QUALITY, OBSOLESCENCE AND UNSUSTAINABLE INNOVATION

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UDK: 339.138
Review article

Received: October 27, 2015
Accepted for publishing: November 28, 2015

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Abstract

One of the negative side effects of the consumer society and the increasing number of consumer goods available to the average household is the intransparency of product quality, especially product lifetime. There are many examples on failing products and premature obsolescence. Often this phenomenon is related to companies' profit maximization strategies (planned obsolescence) and consumer protection policy is mobilized to stop this type of exploitation. The paper applies micro-economic analysis to discuss the problem of optimal product quality (e.g. lifetime) in terms of cost-benefit-analysis and under imperfect information (based on Akerlof's lemon problem). Given consumers' actual willingness to pay there is an optimal quality which is lower than the technically possible. If the innovation perspective (Schumpeter's "creative destruction") is added to the analysis, increasing global competition and speed of product innovation are identified as core drivers for shorter product lifecycles and tend to be the actual limiting factor of product lifetime (economic vs. technical obsolescence). Even if the goals of sustainable development are included in the analysis, this does not provide an unambiguous argument for long-life products as new products tend to be more eco-efficient. A broader discussion on optimal quality (lifetime) of products is necessary, based on holistic life-cycle assessment of alternative product quality options. And finally: The tendency of increasing aftersales disappointment of consumers' expectations and conflicts with sustainable development goals need to be addressed in a more general debate on (limits of) consumerism. Minor changes in the laws for protecting consumers (e.g. longer warranty) will not do the job.

Keywords: Obsolescence, innovation, quality competition, imperfect information, sustainable development, life-cycle analysis

1. Introduction: Problem, State of the Art and Method

One of the negative side effects of the consumer society and the increasing number of consumer goods available to private households is the intransparency of product quality, especially product lifetime. There are many examples (anecdotal evidence) of failing products and premature obsolescence, including electric toothbrushes, washing machines and printers. Often this phenomenon is related to companies' profit maximization strategies (planned obsolescence) and consumer protection policy is mobilized to stop this type of exploitation. It seems to bother more and more consumers and tends to become an obstacle for consumerism. Nobody wants to be fooled permanently or wants to invest significant chunks of lifetime for investigating producers' quality promises. In some contrast to popular media contributions and publications (Schridde, 2014, Slade, 2006) there are only few empirical studies and hard facts which prove the significance of premature obsolescence (Prakash et al., 2015). We do not strive to provide any empirical evidence but take the phenomenon as given.

In a more formal way we can formulate the problem of premature obsolescence, i.e. (too) short technical product lifetime T as follows:

(1) T < technically possible

(2) T < customers' expectations

(3) T < "sustainable" (long-life products which would avoid resource consumption)

(4) $\tau < T$ actual economic lifetime τ is even shorter than the technical lifetime.

In the economic theory we are used to focusing on price and quantity, implicitly assuming a given quality. In the standard microeconomic textbook by Varian (2014: 738-741) we find only four pages on quality, referring to Akerlof's (1970) used car market model and adding another one (on umbrellas) which includes companies' optimal production decision and determines an "equilibrium quality". However, no efforts are made to further specify (good) quality, e.g. the lifetime of a car or an umbrella[1]. Different from this mainstream is Schumpeter (1911) who did not focus on (minor) differences in quality but on (major) discontinuous changes. These innovations "do not as a rule take place in such a way that first wants arise spontaneously in consumers and then the productive apparatus swings round through their pressure." "It is the producer who as a rule initiates economic change, and consumers are educated by him if necessary; they are … taught to want new things, or things which differ … from those which they have been in habit of using" (Schumpeter 1911: 65). While in Schumpeter's analysis producers define products (including quality) and consumers' needs and tastes are "given", there is another strand of literature which critically analyses this side of the market (Veblen, 1899; Scitovsky, 1976) – but did not enter mainstream economics. No attempts have been made so far to integrate these perspectives and to relate them to the more recent debate on sustainable development.

