The quality re-evaluation process:

Product obsolescence in a consumer – producer interaction framework.

Written by Björn Granberg

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Acknowledgements

This study would not have been realised without the great help and support of my wife and life companion Ylva. I am also in debt to my children since I have devoted time to this work that was rightfully theirs. I would also like to thank Ronny Petterson at the Department of Economic History for his support and all the valuable comments that you gave me. Others that has helped me are Lars-Erik Orrevall Philips, Lars Jonsson Konsumentverket and Paulina Morel student.

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Björn Granberg

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Part 1
Introduction

"Indisputably, the dynamics of a market originates from the relation between seller and buyer, in their everlasting quest of value vs. money. Consequently the instant of sale is the hub of business in general and of marketing in particular."

Carl Eric Linn[1]

1.1 The significance of the durability of consumer durables

This study focuses on a particular aspect of product quality called durability. The reason for separating durability from other aspects of quality is that durability is the only one related to the time dimension, which means durability has a direct impact on the frequency of repeat purchases by consumers. This in turn means that durability has an impact on producers turnover, consumers volume of accumulated goods and the consumption rate of natural resources. For this reason no other single aspect of product quality is more economically, nor more environmentally, important than durability. In spite of the importance of durability, studys on the causes and origins of obsolescence are rare indeed (obsolescence is a word used to explain how durabitity decay).

If scientific studys on the subject are rare, more or less wild assumptions are less rare, and more often than not manufacturers have been accused of making products with a durability deliberately shorter than technically possible. The classical arguments are that products are designed so that either the consumers get tired of them or the products get tired of the consumers.[2] These assumptions and accusations of producers *planning* the obsolescence of their products have often been based on mere anecdotal forms of evidence with little research or independent surveys to substantiate them.

A lot of these accusations came during a debate that took place in the post-war period and ended in the early sixties when the interest for the subject faded. Durability of consumer durables was during this period discussed primarily as an aspect of product value to be forwarded to the consumer and not tampered with by producers in the purpose of increasing profits. The debates of the time where quite loud and took place primarily in the USA. They occurred because a public opinion had learned that manufacturers' profits increase with less durable products. At the same time the public did not realise that manufacturers did not quite understand how to control the quality of the output, i.e. the quality of the output was fairly uneven and every product that broke worked as coal on a fire in that debate.[3]

The subject dropped in the early sixties and the interest in durability, apart from a few

[1] Quote from back page of Linn, Market dynamics, 1996.

[2] Packard, 1960, for example.

[3] Granberg, 1996.

exceptions, where not until recently revived.[4] An early example of the spiring interest is a report by the Organisation for Economic Cooperation and Development (OECD) that came in 1982.[5] In broad terms the report present some evidence which to a certain extent supports the above mentioned assumptions and accusations of planned obsolescence. The report has, however, not received much attention and, even though it is important, it has had little influence. In contrast with the 1950s, when consumers value was the focal point, the OECD report focus upon the durability of products as one of the key components in assessing the products' environmental impact.

But the OECD report is an exception. It was not until after a controversial article in The Ecologist[6] which argued that recycling offers large companies a convenient environmental excuse for planned obsolescence, that a new debate concerning the durability of products could be said to have started. The article reveals an achilles-heel of the recycling concept and it seems that after its publication environmental organisations are more seriously concerned with increasing the knowledge concerning the durability of products and possible product life extension.

Parallel to the environmental concerns for durability and methods for product life extension, there can also be identified an interest concerning the social consequences of limited product durability, arguing that longer lasting products will reduce the cost per unit time of owning and operating consumer durable goods and thereby benefit weaker groups in the society. Tim Cooper, a British scientist, stresses that the current income is not the sole determinant of the standard of living and argues that it is affected by a whole range of factors, including previously acquired possessions and savings. Cooper argue that the durability of already acquired (necessary) goods should be considered as an important aspect of the standard of living of poorer households.[7]

This line of argument probably has its origin in a debate between the "green movement" and the left. The left arguing that the environmental problem primarily is a problem of the middle class, meaning that environmentally sound products will be too expensive to buy for the low income class. The lower income households thereby will be forced to rely on second hand markets, because they won't afford to buy new goods. This debate seems be most vivid in Great Britain.

Two OECD studies[8] mentions concerns that a policy to encourage producers to manufacture longer lived products will result in reduced labour requirements. These concerns have led to investigations whose results in short are that such fears probably are exaggerated and that effects on labour due to a policy to lengthen product life

[4] Anell 1969; Taylor, 1972; Schumacher, 1974; Dahl 1980. There is also an extensive literature debating the relationsship between the degree of a firm's monopoly power and the durability it chooses to build into the product. This debate is however strictly theoretical and of little use in the context of this study (See a summary in Shy, 1995, p315ff).

[5] Product Durability and Product-Life Extension, OECD-report, 1982.

[6] Fairlie S, Long Distance, Short Life: Why Big Business Favours Recycling, 1992.

[7] Cooper, Poor people, poor products?, 1996.

[8] Baillon, undated and Bordenave, 1976, p73-75 in Product Durability and Product-Life Extension, OECD-report, 1982.

cannot be generalised, but must be assessed on an industry by industry basis.[9]

Another aspect of the durability of durable goods, quite apart from these concerns, is related to the decline of the era of mass production and the growth of a succeeding service economy. The authors[10], who are high lighting this connection, stress that the era of mass consumption emerged when productivity in the manufacturing industries was quite low compared to today. Their argument is therefore that even if an increase in consumption of goods created jobs at that time (the fifties and sixties), an increase in consumption of goods will not have any significant positive effect on employment today.

According to these authors the purchasing power of consumers should be redirected, away from the consumption of goods and towards the consumption of services. A way of doing this is to increase the longevity of the durable goods. This would, they argue, not only result in an increased need for labour but would also result in a more sustainable society. This view has most often been dismissed by mainstream economists who have perceived de-industrialisation as an evidence of economic decline. However, something seems to be happing that may indicate a shift of opinion in a near future. A recent report by the International Monetary Foundation (IMF) presents an analysis that gives strong support to these authors. In fact the IMF goes so far as to say it may be wise to de-industrialise.[11]

1.2 Purposes of the study

When I first embarked on this study my intention was to describe the historical development of the durability of durable goods from the start of the mass producing industries. Admittedly I have not come close to this ambition. First of all because I found that a conceptual framework concerning product obsolescence and its causes were in fact missing and secondly because of the severe lack of empirical research in the field.

Because of this lack of earlier research I found myself in a situation where I, myself, had to delve into the causes of product obsolescence to create the platform needed for the original intention. In doing this I have pulled together most of the relevant literature which I could find, to create a framework for understanding the causes of product obsolescence in relation to both the consumer and the producer.

Thus, the major achievement of this study is the creation of a more developed framework to understand product obsolescence, than we have had earlier. I have also related this framework for understanding product obsolescence to Albert

[9] Product Durability and Product-Life Extension, OECD-report, 1982, p75.

[10] I have read two books taking this stand: Durning, 1992, of the World Watch institute and Rifkin, 1996, from the Foundation on Economic Trends, USA. However, I also recommend reading an article by the president of the American Consumers Union, Rhoda Karpatkin, where she argues that the Consumers Union must take a broader responsibility than before, involving a long-term view on consumption and production with serious considerations aimed towards both ecological and ethical aspects of consumption.

[11] The Economist ”It’s wise to deindustrialise, p88. Their source is World Economic Outlook, april 1997 and ”Deindustrialisation: Causes and Implications” by Robert Rowthorn and Ramana Ramaswamy, IMF Working Paper, April 1997.

Hirschmann's concepts of exit, voice and loyalty. The benefit of doing this is that it made it easier to form sets of hypotheses regarding both consumer behaviour and company behaviour and their respective contributions to product obsolescence.

Using the framework developed together with the company characteristics connected with the management strategy typology, I believe that it is possible to get answers to questions that other studies before this one have been unable to answer or explain. For example: what are the reasons behind the fact that while most aspects of quality generally are improving, product generation by product generation, durability typically remains constant (Cooper 1994, Heiskanen 1996, p31).

Further, when acquainted with the causes of product obsolescence I would have liked to give the reader a historical review of the trajectory that product obsolescence has come to take and possible explanations of the reasons behind. Even though this was the original ambition, I am afraid the study at the end would have become so large that it was not possible to find room for it in this work.

I would like to stress that this study has the character of generating hypotheses, i.e. the ambition is to take steps necessary to move closer to a more comprehensive body of knowledge concerning product obsolescence. I do not have the ambition of delivering clear cut answers.

Part 2
Methods and materials

2.1 Methods

This study is carried out in five basic steps:

i) (Section 3.1 – 3.4) The first step involves collecting known causes of product obsolescence in order to form the basis for a framework for an easy and comprehensive understanding of the causes of product obsolescence.

ii) (Section 3.5 and 3.6) Secondly, this framework will be related to the behaviour of the consumers.

iii) (Section 3.7 and 3.8) All consumers do not act in the same way. A division is made and two basic groups of consumers are chosen to represent two basic consumer behaviours.

iv) (Section 3.9) Three hypotheses concerning the behaviour of the producers are set up.

v) (Section 4.1 – 4.3) Here I check the hypotheses set up in step iv. The job is to see whether there is producer behaviours that matches the behaviour of the consumer.

Step i

The causes of product obsolescence have been collected from the few existing earlier studies of product obsolescence (Conn 1978,[12] OECD 1982, Heiskanen 1996),[13] however, they all derive from basically one source – a study made by Dahl 1980. In all these studies a discussion is held that relate the causes of obsolecsense to each other and thus give the reader a bit more than a rudimentary understanding of the different causes to product obsolescence and how they may interact. Dahl, however, does have the most comprehensive discussion.

Step ii

The framework developed (in reality nothing but bits and pieces drawn from previous research) is related to the behaviour of the consumers and a theory is created. This theory is based upon the assumption that the life of a product hinges upon a continuous process where the consumer evaluates its overall quality in relation to the product itself and in relation to potential substitutes (alternatives) introduced on the market. I call the theory ”the quality re-evaluation process” since it

[12] Conn’s study is reviewed in the OECD study, (Annex 1, ref. 25), OECD 1982.

[13] There are others as well, these however have not been available to me becuase of language difficulties (two in finnish and one dutch survey). These are, however, reviewed by Heiskanen and I do not believe they could deliver any major contributions to this study. There are also some minor British studies which I would have liked to read, however they are quite small and I found that the likeliness of them contributing in any major way was also small but the problems of getting them quite large. . .

is based on the consumers' re-evaluation of the quality of purchased products. The theory is constructed as a gap analysis.

Step iii

After concluding that the quality re-evaluation process is not equal to all consumers I divide the consumers in two basic groups. In doing this I use Albert Hirschmann's fairly well known concepts of exit, voice and loyalty to get the broad picture of market structure and consumer behaviour. I also bring in some related research to support this division in two.

Step iv

At this stage I wanted to test if the framework, the quality re-evaluation process and the final division in two basic groups, would be true in an empirical sense. I could see two alternative ways of checking the work. The first one was to test against empirical studies of consumers' reasons for replacing old products with new ones. The second one I could think of, was to test against research on company behaviour.

I have chosen to test against research on company behaviour for two reasons. First of all because I found that studies on consumers' reasons for discarding products where not suitable. The existing studies are not only limited in numbers, but are also limited in their explanatory value since the results of the studies are firmly linked to the products and circumstances (trade cycle, politics, trends etc.) prevalent at the time of the survey. Thus all such casestudies will be difficult to use for the purpose I had in mind.

If, on the contrary, I should compare with company behaviour the resulting picture would become more complete since both major actors (consumers and producers) would be concidered. Thus this method may create a more holistic picture of the causes of product obsolescence than otherwise would have been the case.

The hypotheses are set up according to the choice of method, which means that they aim towards the behaviour of companies rather than the behaviour of consumers.

Step v

What I do here is checking whether producer behaviour matches the behaviour of the consumers as predicted. Please note that I do not test the hypotheses in a strict meaning. First of all I do not do it since I believe that further research is needed on the quality re-evaluation process, not to mention the division of consumers in two basic groups. Second I simply do not have the time. Further research may bring us to a situation where a set of more testable hypotheses can be set up that would be able to withstand a more scientific process of testing the validity of the framework.

2.1.1 Neo-classical theory vs. evolutionary economics

When discussing methods I find it proper to mention why I have not used common economic theory to explain. There are two dominating bodies of economic thought today; the Neo-classical economic theory and the so called Neo-Schumpeterian

approach developed by Evolutionary economists such as Rosenberg, Dosi, Nelson and Winter to name a few. The major characteristic of the Neo-classical theory is that it builds upon basic concepts such as ”economic man”, ”profit maximisation”, ”marginal analysis”, general equilibrium between supply- and demand sides of the economy etc.

Significant for the Neo-Schumpeterian approach is the salience it attributes to technology and technical standards as engines of growth. For example it claims that the passing age of mass production was underpinned by electromechanical technologies, the products of the mass consumption industries and oil and petrochemicals as basic resources of cheap energy.[14] The *primus motor* of the economy is belived to be the ”entrepreneur” who brings about ”creative destruction” by introducing innovations. The approach has been criticized for being technologically deterministic, meaning that other influences such as social, organizational or market conditions have subordinate positions compared to technological influences when explaining changes of for example economic efficiency and growth.[15]

Since I have chosen to study an aspect of the economy which relate to time I was not pleased with neither of the two discourses. The Neo-classical theory has its focal point on the present and the most cost-effective way of producing and the focal point of the Neo-Schumpeterian approach is change. I felt that durability needed to be studied from both of these angles and I started looking for a framework that could bridge the gap between these two bodies of thought.

I am not the first one who has come in this situation. Payson (1994) for example, tries to explain the dichotomy between the two discourses, which he regards as a ”*by-product of psychological and sociological mechanisms within the economic profession*”.

Another aspect with which this dichotomy has been characterized is a matter of how to deal with certainty on one side and uncertainty on the other. Alchian did this as early as 1950 in in a well known article where he begins by describing what he calls ”environmental adoption”:

> Profit maximisation [he puts the finger on the Neo-classical approach] will be meaningless as a guide to specific action when foresight is uncertain to the firm. Action will instead begin with the environmental adoption of the economic system to a criterion of ”realised positive profits”.[16]

This adoption he then fuses with a type of behavior based on the individual perception of uncertainty and incomplete information. Adaptive, imitative, and trial and error behavior is utilized in the persuit of ”positive profits” rather than ”maximized profits”. If on the other hand certainty is ascertainable, profit

[14] Amin, p 11-12.

[15] Ib, p 13. and Nielsen 1991.

[16] Alchian A, Armen, Uncertainty, Evolution and Economic Theory, Journal of Political Economy, Vol. 58, 1950.

maximization will be a feasible guide for economic action.[17]

Alchians conclusion is that the general Neo-classical theory is an appropriate and reliable analytical tool in environments that do not change much, i.e. when the future is certain. In changing environments one will be better off using the Evolutionary approach.

The framework I found that may bridge the gap between the two economic doctrines is a theory of organisational behaviour developed by the Scandinavian Management School in Uppsala.[18] The theory has an empirical base and the purpose of the studies was to take a broad approach on strategic management issues to gain an overview that could be used as a background for integrating and positioning other, more focused managerial approaches. This background is in reality more or less a typology of firm behaviour that could be used either as a guidance when constructing a managerial strategy for a specific case or reverse: as a guide when positioning companies by their strategy.

Since the Uppsala method rests on empirical results rather than on theory it will embrace all types of economic decision making spanning from the Neo-classical theory to the Evolutionary approach. Thus it will serve as an overall framework where the basic type industries, which often operate in stabile environments, can be positioned and related to knowledge intensive industries that do business in changing environments.

2.2 Materials

The study is of a hypothesis generating character and this is of course reflected in the material used. Most of it consists of earlier research taken from various disciplines, such as consumer research, general economics, applied economics, administration and business economics, etc. All material has of course some bias which I cannot account for. However, I expect that the bias they have in common is in favour of the modern western societies. This means, that this work too will have a bias towards the values of the western societies.

The empirical studies reviewed have a limited explanatory value regarding the causes of product obsolescence because studies on consumers' reasons for discarding are linked to the products and to the circumstances (trade cycle, politics, culture, trends etc.) prevalent at the time of the survey. Since both products and circumstances are in constant change all such tests will be difficult to generalise from. As I see it, their main contribution is when they are added to each other to form a historical understanding of the average service-life of the chosen products, and the causes of the ending of the service-life.

To sum up: The causes of product obsolescence do not belong to a broad and well

[17] Alchian, Uncertainty, Evolution and Economic Theory, 1950.

[18] Nyström, page ix.

penetrated research field. It rather consists of fragments of discussions deriving from a number of disciplines. The understanding of product obsolescence has been subordinated other research tasks in previous studies and I therefore hope that this study will provide a welcome contribution to what we know.

2.2.1 Delimitations

This study concerns consumer durable goods only. Consumer durable goods, or just consumer durables, are products designed for repetitive use such as vehicles, kitchen appliances, audio-visual equipment, furniture and floor coverings, hardware, toys and other household and garden equipment. The life span of such items will vary, a product's durability being its ability to perform its required function over a lengthy period under normal conditions of use, without excessive expenditure on maintenance or repair.[19] If nothing else is said the word product refers to consumer durable goods.

Another limitation will, according to the bias mentioned above, delimit this study so that it is valid for first world countries only, i.e. industrialised welfare states with a democratic political system and a free market economy.

A further limitation, although a theoretical one, concerns the number of users a product has before it is discarded. The implicit assumption of this work is that of one consumer, regardless of whether the goods is bought new or second-hand. This implicates that it is possible that the service-life may be underestimated in some examples due to the fact that I do not distinguish between discarded and taken out of use.

2.2.2 Comments on the work

I find it worth mentioning that I could not be able to find an explicit definition of the concept "quality". In fact very vague definitions were given through out the literature even though, complicated theories build upon the concept. The definition of quality dodged me to a point where I decided I had to define it myself. Therefore the discussion leading to the conclusion that quality is a socio-cultural construction is my own. The same accounts for the quality re-evaluation process concept – I invented it myself and even though it may seem quite obvious to the reader, the like is not to be found in the existing body of literature, or at least I have not been able to find it.

The treatment of psychological obsolescence admittedly receives too little attention in this work. However, psychological economy is not my field and for me to dive into it seemed to be a task that I hardly had time to. Those interested might be glad to know that there is a handbook of economic psychology[20] and a journal titled "Journal of psychological economy."

[19] Cooper, 1996, p5.

[20] Veldhoven Gery M van (ed), Handbook of Economic Psychology, Kluwer verlag, 1988.

Part 3
Factors influencing the life of durable goods

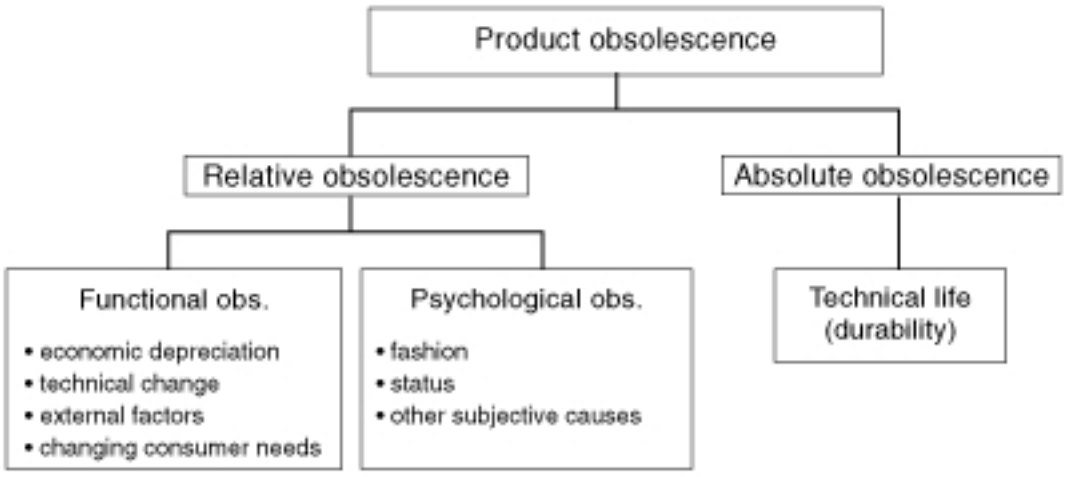
" . . . from a technical point of view there is no question that longer-lived appliances could be made. This is freely agreed upon by manufacturers of these products."

