

# AN ANALYSIS FROM VLIELAND CONSUMER'S PERSPECTIVE: A STEP FORWARD TO BE ZERO WASTE ISLAND

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## ABSTRACT

*The notion of zero waste concept underlines the idea of the production process as a closed loop system considering that the outputs of a process being used as an input for another processes, converted into value added production. As the part of the UNESCO World Heritage in which a large area in this island has been considered as a nature reserve, Vlieland island, strives to find innovation to produce less waste which can be equited into cost savings particularly for disposal into the mainland. In addition, this concept is believed to push the reduction of GHGs emission deriving from food cultivation and shipping the waste. Since consumers is the largest contributor to waste production in Vlieland, this study would focus the discussion of potential solutions from the households and visitors perspective. It means that household-like waste is becoming the focal point of this study align with the waste treatment policy which currently adopted. To collect the data and other information related to food waste and its associates, the observation and interview based on opportunity sampling are carried out to households, visitors as well as stakeholders. The findings are then elaborated through scoring to identified which solution which are feasible to be implemented in Vlieland, North Holland.*

**Keywords:** Consumer, Food waste, Households, Visitors, Mieland, Zero waste.

## INTRODUCTION

The Indonesian nation, which is an archipelagic country and is a nation that has a pluralistic society with diverse ethnicities and cultures. Indonesia has various ethnic groups spread throughout the country, the Indonesian nation is a rich plural country with 1,128 ethnic groups divided into thousands of communities spread over 76,655 villages. Of these, 25,383 villages are located in and around forest areas. The plurality of the Indonesian nation with thousands of indigenous communities with different local wisdoms has long adapted and interacted with their environment. For the people of Indonesia, daily life cannot be separated from the forest, where the forest is seen as a very important source of life, because it acts as a provider of food sources, economy, residential area and medicine. Of the approximately 250 million Indonesian population, around 48.8 million people live around forest areas and 10.2 million of them live below the poverty line. Such communities traditionally depend on forest resources, wood and non-timber products (rattan, honey, agarwood, resin, and bamboo) (Nugrhoho et al., 2020a).

Nowadays more efforts are being done to reduce pollution and save energy to help the world we live in. Many actions have been done by different governments with some positive results but still there is a lot to do. The main work needs to start being done by the individuals and communities, and there's no better way to start than improving our daily habits such as producing waste.

Food is needed by everybody and as the population keeps growing more food is produced resulting in more waste at the end of the chain. Preventing this waste is a duty for everybody as preventing it could help making the world more sustainable and at the same time reducing costs for families and governments. It's important to note that producing waste, managing and treating it represents a cost for all society stakeholders.

The notion of integrated waste management aiming to reduce waste from its source before it even enters the waste stream, has emerged. This idea goes along with the zero emission concept which has risen since the late 1990s. It underlines the term of 'no time for

waste' as it regards the outputs of process being used as an input for other processes, converted into value added which maximize the resource consumption and increasing eco-efficiency. This concept spots the production process as a closed loop system figuring as an industrial metabolism of the sustainable cycles noted as 'grown-use-waste-reuse' (Ngoc and Schnitzer, 2009). On the other hand, the discussion of the food waste stream has also emerged into the hit among the scientists in recent years. An important message is while the amount of food waste tends to increase, the world capacity in providing food for all humans in the world tends to decrease. FAO estimated that about one-third of all food that produced for human consumption in the world is lost or wasted in a year which depicts an opportunity missed of food security (FAO, 2013). With regards to this matter, it can be inferred, that more foods need to be supplied, consequently, more cultivation carried through. Since it is closed related to GHGs emission, the more cultivation, the higher GHGs emission. It is therefore, today, there is a wide recognition of the major food waste and analysed from zero waste perspective.

Zero waste management is a holistic waste management concept which recognizes waste both as a resource and as a symbol of inefficiency of our modern society (Zaman and Lehmann, 2013). Zero waste has been suggested as a means of addressing the changes of lifestyle and consumption patterns and its impacts to environment (Phillips, et al, 2011). There are many constitutes of zero waste. Colon and Fawcett (2006) mentioned of employing zero waste management to facilitate increased recycling, reduced dumping, as well as to improve citizenship within the community.

The concepts of zero waste have been implemented in a number of countries such as South Africa, New Zealand, China, India, provinces (Nova Scotia (Canada), California, as well as by a range of companies such as Dupont, Fuji Xerox and Toyota (Greyson, 2007; Maete and Trois, 2008). For example, the development of a zero waste policy in Mac Kenzie, New Zealand, led to the launch of a range of new waste minimization systems in June 2002, which included an introduction of a new 3-bag kerbside collection system for household residents, the

development of a comprehensive education programme, an installation of a composting unit, and the implementation of financial incentives to encourage separation of waste. Based on the best practices of the implementation of zero waste concept among cities and companies, this study examines what would be the potential improvement to prevent and reduce the food waste in Vlieland island. Vlieland is a remote island in the Netherlands locating at north west side of the main land. It has about 1.100 inhabitants living in the island, and the main incomes for the villagers mainly from tourism which can hit to 100.000 people within a year, in which most of them coming for the event named 'Into Great Wide Open'. Starting with an island such as Vlieland gives the opportunity to use a small community as a pilot for the innovations developed and researched during this case study. If after implementation, waste is reduced and prevented the ideas could be reproduced in different islands of the region.

## MATERIALS AND METHODS

### Scope of The Study

This study would discuss the possibilities of potential innovations for supporting zero waste which is feasible to be implemented in Vlieland. The proposed solutions are assessed from the consumer's perspective including the households/citizen and visitors, towards the food waste.

### Participants and Interview Procedures

This study considered the interview and observations to gain the information. There are 20 households selected as the participants (N-20), in which 11 of them recruited through opportunity sampling while 9 of them expressed a willingness to participate in the interviews. The sample represents a mix of characteristics of age (1. Less than 35, 2. Aged 35-60, and 3. More than 60); household size (1. More than 4 members, 2. From 2-4 members, and 3. Alone), and also gender. We found that men more dominated in our study mainly because their spouse had a language difficulty. We also select 5 visitors and 2 camping sites administrator (Kampeerterrein Stortemelk & Boswachter). The interview conducted in participant's house or on the spot, and carried from 11-13 March 2014. Before the interview, participants are given the information of the purpose of the interview.

