the prevailing constraints of cost and technology; nowadays this is less often true.

Some observers blame producers faced with saturated markets and under pressure to generate replacement sales for 'planning' obsolescence[1] into products. Planned obsolescence, the outcome of a deliberate decision by suppliers that a product should no longer be functional or desirable after a predetermined period, remains entrenched in industrialized economies despite criticism over many years (e.g. Packard 1963; Papanek 1972; OECD 1982; Cooper 1994b, 2004; Kostecki 1998; Slade 2006). It takes a variety of different forms. For example, companies may seek to reduce prices by cutting production costs even though they are aware that this will require compromises in quality (as in the case of budget range household goods and goods sold by discount retailers). Such products, in particular, may lack the potential for repair. Producers use changes in fashion to encourage consumers to replace functional items (for example, watches, spectacles and clothing accessories) and, in the market for consumer electronics, in particular, exploit technological developments to the same end. Many items formerly available only as consumer durables are increasingly sold in 'disposable' form on grounds of convenience or hygiene (examples being disposable pens, razors, tableware, nappies and single-use cameras).

Even so, consumers are at the very least compliant. Many products that still function are replaced in order that their owners can obtain a pristine new item in the latest style or with the most advanced function (Campbell 1992; Cooper 2004). The likely life-span of the replacement is often not considered by consumers to be a major concern. Although there is often no shortage of high quality products with potentially long life-spans, many reasonably affluent consumers are unwilling to pay a premium price for such items, preferring instead to use the money thereby 'saved' to purchase other goods and services.

The outcome of such a throwaway culture is that the current throughput of materials and energy in industrialized economies is unsustainable. Although many countries have achieved a relative decoupling of materials and energy use from gross domestic product[2] in recent years, resource use remains

1 Obsolescence is defined as 'to fall into disuse'.
2 Gross domestic product, or GDP, is a measure of a nation's economic output.

undiminished in absolute terms and the relocation of resource intensive industrial production to developing countries means that many environmental impacts are merely being exported (European Environment Agency 2005). It has been estimated that the equivalent of three planets would be required to provide the necessary resources if people throughout the world had lifestyles similar to those in a country as affluent as Britain.[3]

These environmental impacts are varied. As consumption has increased, not least in countries such as China and India whose large populations increasingly aspire to lifestyles observed in the industrialized West, resource scarcity has re-emerged as a potential threat to future generations (Gordon et al. 2006). The growth in global consumption also has implications for climate change, because consumer goods 'embody' carbon, the energy used for their manufacture and distribution being mostly sourced from finite fossil fuel supplies (Kejun et al. 2008). Finally, discarded products provide a legacy of waste which first has to be transported and then either landfilled or managed through recycling or energy recovery, the latter processes having negative environmental impacts even though preferable to landfill (Cooper 1994b).

This opening chapter commences with a short review of the historical debate on product life-spans. Different meanings of 'product life' will then be discussed and, following a discussion of the economic context, some causes of obsolescence identified. Arguments in favour of increasing (and, exceptionally, reducing) product life-spans are examined with particular reference to potential implications for industry and consumers. The focus of the chapter is on four types of product:

- large consumer durables (including vehicles) that have a substantial impact on the environment due to their volume and weight
- consumer durables that have unnecessarily short life-spans due to design decisions relating to fashion, technology or reparability
- short-lived products of low quality that, while relatively cheap, represent poor value for money
- disposable products that are purchased primarily for convenience.

3 This has led to the development of the concept of 'One Planet Living' by WWF-UK and BioRegional. See http://www.wwf.org.uk/oneplanet/ophome.asp

Emerging Debate

The emergent debate on product life-spans is beginning to raise important questions about the future nature of products and services in a sustainable economy. How much does product longevity matter in relation to other environmental concerns? If products are increasingly scrutinized for their environmental impact and improved, should consumers perhaps be encouraged to replace ageing products that may be inefficient in energy use or contain toxic materials? Would there be negative implications for the economy if consumer durables were to last longer, such as lower incomes and increased unemployment?

