

Product Packaging

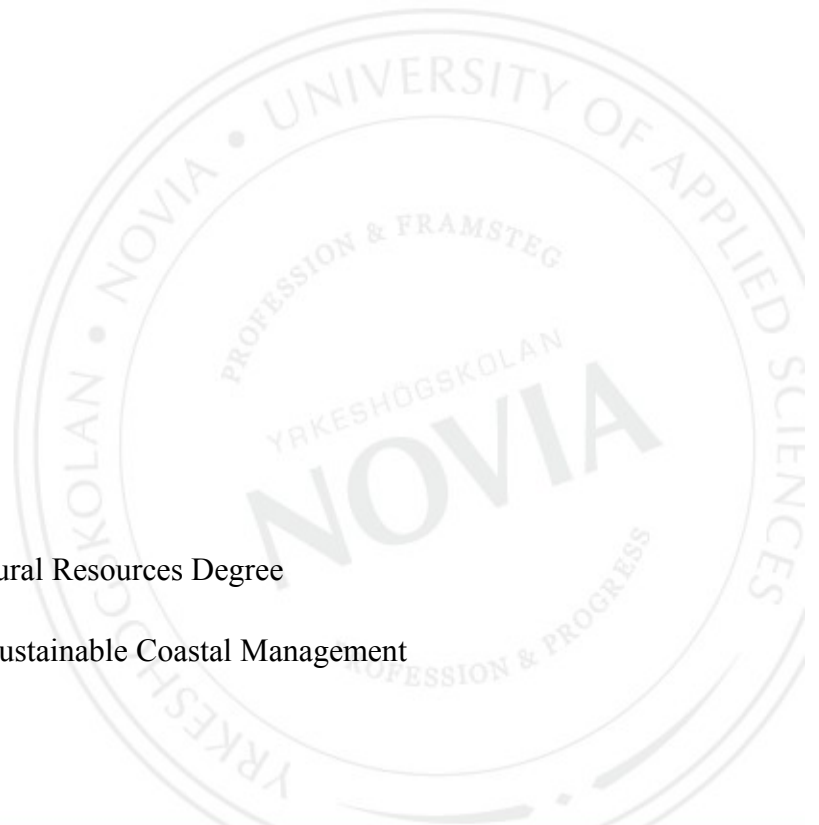
A waste of useful materials

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Appendices. 1

Summary

This study aims to investigate household waste, packaging, its uses and disposal. We have the possibility to change towards environmentally friendly practices. The findings of this study will help people to realise better practices. Questions were asked in the form of a survey. The International English Speakers Association of Finland was the target group for responses. A product passed its life-cycle, the materials it is composed of should be designed for further use. Materials are mixed with other materials during production. The recycle process can be complex and costly. The purpose of packaging is product protection. Packaging tends to be single use. The popular place to dispose of plastic was in mixed waste. Reusable packaging favoured by respondents. Most were for too much packaging. Packaging is the main contributor to household waste. People would like to see a reduction in household waste. Parties involved need to agree on time frame and strategy. Possible to eliminate packaging materials from waste.

Language: English.

Keywords: Waste, reduce, reuse, recycle, upcycle.

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1. Introduction

This study aims to investigate household waste, in particular packaging, its uses and disposal.

With reduce, reuse and recycle being the accepted way of progression in waste management (Sakai et al 2011), how do people perceive its meaning when different waste management plans and practices, from what they have been accustomed to, are in use.

With national waste plans being realised in 2016 and new ones (Hogg et al 2013) currently being formed for the future, we have the possibility to change towards more environmentally friendly practices. In theory people are willing to reduce, reuse and recycle more (Date 2014). To do this more effectively, we could change the way we make things (Braungart & McDonough 2002), to produce less or even zero waste, as demonstrated in the Rubbish Diet (Cannard 2008).

It is intended that the findings of this study will help people to realise better practices, such as upcycling (Braungart & McDonough 2013), in order to achieve a zero waste society (The Scottish Government, 2010).

2. Research Question

Is packaging perceived as needless material waste?

3. Literature Review

3.1 Waste plans

In Europe we deal with waste and recycling at present as determined by The Waste Framework directive (European Commission, 2008). The framework sets out a hierarchical approach to treatment of waste; prevention, prepare for reuse, recycling, recovery then lastly disposal. Separate national waste plans are implemented by each member country based on the framework directive. In Finland the waste plan title suggests recycling, halfway down the EU framework directive hierarchy, as being the way to approach the problems of waste (Ympäristöministeriö, 2009). In contrast the waste plan in Scotland suggests prevention of waste production, by implementing a zero waste plan (The Scottish Government, 2010). Although stating zero waste, the Scottish plan still contains provision for 5% landfill until 2025.

3.2 Scotland's zero waste plan

Scotland's zero waste plan (The Scottish Government, 2010), is the strategy being put in place to reduce waste and encourage reuse and recycling with targets set for 2025. The plan is introduced with a ministerial foreword by member of the Scottish parliament and cabinet secretary Richard Lochhead. From the foreword the plan follows a layout of Introduction, Mission and Vision, Areas of Action and Conclusions and Delivery. In addition there are supporting annexes A, B, C and D. The annexes deal in detail with different areas of the implementation of the plan. Annex A deals with targets and what data is needed. Annex B refers to how zero waste can be helped to be delivered by planning land use. Annex C outlines policies that will be used to support implementation of the plan and landfill bans. Annex D deals with implementation of the framework on the waste directive.

In his foreword (The Scottish Government, (2010) v), Lochhead points out that waste is an issue for every person in Scotland, as such this requires effort from everyone to help in tackling the everyday issues of waste. Targets of the plan are set out in simple terms with preservation of materials rather than discarding as waste a main issue to be dealt with.

The introduction (The Scottish Government, (2010) 1), informs that the plan is a result of studies of resource use and disposal methods, both past and present, in order to comply

with European legislation. A main issue is to create a way in how we think about materials that products are made from and to view them not as sources of waste but as valuable resources. In changing the way we think about creation of waste and the value of resources that would normally be discarded, economic benefit for business and industry can be attained through lesser need for waste disposal services and new opportunities that arise in furtherance of reuse and recycling. New processes will need to be formed to treat materials that are no longer going into the disposal of waste systems. Separation of materials before entering any recovery system, instead of be discarded for waste disposal, would play a large part in the economic and environmental success of any new systems. For waste to be reduced as much as is possible and resources preserved through reuse and recycling, an understanding of how everyone needs to change their ways of thinking and processing of materials after product life needs to be met.

The mission of the zero waste plan (The Scottish Government, (2010) 2), is "To achieve a zero waste Scotland, where we make the most efficient use of resources by minimising Scotland's demand on primary resources, and maximising the reuse, recycling and recovery of resources instead of treating them as waste."

The vision of the plan (The Scottish Government, (2010) 3), is based on managing resources, normally discarded as waste, and the benefit to the environment that reducing waste can achieve. The vision is set around the European waste hierarchy of prevention, reuse, recycling and recovery.

Areas of action (The Scottish Government, (2010) 4), highlights four areas to be worked on to reach the vision of the plan.

Resource streams (The Scottish Government, (2010) 5), suggests a move towards a closed loop management of resources, where materials are no longer put to landfills or the value reduced by using in lesser products. Progressive bans imposed on landfill alongside other measures will create demand for alternative ways of thinking. Increasing awareness of use of resources and their treatment after product life has ended. Increased awareness should lower the need for primary resources and create a market for business in rethinking of how resources are treated.

Economic opportunity from the plan (The Scottish Government, (2010) 7), will see new markets and expansion of existing markets in the use of resources. Recyclate in particular has been identified as one area that should be promoted. Reuse and refurbishment of products and material resources is to be encouraged.. Collection and sorting will provide

other opportunities to develop business in line with the plan, with a "waste to resource tool kit", to maintain standards, being made available for businesses working in the sector.

Resource management (The Scottish Government, (2010) 9), sector will be developed to help replace the waste management industry, to move from discarding waste for disposal and to help with maintaining and recovering resources. A main point in creation of a resource management sector is that it will include everyone and not just management companies. The waste plan will seek to provide measures to promote reuse and recycling as opposed to measures at the lower end of the waste hierarchy. Measures will be put in place to reduce the use of landfill and incineration of waste.

