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Food waste Management: Role of Housewives in enhancing Profitability, Sustainability and Environment Conservation – A Survey in Surat

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Abstract

FAO has defined the term 'food loss' as "the reduction in eatable food at different stages of food chain either intentionally or unintentionally" whereas the term 'food waste' as "the reject of eatable foods at vender and buyerstages." (FAO, 2017). Food waste is quite challenging and concerning topic. As per the reports of FAO, one third of eatable food is wasted in underprivileged nations which leads to the loss of revenue as well as harmful for the environment. A report published in Scotland clearly specify that "Food waste is a more dangerous for environment then plastics, as it produces huge amount of methane after dumping as per the report". Research is done to find out suitable method of reducing food waste/loss to conserve environment, to enhance profitability and sustainability by reducing food waste/loss, to enhance the contribution of housewives in minimizing food waste. Hypothesis claims that there is a significant relation between food wastage/loss and environment conservation, there is a significant relation in enhancing profitability and sustainability and reduction of food waste, there is no significant relation between food waste and housewives. A well-structured questionnaire was circulated among the housewives of Surat and their opinion is collected on a sample size of 45 through Random Sampling method and finally it is concluded on the basis of their feedback received through questionnaire, which recommends Food Bank concept, strict law on food wastage, food sharing model and awareness about the concerns of food waste dumping can be more helpful in saving food.

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I. Introduction

Discarded or lost food can be termed as food waste.Wasted or lost food can be found on various stage of manufacturing i.e. production, processing, retailing and consuming.Globally it is accountedbetween 1/3rd[1] and 1/2[2] of the producedfoodstuff. Food wastage/loss also found at various phases of vendor management. Countries likeBurundi, Afghanistan, Gambia, Ethiopia, food losses mainly occurs at primary stage i.e. production, while in industrializednations most of the food wastage found at the eating stage which is nearly 100 Kg/person/ per year.[3]As per CSR Journal 2019, there are four stages where food islost or wasted, reduction on wastage is only possible when their contribution on wastage if it is closely monitored. Developing countries like India which is 2nd most populous country here wastage found at every stage; from harvesting, shipping, handling, packing and consuming.As per food waste definition, it is not defined which type of wastage it comes under.[4]Wasted food either can be dumped or can be reusedor can be recycled for other purposes.[5]As per UN, decrease in quality or quantity of food is termed as food loss.

As per the definition given by European Union of food waste"edible thing either raw or cooked, which is thrown or intended/forced to be thrown in a dustbin" till 2000 when the old commanding

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directives was revoked by Directive 2008/98/EC, which has no precisedescription of food waste.The commandingdirectives, 75/442/EEC, comprising this description was amended in 1991 (91/156) with the addition of "categories of waste" and the exclusion of any reference to nationwide law.The United States Environmental Protection Agency defines food waste for the United States as "uneaten food and food preparation wastes from residences and commercial establishments such as grocery stores, restaurants, and produce stands, institutional cafeterias and kitchens, and industrial sources like cafeteria". According to the Natural Resources Defense Council, Americans throw away up to 40% of food that is safe to eat. [6]The definitions by the United Nations, United States and European Union definitions of food waste came under scanner for including food that goes to nonfood productive use. After mapping these definitions, two reasons of food waste verified: "Firstly, if recovered food is used as an input, such as animal feed, fertilizer, or biomass to produce output, then by description it is not wasted. But when it is said about financial losses, if the average asking price in the alternative is lower than the recovered food. Secondly, as per the definition of food waste, tracking of food loss on various phase of supply chain management, its share and their movements to nonfood alternatives."[4]

India is 2nd most populous country after China is known for their food throwing attitude which is calculated as much as United Kingdom consumes. Justification of above statement can be cross verified from streets, dustbins, food dumping location which is an alarming issue for any developing countries. Catering establishments like restaurants, banquet,canteens, and households waste a lot of food. As per United Nations Development Programme, India contributes up to 40% of produced food is wasted. Contribution of India in wheat production is about 21 million tonneswhich is wasted every yearand India also contributes 50% of all food across the world wasted where a huge Indian population sleeps hungry. In fact, as per the agriculture ministry, INR 50,000 crores worth of food produced is wasted every year in the country.[1]

India, where show off is also one of the reason of heavy food waste, especially in last year's there is a drastic change in food waste awareness where everyone is trying to reduce wastage as much as they can but still a long way to go. Excess of food either thrown in a dustbin then go to landfill or some establishments adopts "Share for Charity" model. Especially hotels employed Food and beverage controller who keeps control over wastage and also keep eye on every pieces of food to justify the concept of a penny saved is a penny earned. Millions of Indians go to sleep on an empty stomach, where food waste cost a giganticRs 58,000 crore every year — which is 7% of its total food production. India is the second largest producer of vegetables and fruit but 25% to 30% of it is wasted due to inadequate logistical support, lack of refrigerated storage, supply chain bottlenecks, poor transport and underdeveloped marketing channels. The Food and Agriculture Organisation (FAO) puts this figure at around 405 — cost around $8.3 billion (Moin, 2017).