Public discussion surrounding product life-spans has historically centred on the concept of planned obsolescence. This debate first surfaced in America during the consumer boom of the 1950s, although it had been foreshadowed around 25 years earlier, during the Great Depression, when shorter product life-spans to be achieved by regular changes in style were advocated as a means of stimulating economic activity (Packard 1963; Slade 2006). The controversy was prompted by frustration among some industrialists at a perceived decline in the quality of products (Stewart 1959; Mayer 1959) and stoked by a popular critique of the consumerist culture by Vance Packard (1963), *The Waste Makers*, which also expressed concern at the environmental implications of planned obsolescence for resource use and waste.[4]

The debate faded but was renewed during the 1970s as fears grew concerning the threat of resource scarcity and rising levels of waste, culminating in an investigation by the Organisation for Economic Co-operation and Development (OECD). This had a clear environmental motivation, its remit being to consider 'the contribution that extended product life can make towards reducing the waste management and other environmental problems of member countries and towards savings of primary materials' (OECD 1982: 7). Noting that it would be hard to obtain independent evidence of companies deliberately reducing the technical life-span of products, the report instead drew attention to the development of non-repairable and non-maintainable versions of durable goods (such as ballpoint pens and disposable razors) and examples of life-lengthening innovations that had apparently been suppressed by manufacturers (most notably, light bulbs). It also highlighted the influence of

4 Strasser (1999) traces the public debate to an article published in *Business Week* in 1955 which referred to the widening application of planned obsolescence, from automobiles to other consumer goods. See also Footnote 18 below.

consumers through their purchasing, retention and discard decisions. Having reviewed the state of theoretical and statistical research on product life-spans and noted its limitations, the OECD recommended that further research be undertaken on the macroeconomic effects and energy implications of longer product life-spans and on the potential benefits of significantly longer and more stringent warranties.[5] It concluded that particular attention should be directed to automobiles due to the scale of resource throughput in that sector.

Another significant development during this period was the emergence of a body of research which sought to explain why and how people dispose of products and their replacement behaviour (Jacoby et al. 1977; deBell and Dardis 1979; Hanson 1980; Box 1983; Bayus 1988; Antonides 1990; Harrell and McConocha 1992; Cripps and Meyer, 1994). This extended consumer behaviour theory beyond its traditional focus on purchasing and resulted in a greater understanding of the influences upon disposal behaviour and the development of typologies for disposal routes. One key finding was that while many products were purchased and used by a single owner until broken and irrepairable, others passed through various stages which affected their life-spans, such as being stored, lent, donated, sold or traded in. It also became apparent that owners' decisions concerning their unwanted possessions were subject to a range of influences.[6]

Awareness of environmental threats grew throughout the 1980s, culminating in the United Nations Conference on Environment and Development in 1992 which raised sustainable development up the public policy agenda and, in its *Agenda 21* report, explicitly recognized a need to address consumption in industrialized countries.[7] This led to far greater attention being given to the environmental impact of consumer products, which in turn stimulated discussion on longevity in the context of sustainable design (Burall 1991; Fiksel 1996; Charter and Tischner 2001; Lewis and Gertsakis 2001; Vezzoli and Manzini 2008), the utilization of products (Stahel and Jackson 1993; Stahel 2010; Barbiroli 2008; Mont 2008; Weaver 2008) and waste reduction (De Young et al. 1993; Coggins 2001; Runkel 2003; OECD 2004; King et al. 2006; Eunomia et al. 2007). Eternally Yours, a network originating in the Netherlands, broke new ground in bringing together design researchers and specialists in life-span

5 No evidence of subsequent research on the macroeconomic implications of longer product life-spans has been found, and only a few studies have been undertaken in the other areas.

6 These included the nature of the product (and, perhaps, the replacement options), their personal characteristics and the situational context.

7 The conference, popularly known as the Earth Summit, was attended by over 100 heads of state or government.

issues from a range of other disciplines (Van Hinte 1997, 2004; Muis 2006). In Britain the Network on Product Life Spans has continued the debate.[8] A series of research studies have explored the design of products capable of meeting people's changing requirements and products towards which users feel a long term emotional attachment (Van Nes 2003; Mugge et al. 2005; Mugge 2007; Chapman 2005; Van Nes and Cramer 2005, 2006; Odom et al. 2009). Interest in waste-related behaviour has continued (e.g. Barr, Gilg and Ford 2001, 2005; Barr 2007) and has included studies on second-hand markets such as car boot sales and eBay (Gregson and Crewe 2003; Ellis and Haywood 2006). Most recently, interest in planned obsolescence has resurfaced in the context of business ethics (Guiltinan 2009).