Education and awareness (The Scottish Government, (2010) 11), is needed to inform everyone including individuals, households, businesses and education facilities, on how the zero waste plan intends to function and what a zero waste Scotland will mean in terms of benefit to business, the environment and society itself. With good measures implemented in making people aware of how processes are changing, the people will be able to adjust better into a new way of thinking and processing of resources they no longer need or use.

Conclusion and delivery points (The Scottish Government, (2010) 13), to the many challenges ahead in reaching the vision of the plan. By working on past successes and implementing new measures based on solidly founded data, revisions and changes can be made in order for a zero waste Scotland to become a reality.

3.3 Waste management

There are many differences in approach to dealing with waste under one EU directive. When looked at on a global scale the differences can be even more extreme but also similarities in methods can arise in how waste is treated (Kim, 2002), (Ueta et al, 2001). Turun Seudun Jätehuolto Oy (TSJ, 2014). in the Turku region and Helsingin seudun ympäristöpalvelut (HSY, 2014). in the Helsinki metropolitan area are providers of waste management services in their respective areas. Their web services provide information, in English, on how waste is managed and processed.

Households should separate waste and recyclable materials before disposal. Where and how depends on where you live and what amenities are available. People may have access

to a communal waste and recycling point as part of the buildings facilities, or have their own waste bin and access to recycling stations. Households are urged to work with the waste hierarchy in mind; reduce the amount of waste generated, reuse whenever possible, deposit what can be recycled at appropriate place and as a last means to dispose of in energy or mixed waste (HSY, 2014) and (TSJ, 2014).

Waste from packaging can be separated as biowaste, glass, paper, metal, cardboard and cartons, energy waste for incineration and waste for landfill (HSY, 2014) and (TSJ, 2014).

Packaging from biowaste may include naturally occurring packaging such as fruit and vegetable peel or biodegradable bags and packaging as well as suitable paper or cardboard that can be used to contain other biowaste. Biowaste can be collected for composting from your place of residence or composted by the household itself (HSY, 2014) and (TSJ, 2014).

Glass from packaging such as bottles and jars can be placed in a glass collection container or left at a recycling point. Where a deposit has been made on the container, it should be returned to a shop collection point where the deposit will be redeemed. Glass returned through both these methods may be used in the manufacture of new glass containers or in the production of insulation materials (HSY, 2014) and (TSJ, 2014).

Most packaging made from paper would be unsuitable for recycling within the paper waste process, as it may be mixed or coated with other materials. It should instead be separated and collected as recyclable paper-board or cardboard (HSY, 2014) and (TSJ, 2014).

Metals from packaging can be taken to recycling points or centres. Metals for recycling do not need to be separated from other materials, as long as at least half is metal. Drinks containers made of metal, where a deposit is made at point of sale, should be returned to a point where the deposit may be redeemed. Metals once deposited will be collected and separated before being forwarded to for recycling (HSY, 2014) and (TSJ, 2014).

Paper-board and cardboard have many places for collection, from communal waste areas at household buildings, recycling points and waste centres. Although there may be other materials attached to the paper board or cardboard, such as plastic or metal, there is no need to remove them as it is taken care of in the recycling process (HSY, 2014) and (TSJ, 2014).

Non recyclable material, with the exception of that designated for landfill, should be discarded as energy waste. Most packaging would not be destined for landfill. Exceptions

may be when specialised or novelty packaging utilise materials unsuitable for recycling or used as energy waste (HSY, 2014) and (TSJ, 2014).

3.4 Plastics.

Difficulty may arise adopting good waste disposal practice (Philips et al 2003, 105), especially for people who have a different background to where they now live. In the UK plastics with marks 01,02, 03, 04, 05, 06, 07 are all recyclable (BPF, 2014). The number marks refer to 01 PET, polyethylene terephthalate. 02 HDPE, high density polyethylene. 03 PVC, polyvinyl chloride. 04 LDPE, low density polyethylene. 05 PP, polypropylene. 06 PS, polystyrene. 07 Other, these may include thermoplastics, thermosets, bio-based and degradable polymers.

3.5 Need for change.

As consumer products change with time, new strategies need to be applied in how to deal with waste. In household waste the main components are plastic and paper (Ueta et al 2001, 26). In Finland there are sufficient measures in place for recycling of paper, the focus now should be on reducing the amount used. Plastic has differing types and is often used in conjunction with other materials (Braungart & McDonough 2013, 170). making reuse or recycling more demanding than other materials. Using materials with the end of use rather than end of material life should be considered when designing for production. In Cradle to Cradle and the Upcycle (Braungart & McDonough 2002, 17- 45) a need for change in design practices is highlighted. The change required should eliminate waste at the design stage and instead utilise the materials again and again for same or differing products. If waste is eliminated at the design stage, with a clear path how to use the used materials, there would be no need for reducing waste as it would not exist. If we look after the materials we use directly from the outset of design, we can ensure that what we use is healthy and safe for ourselves and the environment.

3.6 Reducing waste.

To be able to reduce household waste new approaches need to be taken (Braungart & McDonough 2002). The rubbish diet (Cannard 2008) shows that households can actively reduce the amount of waste produced if given the correct information and encouragement. The rubbish diet is set as a challenge, to reduce household waste as much as possible over an eight week period. In the first two weeks it is possible to reduce waste put in household bins by at least half. By week seven ninety-five percent reduction is achievable and in the final week it may even be possible to eliminate waste going to rubbish totally. By changing the way that they shop, choosing products for their use rather than being influenced by the packaging style and look (Braungart & McDonough 2013, 170). Opting to purchase with the final destination of packaging in mind can reduce the amount waste being put to mixed and energy waste channels (Cannard 2008). If consumer trends start to show an increase in product selection, through less packaging, manufacturers will move with market trend, enabling design with less material waste (Philips et al 2003, 105). Examples for over packaging are; Blister packs where the packaging is much larger than need be to protect the product, fruit and vegetables that has been shrink wrapped or packaged in film or bags, children toys where packaging is intended to catch the eye and by being larger than is necessary.

4. Methods

A questionnaire (appendice 1), was used to determine perceptions of material waste from household packaging. A series of questions were asked in the form of a survey created using google docs. To ensure no difficulties arose with translation of language, the target audience for responses were English speakers living in Finland. The International English Speakers Association of Finland was chosen as the target group for responses as they have over 6000 members from many different countries. Initial requirement of responses was 30 over a one week period, reviewed daily. Over twice the amount of required responses was gathered in the first 24 hours. A decision was taken at this point to close the survey.

16 questions were asked, defined by 4 groups.

Respondents background: age, residence, gender, origin.

Current practices: Where, need for change, recycling facilities

location: how we shop, local produce, reuse and recycle, export of waste

Amount: purpose of packaging, packaging on produce, amount reused, waste packaging creates.

All questions asked were multiple choice to make the survey quick and easy to fill out.

5. Results

The first four questions are intended to provide background information of the respondents. The responses are to establish factors that may influence behaviour.

Figure 1, shows the variation in age difference of respondents.

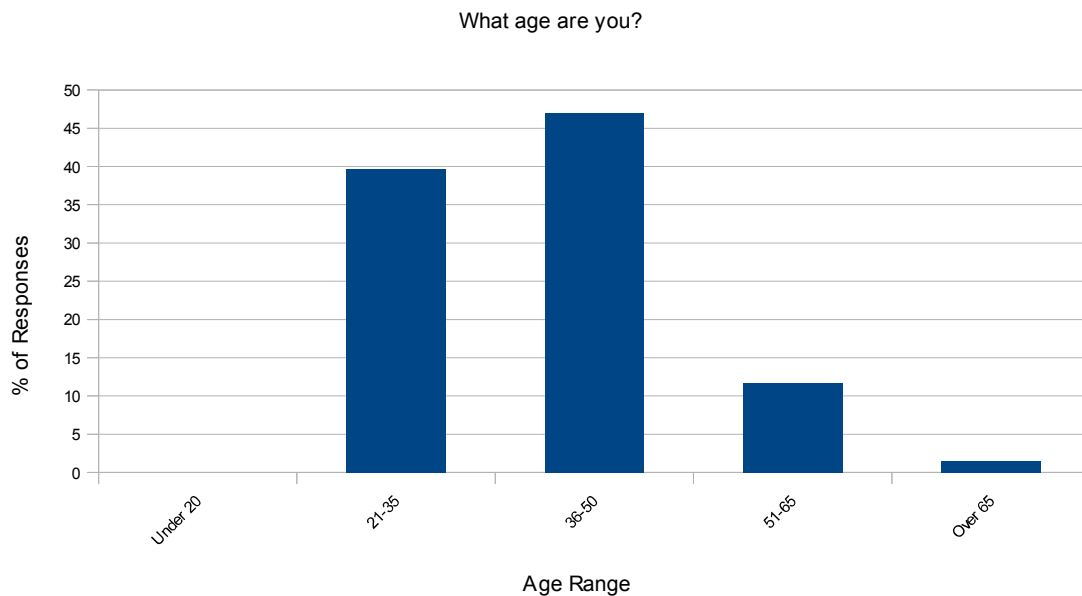


Figure 1: Age range of respondents.

