Saving time and reducing environmental impact of laundry caring

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This paper discusses the research on investigating the laundry caring process to enable consumers to save a significant amount of time and significantly reduce their environmental impact. Due to consumers washing their clothes too much and too often the appliances are running constantly which requires time, labour, and mental energy. By using these appliances, harmful chemicals pollute the waterways and microfibers that are being shed when laundered are ending up in the environment, even resulting in detecting them in the ocean and in people's bodies. Also, consumers own more and more clothing whereby a large part is not even worn. Reducing the amount of time people wash their clothes could result in prolonging the lifetime, reducing the environmental impact, and decreasing the time and costs spend on laundering. However, awareness should be created as most consumers are unaware of the impacts of laundry care on the environment.

Laundering; sustainability; environmental impact; timesaving

1. Introduction

This paper describes a research that was conducted as part of a graduate project of the Master of Industrial Design Engineering at the University of Twente, in order to design a laundry care product for a well-known company in the Netherlands.

2. Methods

The research question 'How can one enable consumers to save a significant amount of time with laundry caring and significantly reduce its environmental impact?' was formulated. To answer the aforementioned question, research on different research domains has been executed. These research domains were market, sustainability, and trends. This chapter describes the different methods used for each research domain.

2.1. Market

The research domain Market is added to the research. As to answer the research question, the market of laundry caring is needed to be analysed. The market domain consists of analysing the laundry care steps and the experiences of consumers on laundry caring. This is done by conducting a survey, in-depth interviews with consumers and interviews with expert practitioners.

2.2. Sustainability

The Sustainability research domain shows insight into the environmental impact of laundry caring. The main method of the sustainability domain is literature research on the different topics on sustainable laundering. Whereby the reasons of laundry caring and the effects are analysed.

2.3. Trends

Adding the Trends research domain, results in finding information on the changing way of laundering over a longer period of time. This trend analysis is done by desk research.

3. Results

The laundry care process is ongoing. The moment a just cleaned and dried clothing item is put in the closet, the laundry basket is already filled with dirty clothing items again. The laundry care process consists of multiple steps and are not in every household the same. The laundry care process is a personal process and dependent on multiple influences. The household size, space, the need to express cleanliness and ownership of appliances are affecting the laundry care process.

With the use of a survey, the most common influences affecting the process are researched. The survey is distributed among 90 respondents in the Netherlands. However, the desired responses of consumers is between the age of 25 and 65 years old that work or are doing an internship. Furthermore, being (partially) responsible for the purchase of household products is also desired. These criteria are needed as the respondents that are left, are the people that most likely need to look representative. Furthermore, partially being responsible for the purchase of household products is added as these respondents are aware of properties of other products and competitors. After cancelling out the respondents that do not meet these requirements, 62 respondents are left.

The questions asked in this survey, are questions regarding opinions and ways of doing of the different laundry care steps. The first couple of questions are regarding the experiences and opinions on the general laundry care process. After that, the questions asked are divided per step.

People wish to buy a comfortable and nice-looking clothing item. They choose an item to wear mostly when it does not smell bad and feels fresh from a closet or the already worn item place. When an item has an unpleasant smell or it has a stain, it is put to wash immediately. Smell is an important factor in deciding whether to put an item in the laundry basket for clothing but also for beddings, towels and kitchen laundry.

People wish to change their outfit when they are going on a trip or have a special occasion to go to whereby the current outfit is not suitable. When disrobing, these items are put on the 'already worn' place or in the 'ready to be laundered' laundry basket. It depends on the circumstances if a clothing item is worn a second time

around. The main reason for wearing a worn item again, is because it does not have an unpleasant smell yet. Another reason is wanting to postpone washing to ensure the clothes stay more beautiful longer. The worn items are placed in the bedroom, on a chair or another item other than a chair, see figure 1 and 2. This to retrieve it easily, let it air and get it in sight to be reminded to wear it again. Freshening up a clothing item is most of the time done by airing it outside or airing it on the indoor air.

Gathering the dirty clothes is mostly done in the bathroom, bedroom and laundry room. Most of the time, the gathering is of dirty clothes is done in the same room as where the clothes are sorted. Most people sort with two sorting criteria's, followed by three or four.

It takes up to 2 or 3 days in a week to wash and the drying of the clothes is done on air, inside on a drying rack due to the methods ability to save energy and therefore costs as well.

People fold instead of de-wrinkle mostly as the item does not really have wrinkles or they do not enjoy de-wrinkling and think it is not always necessary.

Figure 1.; Room putting away clothes

Figure 2.; Way of putting away clothes

Besides the survey, more in-depth information is regarded with the help of in-depth interviews. In total six household, that defer in household size, age of the residents and the type of living are interviewed. This deviation is made as these aspects may affect the laundry care steps. Table 2 shows the characteristics of the different households.

