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How much can bulk stores help reduce carbon footprint by limiting plastic food packaging?

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Bachelor of Science HES in International Business Management**

by

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Disclaimer

This report is submitted as part of the final examination requirements of the Haute école de gestion de Genève, for the Bachelor of Science HES-SO in International Business Management. The use of any conclusions or recommendations made in or based upon this report, with no prejudice to their value, engages the responsibility neither of the author, nor the author's mentor, nor the jury members nor the HEG or any of its employees.

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Executive Summary

This report focuses on the quantity of food packaging waste consumed by an average single individual, residing in Switzerland. It is based on the household budget survey published by the Federal Statistical Office (FSO). This budget survey mentions the food quantities monthly consumed by a single individual and thus, the packaging waste could be computed accordingly. The objective is to compare the packaging waste of an individual grocery shopping in supermarkets with a person going to bulk stores. It aims to show the quantity of packaging reduction by bulk-buying, hence the monthly waste reduction.

The main materials used for food packaging are plastic, glass, metal and cardboard. Due to its durability and popularity, this study also measured the carbon footprint emitted by plastic packaging for a single individual.

Three analyses have been made. The first estimates that an average individual consumed 2.7 kg of packaging monthly, of which more than a half is plastic. This quantity of plastic yearly emits 105 kg of CO₂ emissions. The plastic packaging carbon footprint can be reduced by almost 60% by purchasing in bulk stores.

Even if purchasing in bulk stores decrease the amount of CO₂ emissions, it implies changing customers habits. Hence, the second analysis compares the buying patterns of supermarkets' customers and bulk stores' clients. It reveals that most of the bulk stores customers are small households, while supermarkets customers are larger ones. In addition, there are costs for customers arising from changes, referred to as switching costs.

The third analysis estimates the two main switching costs to adopt more environmentally friendly approaches when grocery shopping. Firstly, the monetary costs show that supermarkets are 30% less expensive than bulk stores and offer wider products selection. Secondly, the time-based switching costs indicate that bulk stores' customers spend weekly 50% more time in grocery shopping. In addition, bulk stores are present in only a few municipalities.

The final part of this report brings recommendations to decrease the customers' switching costs. Several options are possible such as increasing the visibility and products' variety of bulk stores.

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1. Introduction

The mass production of plastics in the mid-20th century shaped the '*Seventh continent*', which represents several areas where debris are accumulated in the oceans. Nowadays, *the Great Pacific Garbage Patch*¹, represents the largest accumulation of plastic in the world. It is estimated to measure three times the size of France² and is constituted of over 1.8 billion plastic fragments (Cleanup, 2020). There are many different types of marine debris. Nevertheless, plastic is the most common due to its durability, abundance and does not biodegrade (National Geographic Society, 2020).

Every year nearly 8 million tons of plastic are released into the oceans, which according to the UNEP³, represent a garbage truck emptied in the ocean every minute (UNEP, 2018). Plastic debris have a severe impact on the environment notably due to the colorants and chemical products leach out from plastic particles. It threatens marine wildlife, ecosystems, and consequently, human health. For this reason, this Bachelor thesis has an ecological focus.

The food industry has a strong environmental impact as it often combines challenges for the environment like deforestation, land use, air pollution, excess of water and energy consumption but also fertilizer (Benz, 2009). Carbon emission associated with farming, shipping, food processing and storage greatly contribute to the climate change (Benz, 2009). This document will focus its analysis on the packaging used when the finished food product is shipped to grocery stores. The packaging involves lots of materials and notably plastics which is an important source of carbon emissions (Benz, 2009).

The objective of this bachelor thesis is to measure the quantity of packaging waste consumed by an average person purchasing in supermarkets compared to bulk-buying. It aims to show the impact in terms of not buying over-packaged food items.

The analysis shows that bulk stores reduce by 72% the packaging waste consumed by an average single individual. However, it implies changing customers habits meaning costs of changes.

¹ It is located between California and Hawaii

² Or approximately 1.6 million km²

³ The United Nations Environment Program (UNEP)

For this reason, this report also compares the buying patterns of retail stores' customers with the clientele of bulk stores. Then, it estimates the switching costs for supermarkets' customers to go grocery shopping in bulk stores.

In this document, the Literature review addresses the role of packaging into society and introduce bulk stores principles. Then, the Methodology describes the Data Collection and Analysis process. Data collection is the research and surveys that have been mandatory to perform to collect the information needed. Data Analysis is the extraction of the data collection to identify trends, average and make comparisons.

The Findings part is three analyses. Firstly, some products packaging from supermarkets have been weighted to obtain a ratio related to the food quantity versus the packaging used. The aim is to compare the food packaging waste production within supermarkets compared to bulk stores. The second analysis is two surveys used to collect consumer's purchasing habits and to measure their level of awareness regarding sustainable purchasing. One survey has been communicated to customers who mostly do their grocery shopping in supermarkets while the other one has been sent to consumers of a bulk store in Geneva. Thanks to this information, a comparison between both types of customers have been made. The third analysis is the switching costs. Switching costs refer to costs incur by a consumer from substituting brands or products. It can be defined as the cost of changing consumers' habits. The switching costs which are going to be considered are the following:

1. The monetary costs for customers to purchase in bulk stores compared to supermarkets. It relates to the price of identical food items found in both places. Also, it indicates the difference in products' range.
2. The time-based switching costs focus on the average time to get to and spent within a bulk store or supermarket. Through mapping, the concentration of the different types of food stores in Geneva is illustrated.

In the Discussion section, the report compares the results of the findings related to the quantity of packaging waste consumed by an average individual. The objective is to understand the main barriers for customers to adopt more sustainable practices and to suggest recommendations.

The concluding part synthetizes the main points of this report. It summarizes the observations and recommendations based on the results previously obtained.

2. Literature review

In the coming years, the total quantity of packaging is expected to increase as in most European countries, the population is growing (Geijer, 2019). The primary role of food packaging is to contain foods as cost-effectively as possible to satisfy the industry requirements, consumers' needs and ensure foods safety. It also provides nutritional information, cooking instruction, labelling and traceability. Packaging may serve other functions, such as extending the shelf-life of foods and transportation convenience. Finally, packaging plays a major role in marketing. It can boost sales by enhancing the product image (Marsh & Bugusu, 2007).

In the comparison of other packaging materials, plastic has a shorter useful life as it is generally disposed after one use (Geijer, 2019). In addition, plastic comes from fossil sources. In fact, the petrochemical industry, which ultimately makes plastic with the crude oil, accounts for 12% of global oil demand of which two thirds is used for plastic (Rühl, 2019).

In Europe, 8.2 million tons of plastic is used yearly for food and drink packaging. It represents the weight of more than 8 million cars (Geijer, 2019). The popular use of plastic, its limited recycling capacity, the fact that it comes from fossil raw material and does not biodegrade, contributes to this quantity of plastic consumed yearly.

In Switzerland, approximately 706 kg from municipal waste¹ is generated per inhabitant yearly with a recycling rate² of 52% (Meyer-Vacherand, 2019). The quantity of municipal waste per individual in the European Union is estimated at 487 kg of which 47% is recycled or composted, 28% incinerated and 24% landfilled (Eurostat, 2019). Thus, Switzerland produces 45% more municipal waste than the average European countries and recycles 5% more. Nevertheless, none of the municipal waste goes to the landfills, and all waste is either recycled or incinerated to produce energy. Recycling rules are specific to local municipalities and managed by the respective municipality departments (Simon, 2019).

However, a team of scientists from the University of Geneva has shown that a dangerous quantity of plastic waste with high toxin level was found in the Lake of Geneva. They estimated that around 50 tons of plastic end up in the Lake of Geneva yearly, of which 10 tons are from rubbish and packaging, representing the second main source of plastic

¹ Municipal waste is the typical waste of a household, also called household waste.

² The recycling rate is the proportional value of the waste recovery into reusable products

trash¹ (SWI, 2018). The plastic deposited on the lake coasts is likely to pose the same problems to wildlife as marine plastics (Turner, 2018).

The town of Carouge in Geneva has set itself the objective of reducing incinerated waste by 30% in 3 years (Carouge Zero Dechet, 2019). Carouge wants to become the first Swiss city with Zero Waste and supports the project of the Zero Waste Switzerland Association (ZeroWaste Switzerland, 2019). According to this association, 37% of all food sold in EU comes wrapped in plastic which makes it the most commonly used material for packaging. However, there are no statistics available regarding this matter in Switzerland (Sandmeier, 2018).

Several initiatives have already been agreed to tackle plastic pollution. For example, the EU Parliament approved a new law banning the single-use plastic items by 2021 and set new recycling targets for producers (Chatain, 2019). In Switzerland, the food store Migros decided to remove disposable plastic from its assortment by the end of 2020. In 2018, Migros announced that thanks to bulk-buying, the company saved 270 tonnes of plastic packaging, hence reducing its environmental footprint (Migros, 2020). Coop, another main retail store in Switzerland, is also committed to the reduction of plastic for their organic product through alternatives, by favoring cellulose packaging, stickers or elastic bands (Coop, 2020).

Another alternative is bulk stores. By selling in bulk, they eliminate the packaging that usually comes with the product purchases in retail stores. The principle of bulk stores is to bring containers and fill in the quantity of food required. For the products packed in glass, a deposit system is usually put in place. Thus, materials are used several times, to indefinitely and do not immediately go to the incineration or recycling process.

¹ The first being tires and cars with 30 tons of waste

3. Methodology

3.1 Data collection and analysis

The first analysis quantifies the food packaging consumed by a single individual according to its monthly food consumption. Regarding the quantity of food consumption, the consumption basket of the Federal Statistical Office (FSO) has been taken as the indicator. This approach was necessary to carefully measure the quantity of packaging waste monthly consume by an individual living in Switzerland. The packaging of several products found in supermarkets were weighed. The quantities of packaging per food product have been computed per 100 grams (gr) or 100 milliliters (ml). Then, they were transferred into the consumption basket of the FSO to obtain the monthly packaging waste of an average individual.

Regarding the second analysis, two surveys were created (Appendices 1.1 and 1.2). The first one involves a broad spectrum of customers (“general customers”) in Geneva. The data have been gathered via a quantitative data collection method, broadly shared in social media. The second survey was dedicated to bulk store customers (“specific customers”) in Geneva and was communicated to them by email thanks to a cooperative’s management.

The purpose was to collect information regarding the current consumers’ purchasing habits and measure their switching costs. The reason why two slightly different surveys have been created was to differentiate and compare “general ” and “specific” customers. Both were mainly closed-ended questions which give respondents predefined options to opt for. This type of questions has been favored to obtain direct answers.

For the second analysis, a sample of 161 answers was taken into consideration for the first survey while the second collected 95 responses. All participants had to meet a single criterion which is living in Geneva.

For the third analysis, three maps have been created to locate the different type of food stores in Geneva. The first map locates retail stores, such as Migros, Coop, Aligro and Manor Food. The second traces Lidl, Aldi and Denner which are discount stores while the last one indicates bulk stores. Regarding the supermarkets, the information was directly taken from their respective official website while for bulk stores, the data came

from the Romande Federation of customers¹ (frc). Their locations were necessary in order to know the ease of access for customers.

Finally, the switching costs are based on both surveys and the information on food stores' official website. The monetary costs compared the price of seemingly identical food products, the customer budget, and the products' range between retail and bulk stores. The time-based switching cost measured the distance travelled by the customer, the time spent on-site and the food stores' location. For the price and the product range, differentiation has been made between standard and organic food items. In fact, bulk stores usually sell organic products and the food labels available in supermarkets are not all considered organic. The Cambridge Dictionary defines Organic as not using artificial chemicals in growing of plants and animals for food and other products. For this reason, only some food labels have been considered as organic in this study. Please refer to Appendix 2 for more details.

¹ Fédération Romande des consommateurs

4. Findings

4.1 First analysis quantity of food packaging

This section measures the monthly quantity of packaging consumed by a single individual in Switzerland depending on where a customer goes grocery shopping. The result contributes to estimate the CO2 emissions of plastic food packaging per capita in Switzerland.

The choice of packaging materials depends on their functions. The table below illustrates the advantages and disadvantages of the ones measured in this study.

Table 1 - Packaging types

Types	Advantages	Disadvantages
<i>Glass packaging</i>	Reusable Widely recyclable Hygienic material (pure and safe)	Heavier Fragile (food is unrecoverable due to glass fragments) High cost of production/manufacturing
<i>Metal packaging</i>	Light Resistant Recyclable	Expensive material In food packaging: Steel does corrode and Aluminum damage taste
<i>Cardboard packaging</i>	Economical Widely recyclable Light Environment-friendly material	Often waxed (for food), recycling is more complex Little resistant (not water resistant) Not applicable to all products
<i>Plastic packaging</i>	Resistant Light Economical (also in terms of transportation)	Potential migration of chemical additives on food High environmental impact, non-biodegradable and petroleum-based products

Some packaging materials are recyclable and thus, lead to fewer carbon emissions than extracting the resources. However, the recycling process still contributes to environmental degradation with transportation, shredding, several cleaning, melting and reshape processes. These activities contribute to pollution and have very intense water and energy consumption. In addition, plastic packaging remains the more damaging to the environment due to its chemical compound. For this reason, the CO2 emissions will be estimated only for the plastic packaging. Recycling materials are better for the environment but reducing the overall packaging waste remains the most environmentally friendly option.

4.1.1 In food stores

Table 2 shows the generation of packaging waste by an average single individual purchasing in supermarkets. This sub-section also estimates the carbon footprint of plastic packaging by an average individual.

The monthly food products consumption is based on the latest version of The Household Budget conducted by the FSO from 2015 to 2017, published in November 2019. More details about the quantities of packaging waste per food items are in Appendix 3.1.

Table 2 - Packaging consumption for an average single individual

Food categories	Single individuals Average				
	Monthly consumption for a single persons in kg	Quantity packaging in grams			
		Glass	Metal	Cardboard	Plastic
Bread and cereal products	6.13	-	-	67.5	359.4
Meat and fish	3.33	-	44.2	32.7	431.7
Milk, cheese, and eggs	9.54	-	12.3	266.8	219.3
Fats and oils	7.59	-	-	0.8	77.5
Fruits	7.32	-	23.9	8.9	160.6
Vegetables	7.56	-	130.8	3.5	88.7
Sugar, jams, honey, chocolate and confectionery	1.67	181.1	9.3	25.2	38.6
Sauces, salt & spices, soups and other	1.74	394.1	16.0	53.8	81.5
Total per packaging material in g		575.2	236.5	459.1	1457.3
TOTAL of packaging in kg		2.73			

In the table above, the food products were only selected in supermarkets. Within the bread and cereals section, the rice and pasta are considered only wrapped in plastic¹. Also, the figures about meat and fish are related to plastic trays. This material ensures food safety, hygiene and moisture stability as they are sensitive to temperature change. There are two plastic packaging methods, the “plastic tray” and the “skin packaging”².