## RESULTS

The summary of the interview findings for customer current practices relating to food waste for consumers are highlighted below in Table 1 below.

Table 1. Findings from campsites

| SIMILARITIES                                                                         | DIFFERENCES                                                                                                 |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| i. They use medias such as pamphlet and flyer to raise the awareness among visitors. | <b>Kampeerterrein Stortemelk</b>                                                                            |
| i. Provide recycle bags to visitors.                                                 | i. Provide doggie bags in restaurants inside Kampeerterrein Stortemelk to reduce food waste from left over. |
| i. No waste segregation.                                                             | <b>Boswachter</b>                                                                                           |
|                                                                                      | i. Provide a box in one specific area to allow visitors to drop their excess foods so others can use them.  |

The respondents made some suggestions which they believe could ameliorate food waste in the camp areas among visitors viz:

- Awareness campaigns on benefits of food waste reduction/re-use championed by the municipality

- Proper Waste segregation via a provision of bins.
- An exchange system whereby visitors would be willing or encouraged to share the excess food between themselves to reduce the amount of possible waste generated in camping ground.

Based on the interview findings, it was deduced that the administrators of the camping site are inclined towards organic waste segregation and reducing food losses hence getting their commitment to promote zero food waste ideas/programmes in the campsites would be very easy.

From households and visitors sides, there are six and eight variables were used to illustrate the current practice for food waste and associated management. The detail of identified variables and categories are presented in Appendix.

Table 2. Household characteristics

| Variable                              | Category                            | Total participants | Percentage (%) |
|---------------------------------------|-------------------------------------|--------------------|----------------|
| Understanding of food waste treatment | Insufficient                        | 3                  | 15             |
|                                       | Fair                                | 10                 | 50             |
|                                       | Sufficient                          | 7                  | 35             |
| Household members                     | More than Four                      | 3                  | 15             |
|                                       | From Two to Four                    | 15                 | 75             |
|                                       | Alone                               | 2                  | 10             |
| Age of participants                   | < 35                                | 4                  | 20             |
|                                       | 35-60                               | 7                  | 35             |
|                                       | > 60                                | 9                  | 45             |
| Composting                            | Not doing                           | 11                 | 55             |
|                                       | Doing                               | 9                  | 45             |
| Gardening                             | Not doing                           | 7                  | 35             |
|                                       | Doing                               | 13                 | 65             |
| Supporting idea to separate waste     | Not support the idea or no interest | 0                  | 0              |
|                                       | Support the idea                    | 20                 | 100            |
| Frequency of shopping                 | Others                              | 1                  | 5              |
|                                       | Once or twice a week                | 9                  | 45             |
|                                       | Three or four times a week          | 3                  | 15             |
|                                       | Everyday                            | 7                  | 35             |
| Motive of supporting zero food waste  | Religious                           | 1                  | 5              |
|                                       | Life value                          | 2                  | 10             |
|                                       | Saving cost                         | 5                  | 25             |
|                                       | Self-awareness                      | 12                 | 60             |

Based on the Table 2, it is concluded that:

35% of the households have sufficient understanding while 50% of them have fair knowledge. It means that 17 households (85%) are considered to practice preventing and reducing food waste in their home. Based on interaction with the respondents, it was noted that some of the households always plan a head before shopping and keep the left over for the next day mainly because the influence of Kliekje perspective (to not trifle away food) particularly for the left over.

80% of the respondents were over 35 years. From the interview it was noted that elderly people (35 years and over) tends to generate less

food waste than younger people mainly because of their *klietje* perspective 95% of households shop frequently however the reasons are unrelated to planning rather it is mainly because the shop is nearby and they can meet and interact with friends.

100% of household participants are fully agree with the idea of separating food waste into organic and inorganic. Some of the respondents practice organic waste separation for reasons like; feeding of birds & indoor composting using bokashi(a special japanese ingredients to foster composting)

45% of the households prefer composting and have a composting facility at their backyard, which is mainly used for garden waste, and uncooked vegetables waste.

65% of household engage in gardening. They also expressed their preference for composting of organic waste for use as fertilizer however, some of them admit that they do not have any sufficient knowledge to do good gardening themselves.

**Table 3.** Motives for food waste reduction by households and visitors

| Variable                             | Category   | Reasons        | Total | %   |
|--------------------------------------|------------|----------------|-------|-----|
| Motive of supporting zero food waste | Households | Religious      | 1     | 5%  |
|                                      |            | Life value     | 2     | 10% |
|                                      |            | Saving cost    | 5     | 25% |
|                                      |            | Self-awareness | 12    | 60% |
|                                      | Visitors   | Saving cost    | 1     | 20% |
|                                      |            | Self-awareness | 4     | 80% |

The finding for visitors is presented in appendix and would not be discussed further in the main report due to the number of respondents interviewed. The reason being that since several thousands of tourist visit the island yearly 5 respondents will not be a good representative of the perspective of visitors in Vlieland.

## STATE OF THE-ART-OF WASTE TREATMENT APPROACH

Zotos et al (2009) argued that the best solution would be to eliminate waste production and remove the need for any waste service provision in the first place in which the the community oriented tools and campaign are necessary. Along with Zotos et al (2009), Zaman, A (2014) also suggested that a household's consumption patterns affect the quantity and types of waste creation. Therefore, in developing the zero waste management system, a vision as a long term strategy are required, in addition, the household consumption should be considered also as one of key indicators for the assessment.

Considering that 31% of the available food supply at retail and consumer level were not eaten (Buzby et al, 2014), therefore, a food waste prevention which reduce the quantity of waste, such as 'Be creative of your left over' program is necessary to make them more responsible with their meals. Similar to that, WRAP (2009) stated that reducing food and drink waste is one method of making a substantial, positive contribution towards reducing greenhouse gas emissions. A more related to customer, Barr (2007) mentioned the segregation of waste in households. Since food waste has been the biggest fraction of the domestic waste stream but only around 2% of this fraction is separately collected, therefore, separating food waste would provide the biggest potential effect in domestic recycling artes. This idea is also supported by Zorpass and Lasaridi (2012).