The Language of Life-Spans

As in any discourse, use of precise terminology is important. The attribute of durability, alongside others (such as functionality, reliability, usability and aesthetic appeal), distinguishes consumer durables from other types of product. Durability is 'the ability of a product to perform its required function over a lengthy period under normal conditions of use without excessive expenditure on maintenance or repair' (Cooper 1994b: 5). It is a measure of how long a product will continue functioning as intended and withstand 'wear and tear' and decay (or, more technically, resist stress or force) before it develops a defect that is deemed irrepairable.[9]

A product's longevity describes its life-span (or 'lifetime')[10] and is thus a somewhat different measure, being partly determined by factors other than attributes formed through design and manufacture. These factors include user behaviour towards a product and wider, socio-cultural influences. Deliberate effort needs to be made to utilize fully a product's potential life-span, through careful use, regular maintenance, repair, reconditioning (e.g. upgrading) and reuse of functional items (rather than disposal). Attempts to lengthen product life-spans, whether by improving intrinsic durability, influencing user behaviour or promoting wider socio-cultural change, are described as product life extension (Conn 1977; OECD 1982; Heiskanen 1996).

8 See http://extra.shu.ac.uk/productlife/

9 A distinction is sometimes made in official statistics between 'durables' and 'semi-durables'. The latter refers to items that typically last more than a year but a shorter period than products categorized as durables; they include clothing, footwear, household textiles, tableware, small appliances, games and toys.

10 The term lifetime is generally used synonymously with life-span (cf. Bayus 1998).

A product's life cycle is a related concept that is used in several different contexts. In the context of consumption it distinguishes the successive phases of acquisition, use and disposal. It is also used in a marketing context, to describe the tendency for specific products (or brands) to pass through a series of stages (development, market introduction, growth, maturity, decline), and in life cycle assessment, a technique used to calculate the overall environmental impact of a product from raw material extraction to waste disposal.[11]

There are several definitions of product life-spans that need to be distinguished (Cooper 1994b). A product's 'technical life' is the maximum period during which it has the physical capacity to function. This upper threshold is rarely reached, either because repair or maintenance work is prohibitive in terms of cost and effort or consumers choose to discard a functional product for another reason. A more commonly used definition is 'service life', a product's total period in use from initial acquisition to final disposal as waste. The term reflects the idea of products as physical objects that provide a 'service' to the user. The service life of products may either be calculated retrospectively, by measuring the life-span of items that have been discarded, or predicted, in which case there will be a degree of uncertainty due to the many variables that determine when an item is discarded by the final user.[12] A third definition, the 'replacement life' of a product, is the period from initial sale to the point at which the owner purchases a replacement, regardless of whether or not the original product still functions, and is of particular relevance to retailers.[13] Finally, the point at which maintaining a product becomes more expensive than replacing it is its 'economic life' (Heiskanen 1996; Kostecki 1998).

The most appropriate unit for measuring product life-spans will depend on the type of product and its pattern of use (e.g. duration, frequency and intensity). The norm is years, but other units may be equally (or more) relevant for certain types of product. Thus operational cycles may be used for items such as washing machines, dishwashers or toasters in order to take account of intensity of use. Hours in use may be most relevant for light bulbs,[14] while for

11 An emerging trend in life cycle assessment is also to address social impacts.

12 For example, consumers will have different attitudes to the level of expenditure on repair and maintenance that they consider reasonable, particularly when the residual life of a product is unknown.

13 The original product, if functional, may have been sold as a second-hand item, given away or kept as a spare.

14 Current industry practice for 'long life' bulbs is to assume a certain daily usage and label bulbs with the equivalent number of years.

vehicles a combination of mileage (intensity of use) and age (years in operation) is generally used to determine resale value.

Attempts to obtain data on product life-spans are fraught with difficulty. Simple functional tests to measure the technical life-span of products may not accurately reflect actual in-use conditions as it may be hard to simulate real situations. Accelerated functional testing[15] could be used but is also subject to error. The service life of products is perhaps more relevant for government, industry and consumers but, again, measurement is not easy. Data obtained from consumer research, sales information or surveys of discarded products will relate to a historical situation and thus not necessarily be applicable to products currently on sale, the design of which may well have changed.[16] Estimating a product's life-span is especially problematic when a faulty product has been repaired. If, for example, after five years of service a prong on a garden fork breaks and is replaced and then, five years later, the wooden handle is damaged and replaced, providing five more years of service, how old was the fork at the time of disposal?