According to Sealpac UK, a company supporting food manufacturers by supplying tray sealers, their vacuum skin innovation can reduce the packaging weight by up to 75%³ (SealpacUK, 2020).

¹These products can also be packed with cardboard. By computing these products in cardboard packaging instead of plastic, the total cardboard packaging would be 108.9 grams, thus 61.3% more, and 354.1 grams for plastic thus, 1.5% less than mentioned in the table.

² It refers to the plastic packaging tightly wrapped around the product.

³ By decreasing the quantity of packaging by 75%, the monthly plastic waste for meat and fish products would be 108 grams.

According to the figures presented in table 2, an average single individual, residing in Switzerland, consumes 2.7 kg of packaging waste each month of which 53% is plastic.

Every year, the plastic packaging waste consumed by an single individual is emitting 105 kg of CO₂ emission. Indeed, 6 kg¹ of CO₂ per kg of plastic are released during its production and incineration process (Rohrer, 2009).

Plastic recycling saves about 2.5 kg of CO₂ per kg of plastic than the original processing (Rohrer, 2009). Hence, recycled plastic saves 44 kg of plastic packaging's carbon footprint per individual on a yearly basis.

The same estimation has also been done using consumption data for households composed of two adults and a child. Couples with one child will have a higher overall packaging waste consumption compared to an average single individual. However, the ratio packaging to foodstuffs is almost identical (see Appendix 3.2).

Since coffee, tea and cocoa are easily found in bulk, they have been taken into consideration for this study as beverages.

An average individual will monthly consume 7 grams of plastic packaging waste by drinking soluble cocoa. For the accuracy of this analysis, the coffee and tea have been divided into subcategories. This analysis assumes that an individual will purchase these beverages on supermarkets depending on its home equipment.

Table 3 - Beverages packaging consumption for an average single person

Monthly consumption (g)		Single persons average	Cardboard ² (g)	Plastic (g)
667.4	Total	Total (coffee ground, tea sachet & cocoa)	28.9	25.5
		Total (coffee beans, tea sachet & cocoa)	28.9	17.8
		Total (with capsules & cocoa)	236.5	319.2
564.9	Coffee	Coffee ground		18.5
		Coffee beans		10.7
		Coffee capsules	214.0	282.4
59.5	Tea	Tea sachets	28.9	
		Tea capsules	22.6	29.8
43.0	Cocoa	Cocoa		7.0

¹ 1 kg of plastic requires 2 kg of oil for energy and raw material, and burning creates 3 kg of carbon dioxide.

² Due to rounding, the numbers may vary by 0.1 from the totals.

Table 3 shows that the elements using the most packaging are the capsules. The total weight of the capsule consists of 60% of the coffee inside and the remaining 40% is the plastic packaging. On average, a capsule is made of 3 grams of plastic for 5 grams of coffee. Some capsules use aluminium, which can be recyclable. However, the most common recycling technique (known as pyrolyze) requires a lot of energy. In addition, international transports are involved as the schema for capsules recycling in Europe cross four countries: The Netherlands for cleaning, Italy for melting in ingots, Germany to change ingots into aluminium sheets and finally, Switzerland to transform the metal into capsules (Damge, 2018).

In this analysis, the capsules are in plastic. The supermarket's brands usually use plastic instead of aluminium as it is less expensive. Accordingly, they can provide similar capsules than major coffee's brands to a lower price.

4.1.2 In bulk-food stores

The principle of bulk-food stores is to bring containers from home and fill with the product from the bulk department. In most cases, the types of packaging used by customers are cloth or cotton bags, jars, glass bottles and containers. An important point is that packaging is used, filled and reused several times to indefinitely by customers. The packaging does not go immediately to the recycling or burning process.

Bulk stores also use plastic packaging for meat and fish products. These need to be wrapped in a thermal or plastic packaging, which keeps the product sterile. Nevertheless, the customer can come with its containers and ask to be filled in. In addition, some dairy products such as cheeses are also wrapped in plastic. This is similar to the counter's services in supermarkets.

4.1.3 Comparison

This sub-section compares the packaging waste consume by an individual for the same food basket depending on its place of consumption. It also measures the CO₂ emissions of plastic packaging by bulk stores and supermarkets for the purchase of identical food items.

In bulk stores, customers come mostly with cotton bags and containers. For this reason, some food products packaging waste is close to zero. In addition, some bulk stores have a deposit system for glass bottles and jars. In table 4, it is assumed that there is a deposit system for glass material within bulk stores.

The quantities of supermarkets' packaging waste differ from table 2 on page 8 as only similar products in both food stores have been taken into consideration. To obtain more details on the packaging waste quantities per food category, please refer to Appendix 3.3.

Many bulk stores use plastic to wrap cheeses while meat and fish are wrapped in thermal or plastic packaging. Thus, the study assumes no difference between bulk and retail stores regarding the quantity of packaging waste for these products.

Table 4 - Packaging comparison Supermarkets vs Bulk stores

Food categories	Quantities packaging in grams Supermarkets				Quantities of packaging in grams Bulk stores			
	Glass	Metal	Cardboard	Plastic	Glass	Metal	Cardboard	Plastic
Bread and cereal products			67.5	120.4			0	0
Meat and fish			31.7	431.7			31.7	431.7
Milk, cheese, and eggs		12.3	266.8	219.3		12.3	44.0	54.4
Fats and oils			0.8	77.5			0	4.3 ¹
Fruits			8.3	160.6			0	0
Vegetables				76.1			0	0
Sugar, jams, honey, chocolate and confectionery	181.1	9.3	25.2	19.4	0	0	21.5	0
Sauces, salt and spices	394.1	16.0	21.5	33.0	0	0	1.8	0
Estimated packaging waste monthly	575.2	37.6	421.8	1137.9	0	12.3	99.0	490.5
Total packaging waste in kg monthly	2.17				0.60			

By taking the same food basket, bulk-buying decrease packaging waste by 72%. In terms of plastic CO2 emissions, the supermarkets will monthly emit about 7 kg of plastic CO2 emissions, while the bulks store will only release 3 kg. Yearly, bulk-buying represents a saving of about 48 kg of plastic CO2 emissions by a single individual.

Regarding the beverages, the packaging waste consumption in bulk stores is at zero as coffee, tea and cocoa are filled with the customers' containers.

¹ The study estimates that for 100 grams of butter, 1.2 grams of thermic paper is needed for wrapping. Only this type of packaging have been computed for the bulk stores while for supermarkets the packaging used for butter is computed with tray plastic packaging.

4.1.4 Conclusion

In conclusion, a single individual residing in Switzerland will consume 2.7 kg of packaging waste each month, hence more than 30 kg yearly. In terms of CO₂ emissions, an individual will emit 105 kg of plastic carbon emissions every year. For beverages, the coffee and tea can be consumed in bulk, sachet, ground or capsule. The beverages' packaging waste thus, depends on the customers' consumption style. However, the capsules are the elements using the most packaging. Finally, the packaging waste of an identical food basket has been compared between supermarkets and bulk stores. It shows that, for a single individual, bulk-buying reduces overall packaging waste by 72% and saves about 47 kg of plastic CO₂ emissions yearly.

4.2 Second analysis customers habits

The second analysis is related to both surveys. Clients of supermarkets are referred to as *general* customers and customers from bulk stores as *specific*. For the first survey, the study sample 161 *general* customers and 95 *specifics* for the second survey. Only customers living in the Canton of Geneva were taken into consideration.

This analysis is divided into 4 sub-sections, Demographics, Purchasing habits, Knowledge of food labels and Knowledge of bulk stores. They aim is to highlight and understand the differences or similarities between these customer's types regarding their consumption habits.

4.2.1 Demographic

The Demographic shows the participants' characteristic like the gender, age, annual income, location and household structure. The objective is to compare the socio-elements of a general customers to the ones purchasing in bulk stores.

In terms of gender ratio, three quarter of consumers are women in both surveys. The general customers are slightly younger as more than a half¹ is between 18 and 24 years old while only 39% of specific customers are between this age range. This may be due to the higher number of students in the general customers' survey².

The average age is between 25 and 34 years old for general customers while for the specific customers is from 35 to 44 years old.

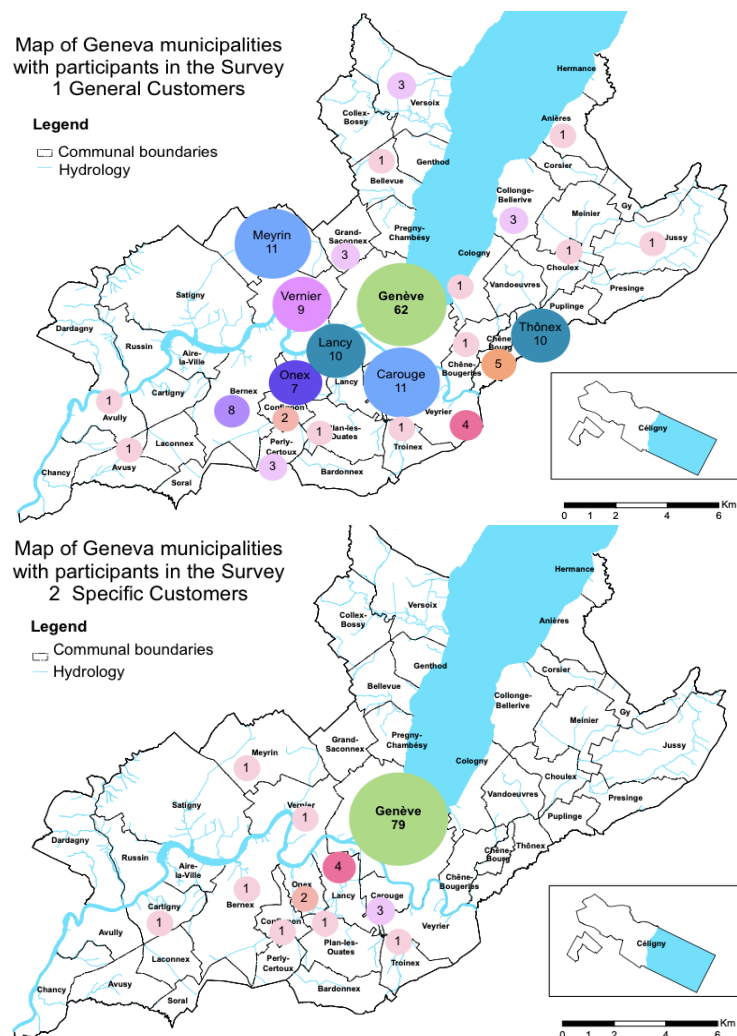
¹ 50.9%.

² In the survey 1 (general customers) 20% are students/trainees while in the survey 2 (specific customers) they are 8%.

Due to the professional situation of the participants, there is substantial variation regarding the gross annual income among them. For this reason, only the income of full-time employees is taken into consideration. In both surveys, the average annual income is between 78'000 CHF and 100'000 CHF. Thus, there is no difference regarding the income between general and specific customers with full-time employment. However, the household's structure differs. Although the households are mostly couples without children in both surveys¹, specific customers are more numerous to live alone². In addition, there are half more large households³ in the general customers' survey.

All the participants are mainly living in the municipality of Geneva. The maps below show that the general customers are more geographically dispersed.

Figure 1 – Location of surveys participants



¹ In the survey 1 (general customers) 32% are couples and 59% are living without children, while in the survey 2 (specific customers) 39% are couples and 75% are living without children.

² 18% of general customers are living alone while specific customers are 30%.

³ Here, large households are considered to be 4 people and more.

4.2.2 Purchasing habits

This section refers to the weekly buying patterns of general and specific customers. It aims to understand the perception of general customers regarding plastic packaging in supermarkets. In addition, it shows which food items are the most frequently purchased in bulk store by specific customers.

Firstly, the frequency for grocery shopping shall be determined and compared between specific and general customers.

On average, the general customers go twice a week grocery shopping in supermarkets¹ while specific customers go more often. A specific customer goes on average 3 times a week grocery shopping as it usually includes several stores like in bulk², markets³ and supermarkets⁴.

The frequency for grocery shopping is influenced by the number of meals an individual cooks during the week. An individual cooking its own meals every day needs to go more often to food shops than a person who eats regularly outside, such as in restaurants. However, the demographic section shows that the specific customers' survey was more single individuals while general customers' survey was larger households. The cooking activity may thus be divided among the people living under the same roof. For this reason, table 5 shows the number of meals cooked weekly by single individuals in both surveys. The single specific customers cook about 3 times more than a single general customers.

Table 5 - Number of meals cooked weekly per single person

Weekly cooked meals	General customers	Specific customers⁵
less than 5 meals and up to 7 meals	69%	17%
between 8 and 10 meals	17%	41%
more than 10 meals	14%	41%

¹ 50% of the participants go grocery shopping in large retail stores such as Coop, Migros and Manor, 20% in discount stores, 18% neighboring France and 12% in bulk, organic stores, markets or regional farmers.

² 80% go weekly grocery shopping in bulk stores.

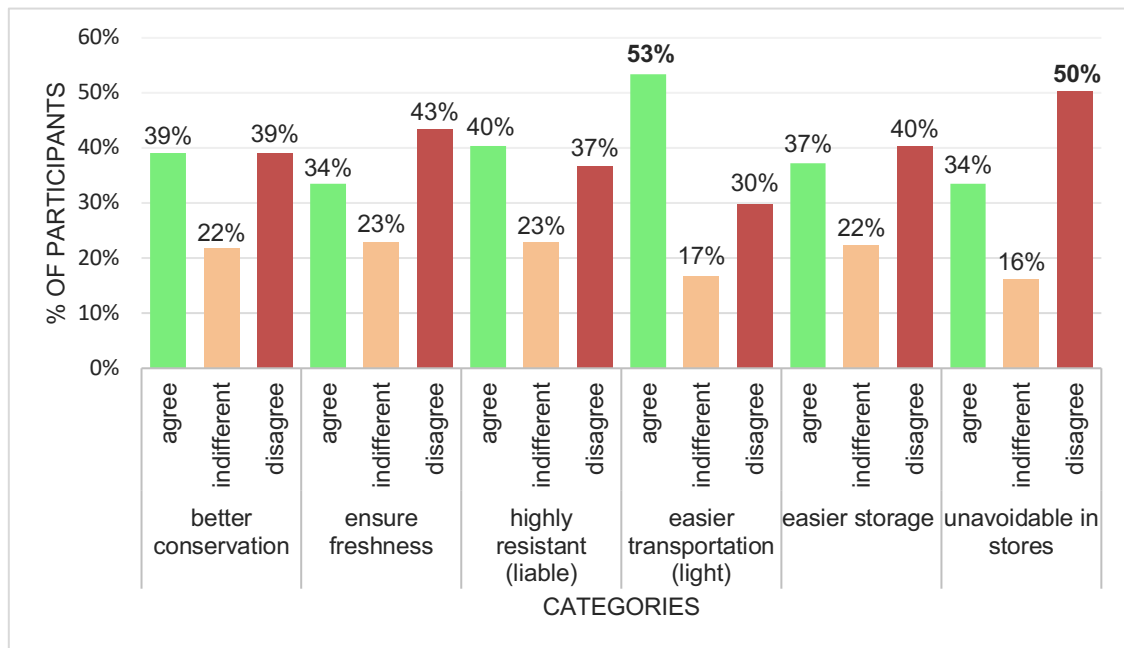
³ 51% go weekly grocery shopping in markets.