From another perspective, Zaman & Lehmann ( 2011) proposes the solutions to reduce waste by developing sustainable designs inspired by nature, where waste is seen as a resource and organic waste is used as fertilizer. This idea is also supported by Blengini, G.A (2008). They also emphasize in behaviour changes aspect. There are also extensive literatures related to the the important of community engagement in zero waste. Colon&Fawcett (2006) conclude that the local community can realistically play in their own waste. Similar to that,

Anantharaman (2014) identify how ecological citizenship theory can be used to analyze and highlight voluntary involvement by socio-economically privileged individuals. In relating to ecocitizenship, McKelvey, B (2012) proposed to build neighborhood community gardens in which the land may be borrowed, rented, or owned. In addition to that, James et al (2011) identified that community gardens could be also used as a serve especially at relevant in urban settings where residents often lack experience with the fundamental processes associated with growing food (local farms, gardens).

A part of that, relating to market mechanism and community engagement, Kusakabe (2013) mentioned the smile market in Yasu City which located on the south side of Lake Biwa, Japan. It basically a donor program which built in a local systemic market and involving the different type of stakeholders such as suppliers, partner shops, citizens as well as shoppers/donor. The money collected from donations thus used to build solar power generation plants, as a return donors are given community currency which valid for 6 months to the Value of 110% of money donated which they can use to pay 3- 5% of their purchase in about 200 registered partner shop. For the shops, they are given opportunity to participate in a city- sponsored market and publish their photos in community paper. Align with that, Seyfang, G and Longhurst. N (2013) presented a barter market system as part of a sustainability initiative in Bemal, Buenos Aires Argentina. Along with them, mendel (2009) also mentioned a barter market system which has also emerged in Quebec, Canada. This market emphasized the motive to more on supporting sustainable development through the reuse of goods.

Kearney A. T (2012) and Seltz, C (2013) also identify the e-groceries possibilities as a necessary everyday task that has to be carried out for family. Besides being perceived as an inspiring journey of discovery, which provides joy and gusto, e- groceries could serve as a way to avoid large purchases of durable and heavy food staples, mainly because it demands a provision plan, which includes making a meal plan with respect to the eating habits and preferences of the household members.

## DISCUSSION

### 1. Vlieland's Upstream Waste System

Based on the information collected, the baseline scenario of waste stream generated among households and visitors could be drawn in figure 1 below. As discussed before, since the notable aspects from customers perspectives according to the upstream system has been related to preventing and how to dispose, therefore, the further analysis would focus on the preventing, separating and waste collection angle before transporting from Vlieland. The proposed scenario is presented in Figure 2 below.

### 2. Indicators of Zero Waste Program

Zaman. A (2014) considers zero waste management as a holistic waste management concept which always been challenging for decision makers to understand and evaluate zero waste management. The increasing amount of waste creation is one of the direct impacts of population, economic growth and consumption. It is believed that to set an idea of free waste island understanding the indicators which could be used to assess the performance of zero waste management system is necessarily important. Partly adopted from Zaman, A (2014), presented in Table 4, this study proposes the main indicators which could be considered in developing the zero waste programs in Vlieland. The idea is that the zero waste programs which would be adopted should meet the criterias selected.

In order to have better picture relating to the possible outcomes for the idea of a zero waste system in Vlieland, having a clear understanding of SWOT analysis would be an advantage.

**Table 4.** Identified Indicators of Zero Waste Programs

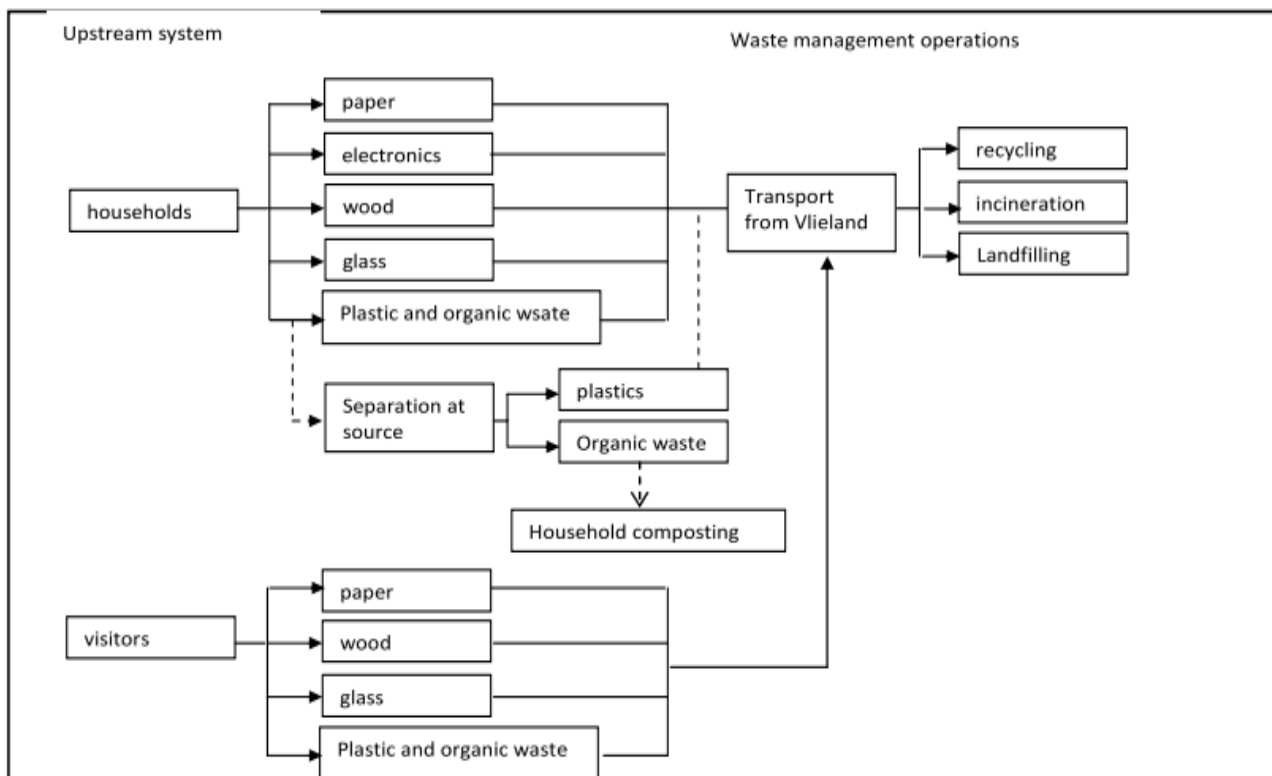
| Domain in zero waste  | Priority areas          | Indicators                                                                                                                                                                                     |
|-----------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Geo-administrative    | build environment       | <ul style="list-style-type: none"> <li>No of buildings (housing, installation, etc)</li> <li>Length of road network</li> </ul>                                                                 |
|                       | Household's income      | <ul style="list-style-type: none"> <li>Household purchase capacity</li> <li>Household expenditure</li> </ul>                                                                                   |
| Socio-cultura         | consumption             | <ul style="list-style-type: none"> <li>food consumption</li> </ul>                                                                                                                             |
| Management            | characteristic          | <ul style="list-style-type: none"> <li>type of waste (e-waste, organic, etc)</li> </ul>                                                                                                        |
|                       | avoidance               | <ul style="list-style-type: none"> <li>avoidance program</li> <li>item exchanged/resell</li> <li>item re-used</li> </ul>                                                                       |
|                       | waste generatation      | <ul style="list-style-type: none"> <li>waste stream(household, Commercial and Industry/C&amp;I)</li> <li>amount of waste</li> </ul>                                                            |
|                       | storage and separation  | <ul style="list-style-type: none"> <li>no of bins</li> <li>type of bins</li> <li>size of bins</li> </ul>                                                                                       |
|                       | Recycle                 | <ul style="list-style-type: none"> <li>Accessibility of recycling</li> </ul>                                                                                                                   |
|                       | Process and treatment   | <ul style="list-style-type: none"> <li>Materials processed in different facility</li> <li>Sorting efficiency</li> </ul>                                                                        |
|                       | Disposal                | <ul style="list-style-type: none"> <li>Controlled disposal</li> </ul>                                                                                                                          |
| environmental         | Env. Burden and benefit | <ul style="list-style-type: none"> <li>Net environmental saving and benefit</li> </ul>                                                                                                         |
| organizational        | Human resource          | <ul style="list-style-type: none"> <li>Training</li> <li>Number of employee</li> </ul>                                                                                                         |
|                       | Waste informatics       | <ul style="list-style-type: none"> <li>Availability of waste data</li> </ul>                                                                                                                   |
| Governance and policy | Governance and policy   | <ul style="list-style-type: none"> <li>Regulatory scheme including awareness program</li> <li>Regulatory law and rules (bans and restriction)</li> <li>Incentives (tax, incentives)</li> </ul> |

