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Has the Durability of White Goods Changed Between 1998 and 2017? – In What Direction and Why?¹

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Keywords: Refrigerators; Freezers; Obsolescence; Replacements; Durability; Product Lifetimes; Product Design; Premature Obsolescence; Product Lifetime Optimisation.

Abstract: The author performed a nationwide representative survey of the durability of freezers, refrigerators, TV sets and stereos in Norway in 1998, as part of his doctoral thesis. In 2017, the Norwegian Consumer Council financed a replication of the survey for the cold appliances, enabling us to conclude on the question of whether product durability goes up or down. We also consider survey material on the age of households' washing machines, dishwashers and tumble driers, why these products are replaced, repair practices etc., but the comparison between 98 and 17 is restricted to refrigerators and freezers.

Between 1998 and 2017 the number of years a household uses the refrigerator; what we here define as the lifespan of the product, has decreased by one and a half year on average. Likewise, in the same period, the lifespan of freezers has also decreased by a bit more than one and a half year. It seems as if the reason for this decrease is that households today, more often than 20 years ago, replace cold appliances that are not malfunctioning. If this is correct, the importance of technical quality/mechanical durability is reduced, while psychological obsolescence and 'new consumer needs' has gained importance. However, qualitative (technical) obsolescence remains the main reason for replacement of cold appliances, even if we observe an unwanted change. For washing machines, where we do not have comparable data over time, it seems as if technical quality/durability is more important than for cold appliances. The same tendency, but somewhat weaker, is observed for dishwashers. Generally, the consumption of washing machines, dishwashers and tumble dryers is different from the consumption of refrigerators and freezers, as these products more often get repaired. This probably indicates that washing machines etc. to a larger degree are seen as functional objects and less as aesthetical objects.

Introduction

The potential contribution from increased life span of products to more sustainable life styles is about to be more broadly recognized (Cooper ed. 2010). Increased product durability is a kind of "three-for-the-price-of-one" solution; reducing energy consumption, reducing pollution and materials use. In addition, it might even be a socially acceptable take on the challenge of reduced consumption in the richer parts of the world.

This presentation explores two research questions:

1. For how long do consumers keep (use) their products? (specified for different products, but the focus here is on cold appliances)
2. Do these products in 2017 last for a longer or for a shorter period than they did in 1998?

Both questions are tricky to answer precisely, but I try to address them by posing identical survey questions at two different points in time, in order to measure any changes in our operational definition of product life spans. In

¹ The presentation builds on a Norwegian language only report from 2018 by Pål Strandbakken and Randi Lavik; *Har hvitevarenes levetid endret seg fra 1998 til 2017?*, Oppdragsrapport nr. 2 – 2018, SIFO Consumption Research Norway; Oslo Metropolitan University. The report was commissioned by the Norwegian Consumer Council.

addition, I want to find out *why consumers replace their products*, and if their *reasons for replacement* have changed during the 20 year period.

This research field comes with a lot of different conceptualizations and definitions. I use *product life span* as the number of years a household has had its number one product; how many years since acquisition? The concept “number one product” is constructed in order to deal with the fact that many households have more than one refrigerator or freezer. We are interested in the newest, which presumably will be placed most visible, in the kitchen.

One might reasonably argue that from an environmental perspective it would be more interesting to study *use time* than *life span* (as we defined it above), because this would give us more information about *durability*. On the other hand will life span come with an interesting relation to use time because it indicates something about the availability of second hand products. Further, and more interesting, our object of study is real social life spans and not potential technically defined use time. It is a problem, however, that most consumers will regard the questions about increase or decrease in life spans as questions of technical quality/durability.

To the extent that we succeed in measuring life spans, and potential changes in them, we should try to explain the reasons for change. Then we have to consider much more than just technical quality. Theoretically, we might have a situation where the technical quality is constant, but that (Norwegian) consumers have become more affluent and replace (buy) products more often than they used to, even if it has nothing to do with technical quality. We could, however also imagine that a more affluent population buys more expensive, hence presumably more durable products.

The measuring of product life spans in the population is based on a picture taken at a specific time at something that is a result of what has happened in the previous ten to twenty years, “historical” consumer decisions taken in markets with different brands with varying product quality, decisions taken by individuals and households in different economic situations.