Robert Lund[21]

3.1 Definitions of product life and product obsolescence

By durable goods we mean products that provide a number of services to its users during their product life and therefore durable goods are bought only once in a long time and are be used for a long time, examples are cars, furniture, watches etc.[22] Durability may also be described as a physical characteristic built into the product and durability is then a word used to describe a products resistance against wear due to use. The term durability therefore is synonymous with technical life.[23] The primary concern of this study, however, is not exclusively that of the degree of durability but more precisely of the *actual* life-span or service-life of durable products. By placing the focal point on the actual service-life it will be necessary to include other factors affecting the products life as well as the products resistance against wear. The interest of the study thus concerns all factors affecting the life-span. These factors are called *factors of obsolescence* (see fig 3.0)

figure 3.0 *Basic tree of the factors of obsolescence*



[21] Quote from the OECD-report, 1982, p25.

[22] Durable goods can be contrasted against *flow goods.* By flow goods we mean goods that are purchased repeatedly and that perish after usage, for example, food products such as fruits and many plastic and paper single-use products.

[23] Muellbauer 1983, according to Heiskanen, 1996.

If we want to organize these factors the first step would be to distinguish between absolute obsolescence and relative obsolescence.[24] Absolute obsolescence referes to the physical wear down of the product, i.e. to durability, while relative obsolescence dependes on an evaluation of the product in comparison with new products.

Relative obsolescence can be further divided into functional obsolescence and psychological obsolescence,[25] depending on which criteria the owner uses when the evaluation takes place. Functional obsolescence occurs when a product is taken out of use because the owner has found that a new product has a so much enhanced function that it is profitable to exchange the old one (some kind of objective, comparable, criterion is used for example watts, horsepowers, clockspeed, etc). Psychological obsolescence occurs for the same reasons but a subjective criteria is used when comparing, for example ”it looks better” or ”it feels nicer”.

By service-life is meant the period from purchase until the product is taken out of use by its last owner. I will discuss the different forms of obsolescence and relate them to their contexts before ending up with a framework where they together form a more complete picture.

3.2 Factors of absolute obsolescence

Absolute or technical obsolescence is often called technical life, whose basic meaning in turn, equals the meaning of the word durability. The term technical life is, however, easily confused with the term technical change and because of that an explicit definition of technical life is needed. Technical life is the time during which a product gives satisfactory service for what it was originally designed for, i. e. until it is worn out. Technical life therefore defines *potential* service-life of a product. This aspect is the most frequently used and resembles taking a strictly technical view on the product life cycle since its measurement only includes wear, service and repairs, upgrades and other physical aspects.

The term technical life is easily confused with that of technical change when the product is said to have become obsolete because a larger system, which it has been connected to, changes technically and thus makes it useless. 5 inch floppy discs and vinyl record players being obvious examples. I would like to stess that technical life only relates to wear and tear of the product and when a product becomes obsolete because of a systems change it has nothing to do whith technical life.

obsolescence due to systems changes is a form of relative obsolescence since products that do not fit the new system may still be intact with service-life left. This mean that the products are only useless relative to a specific system. It does not mean that they are worn out. The consequence of making an error is not merely statistical but also has as a consequence that potential second-hand markets are excluded. To make this completaly clear I would like to give concrete example. Consider the teleprinter.

[24] Dahl, 1980, p31 and Heiskanen 1996.

[25] Ib.

The teleprinter became obsolete because people started using the better technology of fax machines instead. An important explanation to the rapid increase in the number of fax machines is that the fax technology could use the existing telephone cable network whereas the teleprinter technology required a separate cable network. The point here is, that even though a lot of teleprinters were found more or less useless in those parts of the world where fax machines took over, there were other parts of the world where networks of teleprinters continued to be used. Such networks exist even today in third world countries, China for example. Teleprinters are also still used by military forces through out the world because of the technology's high reliability.[26]

The conclusion is that when system changes cause obsolescence, the obsolete system and the product connected to the obsolete system are subjected to relative obsolescence due to technical change.

Wear and tear resistance

Technical life of a product is of course primarily dependent on the resistance to wear and tear built into the product when it is produced. It is recognised as faults, functional deployment etc.[27] The durability is determined by the manufacturer when designing the product, sometimes perhaps arbitrary but often after a conscious calculation whose outcome depends on a whole range of varying factors and aspects of quality. The technical life of a product is just one among the many aspects of quality, but still one of the more important since the planned life-span of a product will set standards for almost all its components and furthermore affect its non-physical aspects.[28]

Process-quality

The technical life of a product is dependent on the regularity of the manufacturing process since irregularities in the process naturally will cause variations in the output, meaning that the technical life will vary between otherwise identical products. The term used to describe this aspect of quality is *process-quality*. An important part of quality control systems is to increase evenness of the output, or enhance the process-quality.

Maintenance, service and repairs

Technical life is also dependent on the possibilities of maintaining the product during its service-life. Available service-shops, spare parts at reasonable prices, well written service manuals and a general ease of repair are the most important factors. An example of this is the increasing service-life of TV-sets which has been explained as being caused by the increase of repairability due to the use of modules that are easily

[26] Private talks with L-E Orrevall, teleprinter expert at Svenska Philips AB with experience from building and maintaining teleprinters and teleprinter networks in China.

[27] Dahl. p31

[28] In the flora of quality management literature I suggest looking for David Garwin, Managing for Quality.

exchanged when broken.[29]

Quality debasing even though the product is not used

Some products age even though they are not used. Rubber, for example, dryes and eventually cracks will appear on the surface. To some extent therefore, products made by or with rubber (tyres, shoes etc) may have a ”best consumed before” date build into them. Some plastic qualities has equivalent characteristics.

3.3 factors of relative obsolescence

As I already have explained, relative obsolescence can be further divided into functional and psychological obsolescence depending on which criteria the owner uses in his or hers quality evaluation of an owned product.

Functional obsolescence occurs when some sort of *objective* criterion is used to determine the quality of the owned product, for example by energy efficiancy: ”my product costs me $ 800 to run each year, the new ones only $ 500, and I have calculated that they will pay themselves in four years” or by strength: ”my product is only a 600 watt one, the new ones are 1000 watts, so they must be better”.

Psychological obsolescence occurs when *subjective* criteria are used, for example ”it looks better” or ”it feels nicer”.[30] There is however a greyzone between functional and psychological obsolescence. For example; even though the buyer belive so, the 1000 watt product in the example above does not necessarily have to be 400 watts better than the 600 watt product. Thus there may exist cases where functional obsolescence in reality is psychological obsolescence. In this study, however, I keep things apart.

3.3.1 Functional relative obsolescence

Economists often talk about ”economic depreciation” when they discuss product life. To estimate the economic depreciation of a product a calculation has to be done that compares the product’s performance with that of new products. This aspect of product life is always considered in relation to capital goods, i.e. productive investments such as buildings and machinery. That it really is used in this respect is more or less taken for granted by most countries’ national account offices, when they try to measure the nation’s capital stock of manufacturing assets.

In the OECD countries the economic depreciation (often called service-life in this guild) of these assets is measured or estimated by the tax authorities because they need to specify the number of years over which the depreciation of the assets may be deducted from profits before charging taxes. Other methods used in measuring capital stocks are company accounts, surveys, expert advice and other countries’ estimates.[31]

[29] OECD, 1982.

[30] Dahl, 1980.

[31] Methods used by OECD countries to measure stocks of fixed capital, OECD,1993.

Economic depreciation

The measurement of economic depreciation, which determines economic life, has of course greater value the more it is tied to the owner's wallet. The economic life of a manufacturing asset, a lathe for example, is dependent on the company's stock of orders, its productive capacity, its need of labour and service, wear of tools, energy consumption etc. All these factors are considered and compared to new lathes and when calculations show that it is beneficial to invest in a new lathe the company will ultimately do so – regardless of the age and function of the present one. A lathe certainly has strong ties to economic preconditions which means that the economic life measurement is appropriate for this kind of asset.

Consumer durables are often much less tied to economic preconditions than productive assets. A refrigerator for example has only two aspects to consider if we want to measure the economic life: price and energy consumption. This does not mean, however, that the economic depreciation of refrigerators is never considered. But since the importance of the cost of maintenance and energy weighs so light, the price of a new household asset (a refrigerator) will play a more important role than the price of a new business asset (a lathe).

If for example a calculation of energy efficiency vs. energy price shows that it is profitable to exchange an existing refrigerator for a new one, the profit is likely to be quite small compared to the initial cost of buying the new one. On top of that the profit will be spread out over the life-time of the new asset, resulting in a risk of loosing part of it, if yet another even more energy efficient product is introduced to the market. The initial cost, on the contrary, one must pay immediately or lend and pay interest for which decreases the profit of exchanging the old refrigerator for a more energy efficient one.

A conclusion would be that the measurement of economic depreciation will have less impact on consumers buying consumer durables than it will have on purchasers buying business assets because they quite likely to be sophisticated in their assessment of new and used assets. Reasons are that the size of their purchases often justifies extensive market and structural analysis before purchase and also because these buyers are likely to be specialists.[32]

It seems that economic depreciation comes close to absolute obsolescence on the markets for business assets. This conclusion can be drawn from the fact that the actors on these markets are well informed and furthermore that both buyers and sellers are using the same criteria – economic depreciation – for buying and for ranging out assets. Further support for this conclusion can be drawn from the above mentioned fact that this is taken more or less for granted when measuring stocks of productive capital. An explicit example on this is a widely cited survey done by Hultén and Wykoff in 1981 who estimated the rate and form of economic depreciation from data on vintage asset prices, thus, and this is my point, taking for granted that economic

[32] Hultén and Wykoff, The Estimation of Economic Depreciation Using Vintage Asset Prices, 1981, p380.

depreciation mirrors absolute obsolescence.[33] Erik Biørn, another author discussing methods to measure depreciation of productive assets, has a similar view:

> ” - - - empirical evidence on survival profiles - - - could be obtained in two ways: By observing the *actual age distribution* of the capital stock and the firms' *actual scrapping behaviour*, or by observing the development of *vintage prices* for sufficiently homogeneous capital units.”[34]

The most frequent method used is, in fact, by using vintage prices (second hand prices) as Hultén–Wykoff and Biørn, do. This method is checked from time to time by empirical research by trying to empirically establish actual age distribution and scrapping behaviour.[35]

Returning to the households it seems obvious that economic depreciation does not determine much of the out ranging or scrapping of their products. The family car or the house may of course come into consideration for the concept, but the majority of the households' possessions will most probably have their service-lives determined from other reasons.

Technical change

When technical change (sometimes called technological obsolescence) causes obsolescence it can be either of the following causes:

(i) new technology creates obsolescence of old technology. An example is when the slide-rule was made obsolete by the pocket calculator.

(ii) enhancements made in existing technology. For example the development of the cathode-ray-tube technology used in TV-sets (the catode-ray-tube has been used as tv-screen ever since it was first developed).[36]

(iii) technology diffusion. Meaning that new technologies are applied together with old technologies. This could be exemplified by the increasing computerisation of almost everything, from toys to air planes.

Changing consumer needs

Humans needs change. When major changes in an individual's life occur, for example when the bachelor forms a family or when the children move out for good. The consumer perceives the products that do not fit into the new situation as obsolete and does away with them. The individual/consumer will choose new ones that are better

[33] Ib, p367. An application of the Hultén-Wykoff study was made 1989 by Bengt Hansson. (Construction of Swedish Capital Stocks, 1963-87) Economic Studies 1989:2, Department of Economics, Uppsala Univ.

[34] Erik Biørn, 1989, p148.

[35] An often used empirical survey is ”The Capital Stock Survey Project” published by Investment and Capital Stock Division, Statistics Canada, 1986. For a discussion on the weaknesses of the use of vintage prices see appendix Ap2-4 in the Evaluation Report of the project. Also take a look in Methods used by OECD countries to measure stocks of fixed capital, OECD,1993.

[36] Rosenberg, 1994.

suited to the new situation.[37] Another example is that children grow out of their clothings. Not to mention their toys.

External factors

External factors causing obsolescence could be changes in complementary products, damages to the product due to accidents, careless handling etc. To the category of external factors I also would like to include gifts.

The habit of giving gifts is a human behaviour that is very old and we do it for social reasons to exchange values and as expression of love.[38] When the buyer of a product is separated from the user of it, symbolic values of the product will come more in focus than is the case when the user himself buys the product.

A designed axe with an expensive hickory handle might be bought as a gift and given to a person who already has an axe, however not designed and expensive. The new axe then makes the old one obsolete and the owner will probably tuck it away somewhere and thus end it's service-life.

Of course all gifts do not induce obsolescence especially if it is flow goods[39] such as a bouquet of roses or a box of chocolate. However, we do not only give flowgoods as gifts. On the contrary, almost any durable good can be forwarded as a gift. A study done by Carrier suggests an increased marketing of products as gifts during the 20th century.[40]

3.3.2 Psychological relative obsolescence

Psychological obsolescence means that the user or owner of a product discards it because of a change in the user's subjective perception of the product. This is usually explained as a shift of individual preferences. These, in turn, rests on socio-cultural and/or socio-economic factors like for example learned experiences, status achievement, fashion, pleasure/annoyance (aesthetic aspects) etc.[41]

Because of the subjective influence, psychological product obsolescence is very diffuse in its characteristic and therefore difficult to distinguish further. (see delimitations, section 2.2.1, page 15)

3.4 An operative conceptual framework

The most appropriate definition for the study of a product's actual time in use is the service-life. Several studies of product obsolescence have used basically this term, however giving it different names; Heiskanen, for example, uses the term product life, Dahl uses service-life, the Swedish Research Group for Strategic Environmental Studies (FMS) uses actual time in use and OECD average life in use. Even though

[37] Dahl 1980.

[38] Russel, Gift Giving as Agapic Love, 1993.

[39] See footnote 22 on page 16.

[40] Carrier, Gifts and Commodities, 1995.

[41] Heiskanen, 1996, p6.

these concepts may have methodological differences, they all define product life as the period from the time of purchase to the time of discarding. These studies (except Dahl) do not have the explicit purpose of studying product obsolescence. They rather resemble prestudies with long run political/environmental ambitions of finding methods to increase the longevity of products. This is perhaps the reason why they all have some what short discussions on the causes of product obsolescence.

I have chosen to call product's actual time in use "service-life" because it has the longest tradition and because it points at the time a product gives *service*. The alternative would have been a combination using the word *use*, however, this word is less precise. For example, it may be said that a product that is stored is in use, since there is a purpose for storing it. On the contrary, a product can not be said to be *in service* if it is stored because the word service connotes to the original function of the product and not to alternative functions of it. Service-life then is the time from purchase to the time when the product is taken out of use for good, no matter what reason.

The service-life of a product is always measured in calendar time beginning at the moment of purchase since service-life is a term that includes all factors of obsolescence and not only technical ones. The *technical life* of a product, however, can be measured as calendar time or as running hours. What is appropriate depends on the type of product.[42] It is important to be aware of this when comparing products and especially when conducting empirical research.[43]

Service-life can be empirically determined simply by studying discarded goods on solid waste dumps. Such measures of service-life will, however, be of limited value since the reasons for discarding the different products are not analysed.[44] A meaningful service-life measurement will have to include all of the above mentioned causes that affect product life. Dahl, one of the first to develop this concept, used it to conduct empirical surveys on the reasons for renewing, replacing and discarding household durables.[45] Since the reasons for discarding were left open, Dahl automatically included reasons previously unknown.

Dahl used the earlier mentioned measurements (technical, psychological etc.) to categorise the different reasons to discard and created a new typology for the remaining reasons derived from the survey. This method is highly inductive (meaning it creates a theory rather than it proves one) but limited to type of product, culture etc. The reasons for discarding given depend on how the questions are formulated to the respondents.[46]

[42] Roughly the technical life of *static* products, that are always in function, like lamps or bookshelves, is best measured by calendar time while the technical life of *dynamic* products, who can be either in function or idle, like vacuumcleaners, cars, CD-players etc. is best measured by running hours.

[43] It is obvious that one can not compare studies where durability is measured using different methods. It is, for example, not possible to compare "years between purchase and discard" with "hours in service before worn out"

[44] Hunkin, 1988.

[45] Dahl, 1980.

[46] Ib, section 1.2.5.

Figure 3.1 illustrates the operating definitions of obsolescence. The figure consists of a time axis where, at the left end, the product is bought by the consumer / user and therefore represents the beginning of the products service-life. Along the axis are placed two points which illustrate the main causes of the possible ends of the service-life. These two points represent relative and absolute obsolescence. Whichever of these causes that comes first on the time accis determines the reason for discarding the product in question.

In figure 3.1 the service-life of the product is ended due to relative obsolescence. From a strict obsolescence perspective, the product could, for example, have been the lathe in the example above; the owner installed a new, relatively better lathe and took the previous one out of use *even* though it, from a technical point of view, had quite a bit of service-life left. Another example that could be illustrated by figure 3.1 would be a pair of bathing trunks which were fashionable the season when they were bought, but not the season after, resulting in the owner purchasing a new pair of bathing trunks the second season despite the fact that the owned pair still had potential service-life left well enough to cover one more season.

Figure 3.2 display a situation where the product meets the end of its service-life at a moment that comes earlier than what the owner would have wished, which is most often the case when absolute obsolescence determins the end of the service-life. The product ”dies” at a point where there is still some time before relative obsolescence would have made the owner renew the product.

A firm that brings out a large portion of inferior goods on the market is therefore likely to be accused of planning the absolescence, and this is exactly what happend in the USA during the fifties and which led to the classical debate on planned obsolescence summed up by Vance Packard in his book ”The Waste Makers” (1960).

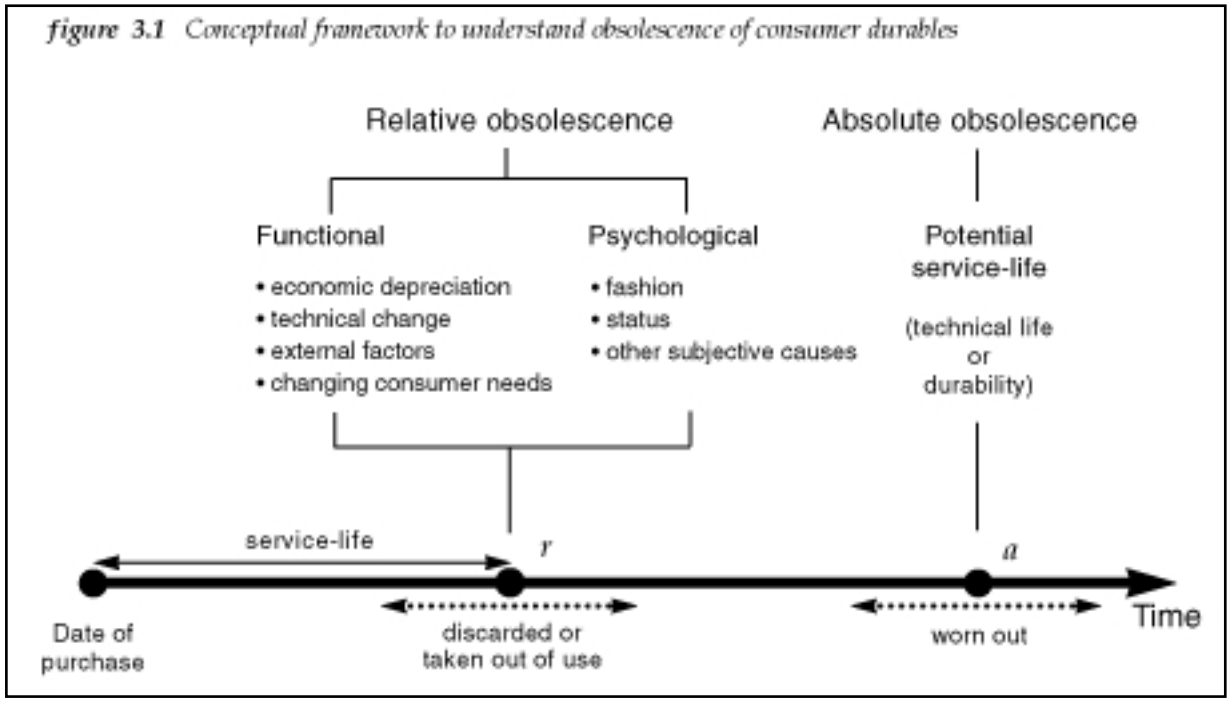
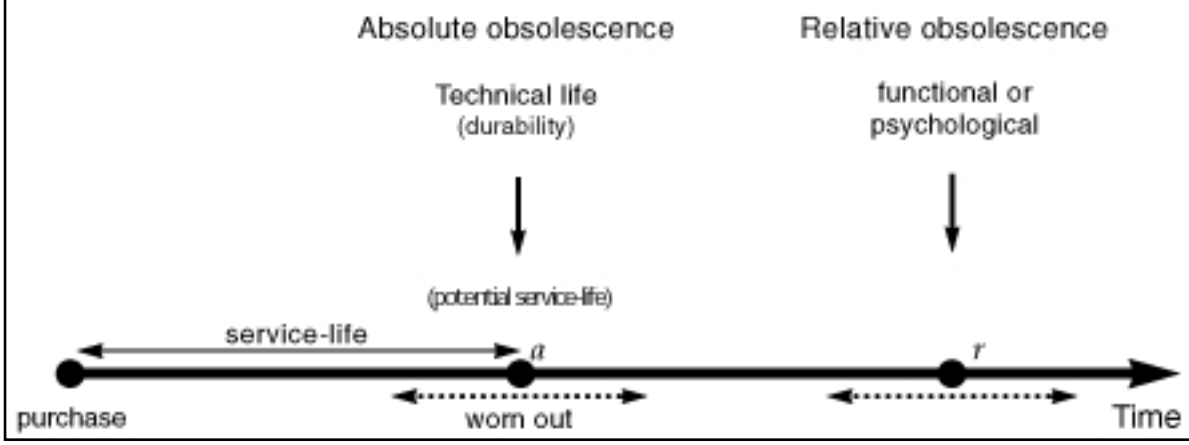


figure 3.1 *Conceptual framework to understand obsolescence of consumer durables*

The term ”planned obsolescence” implicate that there exist some sort of ”natural obsolescence” and that planned obsolescence means shorter service-life than the possible natural choice. However, the natural rate of obsolescence (seen as the feaseble technical-life horizon) would not be interesting as long as people discard products due to changes in fashion, technology etc. In the debate of the 1960s, technical change was, implicitly, regarded as the only legitimate reason for planning obsolescence.[47] Therefore those who argued against planned obsolescence also attacked producers obsession of continuously finding ways to persuade consumers to get attracted by new models.

figure 3.2 The traditional case of planned obsolescence. This situation, when absolute obsolescence occurs before relative, is often called "planned obsolescence". If this accusation is to be true it must first be ascertained that the producer can increase the technical life beyond point a, and secondly: that this can be done at a cost that does not impede the producers' price-competitive position.