### 3.SWOT Analysis

SWOT analysis approach would help in illustrating the contemporary options, weakness and opportunities faced by the Vlieland local authorities. It is used in a context which help in carving a sustainable niche for the island. Based on the interview conducted, the SWOT analysis is summarized in Table 5 below.

**Table 5.** SWOT Analysis

| Strength                                                                                                                                                                                                                                                                                                | Weakness                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>customers awareness in doing composting and gardening</li> <li>customers awareness in segregation</li> <li>preventing and reuse behaviour</li> <li>Natural conservation areas</li> <li>Community engagement</li> <li>Sense of pride to be Vlielanders</li> </ul> | <ul style="list-style-type: none"> <li>Organic and anorganic are not separated</li> <li>Priority conflict at local level</li> <li>Political influence at local level</li> <li>cultural barriers</li> <li>the amount of waste generated</li> <li>visitors behaviour</li> <li>institutional barrier</li> </ul> |
| Opportunity                                                                                                                                                                                                                                                                                             | Threats                                                                                                                                                                                                                                                                                                      |
| <ul style="list-style-type: none"> <li>Public private partnership</li> <li>Homogenous visitors</li> <li>Seasonal visitors</li> <li>Reducing cost</li> <li>Space/land availability for communal gardening and composting without disturbing natural conservation areas</li> </ul>                        | <ul style="list-style-type: none"> <li>No factory</li> <li>high cost of transfer dan disposal</li> <li>animals problem such as rats and seagull for food waste</li> <li>the materials/resource for composting</li> </ul>                                                                                     |

**Figure 1.** Baseline Scenario

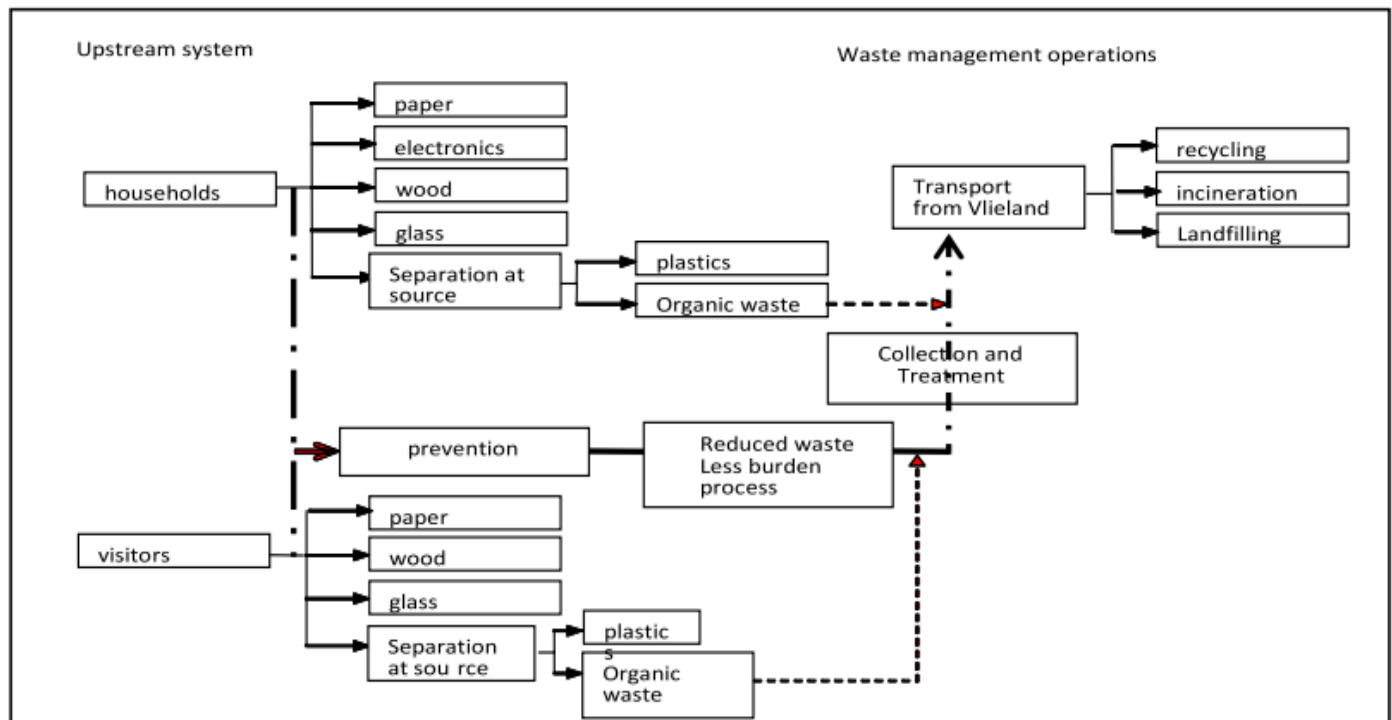


Figure 2. Proposed scenario

Based on key indicators of zero waste system and the SWOT analysis, this study identified some essential points which need to be considered in developing potential solutions such as:

- the management of waste; no incinerators factory, no open landfill to avoid animal problems
- in developing the change of behaviour, should not against the cultural barriers and meet Vlieland situation including the population aspect
- low cost and attainable
- involving community engagement and partnership in the organizations
- associated to government policy including the awareness program and providing facilities

From the the weakness column, there are some aspects which need to be considered, such as unseparated waste system, cultural barriers, and conflict of interest at local level. Therefore, in order to overcome the weakness, establishing vision of the next Vlieland for local government in mainly important which could be to be a zero waste island. This vision would encompass the institutional and conflict at local level. Under this schema, the awareness campaign-this study propose 'I love Vlieland' program, is designed to build the image of 'typical Vlielanders' which is profound of an ownership of zero waste island. The campaign should be brought up and adopted to the entire level of communities, visitors and other stakeholders. The focus of the campaign is shaping the behaviour among customers either in preventive and waste disposal (segregation and collecting). Among of this plan is barter market and 'love food' program which could be applied in the events. On the other hand, to respond of the opportunities, some initiatives which allow the public-private partnership and meet the Vlieland situation are required. Therefore, this study suggests to adopt smile market which comes with the communal gardening and composting.

#### 4. Potential Proposed Solution

In delivering the potential proposed solutions, this study identified the approaches from the aspect of household, municipality and community perspective. It goes under a framework of 'I love Vlieland' vision which basically a strategy to engage in zero waste island. It emphasizes the cooperation between various parties, consisting

municipalities, households, visitors, stakeholders, retailers, etc which presented in Figure 3 below.

##### 1) Households and visitors perspective,

From customers perspective, the ideas are relating to preventive, segregation and disposing. From the study, it is found that households have already practiced preventive action to reduce food waste by shopping regularly to reduce spoiled food in storage. It is revealed that most of the households apply *klietje* perspective since the majority of the Vlieland being dominated by elder people (aged above 35). It is also suggested that they are willing to separate their organic waste and doing composting. Currently they separated only glass, paper, wood, and others. For glass and paper, there is a community in Vlieland who voluntary collects and sells them to the main land where the money earned is donated for musical education for young generation in Vlieland. Also the community collects and sells the used home appliances and home decoration once a week in Vlieland. Therefore, we consider that segregation of waste and household composting could be a feasible solution for household.

In addition be creative with the left over program could be a good solution, mostly for visitors coming with children and staying in a holiday house. Their leftovers should not be thrown away but can be re-cook into new kinds of meal. So they can reduce their waste as well as their expenditure. Align with that, for visitors who stay at hotel and prefer to buy at restaurants, get used to with doggie bag would be very helpful. They can take the left over to home and eat them later is suggested to reduce food waste. However, this idea needs to be supported by retailers by providing a bag for taking home leftover food.

##### 2) Municipality perspective,

From municipality perspective, developing adaptive zero waste strategy is needed to make it had a holistic perspective and implemented in the Vlieland development program.

##### a. Education campaigns.

Municipality also can work together with Omrin to give an educational leaflet for households which they can put in the kitchen to make them aware of their waste and treat their waste.