Household nr.	Age	Size	Living
A	Early 20's	2	Terraced
B	Early 20's	2	Terraced
C	Early 20's	2	Apartment
D	Mid 30's	4	Detached
E	Early 30's	2	Terraced
F	Late 40's	1	Apartment

Table 2.; In-depth interviews households

From the in-depth interviews, it was made clear each households handles their laundry caring differently. One household is finding ways to save time by buying the same colour socks to eliminate the sorting of the same socks. Another household steams their clothes while they shower to make sure no de-wrinkling is needed. Four out of six households, sort while gather. They combine the sorting step with the gathering step to eliminate an extra step. Five out of six households, have a place where they place items they already wore but that are not in need of washing already and can be worn again. Those objects used differ, but the room is the same, the room where the items are changed.

Two expert practitioners revealed that consumers find doing laundry a burden and not pleasant. Consumers are finding it difficult to find a proper spot for gathering dirty laundry which results in a massy and smelly house. Sorting is seen as very time consuming and de-wrinkling can be a hassle. They also struggle evaluating which items can be washed together, deciding on the programme and temperature of different items, and adjusting the amount of detergent to it. When laundry is handled in the wrong way, the clothes can get warped out of shape, stale or shrink. Consumers find it annoying that laundry dries very slow, it takes up a lot of time, laundry clutters in the machines and the space it takes to dry clothing on the air is large.

People are unaware of the burden on the environment of laundry detergent and overdose as they are under the assumption the more laundry detergent the cleaner the end result. However, they seem more and more aware of the energy it takes running a machine. There is an increasing focus on sustainability and environmental awareness, they are willing to lower their ecological footprint. Younger generations are more aware and more prone to re-use clothing or donate instead of throwing it away. Lowering the washing temperature, using eco-friendly laundry detergent, using the right amount of laundry detergent, drying the laundry in a natural way, loading the washing machine full and washing only clothes that are really in need of a wash cycle are sustainable measures that can be taken to act more sustainable. Washing a lot of clothes that are not even dirty is not good for the environment and not for the individual due to washing all the time. Airing the sweat out of a shirt on a hanger outside or inside before an open window could make sure it can be worn another time. The clothing remains more beautiful longer, less throwing away and no need of buying new clothing.

Sorting the laundry on colour, washing on low temperatures, using dryer balls or a clean towel for speeding up the drying process in tumble dryers, scheduling drying and washing could be time-saving measures.

The sustainability domain discusses the aspects affecting the sustainability of laundry caring. It has been shown that the textile industry is identified as one of the most important environmental polluters due to a high resource use in production and during use
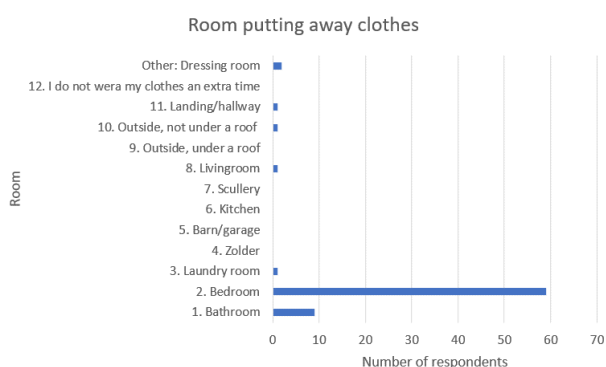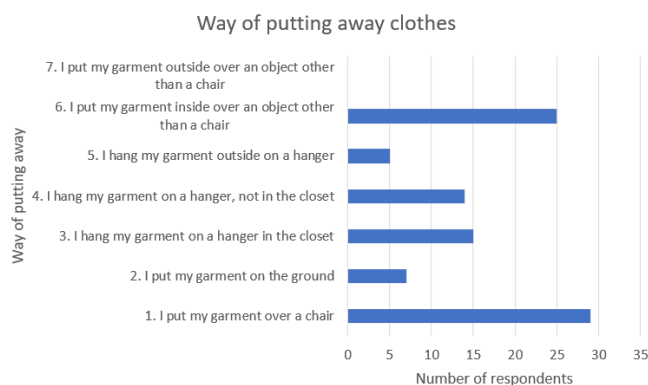
[1]. Of the textiles impact on the environment, two-third is developed during the use phase [2]. The maintenance of clothing has the most significant environmental impact in a fashion lifecycle [3]. The underloaded appliances run overtime and too many chemicals are used that pollute waterways [2,4]. The (synthetic) fibres of clothing are being shed during wash cycles into the environment via washing machine effluent and end up in water, food and bodies that may harm people's health [5,6]. Laundering frequency is the most influential factor for differences in the environmental impacts per wear between garment types [1]. People who disrobe and put the garment directly into the laundry basket remove any chance of another wear and therefore the laundry basket is an end point in the wearing cycle with no more possibility to be worn again [3]. Sustainable laundering and behaviour has the potential to reduce consumption of energy, water and detergent [2,4]. The act of washing less will reduce the effects associated with clothes laundering [3]. The items that are most frequently washed are lightly soiled [3,4]. The consumer is responsible for making sustainable decisions as they decide the method and use of laundering [6,7]. However, people are unaware on how to launder sustainable or are reluctant due to habit and individual concerns [7]. Therefore, the potential of technological improvements is counteracted by consumers' choices and behaviour [7,8]. More consumer education is needed on how to launder sustainable [4]. Focusing on both the environmental benefits as benefits for the consumer is needed to generate success [8]. Furthermore, modest changes to everyday practices that make sense could help in laundering more sustainable [3,4].