The morals apart, it is obvious that *Changes* is a key word for many producers, and that the character of the changes are of little concern as long as the consumer feels attracted to the product and as long as the competitive strength is maintained.

Easy too see is also the impact of a combination of the two, i.e. that relative obsolescence combined with absolute obsolescence so that the two, in an ultimate situation, peak at the same moment. Philip Crosby a well renowned American quality management expert, claims in a book published 1990, that this is the essence of many of today’s quality development programs used by manufacturers.[48]

Historically the industry has been strong advocates for planned obsolescence from the 1910s througout the 1950s. In the late fifties the manufacturers started arguing for

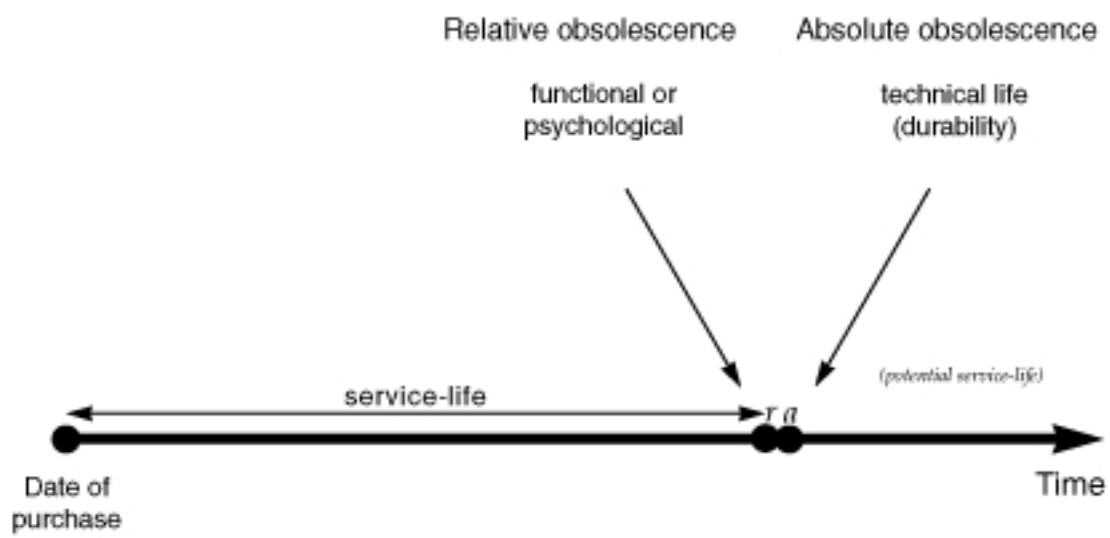
[47] See for example Packard, Durning, Cooper or Shy, Industrial Organisation, 1995, p322.

[48] Crosby, 1990, p16-17. (question three)

a combination of creating absolute obsolescence together with relative obsolescence.[49] The explicit purpose of such scheming being the expectations that these two factors will reinforce each other and by that create a higher demand for the products in question. The thought is illustrated by figure 3.3.

Figure 3.3 illustrates the case when relative obsolescence occurs at the same time as the product finally fails. Since relative obsolescence derives from the owner's subjective perception of the product he/she will not feel any discontent when the product finally fails, as was the case in figure 3.2. The more relative obsolescence the product is exposed to (technical development, design, changed needs etc.) the less discontent will the owner feel if the product meets the end of its service-life due to absolute obsolescence. This idea or "trick" (see footnote No. 49) the producers had an open discussion on during the fifties; the question addressed was how to develop a strategy where all obsolescence factors meet at the same time. The solution, originally developed by General Electric during the second world war, was found whithin the

figure 3.3 *Optimum durability.*



[49] This could be read in for example the Swedish employers (SAF) magazine **Industria** No. 4, 1959: "mass consumption must be based on a fast overturn if the market is saturated, i.e. the car owners must be made to get tired of their cars –or the cars to get tired of their owners! Otherwise there is a risk that the production flood of the car industry stagnates with enormous consequences to the millions of people dependent on the car industry. All this talks for a *modest life-length*, which should not be too difficult to achieve and *frequent model changes*, which are more difficult to achieve since massproduction demands a high degree of standardisation." (Translated from Swedish. emphasis as in the original).

The next example comes from the magazine **Dun's Review and Modern Industry** (1959) as an article titled "Planned Obsolescence: Rescue for Tired Markets?" In this article the author claims that a solution to the problem of market saturation is to create obsolescence through material, function or fashion: "The trick isn't foolproof but ought to work a good part of the time - and perhaps even be planned, assuring the manufacturer of a large, steadily increasing replacement market. - - - *It is clear that a pattern of successful style obsolescence eventually must be reinforced by a decrease in the durability of the product*" (emphasis are mine).

Total Quality Control systems originally developed during WW 2 to control the quality of complicated military equipment.[50]

Now, it is important to recognize that quality control systems are extremely important for any producer who wishes to compete by improving the quality of their output and that today's systems (standardized under the ISO 9001 system) are in fact essential when it comes to increase the quality of output. Equally important is to recognize that the quality systems have one severe flaw, and that is that "garbage-in-garbage-out" rules, which means that the system is highly dependent on the kind of target which is set for the product, i.e. how the producer actually defines "quality" when developing the product.

If the producer defines quality as "fashionable" the ready product will become a fashion item (assuming that the quality control system works properly). If they define quality as "durability" the finished products will last for a prespecified period, etc. For all parts, producer, consumer, society, environment etc., the ultimate quality is when all obsolescence factors meet at the same point, as in fig. 3.3 – the crux is: who shall be in charge of setting the points on the time axis?

Now it is time to take a look at some empirical studies to get a view of the reasons, which consumers have, to renew their possessions.

[50] Granberg, 1996.

3.5 Consumers' reasons for replacing durable goods

In this section I will briefly review some of the more important studies on consumers' reasons for replacing durable products. But first of all it is fair to say that there is not a huge body of research in this area. To draw any conclusions whether consumers' reasons for replacing durable goods actually have changed from a historical perspective is therefore impossible. Such studies would likely be conducted as historical cross-sections, but that requires a choice of comparable objects, which will be difficult to find since most products and technologies change during the course of time – and at different pace. The conclusion is that it will be hard to identify equal products in the different historical cross-sections. On top of this problem comes the lack of studies concerning the sevice-life of durables, i.e. would we against odds be able to identify a number of products that are comparable over time, it seems probable that we will miss the data on the length of their respective service-lives.

When it comes to studies on the service-life of consumer durables it is important to recognise that it is essential to be aware of the type of questions asked. Several studies, for example, more or less take for granted that the end of the product's life is caused by absolute obsolescence. Examples of this kind gives a study conducted by the British Department of Energy 1990 and another one by Euromonitor Market Research 1992. Department of Energy suggests that kettles, irons and vacuum cleaners now are less durable than in the past and Euromonitor Market Research that cooking appliances are less durable.[51]

The already mentioned report delivered by the OECD in 1982 has a wider approach and concludes that while the service-life of some products obviously has increased, long-life light-bulbs, batteries and TV-sets for example, the life expectancy of other products have decreased, lighters, disposable razors etc.[52] They also recognize that the life expectancy depends on a number of factors. This recognition is primarily due to influence from Dahl.[53]

A two year long study of products discarded at English waste dumps supports the observation that products' service-lives depend on more than just their resistance against wear and tear.[54] The study implicitly assumed that products found on dumps were discarded because they were broken (i.e. they assumed absolute obsolescence and had little knowledge of relative obsolescence) and was therefore amazed to conclude that less than half of the products were in such a condition that they were beyond easy repair. One fourth of the TV-sets, refrigerators, freezers, vacuum cleaners, washing machines and sewing machines still worked without any obvious fault. Another fourth could be repaired at a material cost of less than £10.

There were, however, large differences among the product groups. The sewing machines had almost all of them been through some kind of accident – bent shafts

[51] Cooper 1994. Note that Dahl did reach the same conclusion using a more holistic method.

[52] OECD, 1982.

[53] Dahl, 1980.

[54] Hunkin,1988.

and cracked cases were common. A large majority of the vacuum cleaners were worn out due to normal wear, in spite of this their average service-life was less than ten years. Freezers, refrigerators and washing machines often had trivial faults, however sometimes difficult to locate due to the complicated construction of these machines.

Since less than half of the products in this study had reached the end of their potential service-life it is quite easy to conclude that other forms of obsolescence must exist. Apart from the support it gives to my study we may also recognize that it hints at the proportions between relative and absolute obsolescence. However, such conclusions can only be valid in the context from where they originate i.e. the proportion between relative and absolute obsolescence are not likely universal but should logically depend on a number of factors differing between countries and regions and should also change with the course of time.

Another study is just now finished by Statens institutt for forbruker forskning (SIFO) in Norway.[55] This study is an empirical survey where the primary task is to find the reasons behind consumers' choice to renew their possessions. Over one thousand Norwegian households have answered questionnaires. One of the questions, which I can review here, was related to the living room sofa. On the question "why did you exchange your sofa?" the answers have been grouped as follows:[56]

absolute obsolescence	58 percent
psychological obsolescence:	31 percent
technical change:	0 percent
changed needs:	17 percent
average age of the discarded furniture:	8 years

From this we can see that the dominating reason for the Norwegian people to go sofa-shopping is that the old sofa is worn out. The most interesting observation though is perhaps that not a single person goes sofa-shopping because new sofas are so much better than the old ones, i.e. the technical development of sofas seems to stand still.

My interpretation of these studies is that the service-life of consumer durables depends on an interaction between consumers and producers. To look one eyed on the producers will not give us adequate knowledge to understand the reasons for obsolescence. The consumers participate in the process of creating obsolescence and therefore a model or a framework need to be created to make it possible to relate consumer- and producer behaviour to one another. This I will attempt to do in the following sections.

[55] Lecture held by Pål Strandbacken, SIFO Norway, at the Swedish Ministry of the Environment in Dec 1996. The report is due in May 1997.

[56] The figures are preliminary. The sum exceeds 100 percent, which is explained by the fact that some respondents checked more than one box on some of the questions. The terminology above is a translated so that it fits in to the terminology of this paper. Throne-Holst uses the term quality debasement instead of absolute obsolescence and functional obsolescence instead of technical change.

3.6 The quality re-evaluation process

In this section I connect consumer reasons for replacing goods to a quality re-evaluation situation, where the customers compare the product which they possess to new ones they are being exposed to. I will argue that this situation is continuing throughout the service-life of a product and thus constitutes a process. Further I relate the concept to the term ”consumer preferences” and discuss whether or not producers have an influence on these.

The quality re-evaluation process concept as developed here can be said to correspond to a mirror image of marketing managers' attempts to describe the development process of products and in particular the process of developing customer perceived value.

A concept called the ”Product Value Process” developed by Linn,[57] is an example of such a mirror image. It is described as a process where the supplier creates a potential for value, which is realised in the sales transaction and in the buyer's continued process of use of the product.[58] Suh, 1990, has a similar view, although more oriented towards the process of technical design of the product.[59] The explicit difference between the quality re-evaluation process and the ”Product Value Process” is that the focus of the quality re-evaluation process lies upon the consumer's valuation of an *owned* product in comparison with advertisement of a new product, whereas the ”Product Value Process” focuses on ways to increase consumer's valuation of a *new*, not yet owned, product. In the quality re-evaluation process analysis, both the owned product and the new substitutes will be present. In the ”Product Value Process” the presence of the product already owned by the consumer is implicit whereas the new product is very explicit indeed.

3.6.1 Adefinition of quality

First of all we must be at terms with the word quality. Quality is a concept that has a very vague definition. Even organisations working to promote quality in production are found reluctant to give a precise definition.[60] Drawing from several books on quality control thinking aimed at producers I have come to the conclusion that the perception of the word quality differs vastly between different groups in the society. To make this distinction clear I will briefly discuss quality in relation to the producer separately from the consumer.

[57] Linn, 1996.

[58] Ib, p89.

[59] Suh, The Principles of Design, 1990.

[60] An illustrating example is found in a handbook written by the Swedish institute for quality development, SIQ, (Institutet för Kvalitetsutveckling). The handbook is aimed at companies competing for a quality reward (Utmärkelsen för Svensk Kvalitet). Here the following text can be read: “In the criteria for the reward the word ”quality” is seldom mentioned. Instead concepts such as enhancement and customer satisfaction are used. This derives from the fact that ”quality” does not have a clearly recognisable definition but can be interpreted in many ways. Also the meaning of ”quality” is successively shifting over time. Today the opinion seem to regard quality as containing all aspects, factors and conditions that are relevant to a customer or receiver of a product. The quality is right when all explicit and implicit wishes of the customer are satisfied.“ Utmärkt Svensk Kvalitet, p7. (translation from Swedish by author).

Consumer's perceptions of quality

Buyers (unlike sellers) of consumer durables often have a problem: the quality of the product can not be determined prior to the purchase. Therefore what is discussed in most quality-oriented literature is in what way and how accurate the consumer *perceives* quality. This situation, where the consumer lacks information about the product that the producer has access to, is termed ”information asymmetry” and a way to study it has been to categorise products as either ”search” or ”experience” goods.[61] Products whose quality can be determined prior to purchase are called search products and those whose quality can be determined only after purchase are called experience products. These labels are only hypothetical and neither search nor experience goods exist in an absolute sense, rather we should view these labels as two extreme ends of a continuum; product characteristics and buyers ability to evaluate these will determine the degree to which a product is a search product or an experience product. Needless to say perhaps, but most durable goods are experiance goods, while flowgoods are more like search goods.

So, in one extreme there are search products, whose quality is easily detected by the consumer, and thus he/she will search for the most favourable price/quality combination among the substitutes available on the market. In the other extreme there are experience products, where quality is difficult to detect prior to purchase. Here the quality conscious consumer will look for ”signals” that reveal the quality of the product before making the choice.[62] Such signals could be brand-name, producer reputation, warranty, higher price, or the like.[63] Consumers, who wish to prevent the producer from debasing quality prior to a transaction, sometimes choose to offer price-premiums to the producer. These are, however, most common in industrial buying scenarios.[64]

Summing up the consumer's perception of quality we may say that it is just – a perception, i.e. the consumer lacks information of the true quality and therefore what the consumer ”knows” is what he perceives. Taking this a step further it will be recognizable that what the consumer perceives as quality depends on what he values. For example, if a person values ecologically grown food, then a certification of ecological growth printed on the container will mean quality to this person. Another person looking at the same box, but who is indifferent to ecological growth, will not consider this quality aspect of the product, but will compare it to conventionally grown foodstuff.

To a person, who values Adidas' shoes, three stripes on the shoe will mean quality but for a person that never heard of Adidas, the stripes will mean nothing. These are examples where value and quality perception meet. They also tell us that it is the

[61] Search and experiance goods where first coined by Nelson P. in Journal of Political Economy, No 72, 1970, p311-329.

[62] Rao, 1992, p421.

[63] Shy, 1995, p327ff.

[64] Rao, p416.

present values of the consumers that define quality.[65] Since values are constructed in a social and cultural context I argue that quality too is but a socio-cultural construction.

Quality in relation to the producer

The producers' way of perceiving quality transformed in fundamental ways with the advent of quality control systems in the 1950s. The changes involved among other subjects, taking a much broader perspective when designing a product. Before the change, product quality was more or less thought of as determined by the team of engineers that did the actual designing of the product. Primarily technical and functional aspects of the product were considered by this team.[66]

After the changes a new product developing team was formed consisting of people and experts from all corners of the company: marketeers, people from the company financial office, sales men etc. New professions emerged such as the industrial designer. The engineers saw their influence shrink to the strictly technical realm and found that their task in the new quality paradigm[67] had been restrained and now was more to execute what others had already decided.[68]

Today a quality conscious producer of consumer durables will regard quality as all aspects of a product that the consumers in some way pay attention to. He will do this because he is aware that the company's competitiveness depends upon customer satisfaction.[69] This means that the producer will put quality aspects on the product that the customer does not explicitly consider as quality aspects, i.e. the producer will relate the quality of a product towards its ability to sell, while the consumer will relate the quality of a product towards its ability to perform its more obvious functions.

Operational definition of quality

Deciding for a definition of quality I will use the one of the new paradigm used by the producers, i.e. one that may contain all aspects of a product and not only technical/functional ones. For this reason, some might question the definition for being morally unjust. However, I do find that it is just, since I have already concluded that quality is a socio-cultural construction and thus varies, depending on person and context.

What I mean is, in short, that aestetical and other subjective aspects of a product might be just as important as physical wear and tear aspects. There is no reason for excluding any aspect of a product that might be concidered as quality, since an

[65] The observant reader may have noticed that not only did value and quality perception meet but also quality signals and brand positioning. The implication is that, in the case of experiance products, the consumers' values will be heavily guided by the more or less diffuse "signals" that company's offer as a means of revealing the value of the product. Therefore the signals themselves will be part of the value, i.e. Adidas shoes would have a lesser value whithout brand positioning advertisement.

[66] Crosby, 1990, p185ff.

[67] The shift in the producers perception of quality is so large that I do not hesitate to call it a shift in quality paradigms. This notion is supported by Crosby, 1990, p185ff.

[68] Granberg, 1996.

[69] Drummond, The Quality Movement, 1992, passim.

exclusion will only mirror personal or contextual preferences and therefore cannot be universal.

3.6.2 re-evaluating quality

Quality is central when it comes to evaluating any specific product. In the case of consumer durables the durability will naturally be an important aspect of quality when evaluating the product's overall quality. But what quality is right? Depending on view, different answers will be given. The consumer views and values the different aspects of quality and will eventually come up with an answer that most probably differs from that of the producer. A spokesman for the environment may well come up with a third answer, and so on. Even so, products are made and sold and thus quality levels are somehow being determined and agreed upon. Since the focal point is on factors explaining product life and since product life is one aspect of the quality of the product, we may see the process of determining the quality as a possible way of answering why and what is determining product life.