Food is lost at several stages of supply chain, some of them are as follows -

1.1 **Production:**

As there are several stages of food loss, it starts from farmers who cultivates food, where some of it is wasted due to unavoidable circumstances like environment, rodents, insects etc. which is very difficult to control but can be reduced with advanced technologies and awareness. Avoidable food waste circumstances can be achieved by educating farmers, providing proper equipment, andproper irrigation facility and forecasting about

[1]https://thecsrjournal.in/food-wastage-in-india-a-serious-concern/

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weather conditions. Consumer households need to be informed and change the behavior which causes the current high levels of food waste (Jenny et al, 2011).[7]

1.2 Processing:

According to the Associated Chambers of Commerce, India is facing Rs 2 lakh crore loss ever year due to lack of handling units and storingservices. Cold store improvement can be very fruitful and helpful in reducing post-harvest food. Post harvesting loss is quite tough to estimate but amount of food waste loss involved is quite difficult to estimate.Food Safety Regulations (FSR) are able to privilege foods which challengecriteria before they are transported to marketplaces[8]. Food waste can also be used in animal feed but consumer who eats that animals their safety must have to be taken into consideration. Through healthy animal food, healthy meat items can be obtained which cannot cause health hazards.

1.3 Retailer:

By keeping FIFO (First In& First Out) and LIFO (Last In & First Out) principle in mind food waste can be reduced. In 2013 the non-profit NRDC[2]in their study suggested that one of the major cause for food loss is due to dilemma over food expiration dates, better output, and better to use. It creates lots of confusion among the consumers about those products and finally it is considered unsafe to use which resulted into loss.There should be clear instructions regarding till when it is safe to use and till when it will give best result which will also help the consumer to understand the usage of aforesaid product.

1.4 Consumption:

Finally a stage comes where maximum food waste occurs i.e. consumption. Due to strict norms and keeping the safety of consumer is mind, once the food is prepared its life started to reduce and if not consumed on particular time it can turn into harmful/poisonous thing. Highly perishable food products should always be consumed as fast as they are prepared because it has a very short self-life. Proper storage and handling can increase the self-life of prepared products.

II. Causes of food wastage/loss –

As discussed earlier, food is mainly wasted during those four stages like production, processing, retailing and consumption mainly but there are also some factors responsible for food spoilage/wastage, they are as follows -

2.1 Demand fluctuation: miscalculation or catastrophe forecastingand poor ordering system, cyclicalrequirements (sluggish supplyfor a small period of time or vacation slot), proper advertising and impreciseadvertisingcalculations, venderfacilitynearsupplies, itemsleft after closing (perishablefoodstuffs), forecastingbooboos;

2.2 Unexpected/impulsiveoccasions: unduemanufacture for tackling impulsiveoccasions like unexpectedweathervariations or rats/mice/cockroachesassaults, reminiscence (occasional but it has very high influence), marketplaceinstability (due to climatevariation), vender that hand-me-downdistributions;

2.3 Carriage/Packing mistakes: indemnities in carriage, not handling food with care, pitiable quality packing of food can may reasonminor dents or pitiable only on the packing, packing/taggingslipups, valuing errors;

2.4 Eminencecriteria: surplus and eminence criteria, minimum eminence criteria decided by administrativeguidelineswhich includecarefulgathering of fruits and vegetables (Segrè and Falasconi, 2011)[9] ;

2.5 Manufacturing: manufacturing flaws, unable to reuse the byproducts from food processing (Buzby and Hyman, 2012)[10];

[2] NRDC – Natural Resources Defense Council

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2.6 Short Life: Specially highly perishable products like meats, dairy, tofu which have very short self-life needs to be handled carefully (Sertet al., 2016)[11];

2.7 Purchase cycle coordination: Purchase cycle should have proper coordination with all the actors and should be handled/tackled carefully, (Stevenson and Khan, 2013)[12];

2.8 Finally, demand and supply principle of economics also responsible for food loss/wastage. When supply becomes greater than demand then producers find its very difficult to send their products in the market as sometimes they find themselves unable to attain production cost even therefore they left their product in the field and let it for loss to keep themselves away from extra loss.(Segrè and Falasconi, 2011)[9].