The lack of product life-span data in the public domain, long recognized as a problem (Pennock and Jaeger 1957; Conn 1977; OECD 1982; Antonides 1990; Cooper 2004), is thus not surprising.[17] Trends are uncertain. The review of international studies by the OECD (1982) found evidence that during the late 1960s and 1970s the average life-span of televisions and washing machine had increased while that of vacuum cleaners had decreased; it also noted significant variations between countries.[18] There have been anecdotal claims in Britain of declining life-spans for various household appliances (March Consulting Group 1990; Market Transformation Programme 2005). Overall, however, a lack of published longitudinal data means that it is impossible to substantiate claims

15 Accelerated functional testing is a repetition or cycle test on a product that is performed under increased electrical, mechanical or thermal severity.

16 One method to estimate life-spans is to use survival rates by identifying the median for product survival from a benchmark year. Another is to use actuarial tables that identify the probability of a product of a particular age being discarded within the following year. Source data for such estimates may be derived from sales figures or self-reported figures from households (OECD 1982).

17 Increased government regulation of electrical and electronic waste has, however, led to studies in this sector (e.g. Cooper and Mayers 2000; Oguchi et al. 2008).

18 In the USA an early study by Pennock and Jaeger (1964) concluded that there appeared to have been an increase in the life-span of washing machines, cookers and refrigerators, although the increase was not statistically significant. Subsequent research which used this study as a benchmark (Ruffin and Tippett 1975) concluded that the average life-span of items purchased new had subsequently remained broadly unchanged but that there had been a decline in the life-span of items purchased second hand.

that product life-spans have been falling; it would, in any case, be unwise to generalize.

The Economic Context

The relationship between product longevity and the state of the economy has long been recognised. A recent historical study by Slade (2006) traced planned obsolescence, as a strategic goal, to events in the USA shortly before the 1929 stock market crash, when J. George Frederick, editor of *Advertising and Selling*, proposed the 'progressive obsolescence principle' whereby people would be encouraged to replace products that had not worn out.[19] According to Frederick, people should be 'buying for up-to-dateness, efficiency and style ... rather than simply for the last ounce of use' (Slade 2006: 58). He was supported in such thinking by his wife, Christine, who promoted stylistic obsolescence in her highly popular book *Selling Mrs Consumer*. Such logic was soon applied to the economy as a whole. In 1928 investment banker Paul Mazur noted how 'if what had filled the consumer market yesterday could only be made obsolete today ... that whole market would be again available tomorrow' (Slade 2006: 60) and by the early 1930s designers Roy Sheldon and Egmont Arens were promoting 'obsoletism' as a 'device for stimulating consumption' (Slade 2006: 66). The expression 'planned obsolescence' first appeared in a pamphlet by Bernard London in 1932 entitled *Ending the Depression through Planned Obsolescence* which proposed government-imposed maximum product life-spans in times of widespread unemployment, at which point 'people would turn in their used and obsolete goods to certain government agencies' (Slade 2006: 75).

In the midst of the Great Depression such sentiments appeared persuasive to many people and, indeed, the idea of obsolescence as beneficial to the economy has retained a degree of support. Thus in the latter part of the twentieth century planned obsolescence was regarded by some scholars as a means of enabling *more* efficient resource use (Grathwohl 1978)[20] or the motor that drives the economy: 'an engine of technological progress' (Fishman et al. 1993). In the global recession that began in 2008, several governments introduced vehicle scrappage subsidies in order to increase car production and thereby stimulate economic growth.[21] The relationship between product longevity and the

19 It was popularized rather later, in 1954, by designer Brooks Stevens. See Chapter 2 (Burns).

20 Grathwohl (1978: 340) argued that, in fields where technology was advancing, 'for many products a short life policy would permit a reduction in excess quality.'

21 See Chapter 10 (Cooper).

economy has become more complex, however, as the debate has shifted in focus from concerns relating to product quality and value for money to waste generation and other environmental impacts, and is poorly understood.