From the results it was found that 47.06% of respondents were between the ages of 36 and 50, 39.71% were between the ages of 21 to 35, 11.76% between ages 51 to 65 and 1.47% over the age of 65. No respondents were under the age of 20.

Figure 2, shows a representation of the types of areas in which respondents reside.

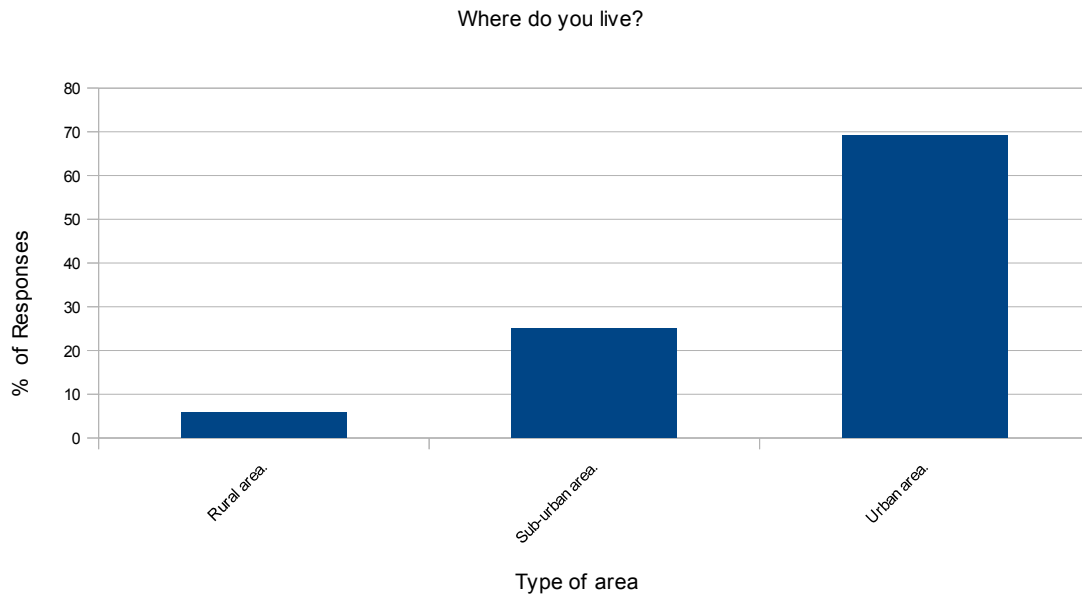


Figure 2: Type of area where respondents live.

The results show that a majority of 69.12% respondents live in urban areas. A quarter of respondents live in sub-urban areas and 5.88% live in rural areas.

Figure 3, shows the difference in gender of respondents.

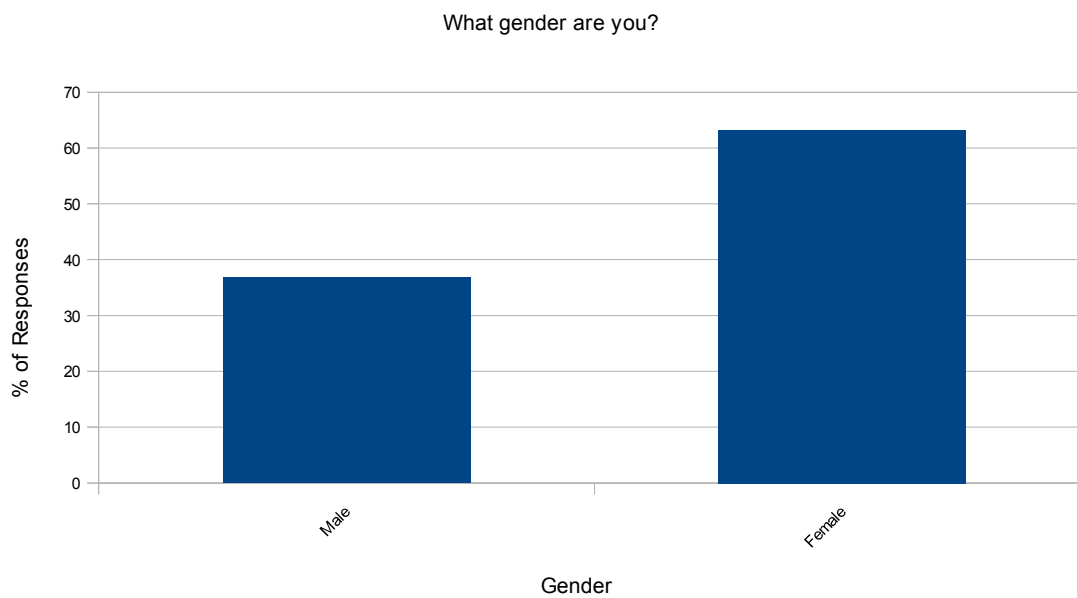


Figure 3: Gender of respondents.

Female responses at 63.24% were greater than male responses at 36.76%.

Figure 4, shows the area of origin for respondents.

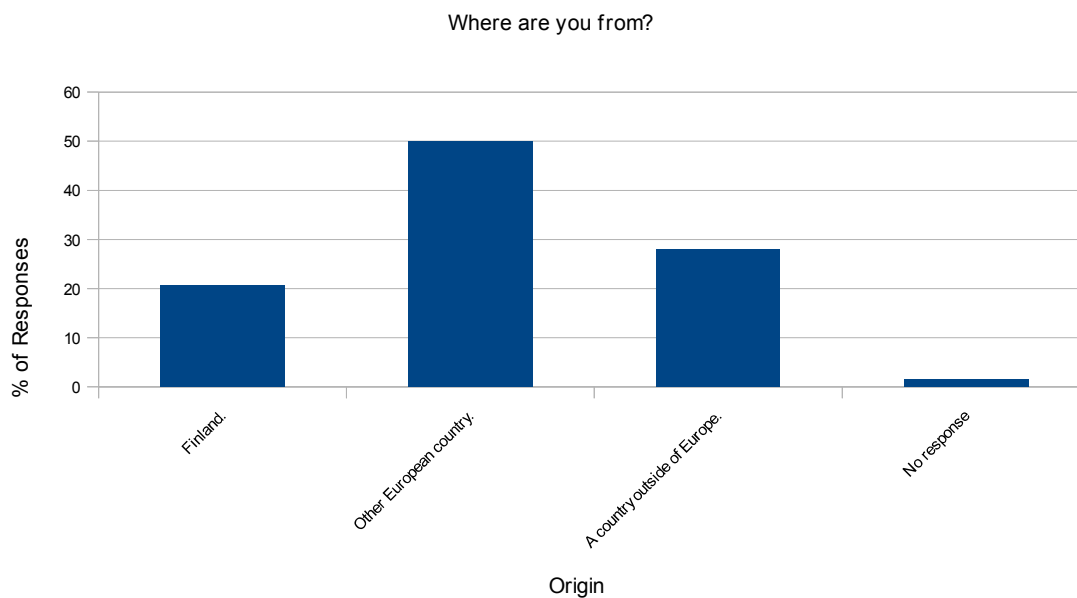


Figure 4: Origin of respondent.

Half of the respondents were from another European country other than Finland, which itself originated 20.59% of responses. Respondents originating from countries outside of Europe totalled 27.94%, with 1.47% not responding to the question.