III. Review of literature –

Bortoleto et al., (2012), study reveals that continuous increase in food waste generation is due to inadequate involvement of individuals in household waste behavior attitude.Beretta et al. (2013), states thatdue to food waste roughly one third of the edible calories produced for Swiss consumption are lost in food value chain which indicates that reducing food waste can increase calorie efficiency and reduce its harmful impact on environment.Giuseppe et al. (2014), study reveals the ideal conditions which ensures the affordability of the food retrievalpolicy including the participation of government in the form of tax reliefs and cost saving for the vender can turn very beneficial if strong system is put into effect. Parizeau et al. (2015), this study indicatesthat there is manifoldconnections between food waste generation and household buying behaviour, food production activities, household waste controlling practices, and food-associatedapproaches, philosophies, and standard of living. Notably, it was observed that food awareness, waste responsiveness, family standard of living, and convenience standard of living were related to food waste production. Finally concluded that it is important to understand the diversity of factors that can influence food wasting behaviours at the household level in order to design waste management systems and policies to reduce food waste.Silvennoinen et al. (2015), this study suggestsdifferent ways of producing food and their utility and their consumption along with the changing eating behaviours of European people to keep track over supply chain.Always keep the alternative opened about the food which is produced in abundance mainly during functions like either to give it needy people, day care centres, old age homes. Not a grain of prepared food should go in dustbin mission can really help in its wastage.Michelini et al. (2018), study recommends about the model where extra food can be utilized in a three categories model, they are – "Sharing for needy" where extra prepared food should be immediately given to non-government organisations (NGO). "Sharing for revenue generation" where extra or abundant food can be given to animal farming where some revenue can exchanged against it. "Sharing to Consumers" where extra or abundance food can be given to staff, hungry people so that it could be consumed and will not go in dustbin.Scherhaufer et al. (2018), the study is based on latest food waste data from which type of food and their contribution in total food wastage is monitored. It was found that most of the food waste emerged during production stage which underlines that by reducing the amount of food production, their wastage can also be reduced. Produce or prepare only that much, whatever is required which is considered as best way of food waste reduction.Thamagasorn et al. (2019), study states about the composition of food where vegetable contributes 47.58 of total food waste production which is further explanation of research which was done by Henningsson et al. (2004), where mainly perishable food products like fruits, vegetables and salads emerged as main contributors of food waste. It contributes 40 to

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50%of food waste, researchers also identified food waste hotspots through quantifiable run investigation which allows caterers/hospitality establish to give more attention to food which contributes more in waste generation. After analyzing the type of wastage component, then it can easily be quantified that how much amount of food can go in wastage and how it can be properly utilised and maximize profit. Sindhu et al. (2019),this study explains about the limitations in terms of technology where food waste can be converted into value added products and their advantages. With the advancement of technology food and kitchen waste can be turn into environment friendly value added products but due to varied nature of waste it is very difficult. Researchers also recommended about the further research on this to come in reach of everyone where revenue or economy should not be emerged as its hindrance. Ribeiro et al. (2019), this study explains about the food waste reduction strategy where food is once marked as waste through Raven model then either it can again be sold in the market by giving 50% discount. Raven wasted food demarcation does not mean it is no longer to use but now started losing its actual taste. By reducing price or distributing it among their clients and co-op members or if remain uncollected then it can be collected for decomposing and farmers can be benefitted from it.Herpen et al. (2019),researchers used nine colour coding techniques where photographs are used to denote or categorize food waste on the basis of its contribution, their concentration, container which is used to collect waste and their category. Comparative analysis is done on the basis of colour coding techniques which gives the estimated weight of food waste and then finally matched up with actual food waste. Coders really able to quantify the food waste and later on it can be reduced to small quantity.Kennard (2019),this study explains the largest barrier to eliminating food loss and waste is the corporate control of the global food system. Within this globalized, neoliberal political economy, waste brings profit and power; whether from corporations encouraging unnecessary and unhealthy overconsumption through marketing campaigns or the governments of the developed world encouraging overproduction of food commodities to use as a mechanism of control through food aid, the global food system relies on creating and profiting from waste. Thus, to truly put an end to food waste, citizens of the world must organize to reshape and rebuild local and global food systems in a way that builds food sovereignty, respects nature, nurtures health and well-being of people, and ensures the right to food for all people in a sustainable and resilient manner.

IV. Research Gap-

More research is required to understand and solve the problem of food losses. This should not prevent us from taking immediate measures to avoid food losses which has already prevailed now. For example, even without a more detailed environmental assessment, it is clear that waste in the households is highly relevant and often unnecessary and, thus, should be reduced. It is also found that there are so many methods of food waste reductions are implemented in different countries. Especially in smaller countries like Scotland – Zero waste model has applied, France has also implemented zero waste law. Being a huge and very populous country after China, it's quite difficult to work on it. But it can be started from a state or even city like Surat whose business model is very famous around the world.