Now, if we remember that quality consists of a number of different aspects of the product, we will soon realise that the evaluation will not only take place at the moment of purchase but that it will continue for as long as the product is in use – the product will become re-evaluated by the consumer during the course of its service-life. The quality re-evaluation will thus resemble a process in time equal in length to the service-life of the product.

Hence, I argue that the life of a product hinges on a continuous process of re-evaluating its overall quality in relation to itself (absolute obsolescence) and in relation to other products (relative obsolescence) and that this process is accomplished by the user/owner of the product.

Empirical surveys have been conducted in the search for consumers' reasons for replacing consumer durables (see section 3.4). All mapping done by these surveys is done at the moment of discard, i.e. at the very end of the quality re-evaluation process. Dahl's survey (1980) for example, found that 64 percent of the vacuum cleaners in Sweden were replaced due to relative obsolescence.[70] This means that 64 vacuum cleaners out of one hundred were replaced before they reached the limit of their potential service-life. This suggests that the relative quality of the possessed vacuum cleaner compared to new vacuum cleaners has been evaluated so low by the owner that it was enough to motivate paying the price for a new one.

One might say that the quality re-evaluation process detected a gap in quality levels between the owned vacuum cleaner and new ones that was difficult to defend when considering the price of the new one.

In the same survey, 17.5 percent of all vacuum cleaners were replaced because of failures. For this segment the gap in quality levels between owned and new product is quite obvious: the vacuum cleaner had ceased to function; the owner does not have a vacuum cleaner any more. The new one, on the other hand does work, which forms

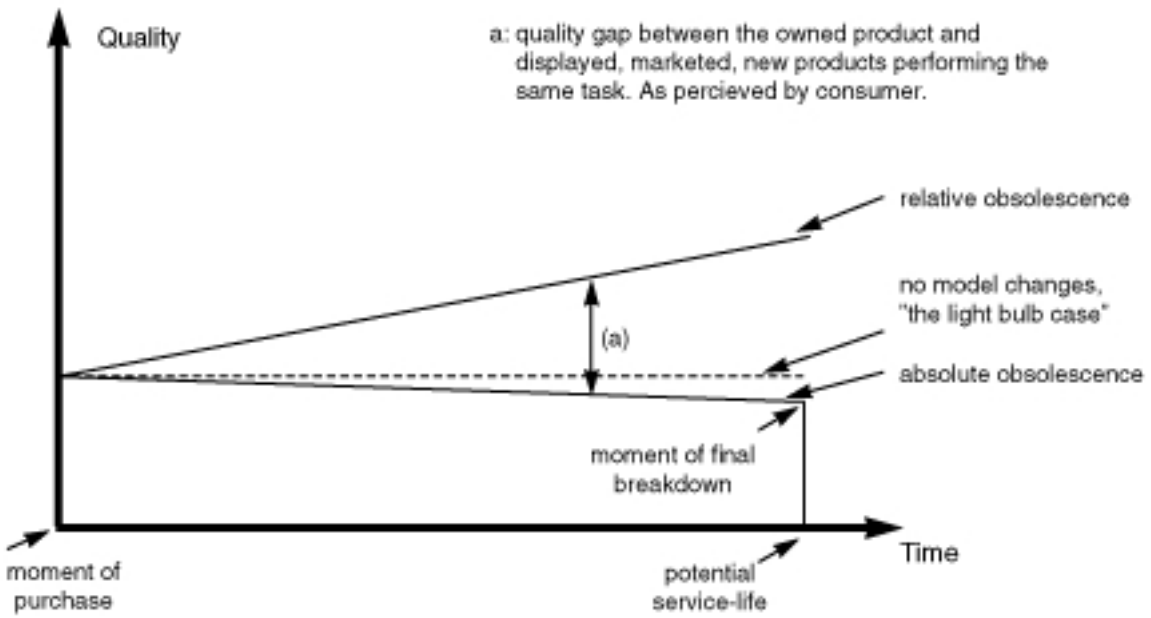
[70] Dahl, 1980, table S 7, p 375. Note the difference here with the result from the Hunkin study, see p28.

a strong motive to renew the possession.

Now, if we stop here for a moment and try to visualise these vacuum cleaners in the hands of their owners at the moment of disposal, we will soon realise that the 64 percent group, who has chosen to replace a product still able to perform its basic task, will be a more price sensitive group than the 17.5 percent group. That is because the latter group is making a choice more based on the basic service of a vacuum cleaner with psychological and other relative factors coming in second hand. Whereas the reverse must be the situation of the former group.

To give a principal understanding of the ”quality re-evaluation process” concept I will give two examples. First imagine a product where no model changes or technical development occur, a light bulb for example. Since there will be little *relative* obsolescence the quality re-evaluation process in this case will consist of the comparison of the technical quality of the possessed product and an equivalent, new one. This means that technical life will determine the length of the service-life of the product, i.e. the product will be used until it is worn out.

figure 3.4 *Principle of the quality gap.*

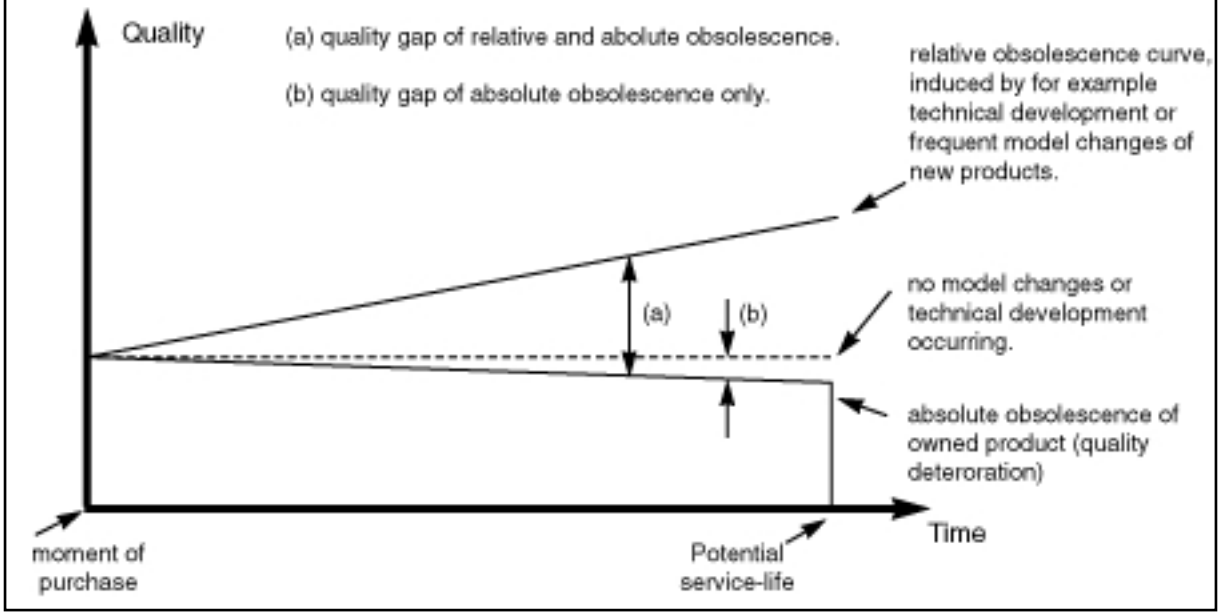


Secondly, imagine a product where frequent changes in models and fashion take place, a coffee-machine for example or a family car. In this case the quality re-evaluation will consist of comparing the product in possession with, not similar products, but slightly different products, thus technical quality will be difficult to compare. Relatively seen the possessed product is getting more and more obsolete, the more the new products are technically improved. *But,* and this is a point, this will be the case no matter what kind of changes the new products are submitted to. The quality gap between the possessed product and new ones will become widened

regardless of the type of relative obsolescence.[71]

Figure 3.4 illustrates how the consumer views quality in a fashion that resembles a process continuing throughout the service-life of any particular product. The outcome of this process is generally called ”consumer preferences” and the process itself ”changing consumer preferences”. I have chosen to avoid this terminology simply because I believe it would confuse the reader since (as far as I know) consumer preferences never have been analysed in a quality-time plane as here, and that ”changing consumer preferences” are believed to be governed by an ”isocost” where the preferred quality is a function of price in relation to the consumer's budget and further that price gives full information of the quality of the product and that the consumer has full and unbiased information about all alternatives existing on the market.[72]

figure 3.5 *Consumers perception of the quality gap between an owned product and new products in relation to relative and absolute obsolescence.*



What is discernible in the concept of the quality re-evaluation process but not in the consumer preferences concept, is that consumer preferences change when the quality of the already owned product is evaluated against new products aimed at performing the same task. (observe that there is a limitation in the quality re-evaluation process concept in the respect that the customer must be making a repeat purchase, i.e. that the customer already owns a car, a refrigerator, a pair of shoes, a coffee machine, a light bulb. . . and renews that possession. The concept does not work when the

[71] Its important to recognise that this is a highly simplified discussion since it does not separate the different types of relative obsolescence from each other. Had I done this I could not have avoided a discussion on the difference in price-elasticity between the types of obsolescence. For example it is plausible that technical changes generally have a higher price elasticity (is less price sensitive) than for example fashion changes does. But, said once again; this all depends on type of product which makes it difficult to generalize.

[72] This can be read in almost any economics textbook. Look up preferences, indifference curve and isocost in the index.

consumer buys the product the first time, in that case the neo-classical concept of consumer preferences is better suited.) This implies two things:

i) product obsolescence is heavily related to the variations of the socio-cultural construction that constitute ”quality”. Price will also be an important factor when it comes to explaining the degree of relative obsolescence in a group of products.

ii) producers have a large influence on consumer preferences in the respect that they as a group have a monopoly on introducing new products. Consumer preferences will therefore change according to actions taken by the producers. This includes both the timing and the nature of the change of consumer preferences.

To understand the first implication we need only to look at figure 3.4 and 3.5. The quality gap (labelled a) will by the consumer be perceived as a penalty connected to the keeping of the owned product. The penalty is that the new substitute products are equipped with attributes (any of the relative obsolescence factors) that the possessed product is lacking. As time goes by, the consumer, frequently exposed to the new substitutes in commercials etc., will be more conscious of the quality gap between the owned product and the potential substitutes. When he or she figures that the penalty for keeping the gap is greater than the price of a new product, a new product will be allowed to replace the old one.

This leads us to the second implication, that producers have a large influence on consumer preferences. From the first implication it is obvious that the quality re-evaluation process needs new or different products to compare the owned one with. Thus, when producers start to introduce new models they also initiate the quality re-evaluation process and by that they also begin a process that will change consumer preferences away from the owned product.[73] This implication is to some degree supported by a study that concludes that mere exposure to a brand name or a product package can encourage a consumer to have a more favourable attitude toward the brand, even when the consumer cannot recollect the initial exposure.[74]

A conclusion must be that competition among producers, resulting in a variety of alternative products performing basically the same task, will speed up the process of relative obsolescence.[75] A further conclusion is that there can be no such thing as a natural rate of relative obsolescence because the rate will depend on the alternatives available to the consumer to compare the possessed product with. If alternative products appear on the market at a slow pace then the rate of relative obsolescence will be accordingly low. If, on the other hand, alternative products appear with short intervals, then the rate of relative obsolescence will become higher.[76]

[73] This assumption may be overly simplified since not all new products become successes. Anumber of products introduced on the market fail to sell and become what is called ”fads”.

[74] Janiszevskij, 1993.

[75] Which is precisely the point when producers are differentiating their line of products, or matching products to more individual preferences. In this respect product differentiating could be seen as a sort of artificialcompetition.

[76] If in doubt of these conclusions I recommend taking part of the literature on marketing management, for example Earl Naumann’s book ”Creating Customer Value” (1995) especially chapter five, p101ff.

3.7 Obsolescence vs. marketing

The above described basic understanding of the causes to product obsolescence has in fact some resemblance to the basics of marketing, however, viewed from a different perspective. Marketing is seldom seen as a scientifically defined concept, even though several disciplines claim that they have the privilege of possessing the true key to explaining what really goes on, or should go on in a company.[77] The main question when it comes to explaining the reason of the company for doing business has been described as *selling whatever it has chosen to deal with at a higher price than it costs to acquire or produce.*[78]

I would like to continue by quoting Carl Eric Linn, a specialist in competitive strategies:

> ”Thus the reason for being a company is its ability to create a value appreciated by the potential buyer of its products (i.e. goods, systems or services). Accepting this reasoning, one must admit that an analysis of the activities, processes and systems of a company from the aspect of value creation, should have priority.
>
> If so happens, that most definitions of marketing focus on value, the creation of value, and the exchange of value. From this I draw the conclusion, that marketing should have priority of explanation of what is going on the company.
>
> You could lay design aspects on every perceivable phenomenon in a value creating organism like a company. – – – In the complete process of value development, it comes naturally to analyse the quality of the process as a whole, as well as its parts.
>
> This does not mean, though, that quality is ”everything”, rather it constitutes a vital aspect on how the process of value development is managed. But however vital and versatile other aspects may be, the description of the process must be founded on the basis for the survival and prosperity of the company. *And that is the discipline of development of buyer perceived value*.” (my emphasis)

The ”buyer perceived value” which Linn talks about as the basis for the survival and prosperity of the company may consist of any aspect of marketable aspect or quality of the supplied product. Further it is not clear whether all aspects of the ”discipline of development of buyer perceived value” is lying on the product. In the very word *marketing* lies a strong notion that the buyer must be educated to be able to perceive the value that the manufacturer has produced.

Linn uses the term ”meta value” to describe the difference between the cost to manufacture and to supply a product and the value of the same product as perceived by the consumer. The goal of the company, according to Linn, is to cost-effectively evoke in the buyer an evaluation which will yield the desired profit margin. The profit margin being the ”meta value” of the product.[79] See fig 3.6.

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[77] Porter 1980, Goldmann 1993, Aaker 1995, Hill 1993 (according to Linn 1996 p7)

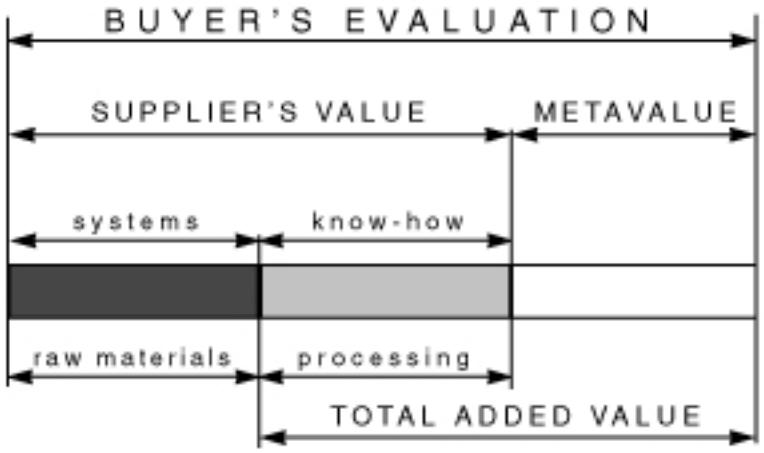
[78] Linn, Market Dynamics, 1996, p8.

[79] Linn, p88-89.

Focusing on the obsolescence perspective is seems that ”the discipline of development of buyer perceived value” has a close resemblance to the creation of relative obsolescence. If Linn is right, and he should be – he is in the business - it seems that the producers will aim their organisations so that they create meta value in the most cost-effective way.

Interpreted, the essence of Linn's framework is that the goal of the company is to induce obsolescence in the cheapest way possible. It is not a very glamourus interpretation, never the less however, it seems accurate.

figure 3.6 Metavalue shown in the supplier's cost breakdown



Source: Linn, Market dynamics, page 31.

3.8 Market mechanisms: exit, voice and loyalty

Now, do the conclusions made above have a general validity? Is the changing of the quality gap a process *equally* valid to all consumers, or are there groups of consumers where the quality gap changes at different paces and perhaps even have a different compositions of the quality gap?

Consider the price of the new product in relation to the quality gap. We can view the moment chosen by the consumer to replace a product which he owns with a new one as the outcome of an equation where subjective and objective benefits of the new product are compared to the owned one. From the theoretical sum of this equation, the absolute obsolescence (quality deterioration) of the owned product is added.

This final mix of subjective and other values are then measured against the price of the new product and forms the final ”decision-equation” of why and when to replace a possession. In total, the decision-equation has several background factors that differ between individuals but which all govern the individuals’ real decision. Of these background factors some of the more important are listed below:

- the consumers’marginal propensity to consume

- the general price consciousness of the consumer
- the consumers' general quality consciousness
- the consumers' loyalty towards the producer
- the number of substitutes available
- the degree of information asymmetry between consumer and producer.

Considering this decision of the consumer I find it valuable to bring in Albert Hirschmann's concept of exit, voice and loyalty.[80] Hirschmann, in short, distinguishes two groups of customers, one relying on exit as a means to use the market forces to allocate resources in an effective way, and the other one using voice to put pressure on the producers for the same purpose.[81]

"Exit" is explained as an act where the consumer shifts to another producer when dissatisfied with the product (or service) he is presently consuming. The consumer is thus said to rely on the market forces to deliver to the producer a message that there is something wrong with the marketed product.

"Voice" is when the consumer, dissatisfied with the product or service, in some way actively addresses the producer and gives him feedback on why he is not satisfied, asking the producer to correct it. That the consumer reacts in this way rather than with exit is explained by situations where there are few substitutes to exit to, or where the consumer has a strong loyalty towards a chosen producer.

In broad terms consumers, who prefer using exit before voice, are more price-sensitive than quality conscious and therefore tend to shift to another producer who offers a lower price for an otherwise equal product. In case a market is dominated by consumers using exit this may lead to a situation where competition among firms transform in such a way that they all react in the same way. Hirschmann describes it like this:

> "For the presence of a number of competing firms fosters in this case [consumers using primarily exit] the perpetual illusion that 'the grass is always greener on the other side of the fence,' that is, that an escape from defectiveness is possible through the purchase of the competitors product.' - - - 'The basic point is that competition may result merely in the mutual luring over each others' customers on the part of a group of competing firms; and that to this extent competition and product diversification is wasteful and diversionary especially when, in its absence, consumers would either be able to bring more effective pressures upon management toward product improvement or would stop using up their energies in a futile search for the 'ideal' product." [82]

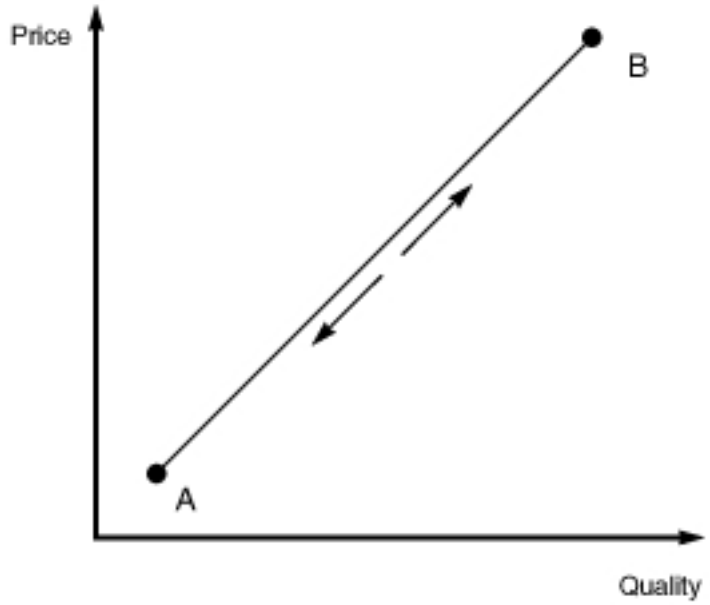
In theory, therefore, competition may look hard indeed but as long as exit is

[80] Hirschmann, Exit, Voice, and Loyalty, 1970.

[81] The Hirschmann theory on the behavior of consumers and the predictions made from it, is supported by a test conducted by Alan Andreasen, 1985.

[82] Hirschmann, Exit, Voice and Loyalty, p 27-28.

figure 3.7 Market reactions caused by quality-consciones vs. price-consciones consumers.



compensated by entry the competitive pressure may in reality be low.[83] How can it then be explained that price conscious consumers, who find themselves discontent, do not start using voice – they too have apparently nowhere to go with their discontent after having bought at cheapest possible price. Hirschmann argues that they will continue to use exit but move slightly upwards in price, since there is nowhere else to go.