Project design and methods

In a certain sense, we enter the material backwards, when we claim that the key to understanding product life spans is to understand why consumers chose to replace their previous product. For a product that is new on the market, that question is meaningless. I have never before owned a tumble dryer - it is my first - so I am not able to answer questions of replacement. For other products, like refrigerators, freezers and washing machines we might by and large suppose that households have changed products, excepting young people in new households. The different reasons for obsolescence is key to understanding how we could influence product life spans in the future; qualitative (wear and tear, technical breakdowns), functional, aesthetic, changed consumer needs or “Diderot” obsolescence.

This paper is based on two nationwide (Norwegian) surveys. As part of the author's PhD (Strandbakken 2007), a consumer survey was conducted in 1998 that studied product durability/life spans (product's age) and reasons for product replacements for refrigerators, freezers, TV-sets and stereos. In Early 2017, the Norwegian Consumer Council asked the author/SIFO to replicate the original survey, in order to determine if product life had increased or decreased in the 20-year period after 1998, the initiative was partly a reaction to some rather negative European reports. We decided that due to technological change, stereos clearly were irrelevant, and TV-sets quite irrelevant. Hence, the specific question in the title is about white goods. Sadly, I did not include washing machines in the original study. In the 2017 study we repeated the original sets of questions from 1998 for the cold appliances. In addition, we included similar questions (and some new ones) for washing machines and dishwashers, plus some material on tumble dryers.

We have not considered if the difference between a telephone survey (1998) and a web survey (2017) might reduce comparability.

Life span

Our estimate for the product's life span is based on the question “How many years ago (approximately) is it since the household acquired the refrigerator/freezer that is in use today? If more than one, answers should

consider the newest". Responses to this question give us the average age of a number of products in Norwegian households. With a degree of humility and some reservations. The number is not the same as the product's technical durability, which is longer. It is a number that estimates for how many years a household has had its number one product. A study of "use time" or technical durability would require a different research design.

Here, we aim at studying the product's social life span. This means that if the owner is redecorating his kitchen and simply "has to" replace his avocado green cold appliances after four years, we register the life span as four years. This brings up a number of questions about environmental benefits (and perhaps the opposite) of second hand markets etc., but I will not go into them here. The basic idea is that with all its possible inaccuracies we will, by posing this question at two different points in time, be able to give a tentative answer to the question of whether product life spans go up or down. We also analyse any changes in the reasons given for product replacements. How often are replacements resulting from malfunctioning or breakdown of the old product, and is this share increasing or decreasing?

Product obsolescence/replacement

From the environmental perspective, two questions about product life spans are interesting: why was the old product replaced, and what happened to it. We have to understand the consumers' reasons for scrapping the old product if we want to influence product life. In Strandbakken 2007 (p. 171) we offer a typology of reasons for regarding products as obsolete, developing/expanding Packard's (1960) scheme.

Obsolescence of function

Obsolescence of quality

- Aesthetic dimension
- Technical: product malfunctioning/breakdown/damaged product

Obsolescence of desirability

- Fashion change
- Change of personal style
- Diderot effects
- Hedonism

Obsolescence due to new consumer needs Packard's scheme contained function, quality and desirability (the last often renamed "psychological" obsolescence). The typology is basically self-explaining. Functional obsolescence might be exemplified by the transition from vinyl to CDs in the early nineties. Highly relevant for smartphones etc., perhaps less so for cold appliances and washing machines. *Quality* is the dimension most often referred to when durability is debated. Are today's products better or worse than yesterday's? Are they repairable? Questions of *planned* obsolescence might be raised, but we will not deal with that theme here. Desirability deals with the consumers' mental relation to their products, as fashion or personal style. In addition we have the so called "Diderot effect", based on the observation that consumers tend to search for consistency in the product portfolio (McCracken 1988). Hedonism refers to the well known "feel good effect" of buying new things. New consumer needs refers to real or objective changes in the consumer's life that necessitates change. Quite simplistic, like when you need plus size clothing if you have gained weight, more flexible furniture if you have to move to a two room apartment after a divorce or when you need a larger freezer because you have taken up moose hunting.

Our questionnaire was designed to cover all of these product replacement justifications.

Refrigerators and freezers

1998–2017

Ownership share and average age

Refrigerators, and to a lesser extent freezers, are part of what we might call the Norwegian households' standard package (table 1).

	1998	2017
Refrigerator	98.3	99.4
Freezer	91.3	91.3
N	893	1000

Table 1. Percentage owning cold appliances.

I started out, assuming that due to an unprecedented period of economic growth in Norway from 1995 to the present, a gradually more affluent population would have bought better and more expensive white goods (here cold appliances), and that this would have

resulted in an increasing life span of the products. I was wrong. Table 2 shows that for both product types the product life had decreased by approximately one and a half year.