V. Objective of study –

5.1 To find out suitable method of reducing food waste/loss to conserve environment.

5.2 To enhance profitability and sustainability by reducing food waste/loss

5.3 To enhances the role of housewives in reducing food waste

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VI. Hypothesis

6.1 H1A1 – There is a significant relation between food wastage/loss and environment conservation

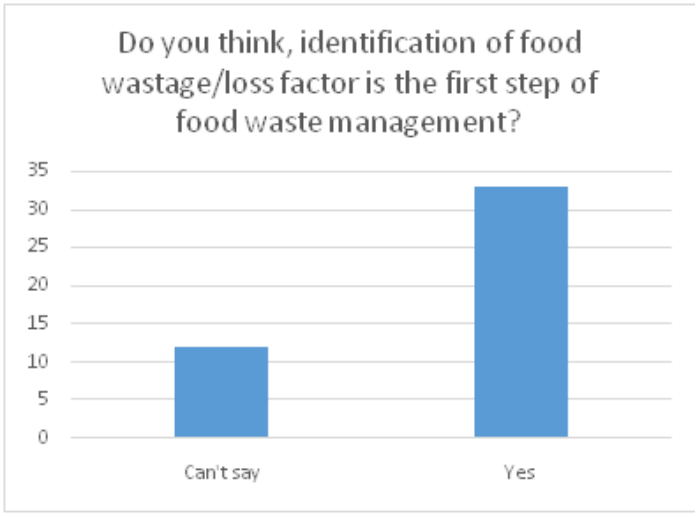
6.2 H2A2 – There is a significant relation in enhancing profitability and sustainability and reduction of food waste

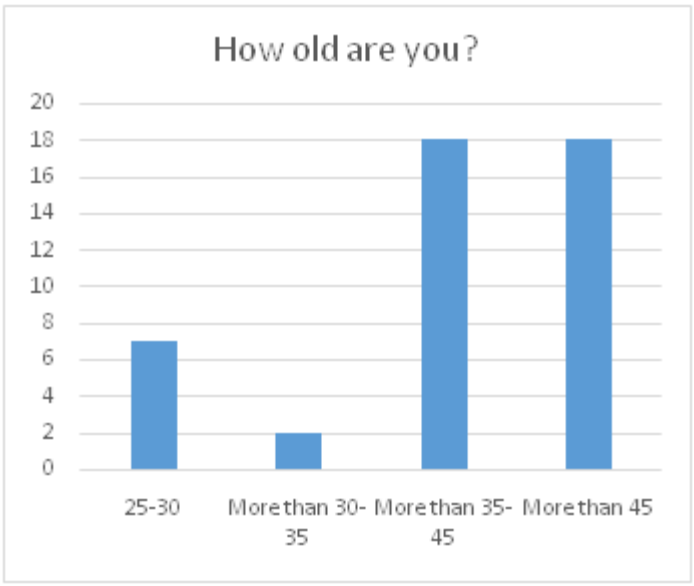
6.3 H3A3 – There is no significant relation between food waste and housewives

VII. Research methodology –

Survey method is adopted to conduct this research on the respondents of Surat where random selection of sample is taken and finally respondents reply is analyzed. Then every reply is tabulated and where ever maximum reply is received, it is assumed/perceived that it is expected and can be helpful in finding the desired result. Questionnaire is designed by keeping objective of the research in mind and also the gap which was found after doing the literature review. Literature review recommendation also helped in deriving the objective of the research and designing hypothesis.

VIII. Findings





By keeping above mentioned objectives in mind, below mentioned questionnaire was designed and circulated among the respondents of Surat. This survey was done on the age group of 25 to more than 45 years of age group. Maximum participation came from the age group of more than 35, which shows that most of the respondents are very well versed with household activities and their concern about food is quite genuine.

Most of the respondents believe that that they know the difference between food loss and food waste, whereas some of them still believes that these are same. Food loss is the primary stage of food waste, food loss is mainly caused due to unintentional reason which can be avoided. Whereas food waste can be easily avoided and minimized if necessary steps can be taken.