⁴ 62% go weekly grocery shopping in supermarkets.

⁵ Due to rounding of figures, the percentage does not sum up to exactly 100%.

The second element considered in the purchasing habits section is the perception of plastic packaging in supermarkets by general customers. The purpose is to understand what are the main advantages of plastic packaging for general customers when grocery shopping.

Figure 2 - Plastic packaging advantages from general customers



The graph above shows that there are divergent opinions concerning the advantages of plastic packaging. Indeed, in most categories, *agree* and *disagree* obtained similar percentages¹. However, the ease of transportation seems to be the major advantage of plastic packaging for general customers. The second highest percentage is related to the unavoidability of plastic packaging in food stores. Half of the participants consider that plastic packaging can be avoided when grocery shopping. This result is surprising as the general customers mostly go grocery shopping in supermarkets where the over-packaging of food is customary.

In bulk stores, the plastic packaging is limited to specific food products, such as meat, fish, butter and cheeses. Plastic can still be avoidable by bringing containers though. For this reason, this section took into consideration the frequency with which specific customers purchase certain food items.

¹ Due to rounding of figures, the percentage related to the easier storage do not sum up to exactly 100%.

Table 6 - Frequencies of food products purchase by specific customers

Frequencies in % of food purchase in bulk stores	Never	A least once a week	4 to 5 times a year
Grain products (flour, cereal seeds, semolina)	6%	15%	6%
Bread	21%	31%	6%
Meat	36%	4%	14%
Fish	46%	1%	13%
Milk	41%	13%	5%
Cheese	7%	40%	4%
Yogurt	23%	26%	6%
Eggs	12%	40%	1%
Fats (butter, margarine other vegetable fats)	29%	9%	8%
Jams (marmalade, compote)	46%	1%	19%
Oils	21%	2%	31%
Sugar	32%	1%	35%
Fruits	4%	60%	0%
Vegetables	4%	65%	0%
Chocolate, confectionery	18%	5%	12%
Salt, spices	21%	3%	34%

Table 6 shows that the highest frequencies are related to purchasing vegetables at least once a week (65%), closely followed by fruits (60%). These elements are heavily packed in plastic in supermarkets. Fish and Jams are the elements which acquired the highest percentage in the never frequency, closely followed by milk. One reason is that these products cannot be easily found in every bulk stores. The disparity between the other food items may be explained by their lower consumption and/or their long-life storage. For example, the sugar is for 32% never purchase in bulk while 35% buy it 4 to 5 times a year. It shows that more than two thirds of the participants do not purchase a lot of sugar in bulk within a year.

4.2.3 Knowledge of labels for sustainable food products

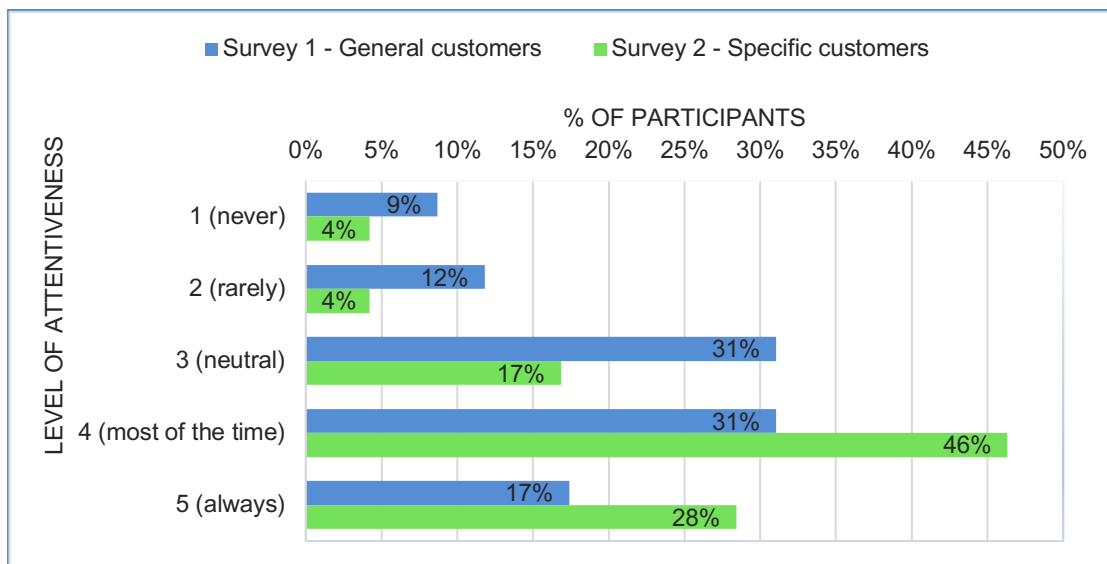
This section relates to the extent of knowledge by customers regarding labels for sustainable food products. Swiss legislation provides a minimum framework to prevent abuse for all foodstuffs. Food labels go beyond this framework and guarantee more sustainable food products from land to the plate (Frc, 2015).

Food labels bring additional value to consumers since the product complies with additional regulations (Frc, 2015). They are primarily assessed on the respect of the environment and on the farming conditions but are not evaluated on the type of packaging used. However, bulk stores provide organic food products with sustainability labelling.

The participants of both surveys mainly agree on which criteria food labels should be evaluated on (Appendix 4). Regarding the type of packaging used, the vast majority¹ think that it is important in the evaluation of label for sustainable products' evaluation. For this reason, their level of attentiveness and knowledge regarding food labels have been compared.

All customers were required to scale their level of attentiveness regarding food labels from one, never, to five, always. Figure 3² shows that the average level is three for general customers and four for specific ones. It means that specific customers most of the time look at food labels while general customers are neutral.

Figure 3 - Level of labels' attentiveness



To test the trustworthiness of their response, the participants had the possibility to select several food labels, including two fake named *Biosol* and *Ecodéfi*. 12 general customers chose at least one of the two fakes labels while 3 specific customers did. After having removed the results of fake labels, the general customer recognized on average 4³ labels and the specific customer 5⁴.

¹ 88% of general customers (survey 1) and 98% of specific customers (survey 2) consider the type of packaging used important. The remaining percentage is in the middle-importance.

² Due to rounding of figures, the % of survey 2 do not sum up to exactly 100%.

³ 585 right answers divided by 161, number of the participants in survey 1 is equal to 3.6.

⁴ 494 right answers divided by 95, number of participants in survey 2 is equal to 5.2.

In summary, both customers consider that the type of packaging used should be part of the labels for sustainable food products' criteria. In addition, the specific customers have a higher level of knowledge and attentiveness regarding food labels.

4.2.4 Knowledge of bulk stores

The last sub-section of this second analysis aims to measure the extend on which general customers know about bulk stores. The objective is to underline the elements which prevent general customers from going grocery shopping there.

More than half¹ of general customers never go shopping in bulk stores. The reasons that keep them from not going more often are numerous and are illustrated in the figure below.

Figure 4 - Reasons for not going to bulk stores by general customers



The principal reasons are illustrated in figure 4. It reveals that general customers may think that bulk stores are expensive considering that more than half of them never go grocery shopping there. Thus, general customers may have heard this information without having been to bulk stores.

The second reason is the distance to travel closely followed by the little knowledge of where to find these stores. On average, the general customers know 2 bulk stores with the majority knowing none of them.

¹ 54% of the general customers never go grocery shopping in bulk stores while 18% go less than once a month.

In comparison, the specific customers know twice more food stores where customers can purchase in bulk than general customers. This result is not surprising as specific customers are frequently bulk-buying.

In summary, the locations of bulk stores are not common knowledge. The consumers' relatives play an important role as 41% of the specific customers discovered bulk stores thanks to friends, family and word-of-mouth¹.

If the reasons that prevent general customers from going grocery shopping in bulk stores are numerous, the specific customers believe that there are some advantages to that. Almost all specific customers (98%) consider the support of local producers as the primary reasons for going to bulk stores. Indeed, they are usually in contact with regional producers who provide bulk stores with fresh products. The second main benefit is the limits of production waste. As demonstrates previously, bulk-buying decrease packaging waste by 72%. The third reason for specific customers to go grocery shopping in bulk store is to be part of the zero-waste community.

4.2.5 Conclusion

In conclusion, bulk-buying customers are usually small household, one or two people, living in the city center. In addition, specific customers go more often grocery shopping as they usually cook more. They also purchase food in different places like in bulk stores, markets and supermarkets. An interesting finding is that vegetables and fruits are the products the most frequently purchased in bulk stores.

According to 53% of general customers, plastic packaging facilitates transportation while the other reasons create more disparity. In addition, half of them believe that plastic packaging can be avoided in food stores.

Despite not being assessed on the packaging material used, both customers' types agreed that the labels for sustainable food items should, however, be evaluated on it. Specific customers pay nevertheless more attention and have a higher knowledge on food labels.

Most of the general customers never purchase food in bulk stores because they think that they are more expensive. In addition, they only know a few numbers of bulk stores.

¹ For the remaining percentage, 21% discovered bulk stores in social media or website, 21% in brochures or flyers and 17% by personal interest and discover by chance (e.g. close from work place, festival, walked past...).

Despite the barriers of general customers to go more often in bulk stores, specific customers unanimously consider that the main advantage of bulk stores is bringing support to local producers. The second benefit is reducing waste while finally, it is being part of a community.

4.3 Third analysis switching costs

The third and last analysis of this report measures the switching costs for general customers to change their purchasing habits. It refers to costs incurred by a consumer from changing its place of consumption, hence favoring bulk stores. On the previous analysis, the general customers mentioned the high price, the distance and the lack of products' variety as barriers from going in bulk stores. For this reason, two switching costs will be measured.

Firstly, monetary switching costs are estimated. The objective is to determine the difference in price for seemingly similar food products in bulks and retail stores. The range of food items will also be taken into consideration to know by which extent supermarkets offer larger choice.

Secondly, the time-based switching costs refer to the time spent within food stores by general and specific customers. The location of retail food stores and bulk stores are displayed on maps.

4.3.1 Price differences

To measure the monetary switching costs, the first element to take into consideration is the difference in price between supermarkets and bulk stores. Then, the product range has been estimated. The objective is to determine whether bulk stores are more expensive than supermarkets and if the food products range is wider or not. In this subsection, only similar organic foodstuffs which can be found in both places have been compared. In this report, the food items considered as being organic in the supermarkets are the ones with some labels for sustainable food products (see Appendix 2).

As price and variety are usually impacted by seasonality effect, the data collection has been performed between the end of April and beginning of May. The impact has been minimized by taking into account the average price for each food product.

The products' price is an important element for general customers as two thirds agree that the competitive price is one of the main reasons why they go to supermarkets. In addition, 56% admit that what prevents them from going to bulk stores is due to the higher prices.

Table 7 - Price comparison Supermarkets vs Bulk stores

Prices comparison ORGANIC vs ORGANIC	Supermarkets ¹ Average	Bulk stores Average	% Variation
Grain products	CHF 0.80	CHF 1.13	-29%
Fresh bread & flour	CHF 0.62	CHF 1.18	-47%
Sugar	CHF 0.30	CHF 0.54	-45%
Dairy products	CHF 1.17	CHF 1.53	-24%
Fats & oils	CHF 1.67	CHF 2.48	-33%
Fruits	CHF 0.76	CHF 1.07	-29%
Sauces, salt & spices	CHF 1.80	CHF 2.58	-30%
Dried fruits & mushrooms	CHF 8.02	CHF 8.97	-11%
Vegetables & aromatic herbs	CHF 1.88	CHF 2.35	-20%
Nuts	CHF 2.40	CHF 3.31	-27%
Confectioneries	CHF 2.23	CHF 4.23	-47%
Meat, fish & substitute ²	CHF 3.60	CHF 4.08	-12%
		Result	-30%

Table 7 shows that supermarkets are estimated to be 30% less expensive than bulk stores. It only compared similar organic food items in supermarkets and bulk stores.

¹ Two supermarkets have been taken into consideration for the average, Coop and Migros.

² Here, the substitute is tofu which have been incorporate as a meat in the calculation.

In terms of beverages¹, supermarkets are estimated to be 36% less expensive than bulk stores. The details of the products' selection and the ratios are in Appendix 5.1.

On average, general customers' weekly grocery budget is between 100 and 200 CHF. For specific customers, their average budget is 168 CHF which is split between bulk stores (46%), supermarkets (38%) and markets (16%). Hence, there is almost no difference in the allocated budget for food. However, the demographic section indicated that the household structure was different. It means that general customers have a lower budget per person as they usually are larger household compared with specific customers.

Simultaneously, another calculation has been performed including the same selection of product but non-organic. It shows that the non-organic products in the supermarket are approximately 40% less expensive than the organic product in bulk stores. For non-organic beverages, supermarkets are estimated to be 55% less expensive. More information is in Appendix 5.2.

The vast majority of the general customers (91%) consider the wide range of product as the reason they choose to go grocery shopping in some retail stores. Moreover, 23% of the general customers are not usually going to bulk store due to the lack of product variety. The study estimates that supermarkets provide at least 30% more organic products than bulk stores². However, this analysis only refers to the food items publicly available on shops' websites. Some bulk stores are specialized in some food products which thus, may not correspond to the average estimated in Appendix 6. In addition, the size of food stores also plays a role in the variety.

In summary, by comparing similar organic products, it shows that supermarkets are 30% less expensive than bulk stores. In addition, supermarkets provide on average 30% more products' variety.

¹ Beverages in this study refer to coffee, tea and cocoa.