Another answer to this contradiction (why consumers ”move around looking for greener grass”) is the marginal benefit of quality.[84] When a consumer, who bought at the lowest price, feels discontent with the product, the discontent in itself gives the consumer the ”experience” that the marginal benefit of quality was under estimated when doing the purchase. This experience explains how a price conscious consumer can move upward in price when exiting from the lowest priced product or service instead of using voice. Consequently these consumers are a strategic target group for comparison advertising.[85]

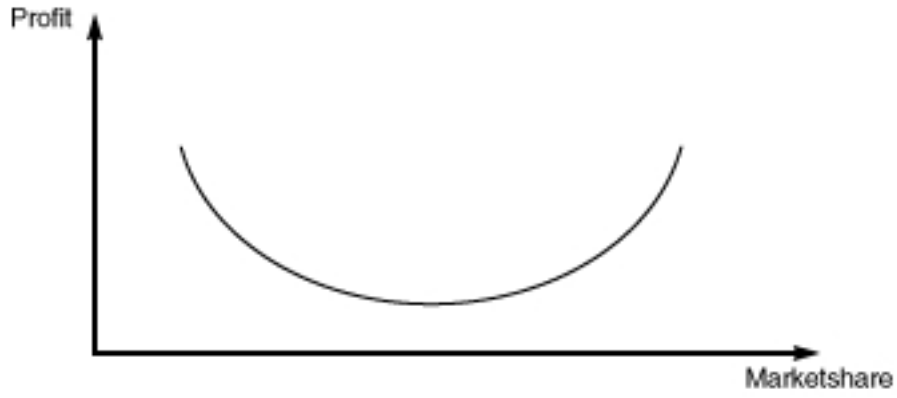
The group using voice is more conscious about quality and therefore tends to move upward in price, if they have a choice of exiting from a producer because of deteriorating quality. This group is therefore often found in the upper price levels of a certain type of products. When reaching the top of the line products, the products with the highest quality, the exit alternative diminishes and the only means of telling the producer of their discontent is to use voice. Producers having this kind of consumers will have two main advantages. One is that their products will have a

[83] ib. p124. (This observation led me to hypothesis No. 3.)

[84] Marginal benefit: What a consumer is willing to pay for an extra ”unit” of quality. When choosing among a number of products with different quality and price, the consumer will choose the product where the cost of the last unit of quality equals the benefit of that unit.

[85] Shy, 1995, p294.

figure 3.8 Relation between profit and marketshare



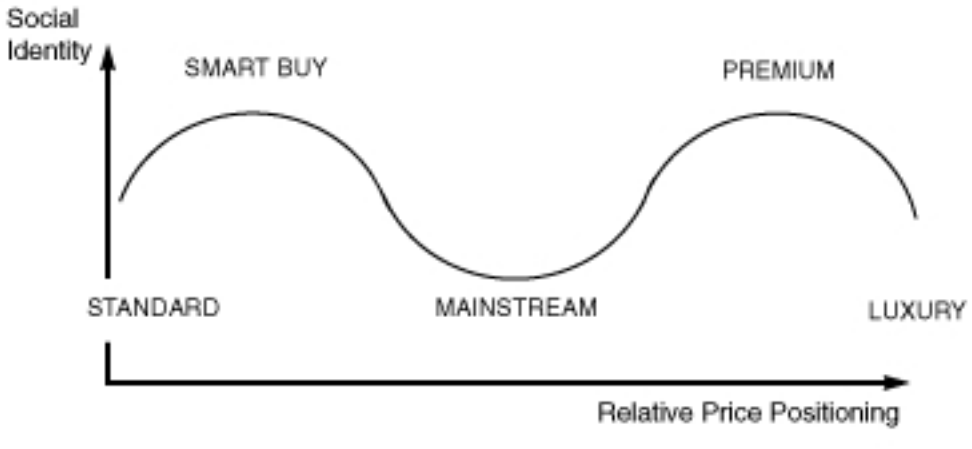
Source: Porter, Competitive Strategy, 1980.

higher price-elasticity, i.e. they have more money to spend, and the other that their customers will tell them directly of the problems with their products.[86]

Because true quality of a product is hidden, the price conscious consumers will not move towards higher quality. The quality conscious consumers, however, will move towards higher quality since they are actively pushing for higher quality products produced by ”their” company, they will also move towards higher price for other reasons, there is, for example, research evidencing that quality conscious consumers are willing to pay price-premiums to the producers to keep them from debasing the quality of products.[87]

My interpretation of Hirschmann’s observations is that they reveal a pattern of a dual

figure 3.9 *Relation between profit and marketshare*



Source: Linn, market Dynamics, p56.

[86] Maybe it is not a higher price-elasticity that explains the higher prices these producers can take. An alternative or complementing explanation is that price-premiums are paid by the consumers to avoid having to use voice. Rao, 1988.

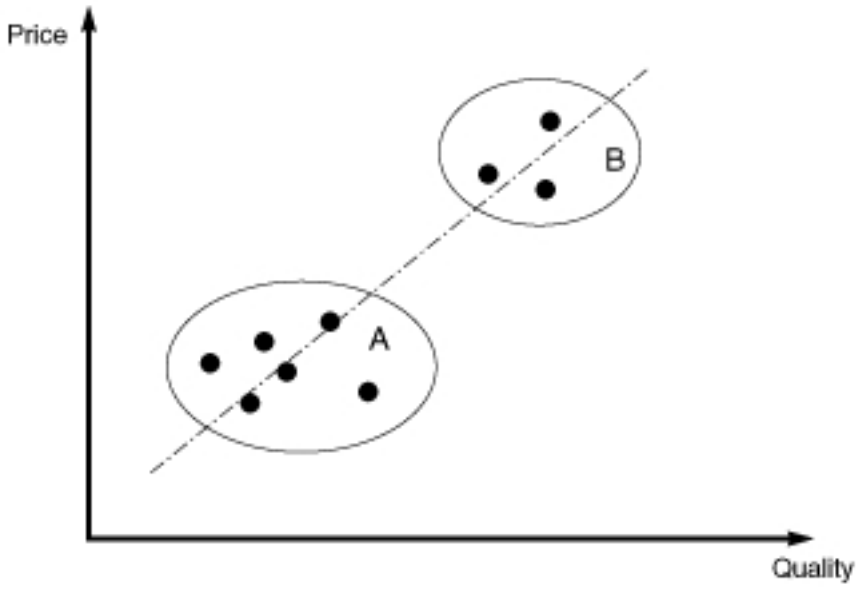
[87] Rao, 1992.

motion on a typical market; price conscious consumers move towards lower priced products and quality conscious consumers move towards higher quality products. Figure 3.7 is an attempt to illustrate this dual motion and the interpretation of it is not that consumers will only buy the cheapest or always buy higher quality but rather that two clusters will develop. One cluster consisting of consumers mainly using exit (the A-side in the figure) and the other one consisting of consumers using voice (the B-side).

This interpretation is consistent with Michael Porter's framework in which firms may compete either by increasing the cost advantages, or by offering special high quality deals to the consumer, or by focusing on a small number of customers.[88] The first group (the cost oriented firms) will be the largest. The second group has a marked innovative character because of consumer influence. The firms in the third group, usually quite small, relate only towards a small number of business customers and are therefore irrelevant for this study.

Even though Porter claim that there exists no general connection between profit and

figure 3.10 *Clusters of producers* as an adaption to market conditions.*



* In theory there may be one produer for each product. In reality producers often differentiate the production into many price/quality combinations.

market share he concludes that for many well defined markets there is such a connection. He uses the global automobile industry as an example where relatively small firms (Mercedes) and large firms (GM) both enjoy high profits while a number of firms that are in between (Fiat, Chrysler, British-Leyland) are troubled with low profits. For these markets a U-shaped relation between profitability and market share seems to exist (fig 3.8). He underlines though that his example is a textbook example. But in spite of this, the indications made by Porter to some extent support the notion

[88] Porter, Competetive Strategy: Techniques for Analyzing Industries and Competitors, 1980.

of a development of two clusters of companies on a theoretical market.

Carl Eric Linn has a similar view to that of Porter, however he distinguishes two humps of value among five positions (fig 3.9), which has been deviated from a linear function of social identity vs. price and an assumption that large groups of consumers prefer to identify themselves as being smart, or ”brainy”. The most rewarding positions, both for the manufacturer and for the consumer, are premium and smart-buy. The purpose of this concept, is for it to be a tool for differentiation and positioning of brands more than of single products.[89]

My conclusion is that there will emerge two basic clusters according to the dual motion mentioned (fig 3.10). In one cluster (the B-cluster) consumers want premium quality. Here exit is more costly to consumers who therefore use voice. They become more brand loyal and are more willing to pay price-premiums. The loyalty of the consumers will also mean that entry by new producers into this cluster will be quite difficult.

The A-cluster will consist of consumers looking for the smart-buy and using exit when they are not content. The producers in this cluster will thus face customer disloyalty as a problem. However, loss of market share due to exiting consumers may frequently be compensated by consumers who, exiting from a competitor, entry as new customers. In this cluster entry by new producers will be easier and therefore it seems likely that this cluster will have a larger number of producers.

An example of a market with a structure similar to this one is the Swedish market for washing-up brushes (or dish-brushes).[90] The market consists, in large, of six producers of which two are not producing themselves but have laid out the production on foreign brush-producers, they are so called ”contract-producers”. Five of the producers aim their efforts to the general consumers market through one of three existing wholesale business firms (ICA-Teampac, Dagab, KF). These five producers manufacture brushes that are identical in quality, meaning that exiting from one of these producers to another only results in getting a brush with a different design but with the same expected function and service-life. This group of five can thus be compared to the A-cluster of producers in fig 3.10.

The sixth producer (Alfa-Laval) offers a brush with significantly longer potential service-life (all other functional aspects are equal to the other producers’ brushes). The technical life of their brush is up to four times that of the A-cluster. The price is about two and a half times higher.[91] Alfa-Laval is not offering their brushes towards the general consumers’ market but sell it to a more or less isolated market segment of farmers only. The farmers then represent the quality conscious group that has acted

[89] Linn, 1996, p53-60.

[90] See appendix Afor details of the market for washing-up brushes.

[91] An interesting fact is that the production cost of this brush is only marginally higher than the production cost of the B-cluster brush (see App. A.), thus the price of the brush is the monopolist price. This reflects the strong segmentation on the market. However, referring to the earlier mention of price-premiums it is possible to discuss whether the farmers willingly pay a price premium to Alfa-Laval to keep them from cheating on the quality of the brush. See Rao, 1992, for further details on price-premiums.

through voice to force their producer to offer a brush that has a higher quality. Consequently Alfa-Laval could be said to represent the B-cluster of producers.

3.9 Hypotheses

H1) there exists management strategies developed for competitive situations that correspond to two clusters that can be identified either by consumers using ”exit” (cluster A) or by consumers using ”voice” and being brand loyal (cluster B).

H2) psychological obsolescence will be more pronounced in the A-cluster.

H3) relative obsolescence are of the functional nature in the B-cluster.

Hypothesis 1

A quality re-evaluation process theory has been generated from a discussion concerning the basic explanations of product obsolescence. From this theory a set of background factors governing the consumers actual decision making was assumed and a consistency with the concepts of exit and voice could be established.

Exit and voice are two ways by which consumers express dissatisfaction in the purpose to set in motion efforts by firms to revert to the acceptable standard of the product, from which the product has lapsed.

A general conclusion derived from this is that companies in the A-cluster will have management strategies different from the companies of the B-cluster. This means, that it will be possible to identify to which of the the two clusters companies belong by studying their managerial strategies. A hypothesis is therefore that there will exist management strategies developed for competitive situations that correspond to the two clusters.

Hypothesis 2

Exit and voice, the two ways in which the consumers express dissatisfaction, resemble two different kinds of quality re-evaluation processes which result in basically two different compositions of quality gaps. The two different quality gaps will be composed by obsolescence factors according to how the consumers express dissatisfaction.

The quality gap of the price conscious consumers in the A-cluster, however, will most probably consist of quality changes that are more in the hands of the producers than of the consumers. The producers, competing in markets consisting of price-sensitive buyers, will concentrate on creating obsolescence in the most cost-effective way in order to meet the behaviour of the consumers. Assumed that redesigning a product is cheaper than enhancing the product in a major way or developing entirely new products it is possible to raise the hypothesis that psychological obsolescence will be more pronounced in the A-cluster.

Hypothesis 3

quality conscious consumers of the B-cluster will actively contribute to the widening of the quality gap since they are using voice to express dissatisfaction. Thus, the quality gap of this group likely consists of obsolescence factors that lie in the

users / consumers direct interest. The consumers want premium quality products and companies adopting their managerial strategies to a competitive situation like the one in this cluster likely will put more efforts on R&D related activities. A hypothesis is therefore that relative obsolescence are of the functional nature in the B-cluster.

If a company changes a product, that consumers are used to and have come to like as it is, it could result in customers exiting to other companies. Therefore it seems logic that companies, facing a market where the consumers are using exit, will emphasize stability and status quo. Expected changes of a product, such as annual model changes, may in this sense be part of status quo - even though a slow change of the product is possible. This also account for the low risk assessment of these companies and for the company culture and structure that support stability. Marketing efforts that cater existing needs among existing consumers point in the same direction, i.e. to keep consumers from exiting. That their R&D budgets are small and mainly directed at modifying existing products and utilizing existing technologies comes as a direct result from this.

ii) Since price is emphasized by the consumers of this cluster a natural response from the companies will be efforts to try to cut the manufacturing costs of the product. I see the closed type of organisation as such an effort, as well as the special company culture and climate that secures stability and promotes efficiency and control. The focus on existing products and technologies means that the production process will be improved, rather than new products developed, which also accounts for the consumers' interest in a low price of a given product.

Add to this that positional companies devote large resources to product differentiation, market research, advertising and sales promotion in order to hold their market segments and make customers stick to them.[92] Then it will be reasonably clear that the products of this cluster will have an obsolescence pattern that probably has shorter potential service-life and further that relative obsolescence will have a strong psychological emphasis, due to the large resources devoted to advertising etc. and / or to counterbalance the lack of functional relative obsolescence that comes as a result of the focus on existing technologies, thus supporting hypothesis two (H2: psychological obsolescence will be more pronounced in the A-cluster).

[92] Nyström, p20.

Part 4

The manufacturers

"A car should not be able to live for over 20 years, as is the case with the Volvo 240 series. Even the 900 series, with 7-8 years on its back, is considered too old today."

Sören Gyll, head of Volvo[92]

4.1 Introduction

Before connecting the quality re-evaluation process to the behaviour of the producers I find it appropriate to answer the question, What is a company management strategy? To make understanding easier, imagine that management- or business strategies resemble "programs" that companies need to reach goals and commitments they have set up.[93] When the top managers of a company choose an appropriate strategy, these commitments must act as guideline. The first thing they need to establish is therefore what goals and what commitments the company should have. To get this fundamental question right, the top management team first will have to answer the crucial question – what will tomorrow look like? Will future, in broad terms, be like today with only minor changes, or will it be radically different and filled with new chances and opportunities?

The answer to this question, determined by the top management team, forms the basis of the choice of company strategy. For some companies the future, by definition, will consist of new challenges and will also become what they themselves do with it in the sense that they create holistic visions of the future which in turn create strategic images that may guide and influence human and company action.[94] Such images must be based on open expectations and possibilities for the future, rather than narrow projections and concentrations of present ideas or technologies.[95]

Other companies will conclude that the future will look more or less the same as today. They do not count on any dramatic change to come and have a difficult time imaging how and in what way their business or their products could differ from what they already are. These companies will choose a strategy that is quite different from the above, image-guided, companies. According to Nyström companies choose the strategy they find most appropriate to bring them to their goals and fulfil their commitments. The basis for this choice is in fact the company's own view of its future.

[92] Gyll, head of Volvo, intervued in Dagens Nyheter, 1 august 1994, page C-8. Article titled "Gyll riktar in Volvo på nya spår" (Gyll steers Volvo towards new tracks).

[93] The word *strategy* is often mixed with policy. Policy, however, is often used to refer to the official goals of a company, even when these goals are detached from actual decision-making. In the Nyström approach "strategies are patterns of decisions" Nyström p6.

[94] Nyström, p117

[95] The word *image* is referring to the mental picture (conceptual representation) that an individual has of some aspect of reality. It assumes an active psychological orientation towards the environment (of the mental picture) and allows for psychological interplay between individuals. Thus, image is not seen as the result of passive perception of environmental cues. Nyström, 1990, p. 28ff.

We must remember, however, that it is their view of the future in relation to company goals and commitments that form the basis for the choice of strategy, thus the choice of strategy will always reflect the top managers belief in the company's present technology. The Swedish company Facit for example had a strong belief in the future of the mechanical calculator of which they were a leading manufacturer, and developed a strategy that, broadly speaking, aimed at preserving that technology. Their R&D was mainly spent on refining the existing technology and not on the development of new technologies. Facit therefore represents an example of a company that had a difficult time imagining how and in what ways their products could differ from what they already were. The result was in this case disastrous for the company because it prevented them from foreseeing the competition arising from electronic industries who spent their R&D on developing *electronic* calculators.

4.2 The Nyström typology of firms

The basic idea of this typology is that firms may use different development strategies to succeed under different technological and market conditions. This means that companies for different reasons use different methods to grow. In all its simplicity the model resembles a continuum, or an axis where at one end we find companies that choose a strategy that focuses on existing technologies and markets and at the other end we find companies trying to create entirely new products and markets.

The companies focusing on existing technologies are called positional companies, they avoid changes and therefore are best suited for stable environments. Their strategies emphasize status quo and are because of that mainly reactive. Companies that emphasize the creation of new technological and market opportunities are called more innovative companies. These companies are best suited in dynamic, complex and changing environments, which they also help to create through their mainly proactive strategies.

The Nyström framework can be said to distinguish background influences on the company's choice of overall strategy. As we can see in figure 4.1 these choices are primarily dependent on the technological and marketing environments facing the company, but we can also see that the company strategy is dependent on the company's internal structure, culture and climate.

A strategy is the, often implicit, guide of company activities, with long run implications for product and company development. Strategy is more concerned with conditions for change than with actual outcomes.[96]

The typology of Nyström may be compared to other theories of organisation, for example that of Burns and Stalker who came to separate mechanistic organisations from organic after empirical studies of electronic and textile companies in England and Scotland. Mechanistic organisations are much like Nyström's positional companies; highly specialized in task performance and employing precise definitions

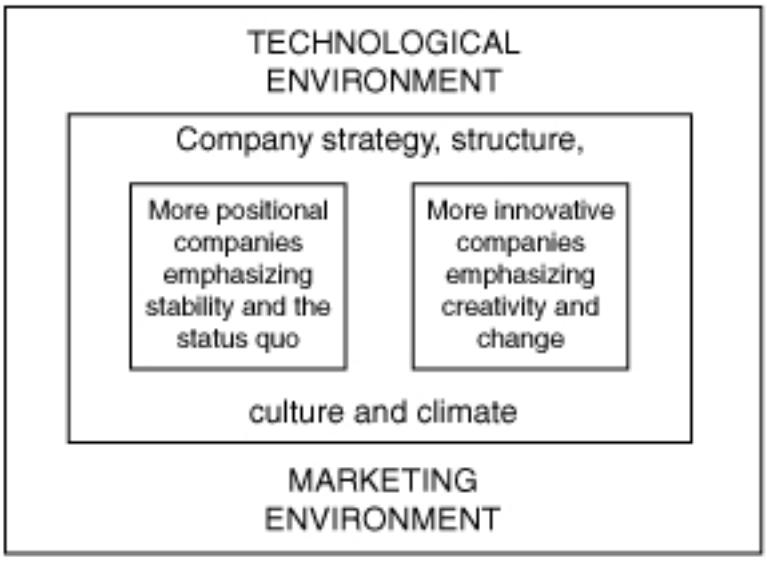
[96] Nyström 1990, p23.

in carrying out operations. Organic organisations build on network interaction with continual adjustment and and readjustment of roles and activities and are thus similar to the innovative firms of Nyströms terminology. In the same way R. M. Kanter's distinguishing of segmentalistic structures/cultures from integrative ones may be viewed as a parallel to the distinguishing of positional companies from innovative ones.[97]

It is important to recognize that the classification scheme of positional versus innovative companies is an ideal one, since it highlights different features, that are less obvious in actual development situations. It does not imply that either type of company by definition is better or worse from a company development point of view. What determines success in company development is the ability of the company to adapt its strategy to the environmental conditions. The strategy, structure, culture and climate of a company determines its capacity to change together with changes in the environment. Since market and technological environments are changing almost everywhere, most companies experience the need to change to become more innovative. This need, however, is much more pressing for some companies than for others.[98]

Another aspect important to recognize is that also within a company there are differences in the possibility and the need to be more positional or more innovative.[99] Functions such as production and sales by definition have to be more positional than

figure 4.1 Company development and basic background influences



Source: Nyström, Technological and market innovation, p17.