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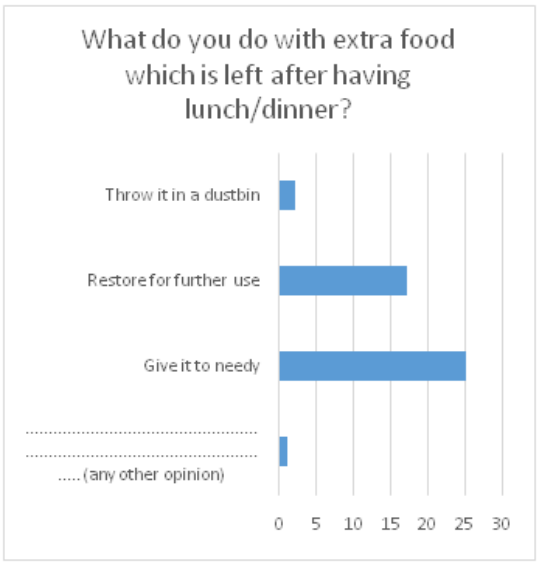
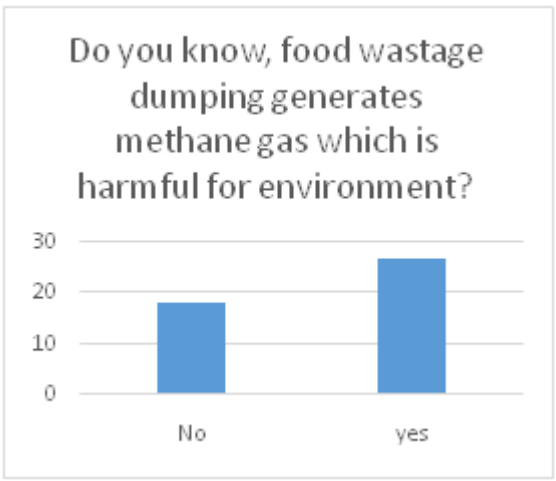
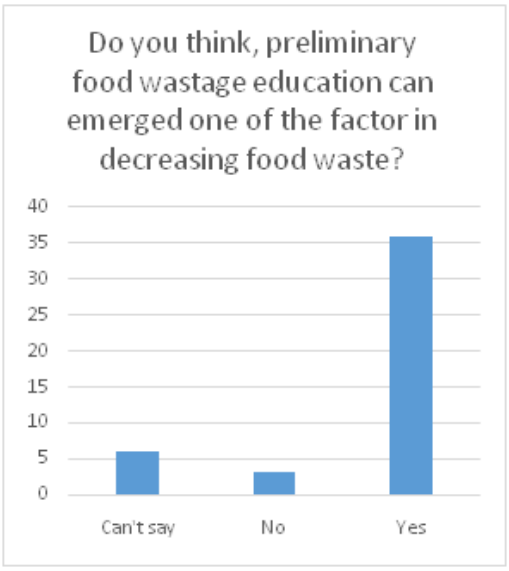
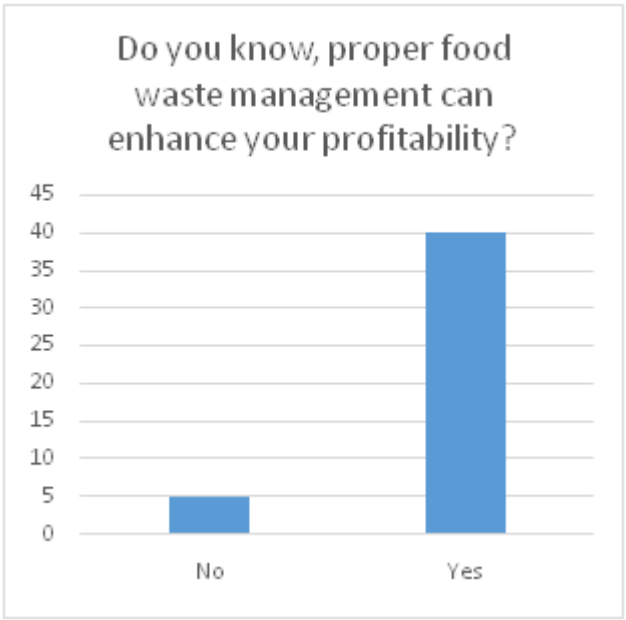
Lack of knowledge about the amount of food waste and their contribution in revenue loss either on commercial platform or household level. To minimize this wastage, education and awareness can play a major role.







Leftover food, which seems to be one of the major reason for food wastage. Most of the respondents had an opinion that leftover food is being given to needy people whereas some of them store it for further use. Sharing for food model is followed by most of the respondents but it's quite difficult to find needy people and there is a risk factor involved in it as well, like if something went wrong things will come back on them. Throwing leftover food is also one of the options is adopted by respondents to stay free from any tension and worry.