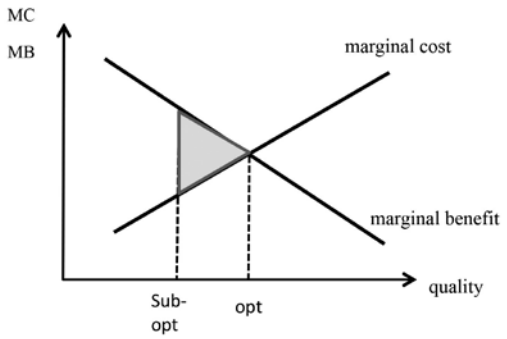
In this paper we transfer and apply the available theoretical components to investigate some economic aspects of product quality focusing on product lifetime and durability. What could economics contribute to explaining the (perceived) discrepancy between consumers' expectations on quality (durability, lifetime) and the actual, unsatisfactory quality which is delivered by industry? In our analysis we first apply basic microeconomics to discuss the problem of optimal product quality (e.g. lifetime) in terms of cost-benefit-analysis. We then analyse the implications of imperfect asymmetric information - based on Akerlof's lemon problem. In the next analytical step we add the innovation perspective (Schumpeter's "creative destruction") to the analysis and accelerated product innovation is identified as core driver of shorter product lifecycles (economic vs. technical obsolescence). We then ask how sustainable development goals influence quality decisions. Does this normative context support high-quality, long-life products and thus also contribute to overcome consumers' frustration?

Based on these aspects of theoretical analysis we ask what role government could play in addressing the premature obsolescence problem, especially whether forms of regulation would be justified. We end by considering some perspectives and probable limitations for (product) innovation and accelerated "fashions" – given the challenges of sustainable development. This raises primarily questions for the individual consumer and his sophisticated consumption patterns. But it might also have some implications for industry and new dimensions for the consumer protection policy.

2. Optimal Product Lifetime

Higher product quality is related with higher costs. With the degree of perfection (reliability, durability, long-life) costs normally even tend to increase disproportionally, i.e. we face increasing marginal cost. On the other hand, consumers' benefit of an additional increase in quality will decrease the more "perfect" a product already is (declining marginal benefit). If this well-known argumentation holds[2], we face the following optimization situation:

Figure 1 Optimal Quality



Source: Author

It is then possible to determine an optimal level of quality – given production cost (technology) and consumer preferences or willingness to pay. It is clear that this economic optimum is not using the maximum of the technological potential. Companies should produce only the quality which is covered by consumers' willingness to pay. If quality is persistently lower than optimal (e.g. as a consequence of monopoly power), society suffers a welfare loss as illustrated in Figure 1. A higher level of quality (i.e. marginal cost > marginal benefit) would also reduce economic efficiency (welfare).

The interesting point now is whether markets will converge towards such equilibrium – or if rather a "benevolent dictator" is needed. For companies it could be attractive to offer lower quality (shorter lifetime) as this would c.p. (ceteris paribus) reduce their costs and increase revenues. However, this will work only if and as long as consumers' are imperfectly informed.

To sum up: In an efficient (welfare maximizing) economy there is an optimal quality (life-time) which is lower than the technically possible. This optimum can be perceived as (too) "low", however it reflects consumers' (insufficient) willingness to pay for high(er) quality. Everybody would like to have high quality – but only few are willing to pay for it. Quality to some extent has public good character – and might be considered for government regulation. The (popular) goal is consumer protection, e.g. from low-quality, failing, dangerous products. The government could define a minimum standard, ruling out the extreme low quality options. The next level of discussion is then this: Who is going to pay? Can industry be forced (lower profits) or is paying up to the consumer? Both could form a coalition – and succeed in shifting the burden on the tax payer (the government subsidizes the quality standard).

3. Imperfect Information and Market Failure

With perfect information (or low search cost) market prices would adapt so that they would reflect differences in quality offered by companies. Consumers decide according to their individual preferences on quality-price-combinations. Companies will decide on the market segment they want to serve. Combinations "low price – low quality" as well as "high price – high quality" could be profitable and survive in the market.