[97] This discussion concerning other theories of organization is a short review of a longer discussion found in Nyström, p17ff.

[98] Nyström, p18.

[99] Ib, p233ff

functions like for example market development and R&D. In this work, however, the only perspective discussed is companies in relation to their outside environment, thus the internal aspect of the company is left aside.

So, where do we find these companies? Of course there is the empirical material of professor Nyström's studies. His studies of Swedish food processing industries show for example, that in an environment like theirs it is difficult to successfully pursue innovative product development strategies. Therefore positional strategies will be (and are) common in this type of industry. Other examples are found in the pulp and paper industry, who have been found using pronounced, and successful, positional strategies.

Studies of the pharmaceutical industries on the other hand, indicate that innovative strategies are sought after with great zest by the leading companies. Furthermore these companies are also closely linked to success. Their environments are, contrary to the food processing industries, such that they withhold strong motives for companies to assess innovative strategies.

The most important distinction between the environmental characteristics of these two industries is the difference which consumers show in their willingness to accept changes or innovations. Consumers are generally quite conservative in their food habits for example, i.e. they are quite satisfied with what they are used to buy and suspicious of new products.[100] Doctors and patients on the other hand are keen to buy new, more efficient drugs when these are introduced on the market.[101] Another example is, according to Nyström, the electronic industry that has been equally

figure 4.2 *A typology of firm behaviour viewed as a continuum*

Source: Nyström, Technological and market innovation, p 250ff.

successful in using innovative strategies.[102]

It is important to note that even though the Nyström typology is based on empirical evidence, the typology is a generalization. In reality there are no absolutely positional companies nor are there any innovative companies in an absolute sense. In the real

[100] Ib, p19 and p207-209.

[101] Ib, p19

[102] Ib, p 177-196.

world there are only companies that have strategies which are more pronounced in one direction or the other. In figure 4.2 the typology is displayed as a continuum with the positional strategy in one extreme end and the innovative strategy at the other

Table 4.1 *principal characteristics of positional vs. innovative strategies*

Source: Nyström, passim.

extreme.

4.3 Comparing the hypotheses to the Nyström framework

It is important to hold in mind the generalizing character of the typology when studying table 4:1 above. In this table we find the principal characteristics of the positional and the innovative strategies. Many things in it speak in favour of an assumption that the characteristics of the positional strategy resemble a strategy that is appropriate for the companies of the A-cluster), and also in favour of the assumption, that the characteristics of the innovative strategy is a good choice for a company of the B-cluster (quality-conscious / voice). Here I will discuss why I draw these conclusions.

4.3.1 The A-cluster and hypothesis 2

To begin with the A-cluster; what says that companies facing ”exit” as a problem are using positional strategies? I can see two main reasons for the characteristics of the positional strategy being the result of the behaviour of exit oriented consumers: i) to avoid unexpected changes, and ii) the consequences from price oriented competition. I find that these two main reasons support hypothesis one to the extent that company management strategies exists that correspond to one of the two clusters.

i) To avoid unexpected changes. If a company changes a product, which consumers are used to and have come to like as it is, it could result in customers exiting to other companies. Therefore it seems logical that these companies will emphasize stability and status quo. Their marketing efforts, that cater existing needs among existing consumers, point in the same direction, i.e. to keep consumers from exiting. Their small R&D budgets which are mainly directed at modifying existing products and their favour of using existing technologies comes as a direct result from this.

ii) The consequences from price oriented competition. Since price is emphasized by the consumers of this cluster, a natural response from the companies will be efforts to try to cut the manufacturing costs of the product. I see the closed type of organisation as such an effort, as well as the special company culture and climate that secures stability and promotes efficiency and control. The focus on existing products and technologies means that the production process will be improved, rather than new products developed, which also accounts for the consumers' interest in a low price of a given product.

Add to this that positional companies devote large resources to product differentiation, market research, advertising and sales promotion in order to hold their market segments and make customers stick to them.[103] Then it will be reasonably clear that the products of this cluster will have an obsolescence pattern that probably has shorter potential service-life and further that relative obsolescence will have a psychological emphasis, due to the large resources devoted to advertising etc. and / or to counterbalance the lack of functional relative obsolescence that comes as a result of the focus on existing technologies, thus supporting hypothesis two (psychological obsolescence will be more pronounced in the A-cluster).

[103] Nyström, p20.

4.3.2 The B-cluster and hypothesis 3

What says, that companies facing quality-conscious customers using voice, will be using strategies that resemble the characteristics of the innovative strategies outlined by Nyström?

First of all the competitive situation of the B-cluster seems to correspond with the market situation connected to innovative strategies. These companies are by definition competing by developing new and much better products, i.e. functional quality is in focus of the competition (thereby hypothesis one receives further support). Apart from this notion, the three characteristics of the B-cluster (voice, loyalty and comparably price indifferent customers) may, as discussed below, account for the characteristics of the innovative strategy as outlined by Nyström.

i) Customers voice their demands directly to the company. This may be the cause of the emphasis on creative thinking and flexible organisational structure significant for the innovative strategy. This may also explain why Nyström chooses to call these companies pathfinders rather than problem solvers and why they have offensive product development strategies rather than defensive. From this also follows that companies devote large parts of their income to R&D.

ii) The loyalty of customers. This account for some of the high risk assessment companies are willing to take and the fact that marketing efforts can be aimed at new primarily unknown customers and market segments but also that they try, and use, new technologies.

iii) There is a special importance of the relative price indifference of the quality consiuous consumers. First of all, this too may account for the high risk assessment of the companies, since they may be able to count on the price-premiums to cover for projects that flopped. Another thing is that R&D activities are extremely costly[104] and therefore most probably will require high prices on products to cover for the development costs of them.

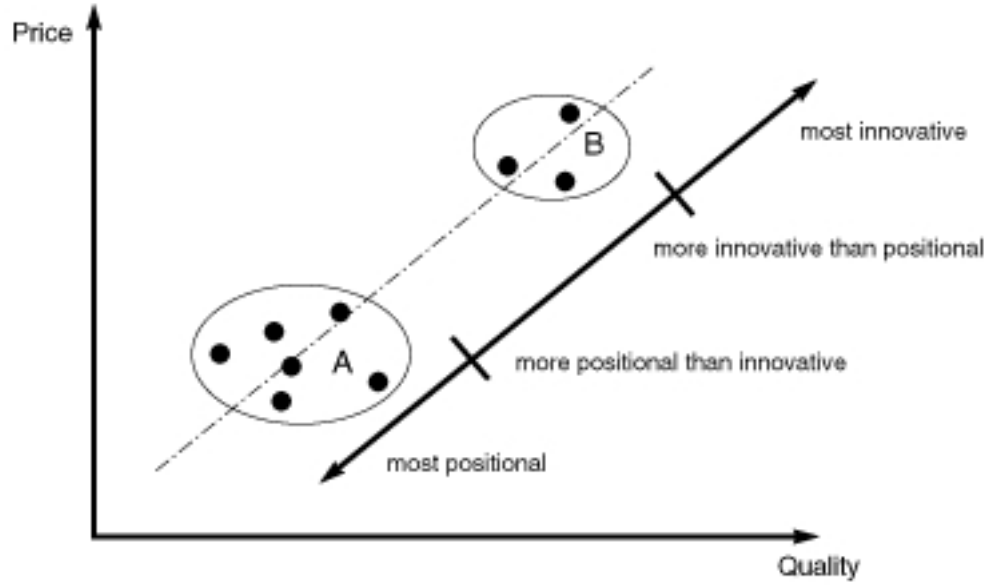
It seems reasonably clear that the products of the B-cluster will have an obsolescence pattern that probably has longer potential service-life (because the company would otherwise face a risk of upsetting the customers, who have voiced their opinion on the service-life and who pay price-premiums to avoid such problems) and further that the focus of the relative obsolescence should be on functional aspects (due to the large resources devoted to encourage new ideas and develop new products). Conclusively this supports hypothesis three (relative obsolescence are of the functional nature in the B-cluster).

4.3.3 The two clusters and hypothesis 1

The Nyström typology seems to fall well in place indeed in relation to the two clusters, and I find that this supports hypothesis 1 (H1: there exists management strategies developed for competitive situations that correspond to the two clusters). Recalling the discussion concerning the frameworks of Michael Porter and Carl Eric

[104] Rosenberg, 1994 or Rosegger 1980.

figure 4.3 *Clusters of producers of consumer durables and their strategies in a price – quality plane.*



Linn at the last pages of part 3.8, it seems that they basically form the same principal understanding, i.e. there are two dominating clusters or groups in which companies position themselves. According to Porter the group consisting of ”cost oriented firms” (positional companies) will be the largest whereas the second group of ”innovative firms” (innovative companies) will be smaller.[105] We can approximate these findings by placing the Nyström continuum next to the two clusters, as illustrated by Figure 4.3.

Despite the fact that the Nyström typology has been derived from empirical results, one may wonder how it can possibly prove to be correct, since all positional companies take the risk of being outmanoeuvred by innovative companies developing products making their own ones obsolete over a night? It is obvious from the Facit company example,mentioned earlier, that this risk is not to be taken too light. How then, is it possible for some firms to manage their strive for status quo despite this threat?

Gunnar Eliasson, a well renowned Swedish economist, has observed that there are companies on different markets that manage to balance between an innovative strategy and what he calls ”a short-term co-ordination efficiency strategy” but would be called a positional strategy in Nyström’s terminology. Eliasson claims that these firms are calculating on the risk it means to be ”innovatively” inactive. Meaning they make a qualified judgment involving the risk of an introduction of an innovation that could make their own product obsolete. When the company top managers have learnt how to transform this ”uncertainty” into calculated or insurable risk they can prolong the life-cycle of an existing technology.

In broad terms the risk which they are calculating with consists of two parts:

[105] Porter, 1980.

(i) The risk of loosing the monopoly rent created by each innovation.

(ii) The risk of becoming laggard if large scale repositioning occurs on the market.

On the credit side is that they can postpone R&D expenses which allows for a possibility of freeing capital.

Eliasson concludes that if the company has reasons to believe that the monopoly rents created by innovations are likely to vanish in a short period due to imitators copying the innovation and furthermore believe that there is a great risk for market failure in the introduction of new products, then it could be a superior strategy to rationalize and increase efficiency in already existing activities and shelf the innovative ambitions. In his own words:

> "There can be observed firms that manage a critical trade-off between dynamic (schumpeterian) efficiency associated with innovative reorganisations of firms, and the (static) flow efficiency, achieved through coordination of existing activities; or the minimisation of internal slack or waste. While innovative reorganisations decide the long-term survival of firms, coordination efficiency can generate superior performance for years." [106]

In a similar context Eva Heiskanen claims that a low-price strategy may be easier to market than a high quality one.[107]

Another interesting study, recently published by Michael Hitt, uses basic assumptions on company behaviour that falls well into the Nyström continuum to characterize companies.[108] The study makes its departure from the observation that the positional type of company uses mergers and acquisitions to expand.[109] Their small efforts devoted to internal innovations (small R&D budgets) are compensated by acquisition of smaller companies, that have been more innovative and risk-willing.

Hitt explains his findings as being the possible result of internationalisation and foreign competition changing the competitive landscape. Increased foreign competition places importance on companies being able to innovate in order to remain competitive in a global market.[110] His findings suggest that an active acquisition strategy has direct negative effects on the internal development of company innovation. The Hitt study, which was large (250 companies were studied) not only supports Nyström but its further implications are also very important.

Given that innovation is important for strategic competitiveness and that the buying and selling of businesses is becoming a globally popular strategic action, the results are profoundly important because the implication is that it will be increasingly

[106] Eliasson, The firm as a competent team. This phenomenon is given a detailed discussion in the the Eliasson IUI paper No 207b. Unfortunately I have not been able to get it and even Eliasson himself could not find it for me. However, it is to some extent reviewed in Andersson Helén (1995).

[107] Heiskanen, Conditions for Product Life Extension, p21.

[108] Hitt, The market for corporate control and firm innovation, 1996.

[109] And so has Nyström, however I have not mentioned it earlier.

[110] Hitt, p1110.

different for companies to remain in the B-cluster. Thus the types of obsolescence created in the realms of the A-cluster increase while the types of obsolescence created in the B-cluster will decrease. This is suggested by the fact that innovative (B-cluster) companies are bought up rapidly, which hampers the development of new products. The B-cluster, important for innovations and technological progress, is therefore not only difficult to enter and has demanding customers. Another difficulty, according to Hitt, is that if the company succeeds, it will likely be bought by some big company from the A-cluster.

4.3.4 Auxiliary hypotheses

The observant may have noted that two auxiliary hypotheses have been generated in this last chapter. I do not want to estimate their value, merely note that they exist as inspiration for further research.

• products of the A–cluster will have shorter potential service-life, due to price cuts done in the manufacturing of the item, compared to equivalent products of the B–cluster.

• products of the B–cluster will have a longer potential service-life than products of the A–cluster, because the company would otherwise face a risk of upsetting the customers who have voiced their opinion on the service-life and who pay price-premiums to avoid such problems.

Part 5
Summing up

If we knew what it was we were doing, it would not be called research, would it?

A. Einstein

This part consists of three sub-parts; a sum up of the study, a brief review of the economic history to place the study in its historical context and finally some issues on further research.

5.1 Summing up

This study focuses on durability as the only quality aspect of products related to the time dimension. The life time of consumer durable goods has significant impacts in several areas of the western economies, for example the frequency of repeat purchases done by consumers. The frequency of repeated purchases has, in turn, an impact on producers' turnover, consumers' volume of accumulated goods and the consumption rate of natural resources.

The importance of the longevity of durable goods can also be read in the macro economic policies that a majority of the OECD countries had during a period stretching from Roosevelt's "New Deal" in the 1930s to the crises in the mid 1970s. These macro economic policies build upon the assumption, that increased consumption lead to economic growth. And increased consumption definitely has an impact on the longevity of consumer durables. For these reasons no other single aspect of product quality is more economically, nor more environmentally important than durability. In spite of this, studies on the causes and origins of product obsolescence are very rare indeed (obsolescence is a word used to explain how durability decays).

5.1.1 Summing up: The basics of the quality re-evaluation process

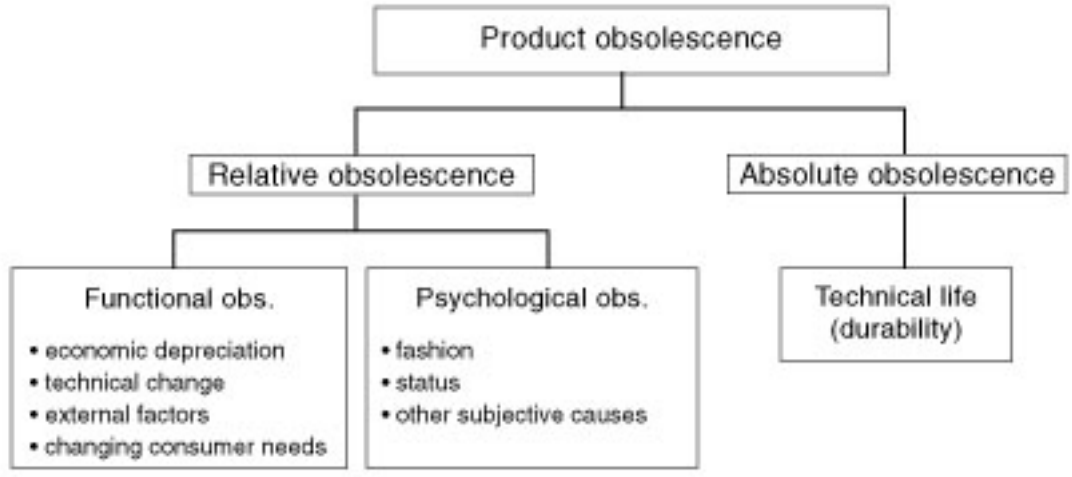
The ambition of this study was to take some necessary steps in order to come closer to a more comprehensive body of knowledge concerning the obsolescence of consumer durable goods. The major achievement of the study has been the development of a conceptual framework to understand product obsolescence that did not exist previously. The basis of the framework is knowledge derived from empirical research on why consumers discard or in other ways stop using their consumer durable products.

The quality of a product depends on a number of different aspects of it, and the products service-life depends on an evaluation of those quality aspects that continue for as long as the product is in use. The quality of a product is therefore evaluated by

the consumer in two separate contexts during its life time. The first one comes prior to purchasing the product, while the second evaluation is a longer process continuing from the moment of purchase during the course of the service-life.

The consumer can be said to perform a re-evaluation of the product's quality that starts right after purchasing the product and ends when the product is renewed. The quality re-evaluation of the product will thus resemble a process equal in length to the service-life of the product.

figure 5.1 Basic tree of the factors of obsolescence



The consumer sees the aging of the product in two separate ways called absolute and relative obsolescence. By absolute obsolescence is meant the physical wear down of the product that comes as a result from using it; a tire, for example, gives service for a certain mileage. Absolute obsolescence also occur in some products even though they are *not used*; tires are again an example since the rubber "dries" during the course of time and eventually becomes less suited for using.

Relative obsolescence is more complex. It is divided in functional and psychological obsolescence to distinguish that it has one objective and one subjective side (see fig. 5.1). When the consumer refers to an objective, measurable, cause in order to explain the obsolescence of an owned product it is called functional obsolescence.

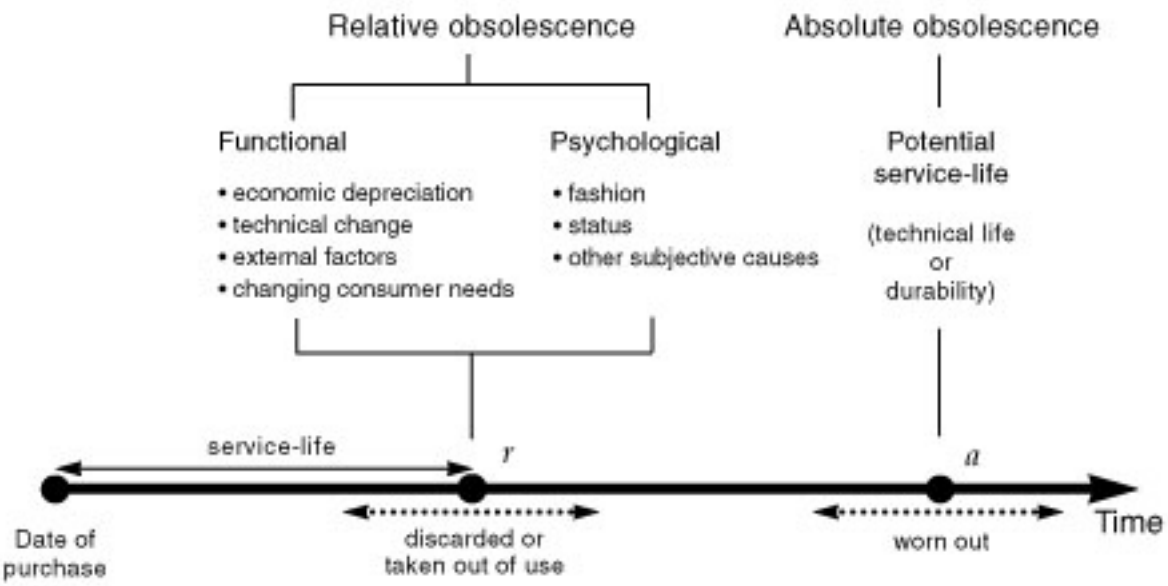
When the consumer uses a subjective description to explain the obsolescence of a product, such as "*I chose to replace the product because the new one had a nicer appearance*", it is tagged psychological obsolescence.

The central thesis of the framework for explaining product obsolescence is that the life of a product hinges on a continuous process of re-evaluating its overall quality in relation to itself (absolute obsolescence) and in relation to other products (relative obsolescence) and that this process is accomplished by the user/owner of the product.