Government policy in industrialized countries such as Britain has sought to decouple economic growth (with, by implication, rising consumption) from environmental impacts, in part through measures to increase resource productivity (Cabinet Office 2001; Defra 2002, 2003, 2005). This demands a transformation from a linear economic model to a circular economic model (Pearce and Turner 1990; Jacobs 1991).[22] Economic activity has historically been based on the linear model, which assumes at the outset of any production process that the Earth has an unlimited supply of raw materials and energy and, at the end, an infinite capacity to absorb pollution and waste. No such assumptions are made in the circular model, which thus requires that the throughput of materials and energy be minimized by optimizing product longevity, reusing or reconditioning products and their components, and recycling (alongside other measures such as increasing energy efficiency). The use of these 'loops' in the circular economy reduces environmental impacts by utilizing resources more fully (Stahel and Reday-Mulvey 1981; Stahel and Jackson 1993; Cooper 1994b; Stahel 2010), perhaps ultimately leading to a 'cradle to cradle' approach to resource use (McDonough and Braungart 2002).[23]

Recycling has long been used by governments as an indicator of their environmental commitment and is an important element in the transition from a linear economy to a circular economy. Despite this positive portrayal, however, recycling has negative environmental impacts that are not always fully recognized and as such offers only a 'least bad' solution to waste:

> *Energy is consumed as waste products are collected, sorted, cleaned and separated into their constituent materials. Pollution is caused, both as a by-product of this energy consumption and, more directly, by materials reclamation processes. The subsequent manufacture and distribution of products made from recycled materials also has an impact on the environment. (Cooper 1994b)*[24]

22 The extensive academic literature on ecological economics addresses this shift.

23 McDonough and Braungart's 'cradle to cradle' model proposes that resources used should either be synthetic materials that have no negative effects on the natural environment and are used in continuous cycles ('technical nutrients') or organic materials that, once used, can be disposed of in any natural environment and decompose into the soil ('biological nutrients'). Consequently there is no waste.

24 No pagination; the quote is taken from the front cover.

The reduced throughput of materials and energy required in industrial economies thus demands a strategy which goes beyond recycling and includes longer lasting products (Conn 1977; Cooper 1994b, 2000; McLaren et al. 1998). In other words, resources need to be used as efficiently as possible before products reach the point of disposal. In proposing the 'Factor Four' principle, that resource productivity should be quadrupled to enable a doubling of wealth while halving resource use, Von Weizsäcker et al. (1997: 70) argued that 'durability is one of the most obvious strategies for reducing waste and increasing material productivity.'

A circular economy is a prerequisite for sustainability but may not be sufficient if resource throughput remains high. Nor will sustainability be achieved if improved efficiency is offset by increased consumption: in the case of energy, for example, overall electricity consumption in the Netherlands rose over a 20-year period despite significant efficiency improvements to appliances (OECD 2002). A complementary approach would be to slow down the rate at which raw materials are transformed into products and the products 'used up', a process which has been described as 'slow consumption'.[25]

The language of 'slow consumption' may be problematic for politicians and economists used to portraying increased consumption as a sign of success. Even 'sustainable consumption' is subject to different interpretations: some United Nations representatives have proposed that it means consuming differently but not less, whereas critics have argued that 'green consumerism' is inadequate and radical lifestyle changes are required. In other words, sustainable development demands both efficiency and sufficiency (Fuchs and Lorek 2005).

A strategy to promote increased product longevity would unite these contrasting approaches which, if applied alone, could be problematic (Cooper 2005). Greater efficiency through increased resource productivity will not adequately reduce the environmental impacts of consumption if it results in 'green growth' and the environmental gains are offset by the 'rebound effect' of additional consumer spending (Chalkley et al. 2001). Achieving sufficiency by restraining consumption and thereby slowing down the throughput of materials and energy may lead to an unmanaged decline in economic activity that reduces environmental impacts but also results in unemployment and other social injustices. A trend towards longer

25 The term, derived from the 'Slow Food' movement, was cited by Christine Ax in Charter and Tischner (2002) and subsequently explored in Cooper (2005). The 'slow' philosophy has been popularized by Honoré (2004). See Chapter 6 (Fuad-Luke).

lasting products may prevent such problems, as seen in a simple model (Figure 1.1) described below:

> *Increased product life spans, whether through greater intrinsic durability or better care and maintenance, may enable ... problems to be overcome by providing for both efficiency and sufficiency. They are a means by which materials are used more productively (i.e. the same quantity provides a longer service) and throughput is slowed (i.e. products are replaced less frequently). Meanwhile a shift to more highly skilled, craft-based production methods and increased repair and maintenance work would provide employment opportunities to offset the effect of reduced demand for new products.*
>
> *The model thus indicates that longer product life spans provide a route to sustainable consumption whereby reduced materials and energy throughput arising from eco-efficiency is not offset by increased consumption, while the economy remains healthy because products are carefully manufactured and maintained and there is less dependence on rising consumption for economic stability. (Cooper 2005: 55)*