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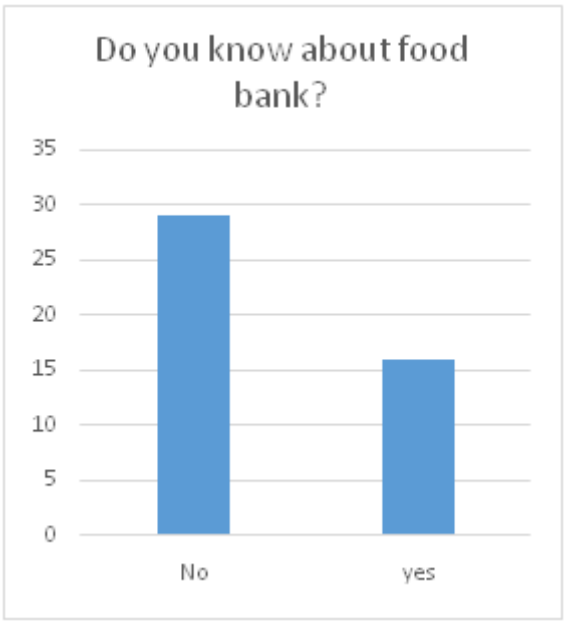
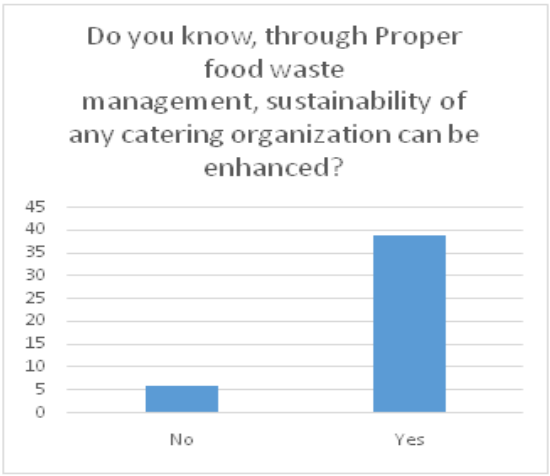
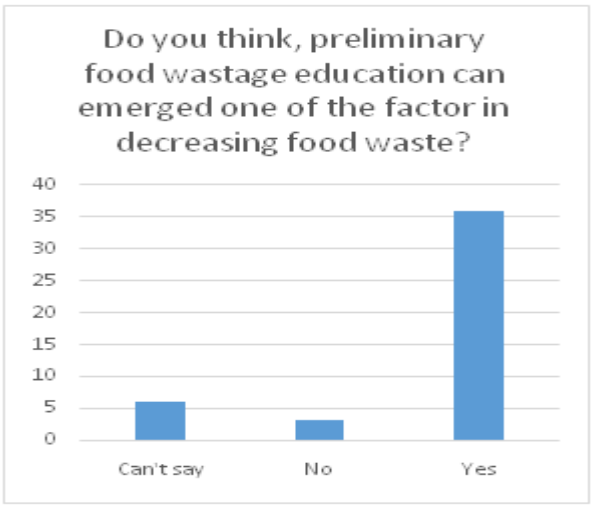


When asked about the environment damage due to food wastage like generation of methane gas due to dumping of food, respondents replied that yes, they know about it but unable to help the environment which shows that they are educated enough to decide what is right and wrong? Not much pain is required to reduce food wastage except implementation of strict law against food wastage in which respondents are quite happy and in favour of its implementation through which profitability, sustainability and environment could be safeguarded. Government needs to look it as an opportunity and new and strict law could be enforced to minimize the loss of food.

No doubt, reduction in food wastage can lead to profitability not only in the terms of ingredients but also in the terms of labour cost, environment conservation cost, sustainability cost etc. But effort is required from both side i.e government as well as individual. Concept of food bank can be one of the beneficial step towards food waste management and food for sharing model can be justified and effective. Respondents reacted very enthusiastic with the concept of food bank, which seems to be very good approach towards saving food and needy can be benefitted from it.





Basic education like moral science which is imparted from school days, same can also be emerged as a very good initiative in reducing food waste. Even children will also be aware about the loss of food and their adverse effect which can directly or indirectly affect profitability and sustainability of household and catering establishments. Respondents reacted very positively that sustainability of catering organization can be improved through proper waste management and preliminary education can also help in reducing food waste. Report can be presented in front of the government and initiative for minimizing food waste can be initiated.

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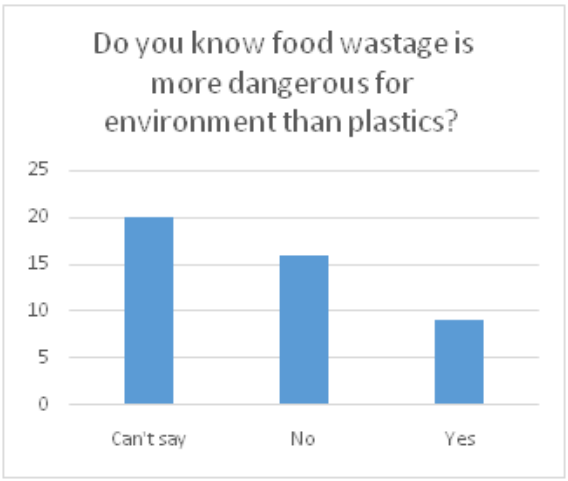