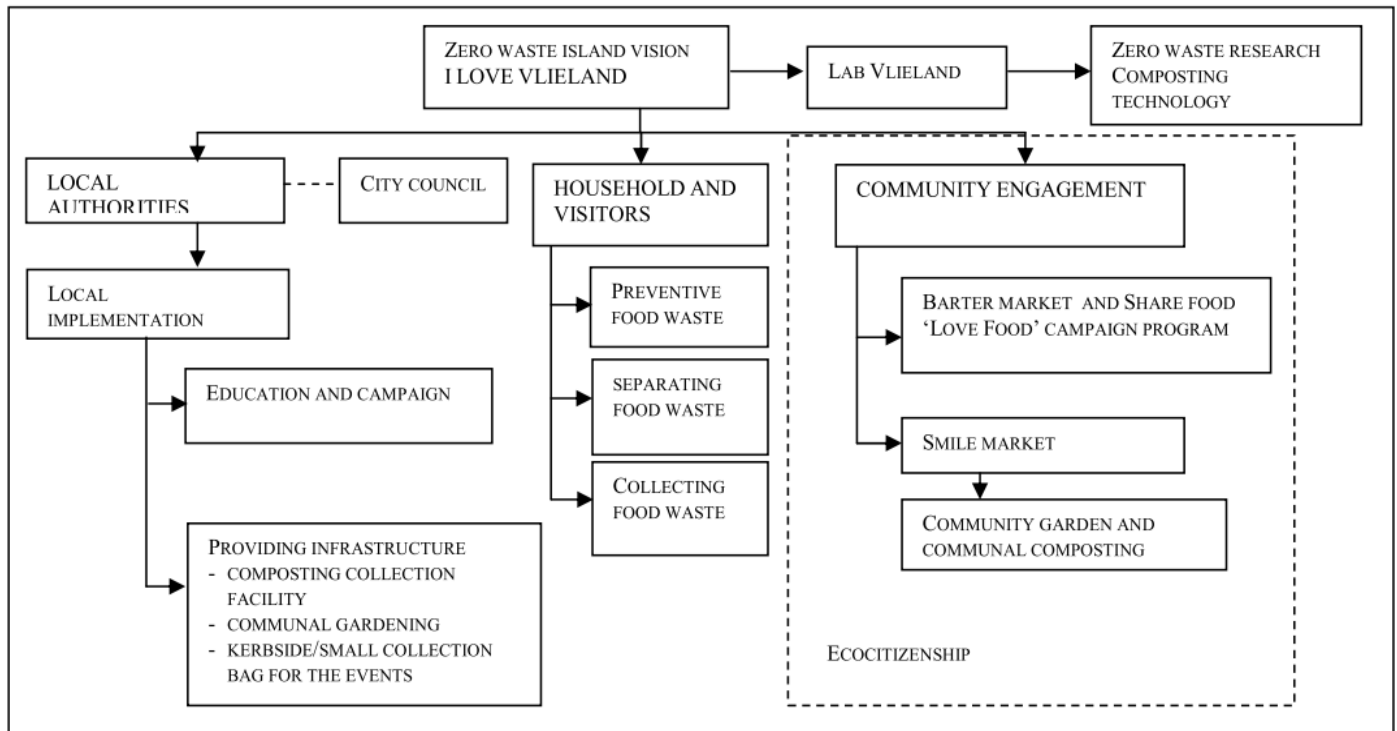


Figure 3. The Framework of Proposed The 'I Love Vlieland' Program

This might be the best option to reduce food waste in Vlieland on preventive ways. This campaign program could be the program implemented to households and visitors to be more responsible with their meals. Furthermore, this program could also take place in several central places in Vlieland, schools, offices, hospitals, tourist information, and even hotels and restaurants. One point that FAO (2013) suggest to reduce food wastage is rising awareness about food wastage by developing communication campaigns and promoting food waste audits. Zaman, A (2013) also mention that enhancing education and awareness among the general public requires long term policies such as waste education being part of the school curriculum and implementing community engagement programs that explain the benefits of product reuse and highlight the burdens of environmental pollution. However, further study will be needed to accommodate the efficient way to deliver awareness campaign in Vlieland.

#### b. Providing infrastructure.

From visitors perspective, providing paper bag/kerbside in the occasional big event such as in camping sites as a replace for organic container. The idea is to facilitate them in separating the waste, since the availability of additional container for organic waste is relatively expensive, therefore, providing small paper bag/kerbside for food waste among visitors could be an alternative solution to make them easily to be composted. The visitors could get the kerbside in the kampeerterein or defined places which is accessible. This study suggests that this would not be a constraint, since 100% of the participants interviewed are willing to separate their food waste. A part of that, municipality also need to work with holiday house owners to provide paper bag/kerbside for organic waste since most of the visitors renting a holiday house are likely to generate food waste, mainly because they travel with children. This particularly for a holiday house without a household composting facility, so the visitors can collect their food waste into communal composting areas.

#### 3) Community perspective,

From this perspective, the aim is to avoid excess food and left overs among consumers, and also processing the food waste within the island. The idea here how to involve communities in supporting the this

program, and engaging them in different scenarios of activities as proposed in the following.

#### a. Building smile market.

Kusakabe (2013) stated that the main benefit of smile market project is that citizens have actively being part and taken ownership of the process which made them more interested in taking action for the local environment. Considering the participation of citizens in community engagement and their sense of being Vlielanders, and also the motives of visitors and households which are likely driven by self-awareness and saving cost, this study suggests that the adoption of smile market in supporting the idea of free waste island in Vlieland would be one of the options. The municipality can bring up the idea to citizens, shoppers, suppliers, other community organizations to involve in this program. The idea is to have their full supports to implement this project.

Different from Yasu city, in Vlieland, the donations are collected to manage nature conservations including community gardening and communal composting areas. In return for their donations, donors are given Vlieland community 'smile' currency which could be represented by a 'card note', valid for 1 year, to the value of 10% of the amount they donate, and they can use this 'Smile' currency to pay up to 5% of their purchases in about registered partner shops in Vlieland. In return for the up to 5% discount they provide, these shops are introduced as 'typical Vlielanders' and allowed to advertize in official website of 'I love Vlieland' project. The idea would benefits, first of all it would attract people to visit Vlieland again because the brand of 'typical Vlielanders', and also involving them to engage in conservation activity and zero waste program without any forcing. Secondly, the idea would also reinforce the idea of ecocitizenship which bringing a sense of ownership of free waste island process into their own in an easy way. However, this study considers that a more detail study are needed to introduce and for piloting this program.

#### b. Community Garden and Communal Composting.

This study believes that a community garden would be acceptable in Vlieland, considering that 65% of Vlieland household doing gardening. They utilize their garden either for flowers, fresh fruit or vegetables. However, since not all households have understanding on how to do gardening in a good way, therefore, this study considers that having community garden and let the gardeners to do the gardening or asking help from gardener for growing fruits, and vegetables would be an

advantage. People can buy their vegetables and fruits right from sources and it is argued that it could escalate the campaign of 'I love Vlieland' vision. So community garden is not only help in treating food waste particularly for composting, but also can influence buying behavior for particular vegetables/fruits. In addition, besides being a place to reconnect with nature, community gardens beautify neighborhoods and help bring neighbors closer together. Furthermore, the idea of community gardens will support the idea of composting program. Moreover, this study suggested that processing the waste into composting and gardening would eventually lead to the reduction of GHGs emission coming from shipping the organic waste into mainland.

McKelvey (2012) suggested to build a community garden into two following way: Scenario one: one person or a small group of people has the idea to start a community garden. Scenario two: an outside group or local agency has the idea and land available to start a community garden. In terms of environment, gardens help community to reduce the heat island effect, increase bio diversity in a small island, reduce fossil fuels from food transport, and recycle local organic materials. It means that instead of throwing the organic materials into containers, people would better use it for fertilizing soil for community gardens. Hence, the ideas of community gardens support for a composting program. Both of community gardens and composting would trigger the idea of ecological citizenship, which highlight voluntary involvement of community roles.

#### c. *Introducing barter market and 'love food' program particularly in the events.*

Since for Vlieland community sharing foods with others is merely sensitive, therefore, it is suggested to introduce barter market and 'love food' program particularly for visitors during the event 'into the great wide open' and other big events. We believe that 'love food' program by sharing visitors excess foods and barter/swapping their foods of comparable value in the occasional events with others is possible to be implemented. With regards to GHGs emission, it is believed that, this program would contribute in the decreasing GHGs. As it helps in avoiding the increase of food needs among consumers, which ultimately, evading more cultivation. The organizer for the events do not have to give specific large place, what they can do is only informing that there is a chance to share and to trade in barter way to get and get rid off what they have and providing particular box/table in which visitors allow to take and give the excess foods. The objective is that people can reduce their potential waste either by trade or give away to others. It is suggested that it could be implemented, as based on the interview, it is found that the awareness of visitors to zero food waste is relatively high and since they have been homogenous (all from Netherland) so they tend to have the same mindset in reducing and preventing food waste.