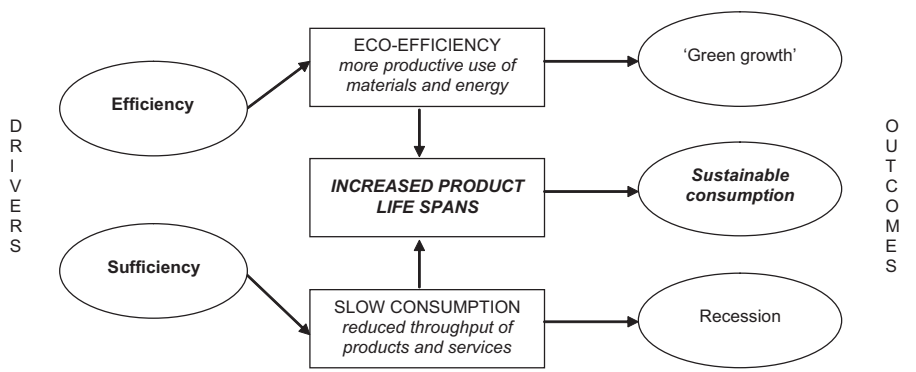

Figure 1.1 Product longevity as a means of integrating efficiency and sufficiency

Source: Cooper (2005).

Sources of Obsolescence

The causes of inadequate product longevity in industrialized countries are complex. Obsolescence, when a product falls into disuse, has been categorized in various ways. Packard (1963) distinguished obsolescence of function, quality

and desirability. He considered obsolescence of function, through which 'an existing product becomes outmoded when a product is introduced that performs the function better', to be acceptable. His criticism was reserved for obsolescence of quality, whereby through deliberate intent 'a product breaks down or wears out at a given time, usually not too distant', and obsolescence of desirability, whereby 'a product that is still sound in terms of quality or performance becomes "worn out" in our minds because a styling or other change makes it seem less desirable' (Packard 1963: 58–59).[26]

The OECD (1982) report differentiated between the influence of producers and consumers upon product life-spans. Describing the influence of producers, it argued that many technological improvements to products were minor and that cosmetic changes were used to encourage people to replace functional products, which it described as a form of psychological obsolescence.[27] Noting that these strategies were reinforced by advertising, it contrasted this with the failure of producers to provide equivalent marketing information on product durability. The OECD's criticism was not only aimed at producers, however. Its report noted that 'it is the replacement of adequately functioning goods by consumers that causes the waste, rather than the production of the goods' (OECD 1982: 25). Thus it also described the influence of consumers upon product life-spans through their behaviour, such as their responses to prices (specifically, the cost of repairs in relation to replacement), comparisons made between their possessions and those of neighbours, and their reactions to cosmetic changes in design and to special offers (including trade-in allowances).

Clearly a range of typologies for obsolescence are possible. Cooper (1994b) summarized the key influences on product life-spans as fitness,[28] function and fashion, while Heiskanen (1996) categorized obsolescence by failure, dissatisfaction (as a result of the improved quality of new products, new styles and fashion) and changes in consumer needs. Kostecki (1998) took a different approach, classifying determinants of durability, rather than obsolescence, and distinguishing the functional, economic and symbolic. Cooper (2004) drew attention to technological, psychological and economic obsolescence (Figure 1.2). Van Nes and Cramer (2006) identified a typology for replacement motives, which consisted of wear and tear, improved utility (safety and economy in use),

26 Packard also used the term 'psychological obsolescence' to describe obsolescence of desirability.

27 Strasser (1999: 192) argued that Packard oversimplified the distinction between style and technological advance: 'In practice, stylistic and technological obsolescence have gone hand in hand throughout the twentieth century.'