With imperfect information there will be a systematic difference between the knowledge of companies and of consumers (asymmetric information) – and companies can exploit their knowledge advantage. Akerlof (1970) was the first who analyzed the economic consequences of asymmetric information. In his simplified model of the used car market he assumed that there are only two different qualities: good cars and bad cars (= lemons). With perfect information two market segments would emerge. However, if potential buyers are unable to identify good quality, lemon owners will take advantage of this and pretend high quality. Akerlof shows that as a consequence of imperfect quality information of buyers the market for good quality will collapse. Imperfectly informed buyers are not willing to pay the adequate price for high quality. The market will be dominated by over-priced bad cars. However, there are solutions to this market failure:

- Sellers of good quality cars invest in quality information, e.g. a certificate from an independent expert (signaling).
- Buyers could increase their search efforts and compensate their ignorance e.g. by hiring an expert (screening).

So it is possible to overcome the market failure without government intervention. However, it is costly for market participants (transaction cost). Government regulation could be less costly, e.g. if a minimum of quality information is obligatory. Therefore, the decision about the optimal institutional design has to include the government option. With this option however comes the next problem: the regulator will always be a target of vested interests (capturing) and hence efficient solutions are hard to implement.

4. Innovation and Obsolescence

As Schumpeter (1911) already pointed out, the core process of economic development is innovation[3]: new products displace old solutions in a process of "creative destruction". This process is not a zero sum game but creates as a by-product economic growth and wealth. Without innovation the economy would stagnate (stationary state). In global competition, nations – especially nations with high (labor and environmental) costs - can prosper only if they are superior in innovation. Competition is the driver of innovation. In a competitive world, companies and nations either innovate or decline. They don't have the option not to participate in the innovation race.[4] All government policy must focus on innovation, eliminate barriers to innovation and provide incentives for innovation. This includes tax policy as well as energy and education. It also includes environmental and resource policy which could be a barrier to innovation.

Obsolescence is just the other side of the innovation coin. New products "destroy" the old ones which are outperformed. And although they have no technical defect, they will be replaced by the new ones. The more innovative (and wealthy) an economy becomes, the more economic obsolescence accelerates.

Companies are drivers of the system and are driven by the system. They have to invest and to plan innovation activity carefully. Once a traditional "cash cow" gets old and revenues stagnate, a new ("innovative") product has to be ready for replacing it. However, the new product should not come too early as it would cannibalize the old one. So companies are interested in planning product lifetime. However, they are not in control. In a competitive system it is not the individual company which is defining the speed of the innovation process. It is only one player and might be forced to accelerate by fast competitors.[5]

Consumer protection policy and institutions have an important role to play in this system. It is a regulative framework that supports the disciplining function of competition and government regulation and thus increases the acceptance of accelerated innovation. It helps to eliminate the worst company practices which promise innovation but in fact take advantage of consumers' ignorance. Consumer protection policy so far does not address the basic question of the acceleration spiral: if consumers' wishes and desires get inspired by product innovation, they need more income and they have to work more and harder. Life dominated by work stimulates compensating consumption (shopping adventure, resorts, holidays, alcohol etc.). In this spiral (rat race), life satisfaction (happiness) is no longer increasing – although income increases.[6]

In sum, with the systemic tendency of accelerating innovation and shorter product life-cycles T is more or less irrelevant. Given the immanent long-term fall of τ it would only be rational that T also declines, in order to avoid economic inefficiency. Why construct devices (e.g. mobile phones) for a lifetime of ten years if they are actually used for only three years and then replaced by a more sophisticated new model? If the actual limitation is τ, the question is how to influence this factor. Is it just the human desire for change, improvement, new experience? What is the consumer's role in the innovation race – driver or driven? Could this role change and change the system's dynamics? These questions are part of an increasing sufficiency discussion (Skidelsky, Skidelsky, 2012).