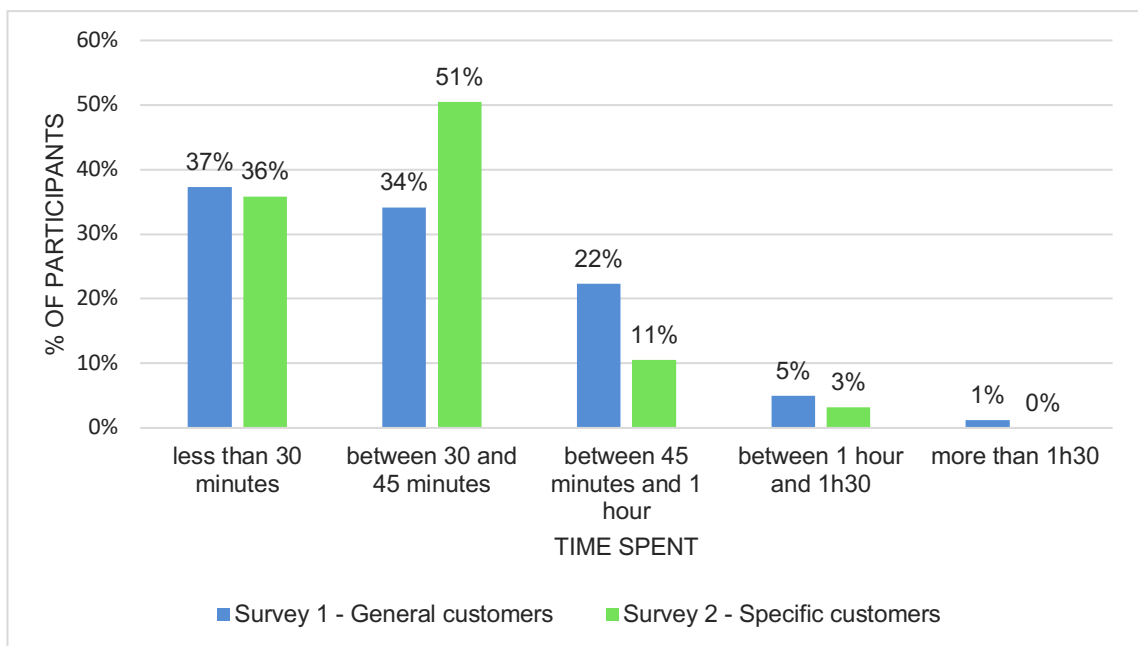
² The comparison is made exclusively within the bulk and retails stores selected by the study for specific products.

4.3.2 Time-based

This section measures the average time spent by customers for grocery shopping. It aims to evaluate which customers spend the most time on site and who travelled the longest distance for grocery shopping. In addition, it also illustrates through maps, the regional presence of the different food stores.

Firstly, the time spent on the site is identical between both customers. On average, general and specific customers spend between 30 and 45 minutes in food stores. However, the previous analysis indicates that specific customers go more often grocery shopping. They usually go 3 times a week compared to twice a week for general customers. It is thus estimated that specific customers spend one-and-a-half more time in food stores than general customers.

Figure 5 - Average time spend in food stores



Secondly, the distance travelled also plays a major role in the customers' choice. Indeed, 93% of general customers favor grocery stores close to their home. In addition, 23% of them admit that one of the reasons that prevent them from going more often in bulk stores is the distance.

Figure 6 - Average distance travelled for grocery shopping

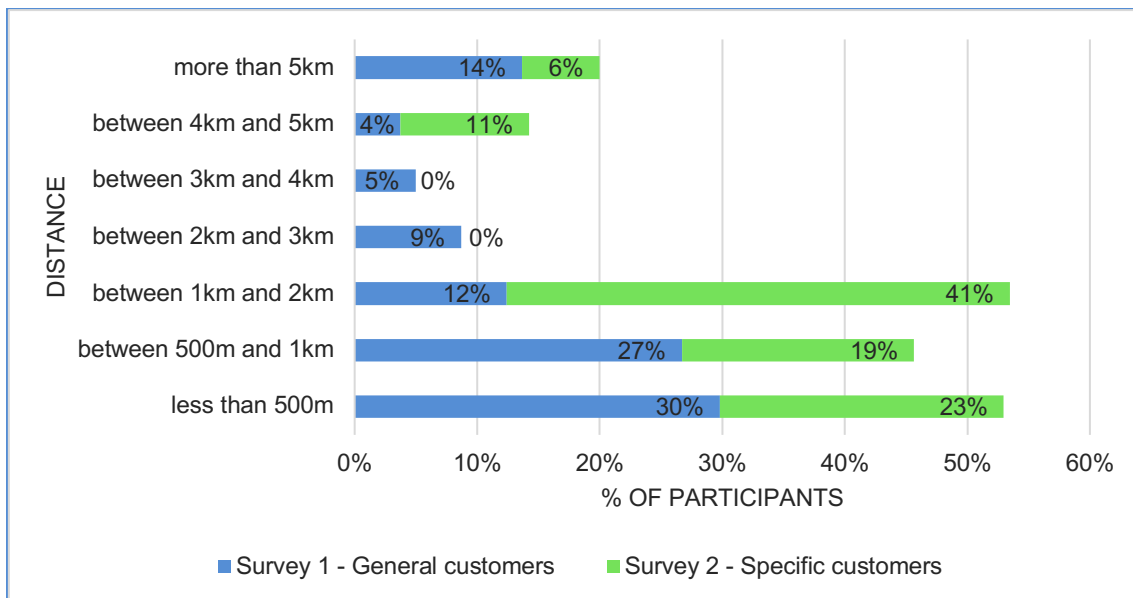


Figure 6 shows the distance travelled by both customers, general (blue) and specific (green), to go grocery shopping. On average, general and specific customers make between 1km and 2km. Given the last analysis, specific customers are mostly living in the city center while general customers are more dispersed in Geneva. For this reason, the locations of the different food stores is essential to be known.

In order to understand the allocation of food stores in the Canton of Geneva, three maps have been created for each category of food shops as Supermarkets¹, Discount stores² and Bulk stores (see Appendix 7).

The maps show that large retail stores covered both downtown and further municipalities areas in the canton of Geneva. Supermarkets are heavily present in the city center but also extend beyond a radius of 6km. Distance is calculated according to the city center.

¹ Coop, Migros, Manor Food and Aligro.

² Lidl, Aldi and Denner.

Table 8 - Number of food stores from the city centre

KILOMETERS	SUPERMARKETS	DISCOUNT STORES	BULK STORES
Beyond 6km	4 stores	2 stores	0 store
Between +4km and 6km	15 stores	6 stores	3 stores
Between +2km and 4km	18 stores	8 stores	5 stores
Between +1km and 2km	21 stores	15 stores	3 stores
Up to 1km	16 stores	5 stores	9 stores
TOTAL	74 stores	36 stores	20 stores

Despite a majority of supermarkets close to the city center, there are also present in 16 municipalities over 45 municipalities of Geneva. Discount stores cover 8 municipalities and the bulk stores only 5. One of the reason is that Bulk stores are almost 4 times less numerous than supermarkets and almost half that discount stores. This lack of visibility from other municipalities may contribute to the 32% of the general customers who do not know any bulk store.

4.3.3 Conclusion

In conclusion, the costs for general customers to go purchasing in bulk stores are monetary and time-based. In term of financial, the weekly budget of general and specific customers is identical. However, the previous analysis indicates that general customers are larger households. For this reason, it is estimated that general customers have a lower weekly budget allocated for grocery shopping.

By comparing organic products that can be purchased in both places, supermarkets are 30% less expensive. In addition, they provide 30% more organic food products variety than bulk stores.

5. Discussion

Plastic packaging is part of the global economy by combining several functionalities and benefits (MacArthur & all, 2016). Its low costs, versatility, durability and high strength-to-weight ratio, makes this material popular across different industries. However, the increasingly used of plastic contributes to environmental issues.

Compared to other packaging materials, plastic has a shorter useful life and comes from fossil raw materials. Moreover, packaging cannot be indefinitely recycled.

Nowadays, recyclable packaging materials became a sales' strategy. Nevertheless, the recycled process still brings damages to the environment by excessively using resources such as water, but also polluting the air with the transportation, shredding and reshaping process. For these reasons, this study shows the impact of reducing the overall packaging consumption, in particular plastic.

In Switzerland, some retailers started to implement new initiatives to reduce their quantity of food packaging. For example, by implementing the bulk-buying concept in organic products, Migros reduced its annual footprint by 270 tons in 2018. The quantity of plastic packaging saved by this measure is equal to the weight of fifty adult elephants (Migros, 2020). Thus, bulk stores are expected to be the most environmentally friendly alternative for grocery shopping. Indeed, one of their principles is to reduce the quantity of packaging by filling in the customers' containers.

In Switzerland, an average single individual, purchasing in supermarkets, consumes 2.7 kg of packaging waste each month. Out of this amount, 53% is plastic packaging.

By assuming that the plastic is incinerated, 105 kg of CO₂ emissions per capita is yearly emitted by plastic food packaging. At a country level, with a population of 8.5 million¹, it yearly represents 892'500 tons of greenhouse gas in the atmosphere.

If the plastic goes to the recycling process, it yearly represents 518'500 tons of CO₂ emissions, hence saving 42% of CO₂ emissions. However, the recycling process for plastic packaging remains limited.

Regarding beverages, the packaging consumption of an individual depends on its home equipment. For instance, coffee and tea in capsules are the elements using the most plastic packaging. Indeed, the total weight of a single capsule is made of 60% coffee and 40% plastic. Thus, a single individual will monthly consume about 320grams of plastic

¹ Retrieved from Bfs.admin.ch (FSO 28 March, 2019) .

by drinking soluble cocoa and hot beverages capsules. The other options like coffee in ground, beans and tea in sachet, decrease beverages' plastic packaging by up to 95%.

The comparison of packaging waste for a similar food basket between bulk stores and supermarkets reveals that bulk stores reduce packaging waste by 72%.

In terms of plastic carbon footprint and for an identical food basket, bulk-buying customers monthly emit 3 kg of plastic CO2 emissions while supermarkets 'customers release 7 kg. A single individual will yearly save 48 kg of CO2 emissions by bulk-buying. Moreover, the packaging waste for beverages is at zero in bulk stores.

According to the World Bank, the CO2 emissions per capita in Switzerland was at 4300 kg in 2014 (TradingEconomics, 2020). The yearly ecological impact of bulk-buying may thus seem small¹ with a saving of 48 kg of CO2 emissions. However, food products and non-alcoholic beverages only represent about 9% of the Swiss household expenditures (OFS, 2019).

If all Swiss customers went grocery shopping in bulk stores, it would represent a yearly saving of about 408'000 tons of CO2 emissions. It represents a little under 400'000 cars. In addition, it is approximately 1500 times more than the carbon footprint saved by Migros in 2018.

Bulk stores reduce considerably the quantity of packaging waste consumed by a single individual. Nevertheless, supermarkets' customers (general customers) and bulk stores' clientele (specific customers) are not the same households.

The household structure of specific customers is smaller. It usually consists of one or two individuals. In addition, they are usually living in the city center where bulk stores are more popular. Thus, they have an ease of access to bulk stores.

In bulk stores, the most frequent food items purchased by customers are the fruits and vegetables. These food items are usually over-packed by plastic in supermarkets. As the principle of buying in bulk is to limit the use of packaging, the advantages of plastic packaging for general customers needed to be understood.

While the other options available create disparity, more than half of the supermarkets' customers agree that plastic packaging helps with transportation. This element reveals that carrying out its containers for grocery shopping may disturb general customers.

¹ It represents approximately 1% of the total CO2 emissions emitted yearly by an individual

In addition, for 50% of them, plastic packaging is not unavoidable in food stores. In supermarkets, several products are already pre-packed in plastic packaging, leaving customers with fewer alternatives. This element shows that customers are, however, believing that they can reduce their plastic consumption.

Both types of customers agree that the labels for sustainable food items should be evaluated on the packaging type. This is currently not the case as food labels are primarily assessed on the respect of the environment and farming conditions. As bulk stores usually sell organic products, specific customers have a slightly higher level of knowledge and attentiveness regarding food labels. For them, bulk stores have several advantages. Almost unanimously, specific customers consider the support of local producers as the primary reason. Bulk stores are usually working in collaboration with regional farmers to offer fresh and local products. The second benefit according to specific customers is the limit of waste production. Thanks to the previous analysis, bulk stores are estimated to decrease packaging waste by 72%. Finally, they consider the community and the participative element as one of the top three advantages.

Despite these advantages, more than half of general customers never go grocery shopping in bulk stores. The primary reason is the higher prices. The customers from supermarkets may believe or have heard that bulk stores are more expensive probably without having been there. While customers from supermarkets know on average 2 bulk stores, they consider the distance to travel as a barrier to go purchasing there. Also, their lack of knowledge about how to find bulk stores and the limited product offers keep them from going more often.

Bulk stores allow to reduce the quantity of packaging waste. Nevertheless changing customers habits implies costs, known as switching costs. By taking into consideration the customers' barriers above, the main switching costs are monetary and time-based.

The monetary switching costs are related to the price difference and the products' range of supermarkets compared with bulk stores. These elements are impacted by seasonality effect. For this reason, the prices in this study illustrate the usual price average. The information has been gathered between end of April and beginning of May. Moreover, only the food items that can be found in both places have been selected and compared.

Organic products and beverages in supermarkets are estimated to be 30% and 36% less expensive than bulk stores, respectively. The gap increases by comparing the price of non-organic products with bulk stores. In this scenario, supermarkets are cheaper by 40%.

Knowing the prices difference, the budget allocated for food items are slightly different between both types of customers. On average, specific customers have a higher budget allocated for grocery shopping. Indeed, their budget is usually split between different food stores. In addition, they are usually smaller households and cook regularly. They also spent weekly approximately the same budget than supermarkets' customers which are larger families.

The monetary switching costs for supermarkets' customers are thus very high. Aside from being more expensive than supermarkets, bulk stores also have more limited selection. Supermarkets are estimated to offer 30% more organic products' variety than bulk stores. Tea is an exception as bulk stores are estimated to offer twice more tea in bulk than retail stores. In addition, some bulk stores are specialized in the sale of particular food items. The products' variety also depend on the size of the stores.

Then, the time-based switching costs are measured by taking into account the distance and the time spent on the store for grocery shopping. Even if the average time spent is between 30 and 45 minutes for both customers, bulk stores customers go more often grocery shopping. Thus, they usually spend about one-and-a-half more time in food stores.

Regarding the distance travelled by customers to go grocery shopping, both do between one and two kilometers. However, customers from bulk stores are mostly living in the city center where bulk stores are popular. This lack of visibility from other municipalities may contribute to the number of general customers knowing only a few or any bulk stores. The maps show that by being four times more numerous, large retail stores covered more municipalities areas.