The actual life of a product, called service-life, is always measured as calendar time beginning at the moment of purchase. It can not be measured in any other way since service-life is a term that includes *all factors* of obsolescence. The term *technical life* (technical life connotes directly to the word durability), however, can be measured as calendar time, as running hours, as mileage or some other appropriate measure.

The concept of service-life opens for a possibility to arrange the different factors of obsolescence along a time axis. Absolute obsolescence will then mark how long the

figure 5.2 Conceptual framework to understand obsolescence of consumer durables



service-life *can be* (potential service-life) on this time axis. Relative obsolescence will mark a point where the consumer ceases to use a product because another products is allowed to replace it (see fig. 5.2).

If absolute obsolescence occurs before relative obsolescence we can be sure that the owner discards a worn out product. If relative obsolescence occurs before absolute the only thing we can be sure about is that it had been possible to use the product for some additional time and that therefore the user/consumer had some grounds on which to base his decision to take it out of use. These grounds could be either functional or psychological.[113]

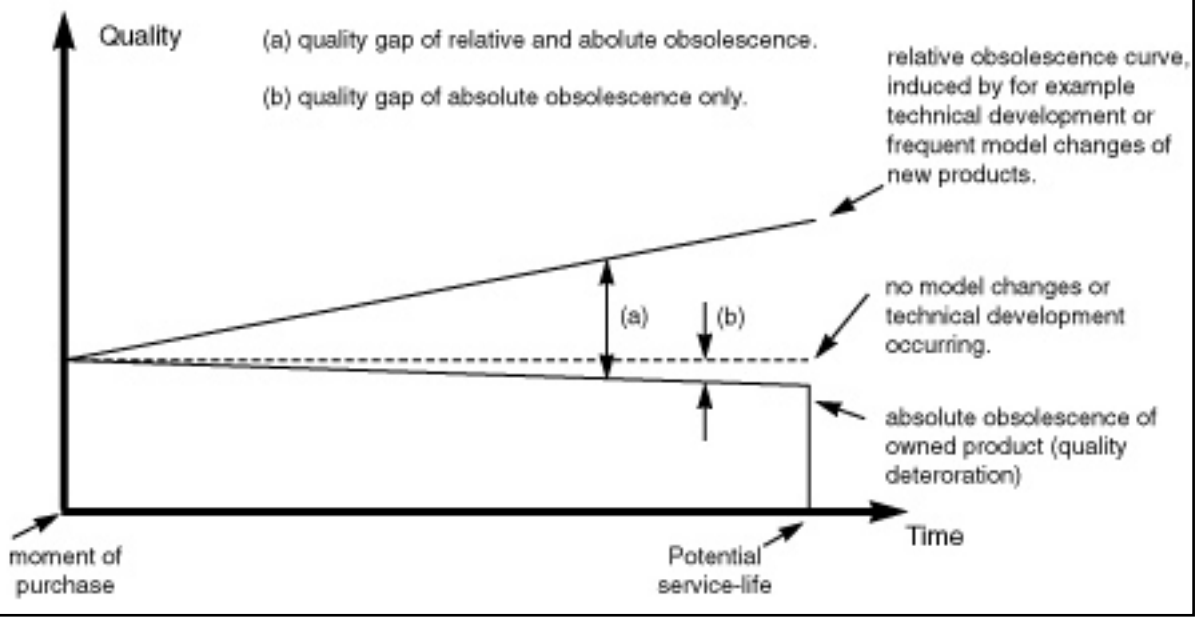
What is discernible in the concept of the quality re-evaluation process but not in the common consumer preferences concept, is that consumer preferences change when the quality of the already owned product is evaluated against new products performing the same task.[114]

This is illustrated by figure 5.3. The quality re-evaluation, which the consumer does,

[113] Of course the grounds could be a combination of functional and psychological reasons, in this paper though, these two are kept apart.

[114] The concept does not work when the consumer buys the product the first time, in that case the neo-classical concept of consumer preferences is better suited.

figure 5.3 *Consumers perception of the quality gap between an owned product and new products in relation to relative and absolute obsolescence.*



makes him perceive the difference between the owned product and new possible substitutes as a quality gap. Because the consumer owns and uses a product that, relative to new products, lacks certain attributes he treats the quality gap as a penalty connected to the keeping of the owned product. Treating the quality gap as a penalty is accurate since new substitute products are equipped with attributes (any of the relative obsolescence factors) that the possessed product is lacking. As time goes by, the consumer, frequently exposed to the new substitutes through advertising etc, will be more conscious of the quality gap separating the owned product from the potential substitutes. When he or she figures that the penalty for keeping the gap is greater than the price of a new product motivates, a new product will be allowed to replace the old one.

Thus, a first implication must be that when producers introduce new models they also start the quality re-evaluation process and by that they will also initiate a process that will change consumer preferences away from the owned product towards the ones introduced. This leads to another implication which is that producers have a large influence on consumer preferences. From the first implication it is obvious that the quality re-evaluation process needs new or different products to compare the owned one with. Producers are the suppliers of these products.

These implications can be summarised and deepened as follows:

i) product obsolescence is heavily related to the variations of the socio-cultural construction that constitute ”quality”. Price will also be an important factor when it comes to explaining the degree of relative obsolescence in a group of products.

ii) producers have a large influence on consumer preferences in the respect that they as a group have a monopoly on introducing new products. Consumer preferences will therefore change according to actions taken by the producers. This includes both

the timing and the nature of the change of consumer preferences.

A conclusion must be that competition among producers, resulting in a variety of alternative products performing basically the same task will speed up the process of relative obsolescence. A further conclusion is that there can be no such thing as a ”natural” rate of relative obsolescence because the rate will depend on the alternatives available to the consumer to compare the possessed product with. If alternative products appear on the market at a slow pace then the rate of relative obsolescence will be accordingly low. If, on the other hand, alternative products appear with short intervals then, in principle, the rate of relative obsolescence will become higher. Thus increased competition speeds up the obsolescence process which also means that the market becomes bigger. If increased competition, of the type discussed here, creates a bigger market but the number of actors remain the same, then the increased competition may be entirely artificial.[115]

5.1.2 Summing up: Approaching the producers

The quality re-evaluation process theory originates from the basic explanations of product obsolescence. From this theory a set of background factors governing the consumer's actual decision-making was assumed and consumers' consistency to the concepts of exit and voice could be established.

Exit and voice are two ways by which consumers express their dissatisfaction with a product. The purpose of both exit and voice are to set in motion efforts by firms to revert to the acceptable standard of the product, from which it has lapsed.

Exit is explained as an act where the consumer shifts to another producer when dissatisfied. The consumer is thus said to rely on the market forces to deliver a message to the producer that there is something wrong with the marketed product.

Voice is when the dissatisfied consumer in some way actively addresses the producer and gives him feedback on why he is not satisfied, asking the producer to correct it. That the consumer reacts in this way rather than with exit is explained by situations where there are few substitutes to exit to, or that the consumer has a loyalty towards a chosen producer.

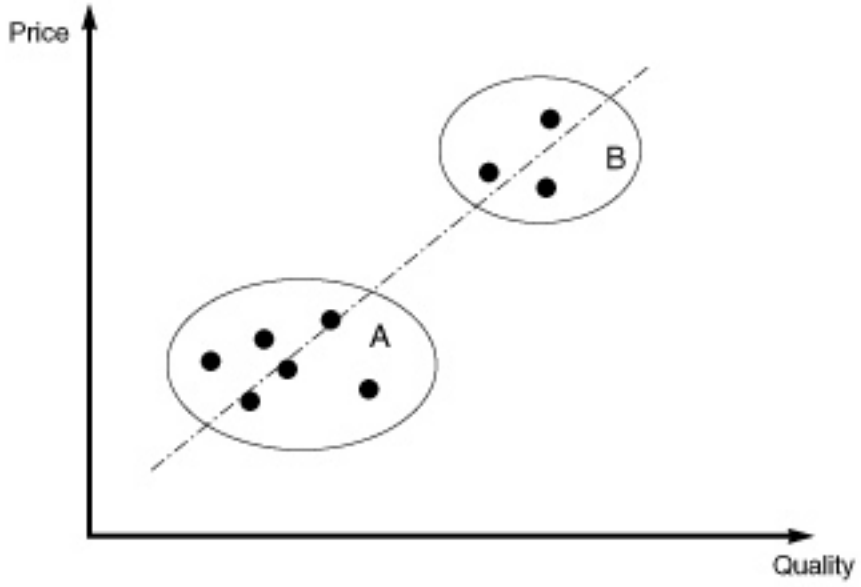
In broad terms consumers, who prefer using exit before voice, are more price-sensitive than quality conscious and therefore tend to shift to another producer, who offers a lower price for an otherwise similar product.

A general conclusion derived from this is that companies can be grouped in two clusters depending on their customer relations (fig 5.4). A hypothesis is that there will exist management strategies developed for competitive situations that correspond to the two clusters and that it therefore should be possible to identify which one of the the two clusters companies belong to by studying their managerial strategies.

Exit and voice, the two ways in which the consumers express dissatisfaction, resemble

[115] Which is precisely the point when producers are differentiating their line of products, or matching products to more individual preferences. In this respect product differentiating could be seen as a sort of artificial competition.

figure 5.4 *Clusters of producers as an adaption to market conditions.*



two different kinds of quality re-evaluation processes which result in two main compositions of quality gaps. The two different quality gaps will be composed by obsolescence factors according to how the consumers express dissatisfaction.

The quality gap of the price-conscious consumers (cluster A in fig. 5.4) will most probably consist of quality changes that are more in the hands of the producers than of the consumers since consumers express their discontent in a passive way. The producers, competing in these markets, will concentrate on creating obsolescence in the most cost effective way in order to meet the behaviour of the consumers. Assumed that redesigning a product is cheaper than enhancing the product in a major way or developing entirely new products it is possible to raise the hypothesis that psychological obsolescence will be more pronounced in the A-cluster.

Quality-conscious consumers of the B-cluster will actively contribute to the widening of the quality gap since they are using voice to express dissatisfaction. Thus, the quality gap of this group likely consists of obsolescence factors that lie in the users/consumers interest. The consumers demand premium quality products and companies that are adopting their managerial strategies to a competitive situation like the one in this cluster are more likely to pay efforts on R&D related activities. A hypothesis is therefore that relative obsolescence is of a functional nature in the cluster where producers meet quality conscious consumers (cluster B).

A total of three hypotheses were set up and tested against a typology of managerial strategies developed from empirical research at Uppsala School of Business. The basic idea of this typology is that firms use different development strategies to succeed under different technological and market conditions. This means that companies for different reasons use different methods to grow. In all its simplicity the model resembles a continuum, or an axis where at one end we find companies which choose a strategy that focuses on existing technologies and markets and at the other end we

find companies trying to create entirely new products and markets.

The companies focusing on existing technologies are named positional companies. They avoid changes and are therefore best suited for stable environments. Their strategies emphasise status quo and are because of that mainly reactive. Companies that emphasise the creation of new technological and market opportunities are called innovative companies. These companies are best suited in dynamic, complex and changing environments, which they also help to create through their mainly proactive strategies. According to Michael Porter the group consisting of positional companies will be the largest whereas the second group of innovative companies will be smaller.

This typology of firm behaviour can be connected to the quality re-evaluation process via the behaviour of the consumers. Regarding the cluster where producers face consumers using exit, there are two main reasons that support a hypothesis that these companies would use the positional strategy:

i) To avoid unexpected changes. If a company changes a product, which consumers are used to and have come to like as it is, it could result in customers exiting to other companies. Therefore it seems logical that these companies will emphasize stability and status quo. Their marketing efforts, that cater existing needs among existing consumers, point in the same direction, i.e. to keep consumers from exiting. Their small R&D budgets which are mainly directed at modifying existing products and their favour of using existing technologies comes as a direct result from this.

ii) The consequences from price oriented competition. Since price is emphasized by the consumers of this cluster, a natural response from the companies will be efforts to try to cut the manufacturing costs of the product. I see the closed type of organisation as such an effort, as well as the special company culture and climate that secures stability and promotes efficiency and control. The focus on existing products and technologies means that the production process will be improved, rather than new products developed, which also accounts for the consumers' interest in a low price of a given product.

Add to this that positional companies devote large resources to product differentiation, market research, advertising and sales promotion in order to hold their market segments and make customers stick to them.[116] Then it will be reasonably clear that the products of this cluster will have an obsolescence pattern that probably has shorter potential service-life and that relative obsolescence will have a psychological emphasis, due to the large resources devoted to advertising etc. and / or to counterbalance the lack of functional obsolescence that comes as a result of the small R&D budgets and the focus on existing technologies.

Now to the cluster of the quality-conscious customers using voice (cluster B). First of all the competitive situation of the B-cluster seems to correspond with the market situation connected to innovative strategies. These companies are by definition competing by developing new and much better products, i.e. functional quality is in focus of the competition. Apart from this notion, the three characteristics of the B-

[116] Nyström, p20.

cluster (voice, loyalty and comparably price indifferent customers) may, as discussed below, account for the characteristics of the innovative strategy.

i) Customers voice their demands directly to the company. This may be the cause of the emphasis on creative thinking and flexible organisational structure significant for the innovative strategy. From this also follows that companies devote large parts of their income to R&D.

ii) The loyalty of customers. This accounts for some of the high risk assessment which companies have and the fact that marketing efforts can be aimed at new primarily unknown customers and market segments but also that they try, and use, new technologies.

iii) There is a special importance of the relative price indifference of the quality consiuous consumers. First of all, this too may account for the high risk assessment, since companies may be able to count on price-premiums to cover for projects that flopped. Another thing is that R&D activities are extremely costly[117] and therefore most probably will require high prices of products to cover for the development costs of them.

It seems reasonably clear that the products manufactured for a market resembling that of the B-cluster will have an obsolescence pattern that has longer potential service-life and further that the focus of the relative obsolescence are on functional aspects. Conclusively this supports the hypothesis that relative obsolescence is of the functional nature in the B-cluster.

[117] Rosenberg, 1994 or Rosegger 1980.

5.2 The historical context of the study – a brief layout

To re-evaluate a product and eventually replace it with a new one after some time must mean that the consumer owns at least one example of the product in question from start. This leads to the fact that the more consumers, who own an example of a particular product, the greater impact will the re-evaluation process have on economy, environment etc, because the number of products that will have their service-lives affected will be greater.

Where do we find this situation? Well, obviously on the markets for mass produced goods, such as cars, white-goods, brown-goods etc, aimed at households. From this observation follows that the relevance of the quality re-evaluation process increases at a pace parallel to the saturation of the market.

Looking at this problem historically it is not difficult to see that the importance of the quality re-evaluation process became obvious to the first mass producers. A clear example would be to contrast Henry Ford's strategy in the 1920s with the strategy of General Motors' boss at that time –Alfred P. Sloan, jr. Henry Ford was not aware of the problem that the market became saturated and continued to produce one, and only one, model (the model T) in the belief that it would continue to be demanded. Sloan, on the other hand realised that the market was saturating and that they would have to sell cars to people that already owned one. Sloan's strategy to overcome this problem was to develop the car, i.e. to induce functional obsolescence of previously made cars, and to regularly change the appearance of the cars, i.e. to induce psychological obsolescence.

It was only due to the rapid decline of the Ford Motor Company in the mid-twenties and the changeover to model A that Ford learned, at great costs, the lessons pioneered at GM. "Sloanism" thus triumphed over "Fordism"; marketing triumphed over pure production. Charles Kettering of General Motors had said it was important "to keep the customer dissatisfied".[118] In spite of Sloan's victory over Fordism, the period of mass production is generally called Fordism.

Mass producers learned to consider that markets have a limit, that they become saturated. But, they also learned that demand could be fostered to remain at a constant level after markets had been saturated. A "flexible" mass production that was able to manufacture a frequently changing output was the solution. Consumerism grew.

The mass producing industries provided work and income to a rising part of the population which increased the states tax revenues. That the western states had become dependent of the mass producing industries became painfully clear to all parts during the depression of the 1930s. The lessons of the depression led to a firmer connection between industry and state and under the banner of Keynes they found an economic theory that provided a basis for mutual growth. Corporativism grew.

The ten years following the second world war mark a turning point. Most western countries found an increased interest in economic growth, and why? The problems

[118] Hounshell, p267.

were that the demand effects of the war and the Marshall plan to rebuild Europe were declining. Another thing was that the surprisingly quickly recovered German industry together with an emerging Japanese industry started to compete on the global markets. Another issue was a ”political systems” competition where the USA saw economic growth as the primary ”weapon” against the Soviet Union. Not to be forgotten there was also a strong internal political pressure to expand the welfare systems. Until this moment in history, producers had mainly been ”one product” producers; car producers stuck to producing cars, bottle makers stuck to making bottles. New inventions were primarily developed in entirely new companies and established producers stuck to enhance their single product.[119]

The increased competition in the 1950s and the fact that markets expanded at a slower pace made it risky for individual companies to rely on only one market. Mass producers started to use their knowledge to produce things similar to the ones they already did, bottle makers started to challange plate glass makers for example, and gave up the ”one product strategy” previously used. The purpose was to spread risk and compete on a larger number of markets. This also accounts for the breakup of vertical ties at the time and that producers encountered an increasing need for flexible control over the markets they had. The result of all this is that the internal organisational structure of the mass producing companies changed radically; marketing, advertising, fashion and design were integrated in a much more conscious way in the planning of the production than earlier. That this development must have had an impact on consumers and the average quality re-evaluation process is utterly clear.

Also, it was during this time that mass producers took a more serious interest to learn about controlling the quality of the output. This development came much because there was a large need for it. Consumers complained on poor quality and consumer organisations tests showed that large parts (tens of percent) of the production was in need of repair within days after purchase. The quality control systems developed had several advantages for both producers and consumers: higher process quality meant fewer products below acceptable standard which meant fewer reclamations and thus happier consumers. The quality control thinking also involved weighing the durability of all components of a product against each other. This gave the producer a possibility to lower the price of the product by matching the durability of a products components to the same level. The component that had the lowest acceptable durability was used to set standards for the rest of the components. In an ideal case, the product would fall apart a the end of a pre-specified technical-life. Hence, quality control systems gave producers the means needed to control the technical life (absolute obsolescence) of the product.

The organisational changes of the mass producing industries after the war moved the influence on technical life from technicians and engineers closer to marketeers and fashion creators. A hypothesis is that absolute obsolescence from this period are increasingly matched against relative obsolescence, i.e. that the technical life of a

[119] Chandler, p605ff.

product is roughly the same as the period that the product is fashionable. This has also been discussed, see page 25 and onwards, as a way to increase the profit of the producers.

During the 1960s, increased global competition and increased labour costs made many mass producers move their production to low wage countries. New markets were emerging but at an insufficient pace to compensate for the already utilised possibilities to increase the saturation capacity of established markets.[120] Hence we can see that Fordism already had seen its heydays and was on the verge of encountering serious internal problems, when the oil crises of the 1970s hit the western world.

To make a long story short, the events of the 1970s led to an abandonment, by a majority of the OECD countries, of Keynesian economic policies. Thereby the state no longer had the key role as a guarantor of a stable demand. At the same time the relative costs for education, welfare etc had reached enormous heights. The states could not cover the costs by borrowing without increasing inflation and since the new macro economic policies (monetarism) foremost target was to *decrease* inflation, many states started to lower welfare and sell public assets to adjust to the harsher reality.

What happened during the 1980s was that a the macro economic design for growth that had underpinned the Fordist era met its limits and ceased to function. The design built upon Keynesian economic policies, corporatism, mass politics, unions and industry in cooperation etc.[121] The mass producers worked like the hub of the wheel through their production and through spreading incomes, thus creating their own markets, tax revenue to the state etc. A fairly well sped up obsolescence of the goods produced by the mass producers was a necessity for the design.

Today we have not yet seen the advent of a new macro economic design. A lot of problems lie in the way, institutional ”rules” from the former design may be the worst but close after is probably the present neo-conservatism that manipulate markets in favour of the strongest economic actors. In an opposite direction works for example the green movement. A proposal from the ”greens” is that the fordistic way to measure productivity (by comparing produced volume towards an increasing capital cost) should be replaced and they suggest that productivity instead is better measured against the consumption of natural resources. As a result, they argue, quality rather than quantity would be the focal point of production.[122]

What we can see is, that the quality re-evaluation process has most probably changed during the course of the 20th century. To Henry Ford obsolescence was mainly absolute obsolescence. Before 1920, he did not even think of relative obsolescence. Today, fashion and design is applied to almost anything we buy. So, no doubt there has been a change in the quality re-evaluation process, and no doubt this change has

[120] From the saturation of markets follows as a consequence that the demand for raw materials is also levelling off. That this seems to be the fact can be read in an article by Larson, E, Beyond The Era of Materials, Scientific American, 1986.