5. Macroeconomic Aspects: Obsolescence, Economic Crisis and Growth

Accelerated obsolescence has been discussed already during the world economic crisis in the 1930's as one option to stimulate demand: if consumers could be convinced to replace old products by new ones, demand, production and employment would increase – the Keynesian multiplier effect is started. This idea was rediscovered during the economic crisis 2008/09 when in many countries (e.g. Germany, France, US) government subsidies for scraping old cars and replacing them by new cars were implemented (Abwrackprämie, cash-for-clunkers, car scraping bonus). These programs intended to stimulate the automobile industry (OEMs) as well as the many (SME) suppliers. As an additional benefit the argument was that the new cars are more fuel-efficient than the old ones (i.e. less greenhouse gas emissions) and hence contribute to sustainable development.

The economic stimulus effect works – at least temporarily. To start the multiplier this is sufficient even if a period of weak demand in the automobile industry follows. But this specific form of stimulating the economy in a crisis seems to be very cost inefficient (for the US see Gayer, Parker, 2013). Moreover, stimulating consumption could support a reduction of the saving rate – and thus have a negative effect on long-term economic growth.

A positive net effect for the environmental effect is difficult to prove. Many of the cars that have been scrapped did not have technical problems and could have been used longer. The consequence of this government-induced obsolescence was the increasing production of new cars with an increase of material (natural resource) consumption and increased negative side-effects on all dimensions of sustainable development. Therefore, the lower fuel-consumption of a new car has to be compared to these negative effects. If the balance is negative, the short-term stimulus is on the cost of future generations. But this is in the Keynesian tradition: "In the long run we are all dead".

6. Sustainable Development (SD) and Product Lifetime

Premature obsolescence contributes to increasing resource consumption, waste and pollution. Therefore it is contradicting the fundamental and vital goals of sustainable development (SD) which have been formulated in global conventions (e.g. on climate and biodiversity), national sustainable development strategies (e.g. in German Federal Government 2012), regional and local sustainability agendas (see e.g. New York, http://www.nyc.gov/html/planyc/html/sustainability). The first question which has to be analyzed in more detail is how this significant shift in the political goal system is linked with product lifetime. If more durable products could in fact contribute to sustainable development, the next question is whether the market process will work and solve this problem or whether government policy is needed. As "sustainable development" is a very wide and often vaguely used term, it is necessary to provide a general definition first.

Sustainable development is development "which meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland Commission, 1987). It includes environmental, social and economic dimensions. The most comprehensive set of relevant goals and targets has now been adopted by the General Assembly of the United Nations: the Sustainable Development Goals (SDG). The environmental dimension has two core elements: Climate protection (2° target) and biodiversity. Climate protection requires a significant reduction of greenhouse gas emissions (GHGE) over the next decades. Germany is committed to reduce GHGE 80-95 percent by 2050 (compared to 1990). The protection of global biodiversity requires the protection of eco-systems and hence the change of land-use patterns. In the German national sustainability strategy the goal is to reduce land consumption to 30 ha per day by 2020 (see German Federal Government 2012).

Such limitations of factor input could be a barrier to economic growth. Output can continue to grow only if "delinking" (decoupling) is successful, i.e. GHGE per unit of GDP have to decline continuously (eco-efficiency revolution). Old, inefficient products and processes have to be replaced by more eco-efficient – from refrigerators to cars and buildings. The government can support this with incen-

tives and subsidies, e.g. cash for clunkers or privileges for electric cars to "modernize" the car fleet and delink mobility from climate protection. If the eco-efficiency revolution is successful (not compensated by rebound effects), technology in fact takes care of the problem and consumers don't have to revise their consumption patterns (e.g. mobility).

Related to product lifetime the first question now is how product lifetime is affecting core goals of Sustainable Development like GHGE or land consumption. There are various approaches for measuring the effects of a product throughout the life-cycle (life-cycle assessment LCA). However, this analysis is costly and not available for many products so far. Therefore, it is in fact not yet of practical relevance and influence in consumers' decision making. An alternative would be "correct" prices, i.e. prices which also reflect environmental cost. However, this is not working because internalization of external effects is very hard to implement in the political process.