Questions 5 to 7 relate to the current practices respondents use.

Figure 5, relates to where respondents would normally dispose of plastic packaging.

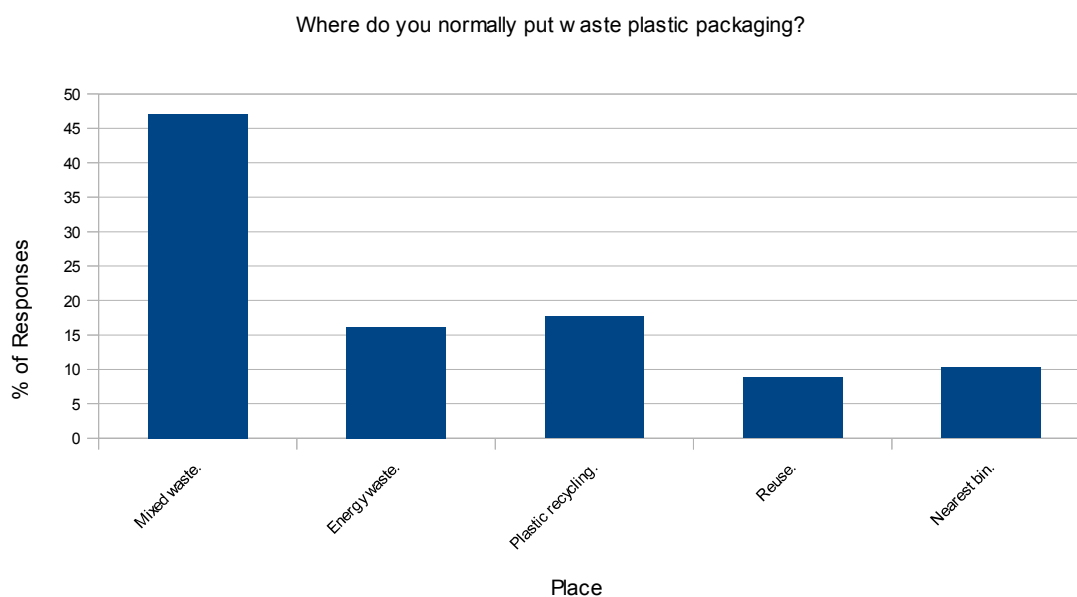


Figure 5: Where respondents dispose of plastic packaging .

The most popular place, with 47.06% of responses, to dispose of plastic waste was in mixed waste. Responses from 17.65% opted for plastic recycling, energy waste was chosen by 16.8%, nearest bin had 10.29% of responses with those choosing to reuse at 8.82%.

Figure 6, depicts respondents who are in favour, against or do not know whether reusable packaging should be used more on products.

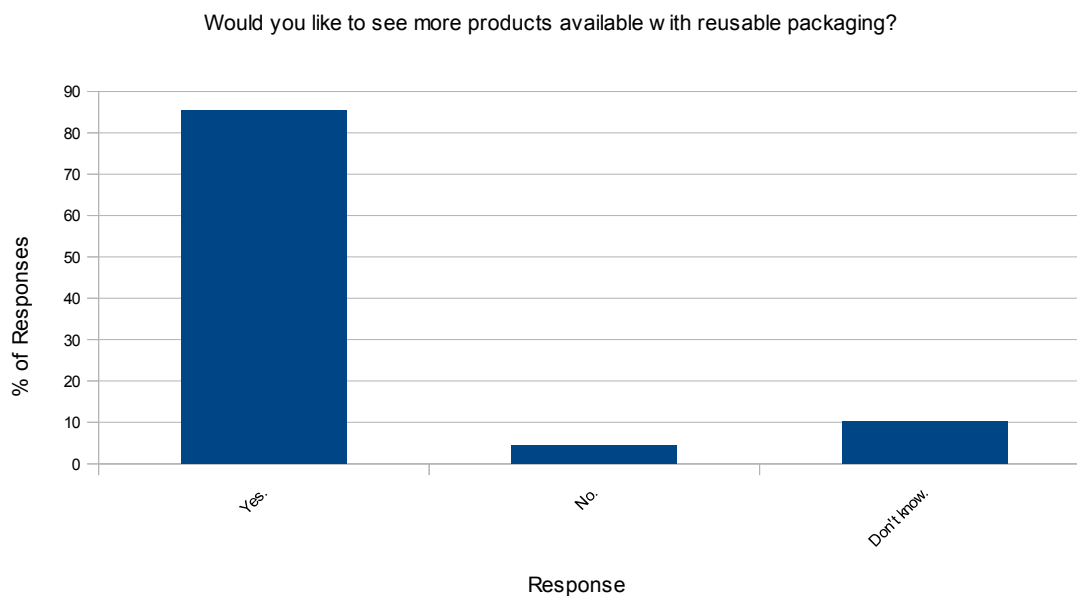


Figure 6: Need for more reusable packaging.

With 85.29%, more reusable packaging was favoured by respondents. Those who were not in favour of more reusable packaging amounted to 4.41% of responses. Those who did not know were 10.29% of respondents.

Figure 7, shows responses for whether there is adequate facilities available, or not, for recycling purposes.

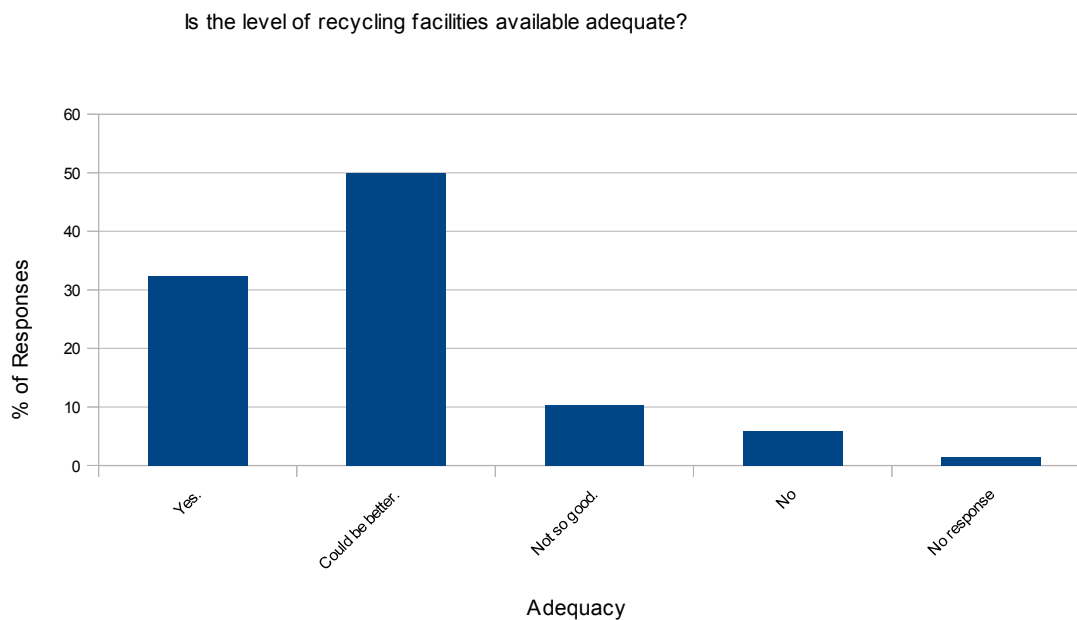


Figure 7: Adequacy of recycling facilities.

32.35% of respondents replied that the level was adequate. Half of all responses replied that it could be better, with 10.29% replying that services were not so good. Adequate facilities not being available was favoured by 5.88%. A small percentage of 1.47% did not respond to the question.

Questions 8 to 11 are based around location.

Figure 8 depicts responses to the effect the internet and online shopping has on waste produced from packaging.

Does the use of internet and online shopping have an effect on the amount of household waste from packaging?