	1998	2017	Sig.
Refrigerator, average	7.7	6.3	***
Refrigerator, median	6	5	
N	893	932	
Freezer, average	9.4	7.7	***
Freezer, median	8	5	
N			

Table 2. Age of products.

The numbers 6.3 and 7.7 should be compared to an upmarket stakeholder estimate that their white goods are used on average for 13 years (Strandbakken & Bøyum 2017, p. 38).

The most dramatic change between 98 and 17 is that the share that reports to have had their product in ten years or more has fallen with between 13 % and 16 % in all age groups older than 29 (30-44, 45-59, 60-80). The youngest group has not changed much, which is natural as their experience with product replacements is rather limited (Strandbakken & Lavik 2018, p. 22).

Age differences between refrigerators and freezers (in both 1998 and in 2017 freezers were older than refrigerators) will probably be explained by a combination of technical and social/cultural matters. Technically, because a top opened chest freezer is simpler than a front opened 'cupboard refrigerator', technically/socially because the freezer will be opened less often than the fridge. Socially and culturally because what we will call social visibility. Today, the kitchen has increasingly become a public room, a room where you might entertain guests. Traditionally, refrigerators have been placed in kitchens, while (chest) freezers often have been placed in garages or in basements. This means that refrigerators have been more exposed to aesthetical aging or psychological obsolescence (obsolescence of desirability) than freezer. This is the difference between front stage and back stage. A freezer hidden away back stage could mentally be reduced to "pure function". The consumer will tend to not replace it until it breaks down, malfunctions, uses ridiculous

amounts of electricity or has an un-convenient size. When we observe a gradual change into kitchen placed 'cupboard freezers' we expect that the difference between the products will be reduced (which it does).

Replacement and reasons for it

What do consumers do with their old products? From an environmental perspective, this is an important question. In Strandbakken 2009, we observed that electricity use in some households increased significantly when the household bought an energy efficient refrigerator or freezer. This because some of the "replaced" products were moved into the basement, to stock beer, soft drinks, frozen pizzas etc. The energy use of the efficient appliance then came in addition to the old product, not instead of it.

	1998	2017
It was sold	6	9
Given to second hand markets, salvation army etc.	2	5
Given to family or friends	8	10
It is placed in the cabin or in the basement	6	8
It was thrown or delivered to retailer, municipal dump etc.	73	64
Other	3	3
Don't know	2	2
Total	100	100
N	586	612

Table 3. What happened to the old refrigerator. Among those who had replaced a product. Percent.

In 1998, those who answered that the old refrigerator was damaged were not asked what they did to the old one. We assumed, however, that respondents answering this had thrown it (387 persons), because the filter was 'the old one was damaged/did not work anymore'. In addition, 12 persons who had replaced had not answered what they did with the old one. These we grouped together with the 'don't knows'. This we might, with some caution, compare the results from the two years. The same procedure was used for freezers.

In 1998, 73 % had thrown the old refrigerator, compared to 64 % in 2017 (table 3, the difference is significant for $p < .05$; kji square test). Most consumers throw their refrigerator because it is not working (obsolescence of

quality), but some also throws well working products.

	1998	2017
It was thrown because it did not work	91	81
It was thrown for other reasons:		
The old one was unmodern	2	4
It did not fit in any longer	2	3
We needed another type	3	8
We are more well off and it is nice to buy new things	0	1
The old one lacked some functions	2	2
Division of household after divorce	0	1
Total	100	100
N	427	392

Table 4. Among those who answered that the refrigerator was thrown. For what reason? Percent.

Among respondents that had thrown the old product, 91 % in 1998 answered that it was damaged, while 81 % answered the same in 2017 (table 4, the difference is significant for $p < .05$; kji square). Surprisingly, the numbers for throwing are identical for freezers (table 6); 91 and 81 %.

	1998	2017
It was sold	5	9
Given to second hand markets, salvation army etc.	1	6
Given to family or friends	10	10
It is placed in the cabin or in the basement	4	5
It was thrown or delivered to retailer, municipal dump etc.	73	65
Other	5	3
Don't know	3	2
Total	100	100
N	333	419

Table 5. What happened to the old freezer. Among those who had replaced a product. Percent.

In 1998, 73 % answered that the freezer was thrown, compared to 65 % in 2017 (table 5).