28 A product is 'fit for purpose' when it functions as would reasonably be expected by users.

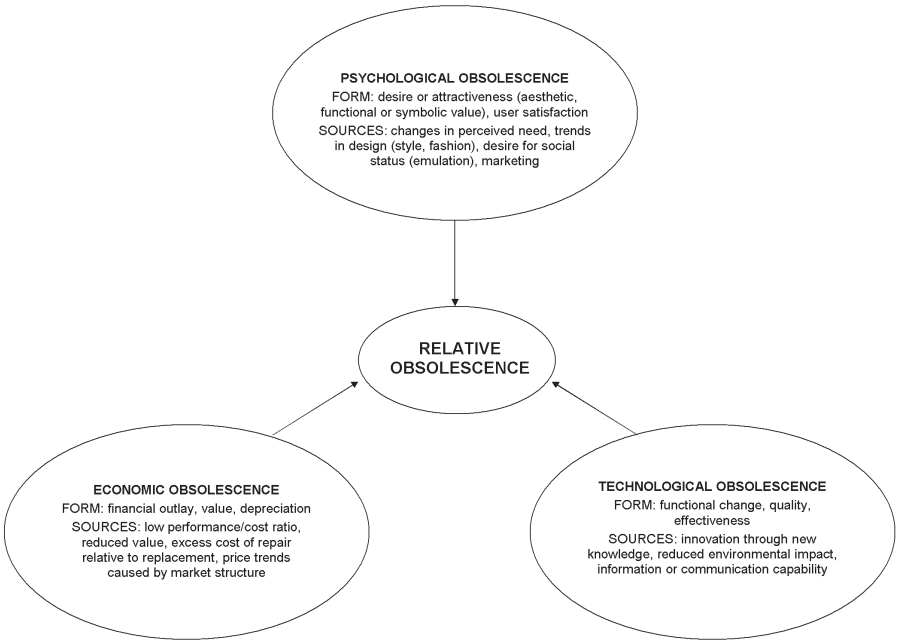

Figure 1.2 Forms of relative obsolescence
Source: Cooper (2004).

improved expression (comfort in use and design or quality concerns) and new desires. In short, there is no definitive typology of the causes of obsolescence, which are complex and interrelated.

In exploring the sources of obsolescence an expedient starting point is to distinguish factors relating to the product, the consumer and the situational context (including the economic and socio-cultural system). These are addressed briefly in turn below.

An important distinction to make is between the failure of a product to function, absolute obsolescence, and the falling into disuse of a functional product, relative obsolescence.[29] Absolute obsolescence occurs when a product reaches the end of its technical life because its durability is expended and it is no longer able to withstand wear and tear from use, perhaps because of

29 There is not always a clear distinction, however, as owners make subjective judgements concerning whether broken products are repairable and worn products are suitable for reconditioning. For example, they (subconsciously) estimate and compare the performance/cost ratio for repair or reconditioning with that for replacement.

material degradation.[30] A product's durability will depend on the materials used, the quality of design, manufacture and assembly, process quality (e.g. consistency), ease of maintenance, reparability and, perhaps, upgradeability. Although these result from decisions made by manufacturers, they will also be influenced by the market structure and conditions, including consumer demand and, perhaps, the mode of supply (i.e. rental or sale). Once in use, a product's durability may also be influenced by its operating environment (due to the potential impact of moisture, light or heat) and by how intensively and carefully it is used (including any necessary maintenance and the use of related consumables such as fuel or water). Relative obsolescence occurs when a functional product is discarded, at which point 'discretionary replacement' may take place. Rational choice theory might suggest that owners carefully apply objective cost-benefit considerations linked to product functionality in making such decisions, but in practice a multitude of influences are likely to be involved.

Little research has been published on the influence of consumers upon product life-spans. Although the OECD (1982) uncovered evidence that people's age and life stage (e.g. marital status and age of children) influence product retention rates,[31] Evans and Cooper (2003a, b) found that demographic and socio-economic variables offered only weak explanations for behaviour relating to product life-spans and concluded that psychological variables are more important.[32] People became aware that they were dissatisfied by a product, perhaps because it had lost its initial symbolic or esteem value[33] or its aesthetic attraction, or no longer needed it.

Consumers' decisions to replace functional products are often prompted by new product development. The styling of many consumer durables changes frequently, often incrementally but sometimes in a more substantial transformation. Functional attributes may change as a result of advances in technology or new manufacturing capability. As a consequence, existing products may be considered inferior to new models that offer additional features (perhaps incorporating increased information or communication capability), greater reliability or improved energy efficiency.[34]

30 For example, rubber dries and cracks, iron rusts and wood rots.

31 The evidence indicated a positive correlation, one explanation being that items such as washing machines were used more intensively in younger households.