A general result of LCA is that new products tend to be more eco-efficient and therefore are superior to the old ones. However, every new product requires additional resource input for production. It is therefore always an optimization question: What is the optimal lifetime of a product?[7] Even in a SD context a shorter lifetime is not per se negative.

The tendency of declining product life-cycles could be compatible with SD under two conditions:

- Old products are reused or recycled with increasing efficiency. In a circular economy with zero waste, old products are just the resources for producing the new ones (cradle to cradle idea).
- To organize such a process and to drive the circular economy, it needs (more) energy and land. The energy has to be climate neutral, i.e. from renewable resources. In a SD strategy no additional land is available (as biodiversity needs eco-systems) for a circular economy.

The conditions of such a vision will not be fulfilled in the near future. Therefore the accelerating product innovation in fact creates "unsustainable innovation".[8] It is a good general diagnosis that the declining lifetime is contradicting SD – and mechanisms to reduce or revise this tendency should be implemented. Based on a broad social consensus on SD such mechanisms could be changes in consumers' behavior (demand for "sustainable" products) and/or changes in the business sector (corporate social responsibility). If the private sector is unlikely to bring about the necessary change processes, we have to analyze government options.

If we focus on the role of consumers, the crucial question is whether there is an additional willingness to pay for more sustainable products or if it could be stimulated. In fact there is some empirical evidence for higher willingness to pay for sustainable products (especially related to nutrition and health) but only small segments of the market and small consumer groups are affected (e.g. LOHAS). For mass markets purchasing price remains the dominant decision making criterium; more enlightened consumers rely on „total cost of ownership", including cost in the operation period e.g. of a refrigerator. Social cost play no significant role. Freeriders learn to live with "cognitive dissonance". Only if prices included social cost, i.e. if resource-intensive short-time products became more expensive, consumers would react. However, this could have negative distributional consequences (energy poverty, mobility poverty etc.).

Would companies change quality decisions if more reliable information on product sustainability were available? Many companies are committed to SD and emphasize Corporate Social Responsibility (CSR). Companies respond it they find consumer groups with a higher willingness to pay for high-quality (long-life) products. They also react if investors and capital markets want to see a broader understanding of risk management including e.g. environmental and resource scarcity aspects. A more pro-active role beyond this is unrealistic and so far the domain of some pioneers (often family-owned companies) with limited success in niche markets. In sum, we cannot expect that the business sector will be the driver for a more sustainable social product portfolio. Changes in the regulatory framework are necessary to make repair-friendly products, recycling, „cradle-to-cradle" (design thinking) a more profitable option.[9]

In sum, it is not realistic to expect that market players – either consumers or companies – will voluntarily support a longer product lifetime.

7. Conclusions and Perspectives, Gaps and Further Research

Before we discuss in the final step of our analysis the role of government policy in the context of product quality, product lifetime and sustainable products, it has to be reemphasized that there is a lack of empirical evidence. So the dimension of the damage (costs) of premature obsolescence for consumers and society is not clear. Only if it is significant, government activity – which also causes costs and damages – can be justified.

Moreover, we have seen that optimal product lifetime should always be shorter than technically possible – to avoid over-engineering which also is a waste of economic resources. In many cases, consumers don't need the most sophisticated product (e.g. drill hammer) and the low-quality option corresponds with their actual needs. For SD reasons government could make this option less attractive or even forbid it – causing problems for low-income consumers.

The core problem, however, is asymmetric information. It is not possible to eliminate this problem completely as producers will always have an advantage and know the quality of their products better than any outsider. Asymmetric info could cause market failure (market power) and hence justify government intervention. This could address companies as well as consumers:

- To increase consumers' information level, independent institutions could be created and subsidized to test products, create quality labels etc. This reduces consumers' information cost but leaves the decision on (high) quality to them. Basically, this is not paternalistic, not intervening in the consumers' preference structure but supporting more "enlightened" decision making.
- Beyond this traditional type of consumer (protection) policy, there are extended options which could apply some of the insights of Behavioral Economics: if decision making would be reframed and include total cost of ownership, a high-quality product might be more expensive today, however, if operating costs are included it might be less costly over time. People tend to underestimate future (dis)advantages systematically (procrastination) – and therefore tend to buy the low-priced product. In order to support the high quality product the government could e.g. offer subsidized loans.