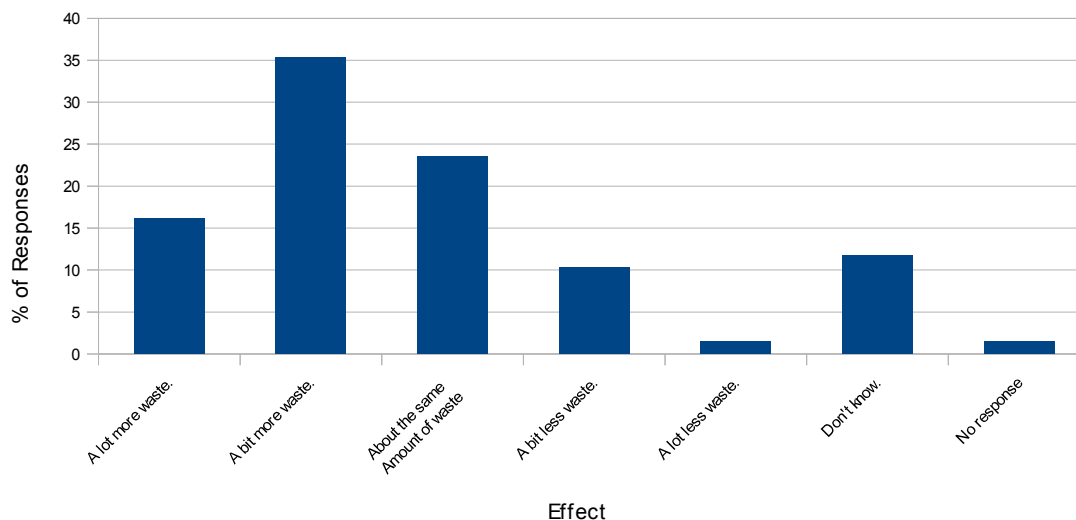


Figure 8: Effect of internet and online shopping on household waste.

More than half, 51.47%, of respondents answered that more waste was created from packaging, due to use of internet and online shopping. Responses for a bit more were 35.29%, with a lot more waste favoured by 16.18%.

Those who answered that less waste is produced accounted for 11.76% of responses. Amount of waste remaining about the same was 23.53% of responses. Answers of don't know were 11.76%, and no response to the question 1.47%.

Figure 9 shows whether people are in favour, or otherwise, of packaging for local produce also being produced locally.

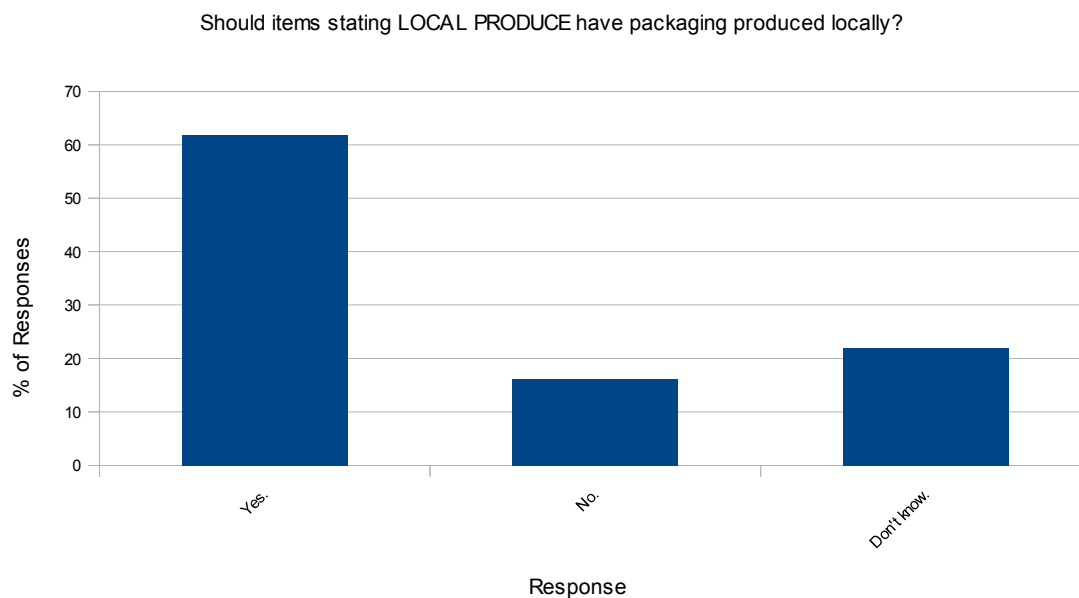


Figure 9: Packaging of local produce.

Most responses, 61.76%, were in favour of local produce having locally produced packaging. Those who answered no totalled 16.8%, while 22.06% did not know which way to answer.

Figure 10 relates to responses on where waste processing should take place..

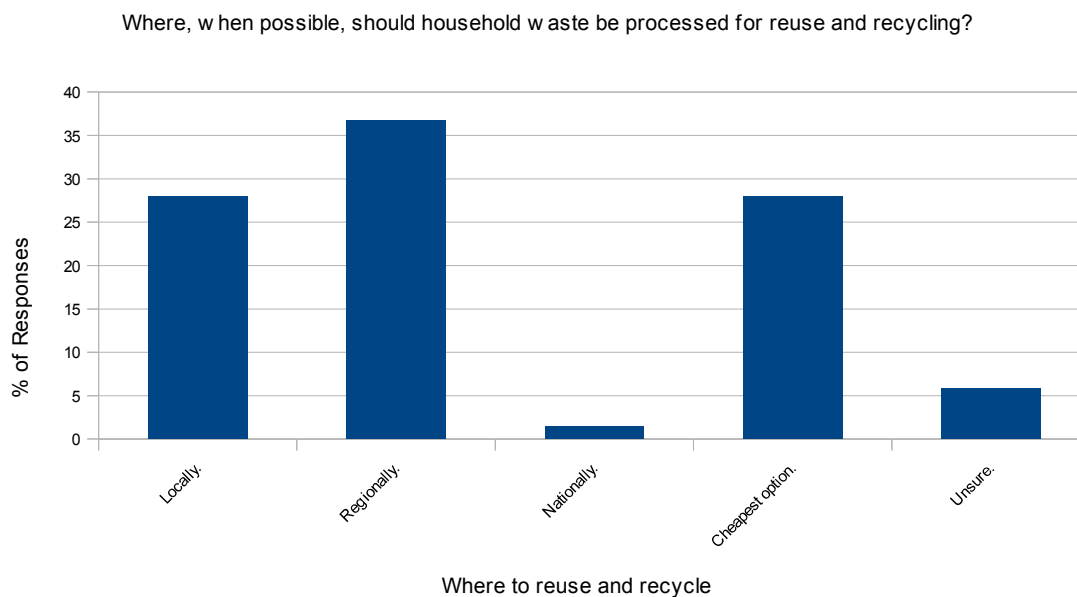


Figure 10: Where to reuse and recycle.

Regional processing was the most popular with 36.76% of responses. Locally processed and the cheapest option responses each took 27.94%. National processing was favoured by only 1.47% whilst 5.88% were unsure of where processing should be done.

Figure 11 shows responses on whether waste should be exported.

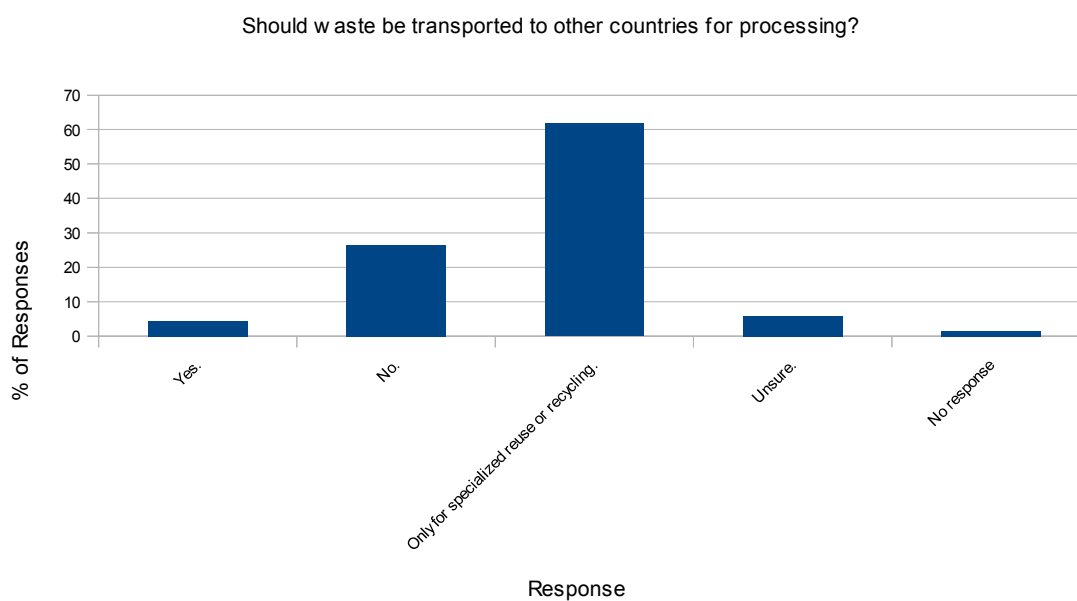


Figure 11: Export of waste.