The idea of 'love food' program and barter market are held on a trust basis. It is argued that it could strengthen the brand of 'typical Vlielanders' in such away that every people in the events could bring back the feelings of connection and trust with other people. Since the scope of the study is related to food waste, therefore, the barter is conducted with other folks in the events for the foods, particularly for those who prepare their own foods. However, for further implementation, it is possible that the transaction can also be implemented for other potential waste such as electronics/furniture, etc. For this matter, the participation of households is also expected. The main important aspects which need to be considered in this implementation is cooperation and acceptance of different stakeholders such as visitors, retailers (mobile restaurants), into the great wide open party, the Kampeerterein, Boswachter, and other related parties. Therefore, this study suggest that to have significant influence on this project, the campaign/spread the information of possibility of barter and 'love food' program from beginning is necessary.

## 5. Opportunities and Barriers Analysis

Based on the selected proposed solution, this study elaborates them into scoring to identify which would be the best option to be implemented in Vlieland. For this process, there are several steps conducted which delivered as follows :

- a) Defining opportunities and barriers,
- b) Scoring each solution according to opportunities and barriers already stated before,
- c) Connecting each score from solutions to one graph.

Furthermore, in order to define which solutions that could be more likely implemented, we have chosen three subject each to point out for both opportunities and barriers of the five solutions proposed.

### 1) *Opportunities,*

This study considers three criterias in opportunities to identify whether the solutions could be executed perfectly in Vlieland.

#### a. *Easily implemented.*

People in Vlieland try to implement the solutions that could reduce or even get rid of the food waste problem. The easier the solution, the more it could be likely to implement for people living there. We think that all the solutions are so easy to implement that considered as the opportunities for implementing the solutions.

#### b. *Level of acceptance.*

High level of awareness and willing of doing the reduction would make the acceptance level of people are even higher. Moreover, not only do households want to remove the problems and conserve environment, but also the visitors. The higher the level of acceptance, the more likely the solution to execute.

#### c. *Long term benefit.*

If we talk about developing solutions, we have to consider also the benefits and drawbacks. In this case, benefits are more tempting to talk to rather than the drawbacks. The solutions proposed before could be applied continuously for the sake of conserving environment and reducing cost. Moreover, the longer the benefit, the more likely solution to apply.

### 2) *Barriers,*

There are three things that consider into the barriers towards the application of solutions proposed in Vlieland.

#### a. *Resistant to vested interest parties.*

There are two sides of parties or stakeholders on Vlieland Opponent and Proponent parties. The first is the parties which immensely support the decision to segregate food waste in Vlieland, whilst the latter is the parties which have their own interest to impede that kind of decision. It does not mean that these parties do not support the decision thoroughly, but there are reasons for them not to support these activities, for instance they will experience a decline in their revenue.

#### b. *Institutional barriers.*

Like the first barrier, the institutional barrier come from the stakeholders that cannot support these solutions comprehensively. The less number of institutional barriers, the more likely the solutions to implement.

#### c. *Consumer's perspective impediments.*

No sufficient knowledge about the impact of food waste and the old paradigm that they do not have the problems regarding food waste are two examples of consumer's perspective that would be the impediments to apply these five solutions. The less number of consumer's perspective impediments, the more likely the solutions to apply.

### 3) *Scoring,*

The second thing to do to make the clear perception of the five solutions is scoring. The idea of scoring is to give a number from 0 (zero) to 3 (three) for each solution regarding opportunities and barriers that



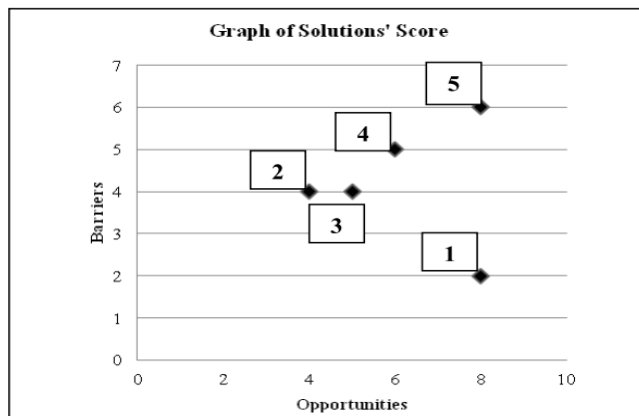
already chosed before. For the opportunities, the bigger the score, the more likely the solution can be implemented. On the other hand, for the barriers, the smaller the score, the more likely the solution can be applied in Vlieland. The following table 6 will present the overall score from the five solutions.

Based on Table 6, thus a graph can be drawn to figure the position of each solution proposed. in terms of its opportunity and barrier. The detail graph is presented in Figure 4. Solution number 1 (education

campaigns), for instance, has 8 as total point for opportunity and 2 as total point for barrier. From the figure above, it can conclude that this solution regarding scoring its opportunity and barrier is the most likely solution to be implemented in Vlieland. The consideration from scoring each solution come from such many information that already get from interview with households, visitors, as well as parties whose activities related to food waste.

**Table 6.** Scoring of Proposed Solution

| No | Proposed Solutions            | Opportunities      |                     |                   | Total Opportunities | Barriers                             |                        |                                    | Total Barriers |
|----|-------------------------------|--------------------|---------------------|-------------------|---------------------|--------------------------------------|------------------------|------------------------------------|----------------|
|    |                               | Easily implemented | Level of acceptance | Long term benefit |                     | Resistant to vested interest parties | Institutional barriers | Consumer's perspective impediments |                |
| 1  | Education campaigns           | 2                  | 3                   | 3                 | 8                   | 0                                    | 1                      | 1                                  | 2              |
| 2  | Providing infrastructure      | 1                  | 1                   | 2                 | 4                   | 1                                    | 2                      | 1                                  | 4              |
| 3  | Barter market/share food      | 2                  | 2                   | 1                 | 5                   | 2                                    | 1                      | 1                                  | 4              |
| 4  | Smile market                  | 2                  | 1                   | 3                 | 6                   | 1                                    | 3                      | 1                                  | 5              |
| 5  | Communal gardening/composting | 2                  | 3                   | 3                 | 8                   | 2                                    | 3                      | 1                                  | 6              |



**Figure 4.** Position of proposed solution according opportunity and barriers

Apparently, according to the Figure 4, the least amount of point is being given for the last option of solution which is communal gardening and composting. However, the opportunity of this solution is the same as that with education campaigns although the point of barrier is different. It might be thought that this solution also can be applied in Vlieland with such a particular way.