Government policy could address companies e.g. by defining additional information requirements. Companies could be bound to inform consumers about the average lifetime of their products – based on the result of laboratory tests. Why are companies not making voluntarily use of this additional option for signaling high quality? The reasons include:

a) Information on product lifetime has to be based on valid long-term tests. With ever shorter product life-cycles there is not enough time for such tests.

b) Tests cause costs and make products more expensive – without directly improving product quality.

c) Incalculable effects on the behavior of users (including moral hazard, i.e. less careful use).

If government regulation were to request such information, it would also have to install control mechanisms and this would cause additional bureaucracy and cost. The overall result would be inefficiency and lack of effectiveness. Information in general has little direct effect on behavioral changes. Consumers are used to life with cognitive dissonance. Companies will invest in counter information to neutralize the public transparency policy.

As information instruments will have only very limited effects, we have to consider also additional monetary incentives and regulations. Monetary incentives could address inputs (e.g. taxes on fossil fuels or natural resource extraction) and/or the end of the product lifecycle (recycling or disposal cost). If disposal taxes or fees are very general (identical for e.g. all washing machines) and not addressing specific product quality, they will in fact cross-subsidize short-time products. Regulation could define a minimum lifetime (or extended warranty) for each product or for product groups (washing machines, refrigerators etc.). This kind of regulation would eliminate low-quality-low-price products from the market. The government would no longer allow consumers to make the decision but act in their best interest (paternalistic). This would cause welfare losses. In addition, this would cause negative distributional effects because the burden of this policy is more on low-income households than on richer ones.

Nevertheless, extending product lifetime could be an important policy instrument if it would clearly support SD goals. However, it depends: "long-life" is not identical with "sustainable". In the context of

a sustainability strategy, longevity is not a reliable sub-goal. Complex LCA is necessary to evaluate potential alternatives. Picking the relevant alternatives is already value driven and based on limited knowledge. What creative response will emerge if dissatisfaction with premature obsolescence becomes overwhelming cannot be predicted. It would therefore not be a good idea to focus SD policy on characteristics of the end product – unless they are really dangerous or hazardous. Rather, SD policy should focus on input factors and correct the price of these factors (internalizing of social costs). If critical input factors become more expensive, market processes will enforce a more efficient use of product – including longer lifetime.

In the next step we analyze policy options for the case that premature obsolescence is based on innovation competition – and on consumers' preference for novelty. Consumers expect, and competition drives companies to provide a steady flow of new products with improved technological features or simply perceived as more "attractive". In this case, premature obsolescence is a pure economic phenomenon; technology plays only a minor role. Some of the consequences and implications of this diagnosis would be:

- A new type of consumer policy has to cover a much broader scope – not just support market transparency for higher product quality. It has to include more fundamental aspects of consumerism, e.g. decision making stress as a consequence of the exploding number of consumption options, the dilemma of the pursuit of happiness if based on status consumption, the tyranny of (failing, malfunctioning) "things" that tend to consume lifetime.[10]
- The role of companies has to change significantly. In the context of the debate on CSR and sustainable company strategies, a search process has already started. Pioneers use LCA, calculate the social cost of their activities, develop new business models beyond quantitative growth (service-oriented) and encourage their customers to critically reflect their buying decisions (e.g. Patagonia's "Don't buy this jacket").
- The government should focus on correcting market prices (internalization) by Pigou-taxes e.g. on CO_2-emissions and on resource extraction. Non-sustainable products would become more expensive and this would change consumers' decisions. Prices can then fulfill their indicator and rationing function. Companies will change the direction of their innovation activity. "Creative destruction" will be harnessed for eco-innovation. However, such a causal therapy faces fierce resistance from well-organized interest groups and therefore it might be necessary to rely in addition on some relatively easy-to-implement regulation measures like extended warranty time. Given the limitation of government policy, the activity of civil society organizations (CSO) becomes more important (see e.g. WBGU 2011).