In summary, bulk-buying decrease the quantity of packaging by 72%. However, bulk stores are more expensive and offer less variety thus, it implies high monetary switching costs. Notably for larger households with budgeted expenses. In fact, supermarkets are estimated to be 30% less expensive. The grocery budget may thus, be heavily affected by changing the place of the household consumption. In addition, general customers are expected to go close to the city center to have access to bulk stores as there are highly geographically concentrated.

5.1 Challenges encountered

The first challenge encountered during this study was to collect enough answers from the survey of general customers. The majority of respondents were living in other cantons than Geneva. To address this issue, a request to several Social Network pages in the Geneva area was sent requiring their help to share the questionnaire. Some Facebook Pages agreed to share the questionnaire which have significantly contributed to the data collection.

Last but certainly not least, the spread of the virus COVID-19 slowed down the data collection process tremendously. Due to widespread panic, food shelves were emptied by customers who desired as a precautionary measure to stock up hence, affecting the process of this Bachelor thesis. The food stores were not only difficult to access for several weeks, but any contact, discussions and meeting were impossible for health security reasons. In addition, the monetary switching costs needed to be rethink in order to not be heavily affected by the changes of price and products' variety due to supply's problems.

6. Conclusion

In conclusion, this report shows that bulk stores reduce by 72% the quantity of packaging yearly consumed by an average single individual, residing in Switzerland. By comparing identical food products, the customers from bulk stores will yearly save about 48 kg of CO₂ emissions. This amount only refers to impact of the plastic packaging waste saved by bulk-buying.

The World Bank estimated that 4300 kg of CO₂ emissions is yearly emitted per capita in Switzerland. Thus, the amount of CO₂ from plastic packaging yearly saved by a specific customer only represent 1.12% of its total carbon footprint. The impact, therefore, seems minimal. However, food products and non-alcoholic beverages also represent a small share of household expenditure, about 9%.

But still, the reduction of the total food packaging remains imposing with a decrease by 72%. For this reason, specific customers consider waste reduction as one of the main advantages of going to bulk stores.

Even if bulk stores bring other advantages, such as support local producers, the changes in customers habits implies costs for general customers. Even more considering that both types of customers do not have the same household structure. Indeed, general customers are usually larger families.

In supermarkets, similar organic products are 30% less expensive than bulk stores, while non-alcoholic beverages are 36% less expensive. By comparing, non-organic products of supermarkets, the gap increase and supermarkets are cheaper by 40%. The grocery budget for general customers may thus be heavily impacted by changing the place of consumption to bulk stores. Moreover, supermarkets are estimated to supply 30% more organic products' variety.

Consequently, going to supermarkets remains the cheapest option while bulk stores are the most environmentally friendly.

The time-based switching costs show that specific customers spend one-and-a-half more time in grocery shopping than general customers. In addition, they are usually geographically located close to the city centre. This shows that for people not living in downtown areas, the access to bulk stores is less practical.

6.1 Recommendations

In order to reduce the switching costs for customers to change their purchasing habits into greener ones, several options can be considered.

Firstly, one of the reasons that prevent general customers from going to bulk stores is the lack of variety in food items. The bulk stores should therefore, increase their food products range. However, they usually work with local producers and thus, the offer depends on their production. For bulk stores, it may imply to diversity and increase the number of suppliers.

Secondly, retail stores are four times more numerous than bulk stores. To increase their popularity, bulk stores should increase their visibility. They should promote more their green principles and be located in more municipalities to increase general customers' ease of access.

Finally, supermarkets can also help customers to reduce their own environmental footprint. For example, they can request from their suppliers to favor the skin packaging method for meat and fish products instead of plastic trays. It allows reducing by 75% the quantity of plastic packaging used for food wrapping. However, this innovative method requires special machinery and know-how from employees.

Moreover, their efforts on the fresh organic products to reduce the excess packaging can be extended to all their fresh food items. Supermarkets should require from their suppliers to use the minimum necessary packaging and consider the most environmentally friendly option. For example, cellulose filet instead of the plastic filet. This is a national level decision for retail stores as it needs to be discussed with suppliers. In addition, this request is complicated to put in place as plastic packaging extends the shelf life of food items. Supermarkets also benefit of packaging as it is easier to put in store shelves and the products are protected from external injuries made by the constant flow of people and food items' movements.

In this report, the comparison between bulk shops and supermarkets was only made at the food and non-alcoholic beverages level. Nevertheless, cleaning and cosmetic products are also becoming popular in the concept of bulk-buying. These elements are usually found in plastic bottles in supermarkets. For this reason, the environmental impacted reduced by bulk-buying can also be extended to non-food items in a further study.

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Appendix 1: Surveys

1.1 Questions of survey 1

<p>DEMOGRAPHIC What is your gender <input type="checkbox"/> Woman <input type="checkbox"/> Man <input type="checkbox"/> Other</p>	<p>My gross annual income is: <input type="checkbox"/> less than 20'000 CHF <input type="checkbox"/> between 20'000 CHF and 40'000 CHF <input type="checkbox"/> between 40'000 CHF and 58'000 CHF <input type="checkbox"/> between 58'000 CHF and 78'000 CHF <input type="checkbox"/> between 78'000 CHF and 100'000 CHF <input type="checkbox"/> between 10'000 CHF and 120'000 CHF <input type="checkbox"/> more than 120'000 CHF <input type="checkbox"/> No annual income</p>	<p>What is your food shopping budget? (per week) <input type="checkbox"/> less than 100 CHF per week <input type="checkbox"/> between 100 CHF and 200 CHF per week <input type="checkbox"/> between 200 CHF and 300 CHF per week <input type="checkbox"/> between 300 CHF and 400 CHF per week <input type="checkbox"/> between 400 CHF and 500 CHF per week <input type="checkbox"/> between 500 CHF and 600 CHF per week <input type="checkbox"/> more than 600 CHF per week</p>	<p>How far away from your home is your favorite food store? <input type="checkbox"/> less than 500 m <input type="checkbox"/> between 500 m and 1km <input type="checkbox"/> between 1km and 2km <input type="checkbox"/> between 2km and 3km <input type="checkbox"/> between 4km and 5km <input type="checkbox"/> more than 5km</p>
<p>How old are you ? <input type="checkbox"/> 18 to 24 years old <input type="checkbox"/> 25 to 34 years old <input type="checkbox"/> 35 to 44 years old <input type="checkbox"/> 45 to 54 years old <input type="checkbox"/> 55 to 64 years old <input type="checkbox"/> 65 to 74 years old <input type="checkbox"/> from 75 years old</p>	<p>How many people are in your household ? (including you) <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and more</p>	<p>In which food stores do you go to most of the time for grocery shopping? (several choices possible) <input type="checkbox"/> Migros <input type="checkbox"/> Coop <input type="checkbox"/> Aldi <input type="checkbox"/> Lidl <input type="checkbox"/> Denner <input type="checkbox"/> Neighboring France <input type="checkbox"/> Manor <input type="checkbox"/> Bulk stores <input type="checkbox"/> Organic stores <input type="checkbox"/> Regional farmers <input type="checkbox"/> Other (free)</p>	<p>How do you get there ? <input type="checkbox"/> Car <input type="checkbox"/> On foot <input type="checkbox"/> Bicycle <input type="checkbox"/> Scooter / Motorcycle <input type="checkbox"/> Public transportation</p>
<p>What is your Zip Code ? (Short answer)</p>	<p>How many children are in your household ? <input type="checkbox"/> None <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 and more</p>	<p>Why do you shop in these particular stores ? (Could not agree more) (Mostly agree) (neither agree or disagree) (Mostly disagree) (Strongly disagree) Competitive price Attractive offers Wide range of products Close to my home (Proximity) Customer service Positive impact on the environment I know the store and know where to find the products</p>	<p>How many meals a week do you cook? (1 week = 14 meals) <input type="checkbox"/> less than 5 meals <input type="checkbox"/> between 5 and 7 meals <input type="checkbox"/> between 8 and 10 meals <input type="checkbox"/> between 10 and 12 meals <input type="checkbox"/> more than 12 meals</p>
<p>What is your professional situation ? <input type="checkbox"/> I am full-time employee <input type="checkbox"/> I am a part-time employee <input type="checkbox"/> I am a student <input type="checkbox"/> I am looking for a job/ not in employment <input type="checkbox"/> I am housewife/househusband <input type="checkbox"/> I receive the AVS/AI <input type="checkbox"/> Other (free)</p>	<p>PURCHASING HABITS How many times a week do you go shopping? (in food stores) <input type="checkbox"/> 1 x per week <input type="checkbox"/> 2 x per week <input type="checkbox"/> 3 x per week <input type="checkbox"/> 4 x per week <input type="checkbox"/> more than 4x per week</p>	<p>On average, how much time do you spend in a food store? <input type="checkbox"/> less than 30 minutes <input type="checkbox"/> between 30 minutes and 45 minutes <input type="checkbox"/> between 45 minutes and 1h <input type="checkbox"/> between 1h and 1h30 <input type="checkbox"/> more than 1h30</p>	<p>PLASTIC PACKAGING & FOOD LABELS In your opinion, what are the advantages of plastic packaging for food products? (strongly agree) (agree) (indifferent) (disagree)(strongly disagree) Better preservation Ensure freshness Reliable Easier transportation (light) Easier storage Plastic packaging is unavoidable in stores</p>

<p>Do you pay attention to food labels ? (label identifying sustainable products) Scale from never (1) to always (5)</p>	<p>In your opinion, food labels should be mainly evaluated on ? (the most important) (very important) (important) (moderately important) (less important) (not important) Respect of the environment (water, soil, biodiversity) Breeding conditions Type of packaging used Type of transportation used Distance travelled to the point of sale</p>	<p>BULK STORES How many bulk stores do you know</p> <p><input type="checkbox"/> None <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 and more</p>
<p>What food labels do you know? (several choices possible)</p> <p><input type="checkbox"/> Bio Suisse <input type="checkbox"/> AB Agriculture Biologique <input type="checkbox"/> Naturaplan <input type="checkbox"/> Ecodéfi <input type="checkbox"/> TerraSuisse <input type="checkbox"/> Fairtrade <input type="checkbox"/> Biosol <input type="checkbox"/> MSC <input type="checkbox"/> None <input type="checkbox"/> Other (free)</p>	<p>What choice do you make ?</p> <p><input type="checkbox"/> Pre-packed apples with certifies organic label (right of the picture) <input type="checkbox"/> Non-organic apples that I choose from a bag provided by the shop (left of the picture) <input type="checkbox"/> None</p>	<p>How often (per month) do you shop in organic or bulk stores?</p> <p><input type="checkbox"/> Never <input type="checkbox"/> Less than 1x per month <input type="checkbox"/> 1x per month <input type="checkbox"/> 2x per month <input type="checkbox"/> 3x per month <input type="checkbox"/> 4x per month <input type="checkbox"/> 5x per month <input type="checkbox"/> 6x per month <input type="checkbox"/> 7x per month or more <input type="checkbox"/> All my shopping is done in organic or bulk stores</p>
		<p>What are the main reasons that keep you from going there more often? (2 possible choices)</p> <p><input type="checkbox"/> Expensive <input type="checkbox"/> Limited choice of products <input type="checkbox"/> Far distance <input type="checkbox"/> Waiting time in store too long <input type="checkbox"/> Unpleasant customer service <input type="checkbox"/> I know any (or a few) organic/bulk stores <input type="checkbox"/> Other</p>