Respondents who answered only for specialized reuse or recycling were 61.76% of all responses. Those who favoured export of waste were 4.41%, whilst those against export reached 26.47% of responses. Unsure of being in favour or not were 5.88% and 1.47% did not respond.

Questions 12 to 16 are about the amount of waste, packaging produces.

Figure 12 relates to how respondents view the role of packaging.

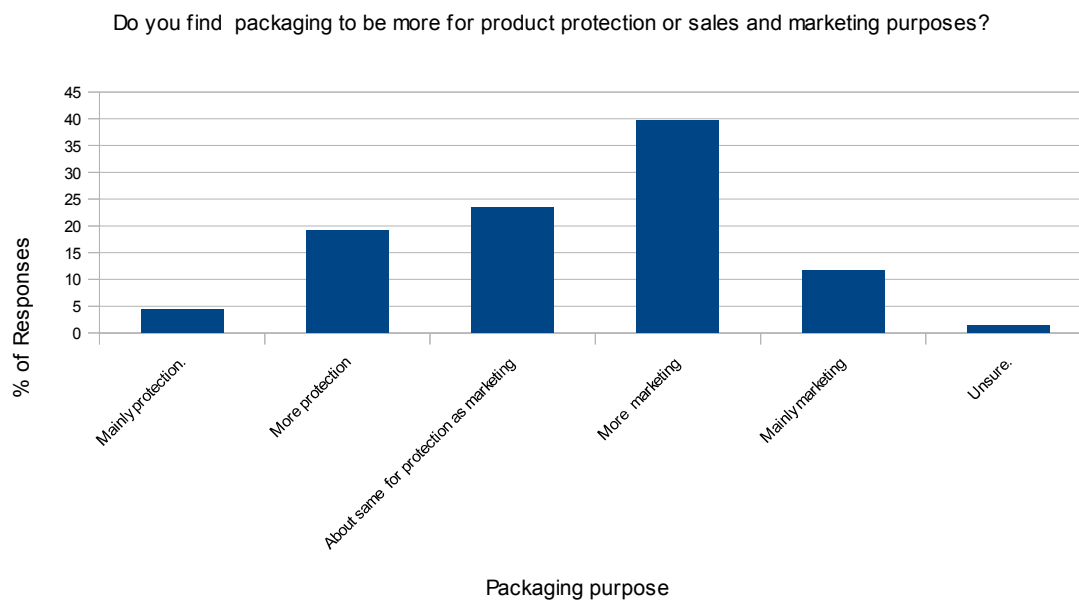


Figure 12: Purpose of packaging.

Respondents answering more for sales and marketing purpose totalled 39.71%. Those answering about same amount for protection as sales and marketing 23.53%. Both, but more for product protection 19.12%. Mainly for sales and marketing purposes 11.76%. Mainly for product protection. 4.41% and those unsure of their answer 1.47%.

Figure 13 shows respondents replies on amount of packaging on products.

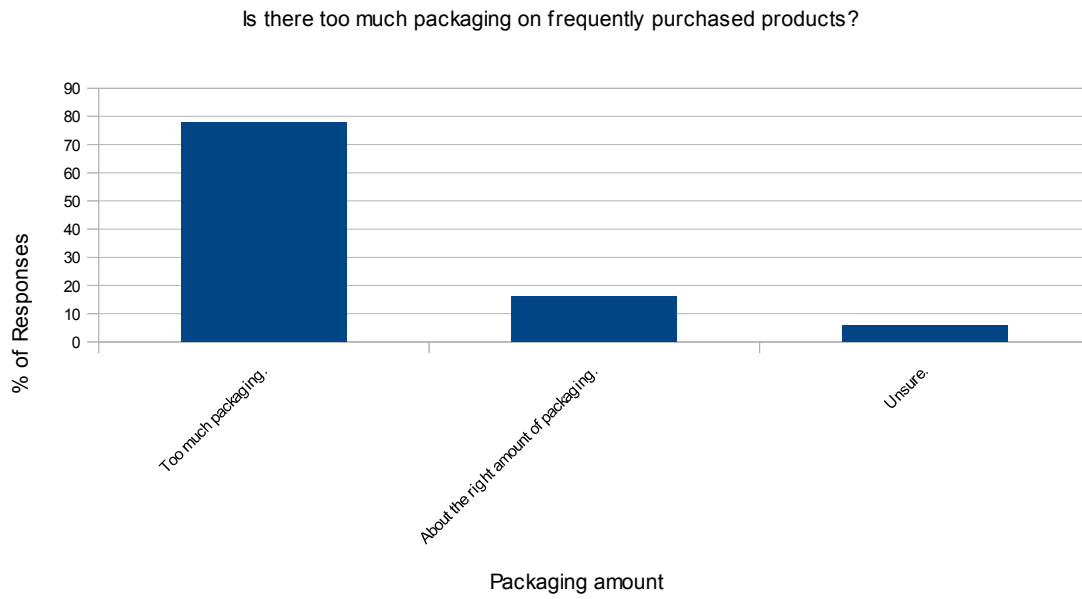


Figure 13: Level of packaging on products.

Most responses, 77.94%, were for too much packaging, whilst 16.18% opted for about the right amount of packaging. Unsure whether there is too much or too little packaging were 5.88% of respondents. No replies were given for too little packaging.

Figure 14 relates to respondents frequency of packaging reuse.

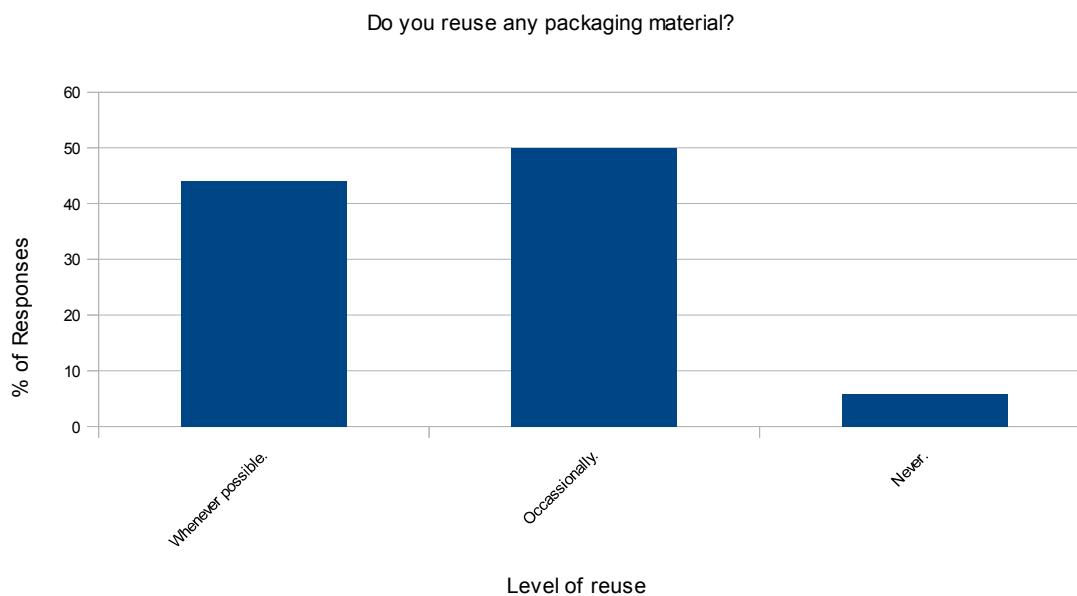


Figure 14: Frequency of packaging reuse.