To sum up, from an economic perspective we should be careful with the diagnosis of premature obsolescence. To some extent it could be quite rational and even sustainable. It reflects consumers' need and limited willingness to pay. To some extent, it is the result of asymmetric information and some companies may try to exploit consumers. However, competition is a strong counterforce and some government regulations (information, warranty) could improve market results. Under a SD perspective the answer is significantly different, especially the role of government is potentially more important. It has to change the framework conditions for decision making – and this will change the (optimal) lifetime of products. So, the obsolescence debate reemphasizes what is already well-known from the debates on environmental protection and SD.

The debate on premature obsolescence is an important one, as it also opens the gate for much broader and more fundamental questions on consumption. These have been discussed in earlier times with different emphasis (Glickman, 1999). However, a new dimension is added in the context of SD (Schneidewind, Zahrnt, 2013: If the promise of an efficiency revolution and of green growth is not materializing, there is no other option than to rethink lifestyles and consumption patterns of the rich. The ever increasing flow of new products, designed to die early will not be supported be the eco-systems of a limited planet. Sustainable consumer policy therefore has to be more than a lawyer for the affluent and has to contribute to the enlightenment of consumers in the basic Kantian sense of "Ausgang aus ihrer selbstverschuldeten Unmündigkeit" (end of self-inflicted immaturity).

For the disappointed consumer this raises a couple of unpleasant practical questions and options:

1. Before any purchasing decision, always check the "zero-option" first: Do you really need this new gadget (electric toothbrush etc.)?[11] A household which owns 10,000 "things" faces a high probability that at any given time at least one is not functioning properly, even if each of them has a very low probability to fail. Therefore, things do not only add utility but each of them is also a potential "Zeitdieb" (thief of time), stressing your attention and your time-budget (Rosa, 2005).
2. Before buying, check sharing options (with your neighbors or professional service providers). Often you are interested just in using, not in permanent ownership (from drilling machines to cars).
3. When you want high quality (long lifetime), this normally has a higher price. However, over the lifespan it could be a good investment.
4. If you are victim of a product with premature obsolescence, inform and fight (in courts) with the producer/seller. Not to buy again ("exit") is a weak signal but "voice" could support learning processes more effectively. "Voice" is made easier by internet platforms like http://www.murks-nein-danke.de.
5. If you are often a victim and think there is a systematic company policy, engage in the political process to change laws and regulations.

All of these options are time-consuming and hence costly. If high quality does not materialize as a result of spontaneous market reactions, there is no alternative to some form of private investments in overcoming the market failure.

Premature and accelerating obsolescence is also a challenge for the economic theory. First of all, investment in more empirical investigations is necessary to better understand the dimension of the problem and main causes (e.g. technical vs. economic obsolescence). Then an integrated theory of the components outlined here would be necessary with a critical view on (unsustainable) innovation and on the formation of consumers' preferences. A third field of research is the systematic analysis of efficiency and effectiveness of alternative institutional settings and instruments for reducing premature obsolescence (information requirements, regulations on minimum lifetime, subsidization of repair cafés, resource taxation etc.). Finally, if innovation activity and consumers' lifestyles change in a more sustainable direction, this will have significant impacts on economic (de-)growth which need to be analyzed. If we understand the obsolescence debate not just as addressing a minor technical problem of some irresponsible suppliers, but rather as a consequence of the core process of a market economy, further research challenges are unlimited.

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(Endnotes)

1 In the management literature we find some more detailed approaches to the obsolescence problem – not only addressing potential (additional) revenues but also risks and costs if a critical part or component of a product fails (see e.g. Bartels et al., 2012).

2 See e.g. Gossen's Laws: Every additional unit has an additional benefit however this marginal benefit is declining.

3 The concept of innovation, "carrying out new combinations" includes product, process and organizational innovations Schumpeter (1934: 66) defines product innovation: "The introduction of a new product – that is one with which consumers are not yet familiar – or of a new quality of a good." In a competitive economy "new combinations mean the competitive elimination of the old." (Schumpeter, 1934: 67).