1.2 Questions of survey 2


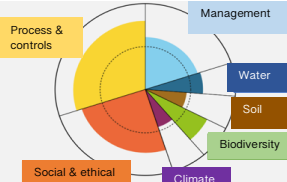


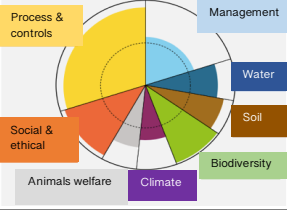

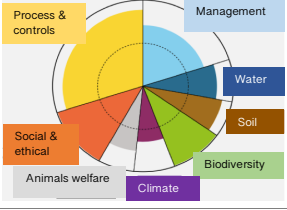

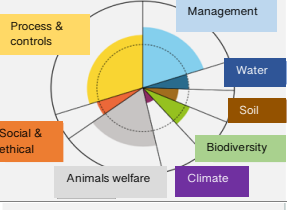

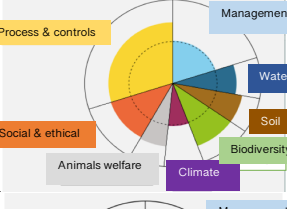

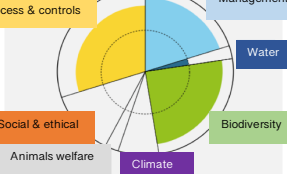
<p>DEMOGRAPHIC</p> <p>What is your gender</p> <p><input type="checkbox"/> Woman</p> <p><input type="checkbox"/> Man</p> <p><input type="checkbox"/> Other</p>	<p>My gross annual income is:</p> <p><input type="checkbox"/> less than 20'000 CHF</p> <p><input type="checkbox"/> between 20'000 CHF and 40'000 CHF</p> <p><input type="checkbox"/> between 40'000 CHF and 58'000 CHF</p> <p><input type="checkbox"/> between 58'000 CHF and 78'000 CHF</p> <p><input type="checkbox"/> between 78'000 CHF and 100'000 CHF</p> <p><input type="checkbox"/> between 10'000 CHF and 120'000 CHF</p> <p><input type="checkbox"/> more than 120'000 CHF</p> <p><input type="checkbox"/> No annual income</p>	<p>How many times a week do you go shopping in bulk stores?</p> <p><input type="checkbox"/> Never</p> <p><input type="checkbox"/> 1 x per week</p> <p><input type="checkbox"/> 2 x per week</p> <p><input type="checkbox"/> 3 x per week</p> <p><input type="checkbox"/> 4 x per week</p> <p><input type="checkbox"/> more than 4x per week</p>	<p>How much money do you spend on your food purchases at SUPERMARKETS? (Short answer)</p>
<p>How old are you ?</p> <p><input type="checkbox"/> 18 to 24 years old</p> <p><input type="checkbox"/> 25 to 34 years old</p> <p><input type="checkbox"/> 35 to 44 years old</p> <p><input type="checkbox"/> 45 to 54 years old</p> <p><input type="checkbox"/> 55 to 64 years old</p> <p><input type="checkbox"/> 65 to 74 years old</p> <p><input type="checkbox"/> from 75 years old</p>	<p>How many people are in your household ? (including you)</p> <p><input type="checkbox"/> 1</p> <p><input type="checkbox"/> 2</p> <p><input type="checkbox"/> 3</p> <p><input type="checkbox"/> 4</p> <p><input type="checkbox"/> 5 and more</p>	<p>How many times a week do you go shopping in supermarkets?</p> <p><input type="checkbox"/> Never</p> <p><input type="checkbox"/> 1 x per week</p> <p><input type="checkbox"/> 2 x per week</p> <p><input type="checkbox"/> 3 x per week</p> <p><input type="checkbox"/> 4 x per week</p> <p><input type="checkbox"/> more than 4x per week</p>	<p>How many meals to you cook per week (1 week = 14 meals)</p> <p><input type="checkbox"/> less than 5 meals</p> <p><input type="checkbox"/> between 5 and 7 meals</p> <p><input type="checkbox"/> between 8 and 10 meals</p> <p><input type="checkbox"/> between 10 and 12 meals</p> <p><input type="checkbox"/> more than 12 meals</p>
<p>What is your Zip Code ? (Short answer)</p>	<p>How many children are in your household ?</p> <p><input type="checkbox"/> None</p> <p><input type="checkbox"/> 1</p> <p><input type="checkbox"/> 2</p> <p><input type="checkbox"/> 3</p> <p><input type="checkbox"/> 4</p> <p><input type="checkbox"/> 5 and more</p>	<p>How much money do you spend on your food purchases at MARKETS? (Short answer)</p>	<p>On average, how much time do you spend in a food store?</p> <p><input type="checkbox"/> less than 30 minutes</p> <p><input type="checkbox"/> between 30 minutes and 45 minutes</p> <p><input type="checkbox"/> between 45 minutes and 1h</p> <p><input type="checkbox"/> between 1h and 1h30</p> <p><input type="checkbox"/> more than 1h30</p>
<p>What is your professional situation ?</p> <p><input type="checkbox"/> I am full-time employee</p> <p><input type="checkbox"/> I am a part-time employee</p> <p><input type="checkbox"/> I am a student</p> <p><input type="checkbox"/> I am looking for a job/ not in employment</p> <p><input type="checkbox"/> I am housewife/househusband</p> <p><input type="checkbox"/> I receive the AVS/AI</p> <p><input type="checkbox"/> Other (free)</p>	<p>PURCHASING HABITS</p> <p>How many times a week do you go shopping in markets?</p> <p><input type="checkbox"/> Never</p> <p><input type="checkbox"/> 1 x per week</p> <p><input type="checkbox"/> 2 x per week</p> <p><input type="checkbox"/> 3 x per week</p> <p><input type="checkbox"/> 4 x per week</p> <p><input type="checkbox"/> more than 4x per week</p>	<p>How much money do you spend on your food purchases at BULK STORES? (Short answer)</p>	<p>BULK STORES</p> <p>How bulk stores do you know?</p> <p><input type="checkbox"/> 1</p> <p><input type="checkbox"/> 2</p> <p><input type="checkbox"/> 3</p> <p><input type="checkbox"/> 4</p> <p><input type="checkbox"/> 5</p> <p><input type="checkbox"/> 6</p> <p><input type="checkbox"/> 7 and more</p>
<p>How did you find out about the bulk stores?</p> <p><input type="checkbox"/> Member of family</p> <p><input type="checkbox"/> Website</p> <p><input type="checkbox"/> Friends</p> <p><input type="checkbox"/> Press, brochures</p> <p><input type="checkbox"/> Social networks</p> <p><input type="checkbox"/> Other</p>	<p>In your opinion, what are the main advantages of bulk stores? (3 choices possible)</p> <p><input type="checkbox"/> Support local producers</p> <p><input type="checkbox"/> Decrease waste production</p> <p><input type="checkbox"/> Fresh products</p> <p><input type="checkbox"/> Participate in the operation</p> <p><input type="checkbox"/> Attractive prices</p> <p><input type="checkbox"/> Close to my home</p> <p><input type="checkbox"/> Wider products range</p> <p><input type="checkbox"/> Other</p>	<p>On average, how far away from your home is the bulk store?</p> <p><input type="checkbox"/> less than 500 m</p> <p><input type="checkbox"/> between 500 m and 1km</p> <p><input type="checkbox"/> between 1km and 2km</p> <p><input type="checkbox"/> between 2km and 3km</p> <p><input type="checkbox"/> between 4km and 5km</p> <p><input type="checkbox"/> more than 5km</p>	<p>How do you get there ?</p> <p><input type="checkbox"/> Car</p> <p><input type="checkbox"/> On foot</p> <p><input type="checkbox"/> Bicycle</p> <p><input type="checkbox"/> Scooter / Motorcycle</p> <p><input type="checkbox"/> Public transportation</p> <p><input type="checkbox"/> Other</p>


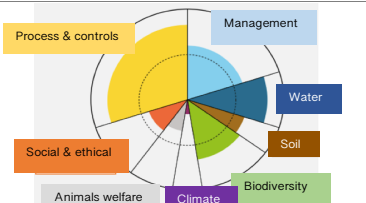

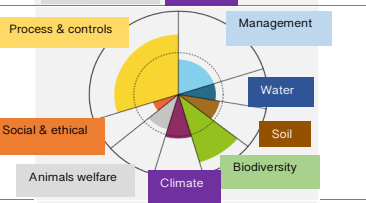

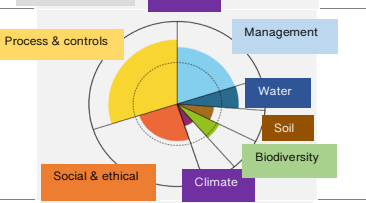




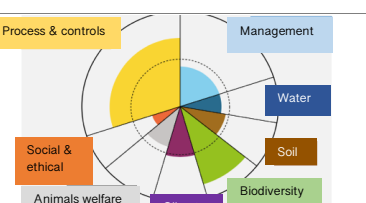

<p>How often do you buy the following products from bulk stores? (at least once a week) (2-3 times a month) (once a month) (bimonthly) (4-5 times per year) (Never)</p> <p><input type="checkbox"/> Bread</p> <p><input type="checkbox"/> Cereal products (flour, cereal seeds, semolina)</p> <p><input type="checkbox"/> Meat</p> <p><input type="checkbox"/> Fish</p> <p><input type="checkbox"/> Milk</p> <p><input type="checkbox"/> Cheeses</p> <p><input type="checkbox"/> Yoghurt</p> <p><input type="checkbox"/> Eggs</p> <p><input type="checkbox"/> Fats (butter, margarine, other vegetable fats)</p> <p><input type="checkbox"/> Oils</p> <p><input type="checkbox"/> Fruits</p> <p><input type="checkbox"/> Vegetables</p> <p><input type="checkbox"/> Sugar</p> <p><input type="checkbox"/> Jams</p> <p><input type="checkbox"/> Chocolate/Confectionery</p> <p><input type="checkbox"/> Salt and spices</p>	<p>FOOD LABELS</p> <p>Do you pay attention to food labels ? (label identifying sustainable products) Scale from never (1) to always (5)</p>	<p>In your opinion, food labels should be mainly evaluated on ? (the most important) (very important) (important) (moderately important) (less important) (not important)</p> <p>Respect of the environment (water, soil, biodiversity)</p> <p>Breeding conditions</p> <p>Type of packaging used</p> <p>Type of transportation used</p> <p>Distance travelled to the point of sale</p>
	<p>What food labels do you know? (several choices possible)</p> <p><input type="checkbox"/> Bio Suisse</p> <p><input type="checkbox"/> AB Agriculture Biologique</p> <p><input type="checkbox"/> Naturaplan</p> <p><input type="checkbox"/> Ecodéfi</p> <p><input type="checkbox"/> TerraSuisse</p> <p><input type="checkbox"/> Fairtrade</p> <p><input type="checkbox"/> Biosol</p> <p><input type="checkbox"/> MSC</p> <p><input type="checkbox"/> None</p> <p><input type="checkbox"/> Other (free)</p>	



Appendix 2: Food labels evaluation

The evaluation system comes from the *Pusch Fondation* in collaboration with *Helvetas*, *La Fédération Romande des consommateurs* (FRC), and *Swiss WWF*. The labels are evaluated in 3 main categories, the Management, Environment and social aspects, and Process and control. The inspections and certifications bodies are accredited by the Swiss Accreditation Service.

Labels	Evaluation	Description	In this report, Organic ?
Fairtrade Max Havelaar 		Products coming from fair trade process. <ul style="list-style-type: none"> ➢ Cereals ➢ Fruits & vegetables ➢ Vegetarian food ➢ Tea, coffee, and cocoa ➢ Sugar 	YES
Bourgeon Bio  		Food products coming from controlled organic farming with importation (by land or sea). <ul style="list-style-type: none"> ➢ Fish and seafood ➢ Dairy products ➢ Wine & beer ➢ Eggs ➢ Meat ➢ Cereals ➢ Aromatic herbs & spices ➢ Fruits & vegetables ➢ Tea, coffee & cocoa 	YES
Naturaplan 		Label coming from Coop Company for food products coming from certified organic agriculture (Bio-Swiss criterias). <ul style="list-style-type: none"> ➢ Fish & seafood ➢ Dairy products ➢ Wine & beer ➢ Eggs ➢ Meat ➢ Cereals ➢ Aromatic herbs & spices ➢ Fruits & vegetables ➢ Tea, coffee & cocoa 	YES
Naturafarm 		Label from Coop company for meat and eggs from free-range farming. <ul style="list-style-type: none"> ➢ Eggs ➢ Meat 	NO
Migros Bio 		Label from Migros Company for organic food products (Bio-Swiss certified). <ul style="list-style-type: none"> ➢ Fish & seafood ➢ Meat ➢ Dairy products ➢ Eggs ➢ Cereals ➢ Aromatic herbs & spices ➢ Fruits & vegetables ➢ Tea, coffee & cocoa 	YES
MSC 		MSC stands for Marine Stewardship Council for seafood from sustainable fisheries. <ul style="list-style-type: none"> ➢ Fish & seafood 	YES

<p>ASC</p> 		<p>ASC means Aquaculture Stewardship Council, which relates to fish from sustainable fish farms.</p> <ul style="list-style-type: none"> ➤ Fish & seafood 	<p>NO</p>							
<p>Terra Suisse</p> 		<p>It is a Migros company label for agriculture product form integrated production (IP Switzerland guidelines).</p> <ul style="list-style-type: none"> ➤ Meat ➤ Fruits & vegetables ➤ Dairy products 	<p>YES</p>							
<p>UTZ Certified</p> 		<p>UTZ certification guarantees the product traceability for coffee, tea and cocoa and imposes a code of conduct on producers.</p> <ul style="list-style-type: none"> ➤ Tea, coffee & cocoa 	<p>NO</p>							
<p>Pro Montagna</p> 	<table border="1" data-bbox="399 828 766 1041"> <tr><td>Content</td></tr> <tr><td>Ecology</td></tr> <tr><td>Breeding</td></tr> <tr><td>Social aspects</td></tr> <tr><td>Fair trade</td></tr> <tr><td>Health</td></tr> <tr><td>Provenance</td></tr> </table>	Content	Ecology	Breeding	Social aspects	Fair trade	Health	Provenance	<p>Coop Compagny Label for products from Switzerland's mountain regions (according to the zone of the Federal Office for Agriculture FOAG).</p> <ul style="list-style-type: none"> ➤ Meat ➤ Dairy products ➤ Eggs ➤ Tea, coffee & cocoa ➤ Win & beer 	<p>NO</p>
Content										
Ecology										
Breeding										
Social aspects										
Fair trade										
Health										
Provenance										
<p>De la region Migros</p> 	<table border="1" data-bbox="399 1064 766 1276"> <tr><td>Content of the label or declaration</td></tr> <tr><td>Ecology</td></tr> <tr><td>Breeding</td></tr> <tr><td>Social aspects</td></tr> <tr><td>Fair trade</td></tr> <tr><td>Health</td></tr> <tr><td>Provenance</td></tr> </table>	Content of the label or declaration	Ecology	Breeding	Social aspects	Fair trade	Health	Provenance	<p>Migros label company for food products produced in the region (short travelled distance).</p> <ul style="list-style-type: none"> ➤ Meat ➤ Fish & seafood ➤ Dairy products ➤ Eggs ➤ Cereals ➤ Fruits & vegetables ➤ Aromatic herbs & spices ➤ Plants & seeds 	<p>NO</p>
Content of the label or declaration										
Ecology										
Breeding										
Social aspects										
Fair trade										
Health										
Provenance										
<p>Ma région</p> 	<table border="1" data-bbox="399 1299 766 1512"> <tr><td>Content of the label or declaration</td></tr> <tr><td>Ecology</td></tr> <tr><td>Breeding</td></tr> <tr><td>Social aspects</td></tr> <tr><td>Fair trade</td></tr> <tr><td>Health</td></tr> <tr><td>Provenance</td></tr> </table>	Content of the label or declaration	Ecology	Breeding	Social aspects	Fair trade	Health	Provenance	<p>Coop label for regionally food products.</p> <ul style="list-style-type: none"> ➤ Eggs ➤ Fish ➤ Meat ➤ Fruits & vegetables ➤ Cereals ➤ Tea, coffe & cocoa ➤ Aromatic herbs & spices ➤ Dairy products ➤ Win & beer ➤ Plants & seeds ➤ Miscellaneous 	<p>NO</p>
Content of the label or declaration										
Ecology										
Breeding										
Social aspects										
Fair trade										
Health										
Provenance										
<p>IP SUISSE</p> 		<p>Label of the IP-Switzerland association for food products coming from organic production.</p> <ul style="list-style-type: none"> ➤ Eggs ➤ Meat ➤ Cereals ➤ Fruits & vegetables 	<p>YES</p>							
<p>Suisse Garantie</p> 	<table border="1" data-bbox="399 1769 766 2038"> <tr><td>Content</td></tr> <tr><td>Ecology</td></tr> <tr><td>Breeding</td></tr> <tr><td>Social aspects</td></tr> <tr><td>Fair trade</td></tr> <tr><td>Health</td></tr> <tr><td>Provenance</td></tr> </table>	Content	Ecology	Breeding	Social aspects	Fair trade	Health	Provenance	<p>From the Association Agros-Marketing Switzerland (AMS) for agricultural products from Switzerland.</p> <ul style="list-style-type: none"> ➤ Dairy products ➤ Meat ➤ Fruits and vegetables ➤ Cereals ➤ Eggs ➤ Vegetarian food products ➤ Fish ➤ Flowers, seeds and plants 	<p>YES</p>
Content										
Ecology										
Breeding										
Social aspects										
Fair trade										
Health										
Provenance										