Half of respondents would occasionally reuse packaging. Respondents who would reuse whenever possible were 44.12% and 5.88% never reusing packaging.

Figure 15 shows amount of respondents who think packaging is, or is not, the main contributor to household waste.

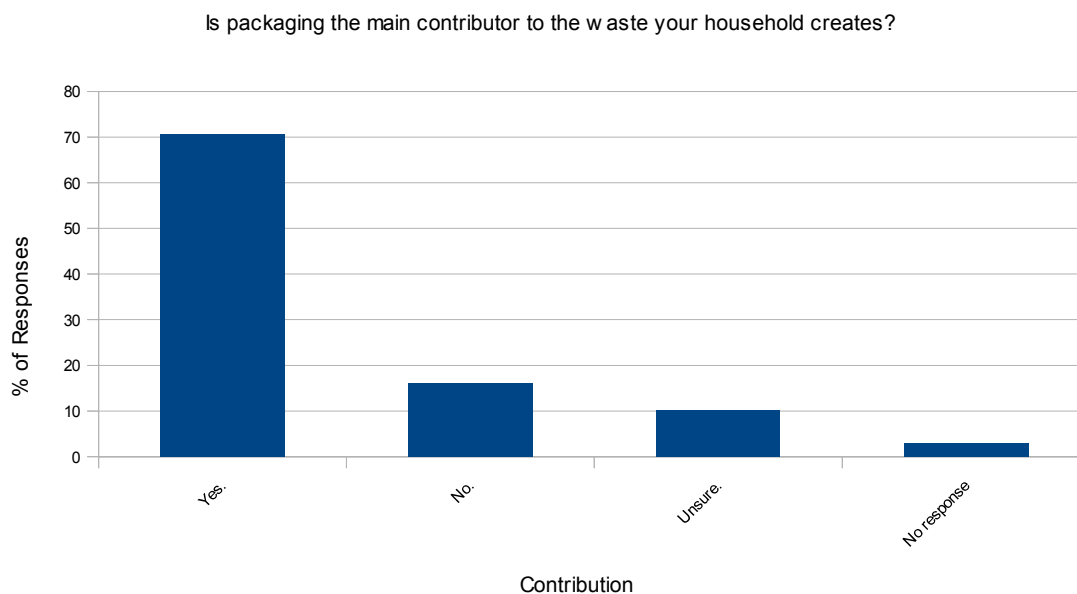


Figure 15: Contribution of packaging to household waste.

Most respondents, 70.59%, agree that packaging is the main contributor to household waste. Those who do not think it is the main contributor totalled 16.18%. Unsure of how to answer were 10.29% and 10.29% did not respond to the question.

Figure 16 relates to whether people would be willing to sort waste more.

If proper facilities and processes were available, would you be prepared to sort waste more for reuse and recycling?

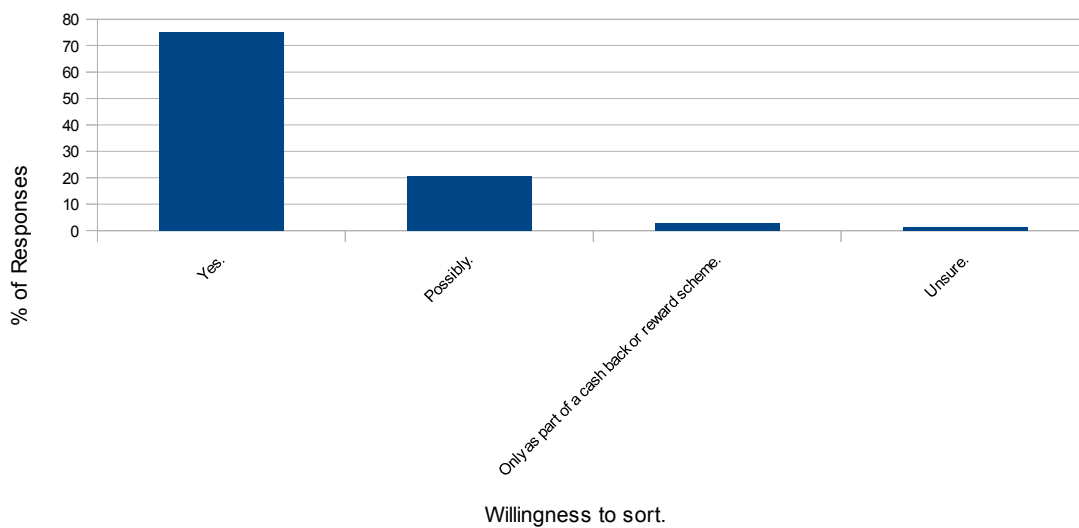


Figure 16: Willingness to sort waste more.

Three quarters of respondents would be willing to sort waste more. Those who would possibly sort waste more were 20.59% of respondents. Those who would only sort waste as part of a cash back or reward scheme were 2.94%, whilst no respondents would not be prepared to sort more. Those unsure of how to answer amounted to 1.47%.

6. Findings

There is a lack of reusable packaging and a need for better recycling facilities. This has kept the amount of plastic packaging being destroyed by incineration or placement in landfill at a higher than needed level.

- There is a lack of reusable packaging and a need for better recycling facilities
- Producing packaging locally is desirable for local produce.
- Reuse and recycling should be done at the cheapest option locally or regionally.
- Waste should not be exported, except in specialized cases.
- Packaging is not regarded as being solely for product protection, but more for sales and marketing purposes.
- There is too much packaging.
- People will reuse packaging material if easily possible.
- Most household waste is considered to be created by packaging.
- People would use recycling facilities if they were available.

7. Discussion

At present households discard a lot of waste from product packaging (Braungart & McDonough 2013, 170). This waste is reused, recycled, landfilled or destroyed by incineration.

A product may have passed its life-cycle but the materials it is composed of should be designed for further use. In normal day to day purchases common materials used are plastics, glass, cardboard, and paper. Cardboard and paper have good levels of irreconcilability, with acceptable levels of facilities for people to use. This said, if the materials are mixed with other materials during package production the recycle process can be more complex and costly (Braungart & McDonough 2013, 14-15). An understanding of material worth and attributes in production could see better levels of reuse and recycling.

Plastic comes in various types, each requiring its own type of treatment in the waste management system. The use of plastic bags has for some time been questioned. Reusable bags have been encouraged and a fee charged for plastic bags in a bid to curb their use, but still people choose to use them if they are their. One solution would be to not offer the choice. "We keep being told carrier bags are polluting the seas, but if they're wrecking the planet why not stop making them altogether? Charging customers 5p for them isn't sorting the problem out, it's just making someone somewhere some money." (Pilkington 2013, 182). Bins for energy waste or mixed waste are most commonly used for disposal of plastic packaging, the majority of this material is put beyond further use. A move towards reusable and recyclable material use would help bring waste levels down. As the waste diet has shown, it is possible to bring waste levels down to almost zero (Cannard 2008).

The main purpose of packaging is product protection. Secondary use of packaging is that of advertising, marketing and sales promotion "You can't go anywhere or do anything without being told what you need in your life and how much better it will be if you buy or do the thing they are selling." (Pilkington 2013, 283). When a product has to compete with other brands or products, there is more incentive to increase packaging for use in attracting customers (Braungart & McDonough, (2002) 172-173). More packaging means more waste if the main purpose has changed from protection to being sales driven. In supermarkets it is possible to see Finnish produced vegetables covered in shrink wrap

plastic sitting next to the same type of vegetable that has been imported the main reason being to promote Finnish produce.

Packaging in general tends to be of single use, once it has served its purpose it is generally discarded (Braungart & McDonough 2013, 170). A choice is made by each individual as to how they will deal with material once its role as packaging is over. The way in which we discard our waste packaging is determined by the types of facilities available. In general people are willing to use the recycling facilities that are available and would be prepared to recycle further if the amenities for doing so were available. When a person knows that it is possible to reuse or recycle in a certain way that is of benefit to the environment.

The findings of the questionnaire raise some interesting points to be explored.