[121] Politics, unions and industry in cooperation have been very significant for Sweden but were perhaps less explicit in other countries, specially the USA.

[122] Rocky Mountain Institute, Sustainable Economic development, www.rmi.com.

been an important ingredient in the Fordist paradigm.

5.3 Issues for continued research

I believe that the quality re-evaluation process concept is well suited to continue working on. Creating the concept have meant that much of what is known about the obsolescence of durable goods have been included. But the concept is far from finished and can be developed in several areas. Below I have listed some areas in which I believe the quality re-evaluation process concept could either be developed or be relevant as a research method.

i) Viewing the quality re-evaluation concept as a framework makes it possible to see that it is not only reasonable to add further empirical knowledge to it but also to relate the role of, for example, warranties, moral hazard problems, leasing/renting contracts compared to buying contracts etc and have the framework used as a tool to study how these separate issues may effect the obsolescence process of particular products. Also the quality re-evaluation concept includes a gap analysis which I believe would be fruitful to develop further. One reason is because it could provide us with an excellent tool for comparing the obsolescence of products in a number of ways. Comparisons could be made between, for example, producers of substitutes, social stratas, in cross-sections of time etc.

ii) More research is needed to distinguish different groups of consumers. The two groups discussed in this study, price vs. quality conscious consumers, is not enough. Another question is how information and experience affect consumers and to what degree they are ”loyal” to their price or quality consciousness. It is possible that Adam Smith’s invisible hand, the contention that the market mechanism will ensure economic efficiency turns out to be a *cul de sac*. The notions of this study hint that price conscious consumers will get goods with shorter service-lives and slower technical development than the other group, i.e. the group of consumers who trust the market mechanism are farther away from economic efficiency than the group who *distrust* the market mechanism.

iii) Implicit in both part 4 (the manufacturers) and in sub-part 5.3 above lies the hypothesis that the ”obsolescence strategies” of companies are different according to how mature a products technology is. When the technology of a product is young, firms compete by functional obsolescence (development of the technology) but as the technology matures this becomes both more costly and more difficult plus that the consumers become conservative and more reluctant to accept significant changes of a product they have become used to. The hypothesis is that producers successively turn to competition by psychological obsolescence as a technology matures, to compensate for the increasing difficulties of competing by functional obsolescence (by producers I mean mass producers of consumer durables on oligopolistic markets).

iv) Moderate service-lives of consumer durables was a key factor in the fordistic macro economic design to provide for the welfare of individuals. Today the macro economic situation is quite different which raises several fundamental questions on the future role of product obsolescence in the economy. Will product obsolescence have a different connection to welfare than earlier? Will product life extension due to

environmental concerns impede on consumer utility – or promote it? Does the durability of products really affect technical development as is sometimes argued,[123] or is that argument attached to the underlying assumptions that underpinned the Fordistic paradigm of mass production?

v) Recent debates discuss the issue of product life extension as a way to decrease the consumption of natural resources. In this context the quality re-evaluation process concept could possibly be developed to work as a case study method to be used in product analysis by firms considering product life extension as a potential environmental strategy.

[123] Fishman et al, 1993.

References and Literature

Amin Ash (ed), *Post-fordism: A Reader*, Blackwell, 1994.

Andersson Helén, *Ett industriföretags omvandling: En studie av Hägglunds förändringsprocess 1922-1981 med bas i företagets produkter*, 1995. (The transformation of an industrial company: A study of the reorganisation of Hägglunds 1922-1981 with basis in the company's products)

Andreasen Alan, Consumer Responses to Dissatisfaction in Loose Monopolies, **Journal of Consumer Research**, No 12, sept 1985, p135-141.

Anell Lars, *Det andra samhället, studier i kapitalistisk mytologi och socialistisk nödvändighet* (The other society, studies in capitalistic mythology and socialistic necessity) Stockholm, 1969.

Akerlof, G. A., The Market for "Lemons": Qualitative Uncertainty and the Market Mechanism, **The Quarterly Journal of Economics**, vol 84, No 3, 1970, p. 488-500.

Alchian A, Armen, Uncertainty, Evolution and Economic Theory, **Journal of Political Economy**, Vol. 58, 1950.

Biørn Erik, Gross and Net Capital, and the Form of the Survival Function: Theory and Some Norwegian Evidence, **Review of Income and Wealth**, series 35, No 2 June 1989.

Burns T och Stalker G M, *The Management of Innovation*, London, 1961.

Carrier J G, *Gifts and Commodities, Exchange and Western Capitalism since 1700*, London, 1995.

Chandler, Alfred D, Scale and Scope: *The Dynamics of Industrial Capitalism*, Harvard University Press, 1990.

Cooper T, *Poor people, poor products?*, paper presented att the XIVth International Home Economics and Consumer Studies research Conference, Roehampton Institute, september, 1996.

Cooper T, The durability of consumer durables, **Business Strategy and the Environment**, vol 3, 1994, sid 23-30.

Crosby, Philip B, *Frågor och svar om kvalitet*, Studentlitteratur, 1990. (Let's Talk Quality. 96 Questions You Always Wanted to Ask Phil Crosby, New York 1989)

Dahl R, *Produkters brukstid (Products'time in use)*, Nordisk Ministerråd, Oslo, NU-serien: B 1980:13.

Department of Energy, *Energy Efficiency in Domestic Electrical Appliances*, HMSO: London, 1990.

Electrolux försvarar planerad produktföråldring (Electrolux defend planned obsolescence), **Svenska Dagbladet Näringsliv**, p10, jan 25 1997.

Eliasson Gunnar, *The Firm as a Competent Team*, **Journal of Economic Behaviour and Organization**, june 1990 (vol 13).

Eliasson G, *Bounded irrational behaviour, dynamic market coordination and the limits of the firm*, IUI Working paper no. 207b, 1989c (IUI, Stockholm). [not available, see review in Andersson Helén]

Eternally Yours Foundation, **website**: http://www.worldaccess.nl/~muis/eternal.htm (updated jan 1997)

Euromonitor Market Research, GB, april, 1992.

Fairlie S, Long Distance, Short Life: Why Big Business Favours Recycling, **The Ecologist**, vol. 22, No. 6 Nov/Dec, 1992, pp. 276-83.

Fishman A, Gandal N, Shy O, Planned obsolescence as an Engine of Technological Progress, **The Journal of Industrial Economics**, No. 4, Dec, 1993, pp 361-370.

Fixed Capital Flows and Stocks, the *Methodology*, and the *Evaluation Report*, Investment and Capital Stock Division, Statistics Canada, 1990.

Gamla kontorsmaskiner återvinns, (office machines recycled), **Dagens Nyheter**, 9 may 1996.

Gordon Robert J. *The Measurement of Durable Good Prices*, 1990.

Granberg Björn, The Swedish dish-brush: Durability and market structure, 1996, (working paper, see appendix A)

Granberg Björn, *Planerad föråldring av massprodukter: Historian, institutionaliseringen och argumenten*, (Planned obsolescence of mass products: the history, institutionalization and the arguments) paper in history of economics, University of Stockholm, 1996. (not publ.)

Griliches, 1979, Cross-industry allocation of the returns to R&D, p104-5.

Gyll riktar in Volvo på nya spår (Gyll steers Volvo towards new tracks), **Dagens Nyheter**, 1 august 1994, p C-8.

Heiskanen Eva, *Conditions for Product Life Extension*, National Consumers Research Centre (Finland) working papers 22, 1996.

Hirschman Albert, *Exit, Voice, and Loyalty*, Harward University Press, London, 1970.

Hitt Michael, *The market for corporate control and firm innovation*, **Academy of Management Journal**, p1084-1119, Vol 38, No 5, 1996.

Hounshell David, *From the American System to Mass Production 1800-1932*, John Hopkins, 1984.

Hultén C R and Wykoff F C, The Estimation of Economic Depreciation Using Vintage Asset Prices, **Journal of Econometrics**, No 15, 1981, p367-391.

It's wise to deindustrialise, **The Economist**, April 26th – May 2nd 1997, p88.

Jancsurac Joe, The Consumer Value Story, **Appliance Manufacturer**, vol. 43, iss. 6, jun 1995.

Janiszevskij Chris, Preattentive Mere Exposure Effects, **Journal of Consumer Research**, No 20, Dec 1993, p376-392.

Karpatkin R H, (Pres. Consumers Union), Consumers and Their Discontents: Issues for a Civil Society, **Advancing the Consumer Interest**, Vol. 8, No. 2 / fall 1996.

Kleinman E and Ophir T, The Durability of Goods, **Review of Economic Studies**, No 33, 1966, p. 165-178.

Kotler Philip, *Marketing Management*, 7'th edition, 1991.

Lancaster Kelvin, Change and Innovation in the Technology of Innovation, **American Economic Review** (Papers and Proceedings), No 2, May 1966, pp14-23.

Laverty Kevin J, Economic "Short-termism": the Debate, the Unresolved Issues. and the Implications for Management Practice and Research, **Academy of Management Review**, Vol. 21, No. 3, 1996.

Larson Eric D, *Trends in the Consumption of Energy-Intensive Basic Materials in industrial Countries and Implications for Developing Regions*, Paper for International Symposium on Environmentally Sound Energy Technologies, Milan, Italy, oct 21-25, 1991.

Larsen Eric D et al, Beyond the Era of Materials, **Scientific American**, June 1986.

Methods used by OECD countries to measure stocks of fixed capital, National accounts: Sources and methods, No 2, OECD, France, 1993.

Linn Carl Eric, *Market dynamics*, 1996.

Morgondagens bil? (The car of tomorrow?) **Industria**, No 4, 1959, p33-35.

Naumann Earl, *Creating Customer Value*, Thomsson Executive Press, USA, 1995.

Nelson Robert, *In memoriam: On the death of the 'market mechanism'"*, **Ecological Economics**, p187-197, No 20, 1997.

Nelson R and Winter S, Neoclassical vs. Evolutionary Theories of Economic Growth: Critique and Prospectus, **Economic Journal**, No 336, 1974.

Nyström Harry, *Technological and Market Innovation: Strategies for Product and Company Innovation*, Wiley, 1990.

Product Durability and Product-Life Extension, OECD Paris, 1982.

Packard Vance, *The Wastemakers*, USA, 1960.

Payson Steven, *Quality Measurement in Economics, New Perspectives on the Evolution of Goods and Services*, USA, 1994.

Pestoff Victor A, Exit, voice and collective action in Swedish consumer policy, **Journal of Consumer Policy**, vol 11 pp3- , 1988.

Planned Obsolescence: Rescue for Tired Markets?, **Dun's Review and Modern Industry,** 1959.

Porter Michael, *Competitive Strategy, Techniques for Analyzing Industries and Competitors*, 1980.

Rao A R and Bergen M E, Price Premium Variations as a Consequence of Buyers' Lack of Information, **Journal of Consumer Research**, Vol. 19, Dec 1992, p412-423.

Resursslöseri i överflöd - en debattbok om varuproduktion och resursfördelning, Fältbiologerna, 1977.

Rifkin Jeremy, *The End of Work: the decline of the global workforce and the dawn of the post-market era*, USA, 1995.

Rosegger Gerhard, *The Economics of Production and Innovation. An Industrial Perspective*, Oxford, 1980.

Rosenberg Nathan, *Exploring the black box. Technology, economics, and history*, New York, 1994.

Russel W B, Gregory S C, Gift Giving as Agapic Love: An Alternative to the Exchange Paradigm Based on Dating Experiances, **Journal of Consumer Research**, Vol 20, No 3, Dec 1993.

Sahal Devendra, *Patterns of Technological Innovation*, Mass, USA, 1981.

Schumacher E F, *Small is Beautiful*, London, 1974.

Shopping and thinking: Corporate takeovers and innovation, **The Economist**, Vol 341, No 7996, 14dec - 20dec, 1996, page 71.

Shy Oz, *Industrial Organisation: Theory and Applications*, MIT Press, Massachusetts, 1995.

Strandbakken Pål, *Produktlevetid og produktkultur* (Product durability and product culture, A study of consumers attitudes), SIFO Rapport nr. 6 – 1997, Norway.

Suh Nam P, *The Principles of Design*, MIT, Oxford, 1990.

Taylor Rattray G, *Rethink*, London, 1972.

Utmärkt Svensk Kvalitet (Prized Swedish Quality) Instutet för verkstadsteknisk forskning, Lund, 1994.

The Case of Planned obsolescence, **Management Accounting**, iss. 8-10, feb-april, 1994.

Williams Robert H et al, Materials, Affluence and Industrial Energy Use, **Annual Review of Energy**, Vol 12, 1987.

Appendix A

The Swedish dish-brush: Durability and market structure

Björn Granberg,
Department of Economic History, University of Stockholm, April 1996.

Methods and materials
This survey is not very deep. It was done from a moment of inspiration to find a way to test the theories in the present paper rather than carried out as a scientific inquiry. It was carried out during a few days by using the phone. The results therefore may have biases that I cannot account for.

Manufacturers
Forsbergs AB, tel. 0380-3041, Contact: Peter Ahlberg
Kronborsten AB. tel. 044-81320
Kungsborsten (Husqvarna)
Nordex, tel. 0417-30290, Contact: Fredrik Sentelius (marketing director)
Jordan (Norwegian exporter of brushes to Sweden)
Alfa Laval, 08-550 294 00, Contact: Håkan Myresten.
In addition, there is irregular import of small batches of brushes, mainly from east European countries.

Monofilament, wholesalers
Primoplast, 040-151520/ 155020
Anton Svensson & son, 0470-778018

Distributors/wholesalers
Dagab
ICA-Teampac
KF

Straw materials used in dish-brushes

Material	Price*	Durability**	Comments
Polypropylen, PP	20 kr/kg	Lower than 1	Very low quality. Most frequent used in low priced import. These brushes are often sold in plenty packs. (Source: Kronborsten)
Nylon, N6	ca 40kr /kg	Lower than 1	Wear resistan only slightly better compared to PP. Absorbs water and therefore also softens when wet.
Nylon, N6.6	ca 50kr/kg	Durability 1	Most frequently used straw. Does not soften as fast in water as N6.
Nylon, N6.12	ca 130kr/kg	Durability 3 x 1	Significantly better than N6 from a wear point of view.
Polyester, PBT (0,30)	ca 70kr/kg	Up to 4 x 1	Very good resistance against wear. Does not absorb water and does not soften in it.

** Price informations from April 1996*
*** Durability 1 correspond to approximately a six month long service-life in a normal four person household. The manufacturers I have spoken to confirm the approximations.*
Source: If not otherwise said, Anton Svensson & son.

The service-life of dish-brushes

A dish-brush consists of two ”parts”: the handle and the straws. The technical life of the handle exceeds by far that of the straws, so that which demarcates the technical life is the straws. Thus the focus concerning the service-life is upon the straws.
Durability 1 is estimated to equal six months of normal use in a normal household of four persons. The PBT-straw has durability 4, which equals two years in the normal household. The durability of the PBT straw is an estimation done by the monofilament wholesaler but it has been confirmed by several of the manufacturers I have spoken to. The farm equipment company Alfa-laval is the only manufacturer that has chosen to use PBT straws in their dish-brushes and they also claim that their brush has a service-life of up to two years in cow-house milk rooms. Whether that would put a heavier strain on the brushes compared to a normal household, the spokesman for the company did not say.
The amount of relative obsolescence concerning dish-brushes is small, since no technical development to improve brushes occur and very small changes in design takes place. Thus absolute obsolescence is clearly dominant as the cause of the discarding of the brushes. I.e. brushes are discarded because they are worn out, no other causes can be found.
The manufacturers have a tendency of blaming the users for the short service-lives of the brushes. For example they argue that users often ruin their brushes against hot frying pans. Another argument is that users buy a new brush because the old one looks filthy. Alfa-Laval claim that the PBT straws has a slightly better resistance against heat. The filthy look of the brush is, according to two interviewed, connected to in what degree the straws softens in water. The longer the straws keep their stiffness during wash-up the less

is the likeliness that the brush will look filthy. Again the Alfa-Laval brush seem to have an advantage since PBT straws does not soften in water. Further Alfa-Laval claim that PBT–straws straightens if the brush is put in boiling water or run in a dish washing machine, i.e. the manufacturer claim it is possible to prolong the technical life of this brush.

Manufacturing cost differences

The straws of a dish-brush weights approximately 15-20 grams. The total cost for the straws contained in one brush then become, for the manufacturer (straw weight 20 gr):

PP, Skr 0.40
N6, Skr 0.80
N6.6 Skr 1.00
N6.12 Skr 2.60
PBT Skr 1.40

Notice the small difference in cost between the most commonly used nylon N6.6 straw and the polyester PBT straw. For an additional manufacturing cost of Skr 0.40 the consumer could have a brush with a durability of up to four times that of which is available for the consumers today. The only manufacturer that offers a brush with PBT straws (Alfa-Laval) however, only sell it by themselves directly to farmers, through diarys and through Lantmännen which is a farmers co-operative wholesaler. They do not sell trough any of the three large wholesalers; Dagab, ICA-Teampac or KF.

Environmental aspects

From a chemical point of view there is no big difference between Nylon and Polyester regarding their environmental impact. According to Anton Svensson & Son the polyester has a slight advantage since the exhaust fumes from the material when burnt are cleaner. Environmentally, a more considerable difference between the two materials is evident through the large differences in service-lives and the differences in marketed volume. Because of the volume, the household market has the greatest significance to the environment. For this market manufacturers have chosen N6.6 for straw material, which is a material that gives the brushes a service-life of 6 months. The size of the Swedish market, which consists of replacement sales, make the overturn of dish-brushes add up to a yearly 8 million brushes, or so, sold. Should manufacturers instead have chosen PBT straws with a service-life four times longer, the consequence would have been that the number of brushes sold each year had been no more than 2 million.

To the environment a changeover to PBT straws would mean that approximately 300.000 kilo of plastics could be saved each year. Further the transports of 6 million dish-brushes would not be needed anymore. This second environmental bonus may be more significant than first thought of since the brushes are bulky goods. The brushes are packed standing up individually in boxes to prevent the straws from being deformed during transport. Also the way they are standing in the boxes provide retailers with a display stand.

Conclusions

The consumer may from the dish-brush market learn that products with long potential service-life pared with high quality is not directed towards the man on the street. The retailing of these products is directed towards the group of consumers that has voiced

their demands of a high class product to the manufacturer. The man on the street is in principle left out to choose among what the manufactures offer, and in the case of dish-brushes, that offer is a handful of practically identical brushes. By that the conclusion must be that the consumer does not have much choice but to accept the manufacturers idea of what should be considered as the right quality of the product.
Economists should observe that it is on the ”free market” that the products with the lowest quality is found, while Alfa-Laval, alone in its market segment, offer a product with significantly higher quality. They offer their brush to a quality conscious group that are willing to pay a higher price. This survey may also form an illustration of how important it is that consumers forward their demands to the producers and not only rely on market forces. In this respect, the survey give support to Albert Hirschmanns implication that ”exit”* is a dull instrument when it comes to improving the quality of products.

Miscellaneous informations

•The weight of a dish-brush is approximately 50 grams. The handle around 30-35 grams and the straw 15-20 grams.
•The development of dish-brushes has gone from more than 70 holes to around 53 today (holes with straws). May that impair the service-life?
•The use of dish-brushes is a cultural phenomenon. In other countries sponges and clothes are used instead. In Denmark the common material used as straw is horsehair.
•The total Swedish market for dish-brushes is today approximately 8 million sold each year or 1.8 brushes per household and year. This information come from Kronborsten and it corresponds with the stated average service-life for the most common straw material N6.6. Kronborsten has the largest market share with 40-45 percent of the total Swedish market.
•Regarding the claim of the producers that users ruin their brushes against hot surfaces (frying pans) one may wonder if there is a potential market for heat resistant dish-brushes specially designed for frying pans.

* Albert Hirshmanns concept ”exit” can in its simplest meaning be described as an act used by consumers to tell producers of their discontent. When exiting the consumer shift to another producer in search for a better product and thus ”punish” the first producer by not being loyal. The opposite of exit is ”voice” where the consumer tell the producer directly of his/hers discontent instead of exiting.