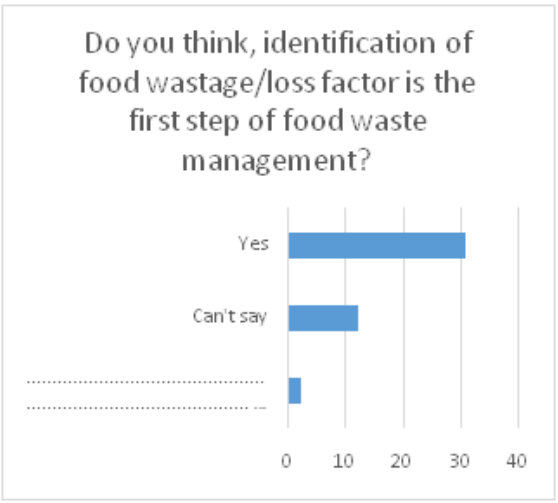

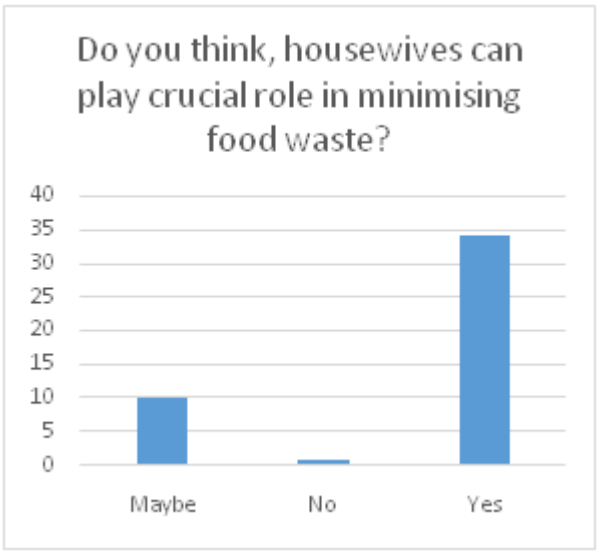

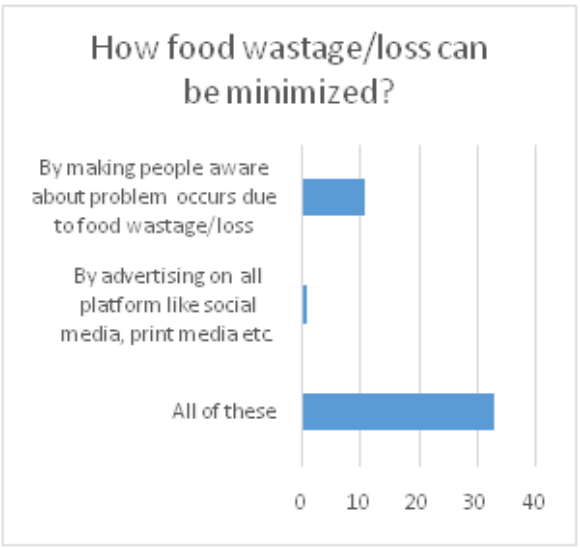

Normally, we consider plastic as a most dangerous thing for environment but research has highlighted that dumping of food waste is considered more dangerous than plastic because of emission of methane in the environment which is not considered good for environment. Respondents replied that most of them are unaware whereas some of them believe that it is not as harmful as plastic. Making the people aware about its side effects can also be helpful in reducing food waste and which can also reflect in their profitability. Housewives can play a huge role in minimizing food waste by their right buying behaviours and limited cooking attitude.

Identification of key drivers of food wastage is very important task of reducing food waste/loss, respondents also believes the same. By following below mentioned guidelines like making people aware about problem occurs due to food wastage/loss, by advertising on all platform like social media, print media etc.; banquet party plate should have stop hunger logo (compulsory) can be supportive in minimizing food waste which is believed by the respondents.

IX. Conclusion

On the basis of findings of questionnaire result which was given by respondents of Surat, Hypothesis number 1 - Proved as an alternate hypothesis which means that null hypothesis is rejected and alternate hypothesis is accepted and shows that there is significant connection between wasted food and conservation of environment

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where government has to be much more careful and preventive measure needs to be adopted.

Hypothesis number 2 - There is asignificant relation in enhancing profitability and sustainability and reduction of food waste proved to be an alternate. There is strong significance between profitability and sustainability and reduction food waste as per the survey result obtained from the respondentsof Surat. To increase the profitability, food wastage needs to be minimized on every step either before production of after production.

Hypothesis number 3 – There is strong significant relation between food waste and housewives which is shown by the respondents. Housewives can contribute more in minimizing food waste by curving there buying attitude and cook as much as to eat.

X. Recommendations –

On the basis of result obtained and hypothesis testing it is proved that housewives can play major role in enhancing profitability, sustainability and environment conservation by reducing food waste at household, society and catering establishment level. Charity begins at home, each and every housewives have to take this challenge of reducing/minimizing food waste which seems to be challenging enough but not impossible. Government needs to make some strict law regarding food wastage which certainly be very helpful in minimizing food waste.

XI. References -

[1] "Global Food Loss and Food Waste". UN Food and Agricultural Organization.

[2] Food Waste: Half Of All Food Ends Up Thrown Away". Huffington Post. 10 January 2013.

[3] Gustavson, Jenny; Cederberg, Christel; Sonesson, Ulf; van Otterdijk, Robert; Meybeck, Alexandre (2011). Global Food Losses and Food Waste. FAO.

[4] "Food Waste Composting Regulations" (PDF). California Integrated Waste Management Board. 2009.

[5] Bellemare, Marc F.; Çakir, Metin; Peterson, HikaruHanawa; Novak, Lindsey; Rudi, Jeta (2017). "On the Measurement of Food Waste". American Journal of Agricultural Economics. **99** (5): 1148–1158.

[6] "Terms of Environment: Glossary, Abbreviations and Acronyms (Glossary F)". United States Environmental Protection Agency. 2006.