	1998	2017
It was thrown because it did not work	91	81
It was thrown for other reasons:		
The old one was unmodern	2	2
It did not fit in any longer	1	4
We needed another type	5	11
We are more well off and it is nice to buy new things	0	0
The old one lacked some functions	1	1
Division of household after divorce	0	0
Total	100	100
N	248	273

Table 6. Among those who answered that the freezer was thrown. For what reason? Percent.

Discussion

Our two initial research questions can be answered:

1. Norwegian consumers today keep their products, specified for refrigerators and freezers, in 6.3 and 7.7 years.
2. Both products have a shorter life span than in 1998, they tend to be replaced approximately one and a half year earlier today.

Sub questions were "why do consumers replace their cold appliances and 'have their reasons for replacing changed in the 20 year period?"

Obsolescence of quality is the main reason for product replacement, with 55 and 56 % for refrigerators and freezers, respectively (table 7). The relative importance of quality, in this technical sense, has, however decreased. It has become 12 % less important for both products.

	Fridge 98	Fridge 17	Freezer 98	Freezer 17
It did not work anymore/out of function	67	55	68	56
The old one was unmodern (colour, design)	5	4	4	4
It did not fit in any more	8	8	5	7
We needed another type (like size)	13	18	16	21
Improved economy/nice to buy new things	1	1	2	1
Old one lacked functions (ex: defrost)	4	3	1	2
Division of household after divorce	2	2	4	3
Other		7		6
Don't know		1		1
Total	100	100	100	100
N	629	671	372	543

Table 7. What was the main reason for changing refrigerator/freezer in the last time you replaced? Among those who had changed. Percent.

The observed difference in replacement reasons for the cold appliances at the two points in time might explain the observed decrease in product life span. Because we want to promote a reasonable and sustainable product culture, we wish to observe that products are replaced after a long life span because they do not work anymore, or work unsatisfactorily. We do not want to see them replaced because the owner feels that the colour is wrong or because it is nice to buy new things.

From the environmental perspective, this means that the change from 1998 to 2017 is one we do not want to see. When 12 % fewer in 2017 reported obsolescence of quality as reason, it appears as if the relative importance of technical product quality goes down. We should repeat, however, that quality remains the dominant replacement reason (table 7).

The other replacement reasons remain rather stable through the period. The changes in "unmodern", "nice to buy new things" (hedonism), "function" and "divorce" are in the range of 1 % (!). Exceptions are "consumer needs", with a 5 % increase for both product types, and for "other", that was not an option in 98, but comprises 7 and 6 % today.

To point to the (sad?) fact that product quality and technical durability does not explain the whole product exchange pattern for cold appliances is obviously not an argument for quality reductions. It is mainly to point out that there are multiple factors at work and that increased social life spans is not achievable by improving technical product quality alone.

Washing machines and dishwashers

In the 2017 survey, we also asked some questions on washing machines and dishwashers:

95.8 % reported to have a washing machine and 87.60 % reported to have a dishwasher. The average life span (comparable to material for cold appliances in 2017) was 5.5 years and 6.0 years respectively. These products were more often than cold appliances replaced because of technical obsolescence (79 % and 64 %). In our social visibility perspective, used to differentiate between kitchen placed refrigerators and basement placed freezers, this gives meaning. Dishwashers, more often than washing machines are placed in kitchens. Washing machines, placed backstage, tend to be more seen as pure function.

We tend to believe that the material we have on repair supports this view. 33 % of Norwegian consumers report to have had their washing machines repaired (15 % for dishwashers and tumble driers), versus 5 % for freezers and 10 % for refrigerators. By and large, we believe that these findings support our function/visibility perspective, even if the numbers for repair of refrigerators and freezers should have been the other way...

Conclusions

We have seen that the life spans of refrigerators and freezers have decreased somewhat (1.5 years) from 1998 to 2017. The main reason for this change seem to be that consumers today, a bit more often than 20 years ago, replaces products that still work, even if obsolescence of quality remains the primary reason for product replacement.

Even if we do not have comparable data over time, it seems as if consumption patterns (or replacement patterns) for washing machines, dishwashers and tumble driers are a bit different, with more focus on obsolescence of quality and more frequent repair.

Future initiatives for increased product life should consider the multitude of different reasons for product replacement. There are, however, years to be gained by influencing consumer attitudes to products, parallel to improvement of the products themselves. Product improvement should probably consider aesthetics in addition to technical quality, at least for refrigerators and front opened cupboard freezers. Even if the last sentence is only partially based on research

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