32 See Chapter 14 (Evans and Cooper).

33 Its ability to meet needs relating to the owner's self-image.

34 One of the aims of marketing is to change owners' perceptions of their possessions in relation to newer models (Bayus 1988).

Lastly, the situational context has an important influence upon consumers' decisions at each stage in the consumption process: acquisition, use and disposal. The situational context includes the home setting, and economic and socio-cultural influences, notably the effect of market forces and social norms. Moving house, for example, particularly to one of different size, may prompt a clear-out of unwanted or unsuitable items.

Product prices are established through the market mechanism. The original and replacement cost of products, together with the rate at which products depreciate in value over time (and thus any second-hand value), will influence the point at which owners consider them no longer worth maintaining.[35] The rate of depreciation over time will depend, in part, on the nature of the product: products subject to technological change are liable to depreciate rapidly, whereas good quality furniture may not depreciate and, indeed, may appreciate in value over time. Other economic factors that influence consumers' decisions include the running costs of vehicles and appliances (notably fuel or energy) and, in the event of faults arising, the cost of repair in relation to replacement. As prices for many consumer durables have fallen in real terms due to reduced manufacturing costs, replacement has become increasingly attractive.

Market mechanisms are often flawed, which has an impact on product life-spans. For example, short-lived products are relatively cheap because the cost of managing the waste that they create when discarded is not properly reflected in prices but is 'externalized'.[36] Market structures, too, may affect product life-spans. Much research has been undertaken by economists on whether there is any connection between the degree of competition in a market and product life-spans, although such studies have been criticised for using unrealistic theoretical assumptions (Waldman 2003). Some have concluded that the more concentrated (and thus monopolistic) the industry, the greater the incentive to manufacturers to reduce product life-spans, while others have argued that manufacturers would instead increase prices (OECD 1982; Heiskanen 1996). The OECD concluded that the weight of theoretical evidence supported the former link, between market concentration and product longevity, noting that, in practice, most producers of consumer durables operated in concentrated markets and were therefore able to influence product life-spans.

35 Many people have a strong preference for products that are new and are willing to pay a premium for 'virginity value'. This is reflected in the rapid depreciation in the price of some types of product: the value of a car, for example, may drop by 50 per cent after the first three years of use even though this may represent barely 25 per cent of its expected life-span.

36 Such costs are paid through local taxation indiscriminately rather than in proportion to the amount of waste that individual households create.

There is no equivalent body of research that has specifically explored the implications for product longevity of socio-cultural influences and trends, although several disciplines (notably sociology, anthropology, human geography and design history) have offered significant insights. Important contributions include the 'cultural theory of expendability' discussed by Whiteley (1987), who traced the origins of 'style obsolescence' in Britain in the 1960s and sought to explain its public acceptance, and the 'desire for the new' proposed by Campbell (1992) as a means of understanding modern consumerism. Sociologists have made an important contribution to understanding the use phase of consumption in recent studies of 'ordinary consumption', exploring the significance of behaviour as an outcome of subconscious decisions and habit rather than conscious reflection (Gronow and Warde 2001) and of repair, reuse and second-hand markets (Gregson and Crewe 2003; Watson 2008).[37] The significance of the socio-cultural dimension to product longevity has been highlighted by Gregson et al. (2007: 682), who argue that to understand the increasing amount of matter being turned to waste it is necessary to consider the social relations of family and home and have 'a focus on love relations and mobility, and not on the trajectories of things themselves.'

The Case for Longer Life-Spans

The case in favour of promoting increased product longevity is primarily based on potential environmental benefits, although there may also be economic and social gains, such as better value for money and more jobs in repair and maintenance, and greater consumer satisfaction. Increased product life-spans should slow the throughput of materials and energy, resulting in reduced use of finite resources, fewer emissions of pollutants (including greenhouse gases) and a smaller amount of residual waste to dispose as landfill. How has evidence of the importance of resource throughput emerged?

As consumption rose through the second half of the twentieth century, reports such as *The Limits to Growth* (Meadows et al. 1972) warned that the growth in global industrial output, combined with other trends such as a rising global population, threatened to deplete the Earth's finite reserves of raw materials. By the early 1980s, however, an economic recession was affecting the USA and Britain and such fears were widely dismissed, although they resurfaced in a report in *Scientific American* which warned that reserves of copper, nickel and molybdenum were below 70 years (Frosch and Gallopoulos

37 See Chapter 17 (Curran).