[7] Global food losses and food waste by Jenny et al, 2011. Food and agricultural organizations of United Nations 2011

[8] Kantor, Linda Scott; Lipton, Kathryn; Manchester, Alden; Oliveira, Victor (January–April 1997). "Estimating and Addressing America's Food Losses" (PDF). Food Review (USDA): 2–12.

[9] Segrè, A., Falasconi, L., 2011. Il libronerodellospreco in Italia: ilcibo, Ed. Ambiente,Italia. Segrè, A., Falasconi, L., Politano A., Vittuari M., 2014. SAVE FOOD: Global Initiative on Food Loss and Waste Reduction Background Paper on the Economics of Food Loss and Waste. Working paper. Food and Agriculture Organization ofthe United Nations, Rome, 2014. .

[10] Buzby, J., Hyman, J., 2012. Total and per capita value of food loss in the UnitedStates. Food Policy 37, 561–570.

[11] Sert, S., Garrone, P., Melacini, M., Perego, A., 2016. Surplus food redistribution for social purposes: the case of coop Lombardia. In: Organizing Supply Chain Processes for Sustainable Innovation in the Agri-Food Industry, vol. 5. Emerald Group Publishing Limited, pp. 153–173 (Chapter 7).

[12] Stevenson, M., Khan, S., 2013. Food Waste & Food Loss: A Research Summary Conducted byR&D Staff to Inform InternalWWFStrategy.

[13] Pakpour, Amir H., Isa MohammadiZeidi, Mohammad Mahdi Emamjomeh, Saeed Asefzadeh, and Heidi Pearson. 2014. "Household Waste Behaviours among a Community Sample in Iran: An Application of the Theory of Planned Behaviour." *Waste Management* 34 (6): 980–86.

[14] Girotto, Francesca, Luca Alibardi, and RaffaelloCossu. 2015. "Food Waste Generation

Published by: The Mattingley Publishing Co., Inc.

January - February 2020
ISSN: 0193 - 4120 Page No. 15650 - 15660

and Industrial Uses: A Review." *Waste Management* 45: 32–41.

[15] Poças Ribeiro, Ana, Jakub Rok, Robert Harmsen, Jesús Rosales Carreón, and Ernst Worrell. 2019. "Food Waste in an Alternative Food Network – A Case-Study." *Resources, Conservation and Recycling* 149 (May): 210–19.

[16] Giuseppe, Aiello, Enea Mario, and MurianaCinzia. 2014. "Economic Benefits from Food Recovery at the Retail Stage: An Application to Italian Food Chains." *Waste Management* 34 (7): 1306–16.

[17] Schanes, Karin, Karin Dobernig, and BurcuGözet. 2018. "Food Waste Matters - A Systematic Review of Household Food Waste Practices and Their Policy Implications." *Journal of Cleaner Production* 182: 978–91.

[18] Poças Ribeiro, Ana, Jakub Rok, Robert Harmsen, Jesús Rosales Carreón, and Ernst Worrell. 2019. "Food Waste in an Alternative Food Network – A Case-Study." *Resources, Conservation and Recycling* 149 (May): 210–19.

[19] Michelini, Laura, LudovicaPrincipato, and GennaroIasevoli. 2018. "Understanding Food Sharing Models to Tackle Sustainability Challenges." *Ecological Economics* 145 (July 2016): 205–17.

[20] Poças Ribeiro, Ana, Jakub Rok, Robert Harmsen, Jesús Rosales Carreón, and Ernst Worrell. 2019. "Food Waste in an Alternative Food Network – A Case-Study." *Resources, Conservation and Recycling* 149 (May): 210–19.

[21] Thamagasorn, Metawe, and ChanathipPharino. 2019. "An Analysis of Food Waste from a Flight Catering Business for Sustainable Food Waste Management: A Case Study of Halal Food Production Process." *Journal of Cleaner Production* 228: 845–55.

[22] Sindhu, Raveendran, EdgardGnansounou, SharrelRebello, ParameswaranBinod, SunitaVarjani, InduShekhar Thakur, Ramkumar B. Nair, and Ashok Pandey. 2019. "Conversion of Food and Kitchen Waste to Value-Added Products." *Journal of Environmental Management* 241 (February): 619–30.

[23] Poças Ribeiro, Ana, Jakub Rok, Robert Harmsen, Jesús Rosales Carreón, and Ernst Worrell. 2019. "Food Waste in an Alternative Food Network – A Case-Study." *Resources, Conservation and Recycling* 149 (November 2018): 210–19.

[24] Heikkilä, Lotta, AnuReinikainen, JuhaMattiKatajajuuri, KirsiSilvennoinen, and Hanna Hartikainen. 2016. "Elements Affecting Food Waste in the Food Service Sector." *Waste Management* 56: 446–53.

[25] Varzakas, Theodoros. 2015. "Food Waste Management," no. January: 141–78.

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