There is a lack of reusable packaging and a need for better recycling facilities, whilst people would use recycling facilities if they were available. Should we be focussing more and creating legislation that would provide better facilities. Much plastic used in packaging is capable of being recycled and people should be able to reuse or recycle. As it stands at the moment a lot of plastic packaging is incinerated as energy waste. Although new facilities may appear expensive, it may prove to be financially beneficial in the long term. If we consider what cost to the environment non provision of available reuse and recycling technologies would be, especially since the waste management hierarchy is based on environmental issues.

Reuse and recycling should be done at the cheapest option locally or regionally. When considering placement and type of facilities to be provided financial restrictions would factor heavily on decisions to be made. Costs may be kept down by decreasing the amount of transportation involved in the recycling process. By keeping collection, sorting, and recycling at local and regional levels the understanding and benefits of these processes may prove easier for people to relate to.

Producing packaging locally is desirable for local produce. As with providing food that is sourced locally and provision of jobs within the communities that people live, the local manufacture of packaging brings positive benefits for local economy. Less need for haulage and transportation of materials will also benefit the local environment.

Waste should not be exported, except in specialized cases. Some materials, by exporting to specialised facilities, could be more cost effective and better for the environment, if creating specialised facilities in Finland would be unrealistic. If it is possible for waste material to be processed in Finland then it should be. Exporting waste for reasons that put materials beyond use, such as incineration, should not be considered as an alternative to processes available in Finland.

Packaging is not regarded as being solely for product protection, but more for sales and marketing purposes. This can lead to there being too much packaging. Excess packaging leads to excess waste. Packaging should be mainly functional with marketing and branding held within the constraints of necessary packaging.

Most household waste is considered to be created by packaging. People will reuse packaging material if easily possible. Without any further use packaging is discarded as waste. If there is a possibility to return or recycle depository available for use, it would most likely be utilised. The return of plastic and glass bottles and aluminium drinks cans, works well maybe because there is a deposit to be returned. Whereas cartons and cardboard, non refundable packaging glass, and non refundable packaging metal function well at recycle points and centres.

8. Conclusion

In general people would like to see a reduction in household waste. Less packaging for sales purposes and more reusable and recyclable packaging would be desirable.

A change in the way that people think about what they use and purchase in relation to the impact of waste on the environment could result in lower levels of material entering waste management systems.

Design, production, marketing, retailing and waste management, require new ways of thinking in order to solve the problem of waste from packaging. Focus should be taken off of waste and more on positives of reduction and recycling. In terms of packaging, waste should not be seen as an option. All parties involved in processes from production to end of use need to agree on a time frame and strategy for eliminating the destruction of materials used in packaging. Possible steps could be to initially put clear labels, markers or notices on all materials used in packaging, with details of exactly how and where to reuse or recycle. Materials that are not currently recyclable should be clearly marked as such, with a time frame set for discontinuation of those materials within the industry.

Facilities for processing all packaging materials after use should be set in place. Such facilities should meet the needs and concerns that people have for the environment. Where recycling facilities seem too costly, a phasing out of the material in question should be put in place, with responsible replacement put in place.

By changing things to help the environment, it would be possible to eliminate packaging materials from being solely single use and reduce the amount of waste our society has to deal with.

9. Bibliography

- Braungart, M. & McDonough, W. (2002). *Cradle to cradle: Remaking the way we make things*. New York: North Point Press.
- Braungart, M. & McDonough, W. (2013). *The Upcycle: Beyond sustainability- designing for abundance*. New York: North Point Press.
- British Plastics Federation. (2014). *Plastics recycling*.
http://www.bpf.co.uk/sustainability/plastics_recycling.aspx (retrieved: 10.11.2014).
- Cannard, K. (2008). *The Rubbish Diet: The slimming club for bins*. The Rubbish Diet.
<http://www.therubbishdiet.co.uk> (retrieved: 05.04.2014).
- Date, W. (2014). *Majority favour higher EU recycling targets*. Letsrecycle.com.
<http://www.letsrecycle.com/news/latest-news/legislation/majority-favour-higher-eu-recycling-targets> (retrieved: 15.04.2014).
- European Commission. (2008). *Directive 2008/98/EC of The European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives*. Official Journal of the European Union.
- HSY. (2014). *recycling and waste sorting*.
https://www.hsy.fi/en/wastemanagement/recycling_and_waste_sorting/Pages/default.aspx (retrieved: 05.11.2014).
- Hogg, D., Vergunst, T. & Elliot, L. (2013). *Targets Review Project: Consultation on the European Waste Management Targets*. Bristol: Eunomia Research & Consulting Ltd.
- Kim, I.C. (2002). Korea's policy instruments for waste minimization. *Journal of Material Cycles and Waste Management*, 4, 12-22.
- Philips, P.S., Clarkson, P., Adams, J., Read, A.D. & Coggins, P.C. (2003). County waste minimization programmes: a case study from Northamptonshire. *Sustainable Development*, 11, 103-118.
- Pilkington, K. (2013). *The Moaning of Life: The worldly wisdom of Karl Pilkington*. Edinburgh: Canongate Books Ltd.
- Sakai, S., Yoshida, H., Hirai, Y., Asari, M., Takigami, H., Takahashi, S., Tomoda, K., Peeler, M.V., Wejchert, J., Schmid-Unterseh, T., Douvan, A.R., Hathaway, R., Hylander,

L.D., Fischer, C., Oh, G.J., Jinhui, L. & Chi, N.K. (2011). International comparative study of 3R and waste management policy developments. *Journal of Material Cycles and Waste Management*, 13, 86-102.

The Scottish Government, (2010). *Scotland's Zero Waste Plan*. Edinburgh: RR Donnelley.

TSJ. (2014). *sorting guidelines*. <http://www.tsj.fi/en/sorting-guidelines/> (retrieved: 12.11.2014).

Ueta, K. & Koizumi, H. (2001). Reducing waste: Japan learns from Germany. *Environment*, 43, 20-32.

Ympäristöministeriö. (2009). *Towards a recycling Society: The National Waste Plan for 2016*. The Finnish Environment 14. Ympäristöministeriö: Helsinki.

Appendice 1: Household Waste

Please answer the following multiple choice questions and submit your answers at the end. Thank you for your participation.

1. What age are you?

- Under 20.
- 20 – 35.
- 36 – 50.
- 51- 65.
- Over 65.

2. Where do you live?

- Urban area.
- Sub-urban area.
- Rural area.

3. What gender are you?

- Male.
- Female.
- Other.

4. Where are you from?

- Finland.
- Other European country.
- A country outside of Europe.

5. Where do you normally put waste plastic packaging?

- Mixed waste.
- Energy waste.
- Plastic recycling.
- Reuse.
- Nearest bin.
- Other.
- Not sure.

6. Would you like to see more products available with reusable packaging?

- Yes.
- No.
- Don't know.

7. Is the level of recycling facilities available adequate?

- Yes.
- Could be better.
- Not so good.
- No.
- Unsure.

8. Does the use of internet and online shopping have an effect on the amount of household waste from packaging?

- A lot more waste.
- A bit more waste.
- About the same amount of waste
- A bit less waste.
- A lot less waste.
- Don't know.

9. Should items stating LOCAL PRODUCE have packaging produced locally?

- Yes.
- No.
- Don't know.

10. Where, when possible, should household waste be processed for reuse and recycling?

- Locally.
- Regionally.
- Nationally.
- Cheapest option.
- Unsure.

11. Should waste be transported to other countries for processing?

- Yes.
- No.
- Only for specialized reuse or recycling.
- Unsure.

12. Do you find packaging to be more for product protection or sales and marketing purposes?

- Mainly for product protection.
- Both, but more for product protection.
- About same amount for protection as sales and marketing.
- More for sales and marketing purpose.
- Mainly for sales and marketing purposes.
- Unsure.

13. Is there too much packaging on frequently purchased products?

- Too much packaging.
- About the right amount of packaging.
- Too little packaging.
- Unsure.

14. Do you reuse any packaging material?

- Whenever possible.
- Occasionally.
- Never.
- Unsure.

15. Is packaging the main contributor to the waste your household creates?

- Yes.
- No.
- Unsure.

16. If proper facilities and processes were available, would you be prepared to sort waste more for reuse and recycling?

- Yes.
- Possibly.
- Only as part of a cash back or reward scheme.
- No.
- Unsure.