The Trends research domain showed that Dutch people spend on average 21 hours a week on domestic chores. Two hours a day on tidying up, cleaning and washing [9]. Due to the available technologies and this resulting in taking less time than before, people use the technology more often and therefore the total time spend on the chore is not decreased. Decreasing the time spend on domestic chores could drastically change people's life [10]. Especially for women as they spend a lot of time on unpaid work [9,11]. It is nowadays more normalized for women to work and take care of the house and children, however the share of women working fulltime has not increased [9]. Unburdening is on the rise, domestic chores are being outsourced, seen on growing platforms for cleaning, grocery, handyman and babysitting services. The goal of these services is to make sure there is more time for fun activities but also align to the circular mindset. The appliances for some domestic chores are doing nothing but do cost resources, space, purchase costs and renewal is preferred every now and then. Clothing and Washing services are growing, some washing services provide subscription-based models, others provide clean laundry. Some clothing services are focused on disowning clothing, others by defining the most suitable clothing items to eliminate bad buys. Domestic chores is a large part of everyone's life in each life phase [12].

4. Conclusion

In the Netherlands, people spend 21 hours per week on household work and this remains a large part of people's lives in all stages of life. It is the women who still mainly take on the care duties. These care duties amount to a quarter of the gross domestic product, and unpaid household work is worth as much as 170 million euros. People do not like the household tasks around laundry and are insecure about their washing skills. They avoid ironing and reluctantly hang the wet laundry on the drying rack. They look for ways to spend as little (time) as possible with the laundry process. Many therefore have a designated spot in the bedroom where they put garments that they may or want to wear again, as long as it has an acceptable odour, and they don't have to

worry about others smelling them. Unfortunately, due to habit and fear, many garments still end up in the laundry basket after one wear. Once in the laundry basket, there is no going back, and the garment will not be worn again until it is washed. The frequency of maintenance in the use phase, is the most influential factor in the biggest environmental polluting phase of the entire fashion lifecycle. This is because maintenance of clothing involves excessive use of water, energy and chemicals and releases microfibers that, along with the chemicals, cause environmental pollution. Man is guided by habits and as a result wash too often, too much, too few garments per wash and use too much detergent. Along with habits, individual concern is a barrier to sustainable laundry management and these habits have already led to a backlash against technological developments. In any case, the use of appliance, physical and mental energy, water, chemicals, microfibers, time and clothing is getting out of control. Laundering frequency is the most influential factor in environmental impact and affects all resources. Reducing the laundering frequency will therefore have a positive big impact on the environmental impact of laundering. Reducing the (body odour) smell of an item could potentially result in wearing an item an extra time as smell is the main factor deciding whether to wear it again. The items that are lightly soiled but not actually dirty are the items aimed for as these wash practices are not necessary.

5. Discussion

Reflecting on the research, it is acknowledged that the number of respondents of the survey is limited to 62. The conclusions of the survey are therefore less reliable. However, the information regarded was sufficient, more respondents would be more trustworthy.

The differences in household size of the in-depth interviews was limited. Only one household consisted of four people. It would have been interesting to get insight into the laundering practices of larger households as they may have different and perhaps more difficult laundry streams and handle this in a sufficient way. Nevertheless, the information regarded was seen as insightful and therefore not more households were needed to be interviewed.

Two of the four interviewed households have the same age, household size and type of living. Therefore, the results may not have been different enough from each other. Because the laundry caring process is very personal, this does not affect the results and is therefore also insightful.

6. Development

A laundry care product was designed for a well-known company in the Netherlands that met the objective of saving time and reducing the environmental impact of laundry caring. This was achieved by reducing the number of wash cycles by facilitating to wear the same clothes more often.

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