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Appendix 3: Quantities of packaging

3.1 Quantities of packaging, single individuals average

The quantities are in grams	Single individuals				
	Average				
	Quantity packaging				
Food products vs quantities of packaging		Glass	Metal	Cardboard	Plastic
Total Bread and cereal products (plastic) in grams	6'127.5	-	-	67.5	359.4
Rice	301.6				7.8
Pasta	777.2			12.4	13.1
Bread	2'080.8				71.0
Pastry	1'820.4				236.7
Sandwich	148.1				2.4
Flour	401.7				15.9
Other cereal-based products	597.7			55.0	12.6
Total Bread and cereal products (cardboard) in grams	6'127.5	-	-	108.9	354.1
Rice	301.56			11.6	
Pasta	777.16			42.2	15.5
Bread	2'080.82				71.0
Pastry	1'820.39				236.7
Sandwich	148.09				2.4
Flour	401.72				15.9
Other cereal-based products	597.70			55.0	12.6
Total Meat and fish in grams	3'318.5	-	44.2	32.7	431.7
Fresh meat	1'605.7				100.5
Sausages and others	714.4			31.7	162.0
Ham, bacon and dried meat	431.6				36.4
Canned meat	40.4		9.9	0.3	
Fresh and smoked fish/ seafood	422.3				132.8
Canned fish	104.1		34.2	0.7	
Total Milk, cheese and eggs in grams	9'536.1	-	12.3	266.8	219.3
Milk	4'338.6			186.6	8.7
Cheese (soft & hard)	1'432.8				54.4
Cream	480.9				15.9
Yogurt	1'948.1		12.3	36.2	86.7
Milk-based products	744.5				53.6
Eggs	591.2			44.0	
Total Fats and oils in grams	759.1	-	-	0.8	77.5
Butter	359.7				61.5
Olive and vegetable oils	399.4			0.8	16.0
Total Fruits in grams	7'320.6	-	23.9	8.9	160.6
Lemons	247.9				3.5
Citrus and oranges	1'303.1				14.3
Bananas	989.7				0.9
Apples	1'327.8				18.3
Pears and quinces	289.6			8.3	0.7
Stone fruits	1'145.2				37.8
Berries	456.6				19.8
Grapes	412.9				16.5
Other exotic fruits	586.5				32.3
Nuts	316.0				10.7
Dried fruits	148.0				5.8
Canned fruits	97.4		23.9	0.6	
Total Vegetables in grams	7'559.1	-	130.8	3.5	88.7
Green salads (leafy vegetables)	868.0				9.7

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Stem vegetables (leeks, fennels...)	309.1				3.4
Aromatic herbs	26.4				6.6
Cabbages, cauliflower, broccoli	397.4				1.7
Tomatoes	911.4				13.7
Other vegetables grown for their fruit (e.g. cucurbits, peppers, etc.)	1'021.3				8.2
Onions	360.7				4.7
Garlic	31.2				0.2
Carrots	1'279.0				12.2
Fresh mushrooms	94.5				5.7
Dried mushrooms	55.0				1.5
Canned vegetables and mushrooms	532.9		130.8	3.5	
Potatoes	1'278.5				8.6
Tuber products	393.7				12.6
Total Sugar, jams, honey chocolate & other in grams	1'673.2	181.1	9.3	25.2	38.6
Sugar	389.2			3.7	
Jam	263.6	172.4	9.3		1.1
Honey	75.8				6.1
Chocolate	519.0			21.4	5.0
Confectionery	126.2				6.9
Ice cream	283.9				19.2
Other sweetened (or cocoa products)	15.5	8.7		0.0	0.3
Total Sauces, salt & spices in grams	1'743.9	394.1	16.0	53.8	81.5
Sauces	745.6	394.1	16.0	1.8	
Salt and spices	116.2				24.5
Soups and broths	113.9			18.0	8.5
Flavors and yeast	14.6			1.8	
Precooked meals	753.6			32.3	48.5
TOTAL	38038	575.2	236.5	459.1	1457.3

3.2 Quantities of packaging, ratio single individuals and couples with a child

Ratio Monthly average in grams	Average single individual		Couples with a child	
	Food consumption	Packaging	Food consumption	Packaging
Bread & cereal products	6127.5	426.9	17866.2	1229.6
Meat & fish	3318.5	507.9	10625.5	1508.2
Milk, cheese and eggs	9536.1	498.4	29026.7	1477.0
Fats & oils	759.1	78.3	2080.2	208.9
Fruits	7320.6	193.4	14823.9	405.0
Vegetables	7559.1	223.0	19335.5	623.3
Sugar, jams, honey	1673.2	254.2	4741.4	714.7
Sauces, salt & spices	1743.9	545.4	4178.9	1417.8
TOTAL	38038.0	2727.5	102678.3	7584.5
RATIO for 1 kg of food	72 grams of packaging		74 grams of packaging	

Ratio Monthly average for beverages in grams	Average single individual				Couple with a child			
	Food consumption	Cardboard	Plastic	Ratio 1 kg of food	Food consumption	Cardboard	Plastic	Ratio 1 kg of food
Total consumption, coffee, tea and cocoa	667.4				1'300.2			
Total beverages (with coffee ground)		28.9	25.5	82 g		47.6	67.3	88 g
Total beverages (with coffee beans)		28.9	17.8	70 g		47.6	53.7	78 g
Total beverage (with capsules)		236.5	319.3	833 g		411.8	578.5	762 g
Coffee ground	564.9		18.5		989.2		32.3	
Coffee beans			10.7				18.8	
Coffee capsules		214.0	282.4			374.7	494.6	
Tea sachets	59.5	28.9			98.0	47.6		
Tea capsules		22.6	29.8			37.1	49.0	
Cocoa	43.0		7.0		213.1		34.9	

3.3 Quantities of packaging, by single individuals supermarkets compared to bulk stores

Same basket in supermarkets and bulk stores	Single individual in Supermarkets				Single individual in Bulk stores			
	Average				Average			
	Quantity packaging				Quantity packaging			
	Glass	Met al	Cardb oard	Plastic	Glass	Met al	Cardb oard	Plastic
Total bread and cereal products (plastic) in grams	-	-	67.5	120.4	-	-	-	-
Rice				7.8				
Pasta			12.4	13.1				
Bread				71.0				
Pastry								
Sandwich								
Flour				15.9				
Other cereal-based products			55.0	12.6				
Total meat and fish in grams	-	-	31.7	431.7	-	-	31.7	431.7
Fresh meat				100.5				100.5
Sausages and others			31.7	162.0			31.7	162.0
Ham, bacon and dried meat				36.4				36.4
Canned meat								
Fresh and smoked fish/ seafood				132.8				132.8
Canned fish								
Total milk, cheese, and eggs in grams	-	12.3	266.8	219.3	-	12.3	44.0	54.4
Milk			186.6	8.7				
Cheese (soft & hard)				54.4				54.4
Cream				15.9				
Yogurt		12.3	36.2	86.7		12.3		
Milk-based products				53.6				
Eggs			44.0				44.0	
Total fats and oils in grams		-	0.8	77.5		-	-	4.3
Butter				61.5				4.3
Olive and vegetable oils			0.8	16.0				
Total fruits in grams	-	-	8.3	160.6	-	-	-	-
Lemons				3.5				
Citrus and oranges				14.3				
Bananas				0.9				
Apples				18.3				
Pears and quinces			8.3	0.7				
Stone fruits				37.8				
Berries				19.8				
Grapes				16.5				
Other exotic fruits				32.3				
Nuts				10.7				
Dried fruits				5.8				
Canned fruits								
Total vegetables in grams	-	-	-	76.1	-	-	-	-
Green salads (leafy vegetables)				9.7				
Stem vegetables (leeks, fennels...)				3.4				
Aromatic herbs				6.6				
Cabbages, cauliflower, broccoli				1.7				
Tomatoes				13.7				
Other vegetables grown for their fruit (e.g. cucurbits, peppers, etc.)				8.2				
Onions				4.7				
Garlic				0.2				
Carrots				12.2				

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Fresh mushrooms				5.7				
Dried mushrooms				1.5				
Canned vegetables & mushrooms								
Potatoes				8.6				
Tuber products								
Total sugar, jams, honey, chocolate & other in grams	181.1	9.3	25.2	19.4	-	-	21.5	-
Sugar			3.70					
Jam	172.41	9.33		1.05				
Honey				6.13				
Chocolate			21.43	4.98			21.43	
Confectionery				6.94				
Ice cream								
Other sweetened (or cocoa products)	8.68		0.03	0.25			0.03	
Total sauces, salt & spices in grams	394.1	16.0	21.5	33.0	-	-	1.8	-
Sauces	394.1	16.0	1.8				1.8	
Salt and spices				24.5				
Soups and broths			18.0	8.5				
Flavors and yeast			1.8					
Precooked meals								
Total monthly per category	575.2	37.6	421.8	1'137.9	-	12.3	99.0	490.5
TOTAL OF ALL PACKAGING			2'172.5				601.8	

The grey areas are the food products that have been removed from the calculation.

Appendix 4: Food labels evaluation criteria

		SURVEY 1 – General customers		SURVEY 2 – Specific customers	
		n°	%	n°	%
respect of the environment (water, soil and biodiversity)	important	158	98%	95	100%
	medium	3	2%	0	0%
breeding conditions	important	157	98%	95	100%
	medium	3	2%	0	0%
	less important	1	1%	0	0%
social standards (fair trade)	important	152	94%	95	100%
	medium	9	6%	0	0%
type of packaging used	important	142	88%	93	98%
	medium	19	12%	2	2%
type of transport	important	142	88%	94	99%
	medium	17	11%	1	1%
	less important	2	1%	0	0%
distance travelled to the point of sale	important	143	89%	91	96%
	medium	13	8%	3	3%
	less important	5	3%	1	1%

Appendix 5: Price comparison

Appendix 5.1: Price comparison organic vs organic

Prices comparison ORGANIC vs ORGANIC		Supermarkets		Bulk stores		Stores n°	% Variation
		CV	Average	CV	Average		
Rice		CHF 0.59		CHF 0.68			-12%
Whole grain Rice	100g	B	CHF 0.43	()	CHF 0.71	1	-40%
Risotto	100g	B	CHF 0.55	C	CHF 0.67	2	-18%
Basmati	100g	C	CHF 0.80	()	CHF 0.65	1	23%
Pasta		CHF 0.69		CHF 0.79			-13%
White spaghetti	100g	A	CHF 0.52	()	CHF 0.63	1	-17%
Tagliatelle	100g	()	CHF 1.05	D	CHF 0.81	2	30%
Penne	100g	C	CHF 0.50	D	CHF 0.95	2	-47%
Cereal seeds		CHF 0.91		CHF 1.02			-10%
Green Lentils	100g	A	CHF 0.68	C	CHF 0.77	3	-12%
Millet	100g	B	CHF 0.84	C	CHF 1.14	2	-26%
Oats	100g	A	CHF 0.56	()	CHF 0.59	1	-5%
Bulgur	100g	B	CHF 0.78	()	CHF 1.27	1	-39%
Chickpeas	100g	A	CHF 0.85	B	CHF 0.79	2	9%
Quinoa	100g	A	CHF 1.75	B	CHF 1.55	2	13%
Grains		CHF 1.02		CHF 2.05			-50%
Sunflower	100g	B	CHF 0.60	()	CHF 1.95	1	-69%
Linseed	100g	D	CHF 0.92	()	CHF 0.80	1	15%
Sunflower	100g	A	CHF 1.55	()	CHF 3.40	1	-54%
GRAIN PRODUCTS		CHF 0.80		CHF 1.13			-29%
Fresh bread		CHF 0.91		CHF 1.92			-53%
Whole meal	100g	B	CHF 0.89	E	CHF 1.73	3	-49%
5 Cereals/Multigrain	100g	()	CHF 1.00	A	CHF 1.31	2	-24%
Grains gluten-free	100g	()	CHF 0.84	B	CHF 2.73	2	-69%
Flour		CHF 0.33		CHF 0.43			-23%
White flour	100g	B	CHF 0.33	A	CHF 0.44	2	-23%
Rye flour	100g	()	CHF 0.33	A	CHF 0.43	2	-24%
FRESH BREAD & FLOUR		CHF 0.62		CHF 1.18			-47%
White Sugar	100g	B	CHF 0.24	D	CHF 0.25	2	-3%
Cane sugar	100g	C	CHF 0.35	B	CHF 0.84	2	-58%
SUGAR		CHF 0.30		CHF 0.54			-45%
Milk		CHF 0.40		CHF 0.50			-20%
Cow's Milk	100ml	A	CHF 0.18	B	CHF 0.27	2	-31%
Sheep's Milk	100ml	()	CHF 0.62	A	CHF 0.73	2	-16%
Yogurt		CHF 0.75		CHF 0.91			-18%
Cow's Yogurt	100ml	C	CHF 0.40	B	CHF 0.69	3	-42%
Sheep's Yogurt	100ml	A	CHF 1.09	B	CHF 1.14	2	-4%
Cream		CHF 1.50		CHF 1.56			-4%
Cream of cow's milk 35%	100ml	B	CHF 1.50	A	CHF 1.56	3	-4%
Cheese		CHF 2.35		CHF 3.84			-39%
Fresh Sheep milk cheese	100g	()	CHF 2.42	A	CHF 4.48	2	-46%
Emmentaler	100g	B	CHF 2.28	()	CHF 3.20	1	-29%
Eggs		CHF 0.84		CHF 0.85			-1%
Swiss Eggs	1 pce	A	CHF 0.84	B	CHF 0.85	2	-1%
DAIRY PRODUCTS		CHF 1.17		CHF 1.53			-24%
Cow Butter	100g	B	CHF 2.39	B	CHF 2.34	3	2%
Extra virgin olive oil	100ml	C	CHF 2.57	()	CHF 4.78	1	-46%
Oil Sunflower	100ml	B	CHF 1.07	A	CHF 1.65	2	-35%
Olive oil	100ml	B	CHF 1.87	A	CHF 2.60	2	-28%
Apple Vinegar	100ml	A	CHF 0.47	A	CHF 1.02	2	-54%
FATS & OILS		CHF 1.67		CHF 2.48			-33%