4 A broad literature addresses the question whether ethical responsibility of entrepreneurial individuals and companies could moderate and modify the systems dynamic (see e.g. Guiltinan, 2009).

5 Even if one company would plan a long product lifetime (e.g. for black and white TVs), competition from innovators (color TV) would destroy this individual plan.

6 Keynes (1930) formulated the idea that with a given consumption level it would be possible to reduce weekly work to just 15 hours within a century – if all productivity increases are used for reducing working hours instead of increasing income (and consumption).

7 Example: An aluminium coach for a car has more negative environmental effects than a conventional steel car body in the production process. However, during the consumption period it is more fuel efficient because the cars have less weight. Aluminium is more sustainable only if the car has a longer lifetime respectively is driven more kilometers.

8 Product innovation is the driver; process innovation (higher efficiency, lower costs) is supportive for diffusion. If product innovation (related with high resource consumption) becomes dominating, it will tend to overcompensate the (resource-)efficiency gains in the production process. „Innovation" than contradicts „SD" – type and direction of innovation has to be changed.

9 As long as material and disposal costs are low, but labor costs are high, labor-intensive repair activity is not an attractive option.

10 The popular debate on premature obsolescence to some extent is just a reflection of the general overburdening of (abundant) consumers. Conventional consumer policy cannot "cure" this disease. Instead of support for fulfilling given consumer preferences, analysis and debate on the creation of preferences is necessary.

11 In some cases companies provide support: „Don't buy this jacket" (http://www.patagonia. com/email/11/112811.html).

Rudi Kurz

Kvaliteta, zastarijevanje i neodrživo inoviranje

Sažetak

Netransparentnost kvalitete proizvoda, a osobito njihova životnoga vijeka, jedna je od negativnih popratnih pojava potrošačkoga društva i sve većega broja potrošačkih dobara koji su na raspolaganju prosječnomu kućanstvu. Brojni su primjeri neuspješnih proizvoda ili preuranjenoga zastarijevanja. Ta je pojava povezana s poslovnim strategijama povećavanja profita (planirano zastarijevanje) pa je mobilizirana politika zaštite potrošača kako bi se zaustavila ta vrsta iskorištavanja. U radu se, na temelju mikroekonomske analize, obrađuje pitanje optimalne kvalitete proizvoda (npr. životni vijek) u okviru cost-benefit analize (analize troškova i koristi) u uvjetima nesavršenih informacija (ovo se temelji na Akerlofovom problemu tržišta limuna). S obzirom na to koliko su potrošači spremni platiti, postoji optimalna kvaliteta koja je niža od one koja je tehnički moguća. Ako se analizi doda inovacijska perspektiva (Schumpeterovo „kreativno uništavanje"), rastuće globalno tržišno natjecanje i brzina inoviranja proizvoda, glavni su uzroci kraćih životnih ciklusa proizvoda te su često stvarni ograničavajući čimbenik životnoga vijeka proizvoda (ekonomsko zastarijevanje nasuprot tehničkome). Čak i kad se u analizu uključe ciljevi održivoga razvoja, ne dobivamo jednoznačan argument za dugotrajne proizvode s obzirom na činjenicu da su novi proizvodi uglavnom ekološki učinkovitiji. Potrebna je šira rasprava o optimalnoj kvaliteti, odnosno životnome vijeku proizvoda, na temelju holističke procjene životnog ciklusa alternativnih mogućnosti u pogledu kvalitete proizvoda. Konačno, sve raširenije razočaranje kupaca nakon kupovine s obzirom na njihova očekivanja te sukobljenost s ciljevima održivoga razvoja trebaju se obraditi u općoj raspravi o konzumerizmu i njegovim granicama. Ograničene izmjene zakona o zaštiti potrošača (npr. produženo jamstvo) neće biti dovoljne.

Ključne riječi: zastarijevanje, inovacije, natjecanje u kvaliteti, nesavršene informacije, održivi razvoj, analiza životnoga ciklusa