Moreover, it is considered that the first is better for Vlieland than the latter, because there are people especially the older one in that island who know how to grow a plant so well. Instead of paying some other agencies for doing gardening, it is better to use their own expertise to grow various kind of plants. Nevertheless whichever the way, it might be thought that all the things have to be taken into consideration. Who would be taking care of the garden, who will be paying for the gardener, who would provide the land, and so forth are the examples of question which will emerge once Vlieland want to implement this solution.

Solution number 2, 3, and 4 (infrastructure, barter market, and smile market respectively) have the same level of opportunity and barrier. They have not so good point on opportunity but at the same time, do not have bad barrier either. It definitely makes these kind of solutions also can be implemented in the small island like Vlieland. In addition, it considered that by implementing the solutions, the opportunity will overpower the barrier.

## CONCLUSIONS

The study is an observation activity that collect and assess information towards food waste handling in Vlieland. Segregations once was applied a couple decade before in Vlieland. Limitation of quantity of

organic waste and municipal budget had pushed the local authority stop waste segregations.

As part of climate change mitigation program, it needs a lot of effort from all the stakeholders in Vlieland to realize Vlieland as a zero waste island. An education campaign is the best solutions that can be implemented in Vlieland, although it would need a long time to see the significant changes. But the benefit of this solution will last for a long time period. For community garden and communal composting also has the best opportunity for the solutions in Vlielands, despite it also has the biggest barriers to be implemented. Since it needed a huge space for gardening and composting area and expertise / labors to handle these areas.

## REFERENCES

- Anantharaman, M (2014) Networked ecological citizenship, the new middle classes and the provisioning of sustainable waste management in Bangalore, India. *Journal of Cleaner Production* 63: 173-183
- Barr, S (2007) Factors influencing environmental attitudes and behaviours. A UK case study of household waste management. *Environment and Behavior* 39 (4). 435—473
- Blengini, G.A (2008) Using LCA to evaluate impacts and resources conservation potential of composting: A case study of the Asti District in Italy. *Resources. Conservation and Recycling* 52 :1373-1381
- Buzby JC, Wells HF, and Hyma I (2014) The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States. El B-121, U.S. Department of Agriculture. Economic Research Service
- Colon. M & Fawcett B (2006) Community-based household waste management: lessonslearnt from EXNORA's zero waste management scheme in two South Indian cities. *Habitat International*;30:916—31.
- EU (2012) Guidelines on waste prevention programmes. <<http://ec.europa.eu/environment/waste/prevention/pdf/Waste%20PreventionHandbook.pdf>(accessed 25.03.14).
- FAO (2013) Food Wastage footprint: Impact on narutal resources. Summary report.
- Greyson J (2007) An economic instrument for zero waste, economic growth and sustainability. *Journal of Cleaner Production*; 15:1382-90.
- Kearney. A.T (2012) A Fresh Look at Online Grocery and University of Cologne, Department of Business Policy and Logistics.
- Korner, I. Sanchez, I. Corrales, Y (2008) Proposal for the integration of decentralised composting of the organic fraction of municipal solid waste into the waste management system of Cuba. *Journal of Waste management* 28:64-72
- Kusakabe, E (2013) Advancing sustainable development at the local level:The case of machizukuri in Japanese cities. *Progress in Planning* 80:1-65.
- Maete N, Trots C. Towards zero waste in emerging countries



- a South African experience. *Waste Management* 28: 1480— 92.
- Mendell, M (2009) The three pillars of the social economy: the Quebec Experience. In: Amin, A. (Ed.), *The Social Economy*, pp. 176-207 (edited by Ash Amin, London:Zed).
- McKelvey, B (2012) *Community Gardening Toolkit*. A resource for planning, enhancing, and sustaining your community gardening project. University of Missouri Extension.
- Ngoc, U.N., Schnitzer (2009) Sustainable solutions for solid waste management in Southeast Asian countries. *Journal of Waste Management* 29:1982-1995
- Phillips, P.S, Tudor, T., Bird, H., Bates, M (2011) A critical review of a key Waste Strategy Initiative in England: Zero Waste Places Projects 2008-2009. *Resources, Conservation and Recycling* 55, 335-343
- Sancar . F., Litt, J (2011) Connecting food environments and health through the relational nature of aesthetics: Gaining insight through the community gardening experience. *Journal of Social Science & Medicine* 72: 1853-1863
- Seltz, C (2013) E-Grocery as New Innovative Distribution Channel in the German Food Retailing.
- Seyfang, G and Longhurst. N (2013) Growing green money? Mapping community currencies for sustainable development. *Ecological Economics* 86 (2013) 65-77
- WRAP (2009) *Household Food and Drink Waste in the UK*. Report prepared by WRAP. Banbury.
- WRAP (2009) *Final report — Updated June 2009: Evaluation of the WRAP Separate Food Waste Collection Trials*. Report prepared by WRAP. Banbury.
- Zaman, A.U., Lehmann, S (2011) Urban growth and waste management optimization towards “zero waste city.”. *City Culture and Society* 2 (4), 177-187.
- Zaman, A (2014) Identification of key assessment indicators of the zero waste management systems. *Ecological Indicators* 36: 682— 693
- Zaman, A (2014) Measuring waste management performance using the ‘Zero Waste Index’: the case of Adelaide, Australia. *Journal of Cleaner Production* 66: 407-419.
- Zotos, G., Zampetoglou.S., Antonopoulos. I-S., Kontogianni, Tchobanoglous. G (2009) Developing a holistic strategy for integrated waste management within municipal planning: Challenges, policies, solutions and perspectives for Hellenic municipalities in the zero-waste, low-cost direction. *Waste Management* 29 :1686-1692.
- Zorpas A.A, Lasaridi K (2012) Measuring waste prevention. *Waste Management* 33: 1047-1056