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Strawberry	100g	()	CHF 1.94	()	CHF 2.86	1	-32%
Bananas	100g	B	CHF 0.30	()	CHF 0.46	1	-36%
Apples	100g	()	CHF 0.65	()	CHF 0.89	1	-27%
Lemons	100g	()	CHF 0.60	()	CHF 0.69	1	-12%
Oranges	100g	()	CHF 0.33	C	CHF 0.46	2	-29%
FRUITS			CHF 0.76		CHF 1.07		-29%
Spices & salt			CHF 1.32		CHF 1.58		-16%
Fine salt	100g	E	CHF 0.34	()	CHF 0.65	1	-47%
Vegetables broth	100g	B	CHF 2.29	()	CHF 2.50	1	-8%
Sauces			CHF 2.29		CHF 3.59		-36%
Tomatoes puree	100g	D	CHF 1.20	()	CHF 2.25	1	-47%
Green Pesto	100g	A	CHF 3.37	()	CHF 4.92	1	-32%
SAUCES, SALT & SPICES			CHF 1.80		CHF 2.58		-30%
Dried mangoes	100g	B	CHF 3.31	A	CHF 4.00	2	-17%
Dried apricots	100g	()	CHF 2.60	E	CHF 4.43	2	-41%
Dried figs	100g	A	CHF 1.69	C	CHF 2.43	2	-31%
Dried Boletus	100g	B	CHF 16.50	()	CHF 17.00	1	-3%
Dried Chanterelles	100g	()	CHF 16.00	()	CHF 17.00	1	-6%
DRIED FRUITS & MUSHROOMS			CHF 8.02		CHF 8.97		-11%
Vegetables			CHF 1.56		CHF 1.90		-18%
Onions	100g	C	CHF 0.16	B	CHF 0.38	2	-56%
Garlic	100g	()	CHF 0.40	D	CHF 1.70	2	-76%
Carrots	100g	()	CHF 0.36	B	CHF 0.45	2	-20%
Bunch radish	1 pce	()	CHF 3.40	B	CHF 3.45	2	-1%
Potatoes	100g	()	CHF 0.42	A	CHF 0.49	2	-13%
Sweet potatoes	100g	()	CHF 0.50	()	CHF 0.75	1	-34%
Avocados	1 pce	()	CHF 2.95	C	CHF 2.45	2	20%
Green Lettuce	1pce	()	CHF 2.95	B	CHF 4.45	2	-34%
Leeks	100g	()	CHF 0.98	B	CHF 0.98	3	0%
Peppers	100g	()	CHF 0.84	D	CHF 1.23	2	-31%
Brown button mushrooms	100g	()	CHF 1.76	()	CHF 2.20	1	-20%
Shiitake mushrooms	100g	()	CHF 3.95	()	CHF 4.28	1	-8%
Aromatic herbs			CHF 2.20		CHF 2.80		-21%
Chives	1 pce	()	CHF 1.90	()	CHF 2.40	1	-21%
Mint	1 pce	()	CHF 2.50	()	CHF 2.95	1	-15%
Rosemary	1 pce	()	CHF 2.20	()	CHF 3.05	1	-28%
VEGETABLES & AROMATIC HERBS			CHF 1.88		CHF 2.35		-20%
Whole nature Almonds	100g	B	CHF 2.58	B	CHF 3.00	2	-14%
Whole nature Hazelnuts	100g	A	CHF 2.10	C	CHF 3.10	2	-32%
Whole nature cashew nuts	100g	A	CHF 2.53	C	CHF 3.83	2	-34%
NUTS			CHF 2.40		CHF 3.31		-27%
Salted biscuits			CHF 2.62		CHF 4.60		-43%
Crackers nature	100g	()	CHF 1.78	()	CHF 4.80	1	-63%
Butter flutes	100g	()	CHF 3.45	()	CHF 4.40	1	-22%
Chocolate bar			CHF 2.27		CHF 5.26		-57%
Chocolate bar dark and orange	100g	C	CHF 2.53	()	CHF 8.25	1	-69%
Chocolate bar dark 70%	100g	B	CHF 2.01	D	CHF 2.28	2	-12%
Jam			CHF 1.80		CHF 2.82		-36%
Honey	100g	A	CHF 1.92	D	CHF 4.11	2	-53%
Raspberries	100g	E	CHF 2.17	C	CHF 2.39	2	-9%
Chocolate Spread	100g	()	CHF 1.33	()	CHF 1.95	1	-32%
CONFECTIONERIES			CHF 2.23		CHF 4.23		-47%
Meat			CHF 2.88		CHF 2.55		13%
Steak of Beef	100g	B	CHF 5.14	()	CHF 4.02	1	28%

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Whole Chicken	100g	A	CHF 1.93	()	CHF 1.70	1	13%
Tofu nature	100g	A	CHF 1.57	()	CHF 1.93	1	-19%
Fish			CHF 4.32		CHF 5.60		-23%
Trout smoked filet	100g	D	CHF 3.63	()	CHF 6.35	1	-43%
Trout fresh filet	100g	()	CHF 5.02	()	CHF 4.85	1	4%
MEAT & FISH			CHF 3.60		CHF 4.08		-12%
AVERAGE							-30%

BEVERAGES								
Tea	Bulk Organic	100g	E	CHF 11.59	C	CHF 13.89	2	-17%
Coffee	Bean Organic	100g	A	CHF 1.76	B	CHF 2.49	2	-29%
	Ground Organic	100g	C	CHF 1.43	B	CHF 3.00	2	-52%
	Overall coffee			CHF 1.59		CHF 2.75		-42%
Cocoa	Organic	100g	B	CHF 1.54	C	CHF 2.99	2	-49%
AVERAGE							-36%	

coefficient of variation < 5%	very good	A
coefficient of variation from ≥ 5% to < 15%.	good	B
coefficient of variation from ≥ 15% to < 25%.	medium	C
coefficient of variation from ≥ 25% to < 35%.	bad	D
coefficient of variation ≥ 35%	very bad	E
Insufficient to compute CV		()

For its calculation, the standard formula have been used: $CV = \frac{\sigma}{\mu} * 100$.

Insufficient refers to the fact that only one store have been taken into consideration for computation of the average. The lower is the CV, the higher is the accuracy of the average.

For liquid products, 100ml is equal to 100g.

The notion "Standard" refers to non-organic products.

Appendix 5.2: Price comparison standard vs organic

Prices comparison STANDARD vs ORGANIC	Supermarkets Average	Bulk stores Average	% Variation
Grain products	CHF 0.68	CHF 1.13	-40%
Fresh bread & flour	CHF 0.55	CHF 1.18	-53%
Sugar	CHF 0.31	CHF 0.54	-42%
Dairy products	CHF 0.99	CHF 1.48	-33%
Fats & oils	CHF 1.19	CHF 2.48	-52%
Fruits	CHF 0.48	CHF 1.00	-53%
Sauces, salt & spices	CHF 2.55	CHF 3.17	-38%
Dried fruits & mushrooms	CHF 6.51	CHF 10.31	-29%
Vegetables & aromatic herbs	CHF 1.69	CHF 2.35	-28%
Nuts	CHF 2.08	CHF 3.31	-37%
Confectioneries	CHF 1.92	CHF 4.23	-55%
Meat, fish & substitute	CHF 2.99	CHF 4.08	-27%
AVERAGE			-41%

BEVERAGES					
Tea	Bulk	100g	CHF 3.57	CHF 9.20	-61%
Coffee	Bean	100g	CHF 1.63	CHF 2.49	-35%
	Ground	100g	CHF 1.41	CHF 3.00	-53%
	Overall coffee		CHF 1.52	CHF 2.75	-45%
Cocoa	Soluble	100g	CHF 1.20	CHF 2.99	-60%
AVERAGE					-55%

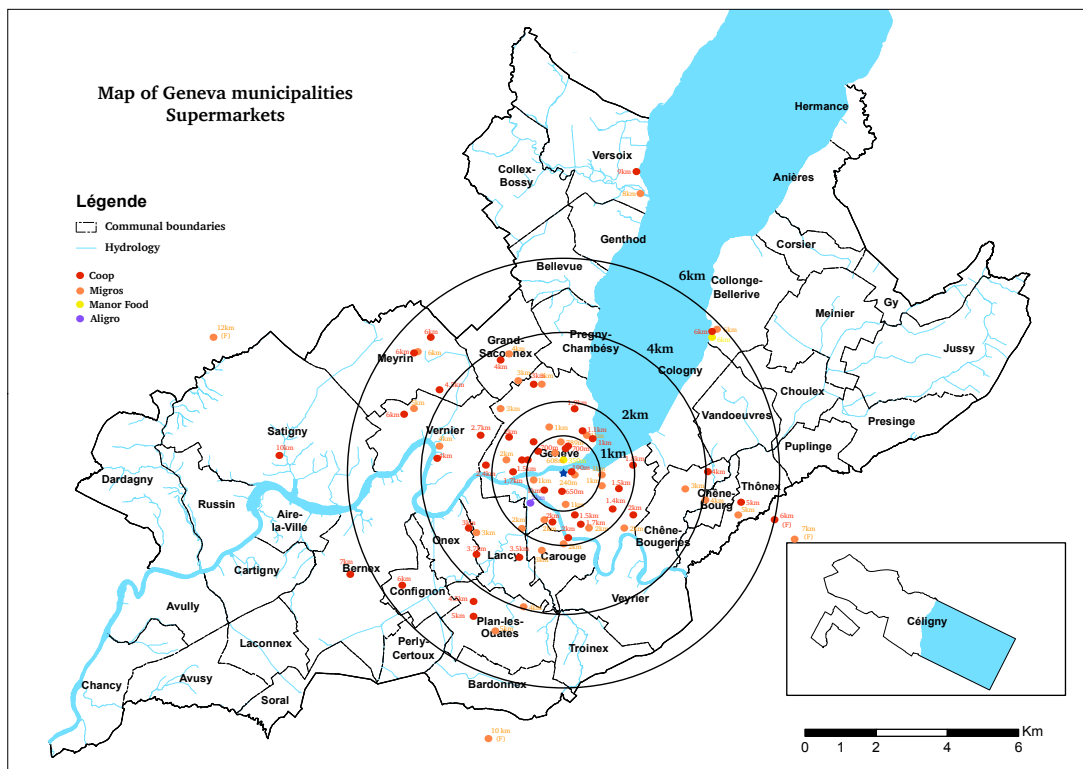
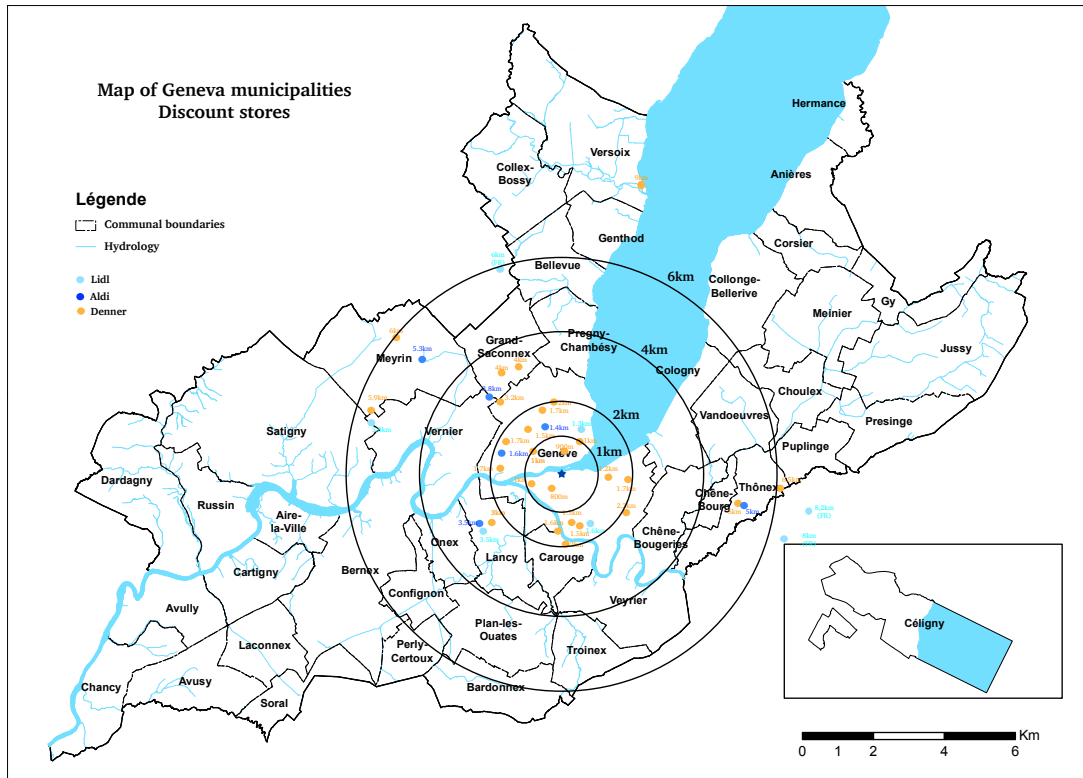
Standard refers to non-organic products in supermarkets

Appendix 6: Variety products range

Variety products range	Supermarkets	Bulk stores	% Variation
	Average	Average	
Rice	16.0	2.5	
Pasta	12.0	7.5	
Cereal seeds	23.0	10.5	
Grains	10.0	6.0	
Grain products	15.3	6.6	57%
Fresh bread	9.0	10.7	
Flour	10.0	9.0	
Fresh bread & flour	12.0	9.8	18%
Sugar & Cane sugar	8.5	3.5	
Sugar	9.0	3.5	61%
Milk	22.5	2.0	
Yogurt nature	7.0	2.5	
Cream	7.5	1.0	
Cheese	37.0	12.0	
Eggs	4.0	1.0	
Dairy products	16.0	3.7	77%
Oils	11.0	7.0	
Vinegar	5.5	3.0	
Butter	5.0	1.0	
Fats & oils	7.2	3.7	49%
Salt & spices	9.5	7.5	
Sauces (for pasta)	8.5	2.0	
Sauces, salt and spices	9.0	4.8	47%
Dried fruits	12.5	8.0	
Dried mushrooms	1.5	6.0	
Dried fruits and mushrooms	7.0	7.0	0%
Aromatic herbs	5.0	9.0	
Aromatic herbs	5.0	9.0	-80%
Nuts	12.5	6.5	
Nuts	12.5	6.5	48%
Salted biscuits	4.5	3.5	
Chocolate bar	6.0	7.0	
Honey	6.5	2.0	
Jam	8.5	7.5	
Chocolate Spread	1.0	1.0	
Confectioneries	5.2	4.2	19%
AVERAGE			30%

BEVERAGES				
Tea	Bulk	3.0	6.0	-100%
Coffee	Bean	6.0	1.0	83%
	Ground	5.0	1.5	70%
	Overall coffee	5.5	1.3	77%
Cocoa	Soluble	2.0	1.0	50%
AVERAGE			9%	

Appendix 7: Maps of food stores in Geneva



How much bulk stores reduce their environmental impact by cutting food packaging?
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