THESIS

Value of Rescuing Nutritious Food to Feed the Hungry

by

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MASTER OF SCIENCE IN SUPPLY CHAIN MANAGEMENT

at the

MALAYSIA INSTITUTE FOR SUPPLY CHAIN INNOVATION

May 2021

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ABSTRACT

The objective of the research is to understand the value of a Malaysian non-profit organization, who tackles hunger and food waste problems by saving surplus food from going to landfill and feed it to those in need. There is no single established method in the literature to measure overall value food banks create. We used a mixed methods approach that consisted of quantitative analysis for the monetary value of food, volunteering, and environment and qualitative analysis for identifying the value that stakeholders perceive through a semi-structured interview and a structured questionnaire. We estimated the food value to be 505,939 USD/year, volunteering value 82,167 USD/year, and environmental value 21,370-39,997 USD/year. For donors, we found a sense of contribution, traceability, and reliability were the most desirable elements rather than cost saving and brand awareness, which implies donor prioritize operational excellence or certainty. For volunteers, we found a sense of contribution, satisfaction, and education were the most desired elements rather than job training, which implies volunteers prioritize mission rather than practical takeaways. For beneficiaries, we found quick response, basic food needs, money saving, and food security were the most desirable elements, which implies the role of the company is more than just providing food. Our contribution is identifying the value for three categories of stakeholders, which are thoroughly explored in the existing literature.

Thesis Supervisor: Dr. Shardul Phadnis
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Acknowledgements

We would like to thank Dr. Shardul Phadnis, our thesis advisor, who gave critical advice on planning and helped a lot with the progress of the thesis in all fronts. Particularly through teaching writing structure, and essence of the thesis in “Technical Communication 1” and “Technical Communication 2” classes as an instructor, as well as through regular thesis meetings.

We would like to thank Mr. Syazwan Mokhtar, the general manager of the thesis sponsor, The Lost Food Project, and Ms. Seok Kwan Tan, the thesis counterpart in The Lost Food Project. They supported our research activities by providing data, connecting us with stakeholders and helped us distribute the questionnaire.

We would like to thank the faculty members of Malaysia Institute for Supply Chain Innovation, who gave critical feedback of the thesis poster presentation, early on in the thesis writing process. We also thank our colleagues who helped us improve our thesis. Particularly, we would like to thank our classmates Ms. Azzatul Iradah Jamaluddin and Mr. Viknapergash Guraiah for sharing their learnings on the interview analysis method. Finally, we would like to thank Mr. Julian Antonio Gutierrez Bernardin and Mr. Alvaro Manuel Morales Iniguiez at Zaragoza Logistics Center for making a peer review for Chapter 1-2, Mr. Varun Nagpal, Ms. Tatiana Egorova, and Mr. Pablo Enrique Gonzalez Araya at Zaragoza Logistics Center for making a peer review for Chapter 3-5.

Evangelos Dimitriou wants to thank all the MISI faculty for giving him the opportunity and the trust needed to represent MISI when working with the thesis sponsor. Additionally, Evangelos would like to thank TLFP for sponsoring the thesis and for being so open to collaborate and support this thesis research objectives. Finally, Evangelos would like to thank his family, close friends, and everyone else who morally supported him as to complete this thesis.

Masahiro Nomi thanks his family, especially his wife, Miyuki Nomi, for supporting his research activity. He also thanks his employer, Toyo Wharf and Warehouse Co., Ltd., who gave him a leave for this course.

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Acronyms and Abbreviations

AUD: Australian Dollar
B-40: Malaysian group whose income is on the bottom 40%
CPG: Consumer Packaged Goods. See also FMCG.
CSR: Corporate Social Responsibility
FAO: United Nations Food and Agriculture Organization
FMCG: Fast Moving Commodity Goods
GFN: The Global Food Banking Network
KPI: Key Performance Indicator
MYR: See RM
NGO: Non-Governmental Organization
PPR: *Program Perumahan Rakyat* (People's Housing Program; Low-cost flat)
RM: Malaysian Ringgit
SAA: Social Accounting and Audit
SIA: Social Impact Assessment
SROI: Social Return on Investment
TLFP: The Lost Food Project
USD: US Dollar
ZAR: South Africa Rand

1 Introduction

In this chapter, we introduce the dual challenge of global hunger and food waste, as well as the situation in Malaysia and we discuss the food bank industry as a solution for both challenges. Next, we introduce our project sponsor, The Lost Food Project (TLFP) who tackles the problem of hunger and food waste in Malaysia. Finally, we conclude this chapter by providing an objective of the thesis.

1.1 The dual challenge of global hunger and food waste

There are two major worldwide problems relating to food supply chain: hunger and food waste. This is a paradoxical situation, as there is a huge amount of food shortage of food on one side, and also there is a huge amount of food excess on another side. This situation is seen not only in global level, but also in each country to a different degree.

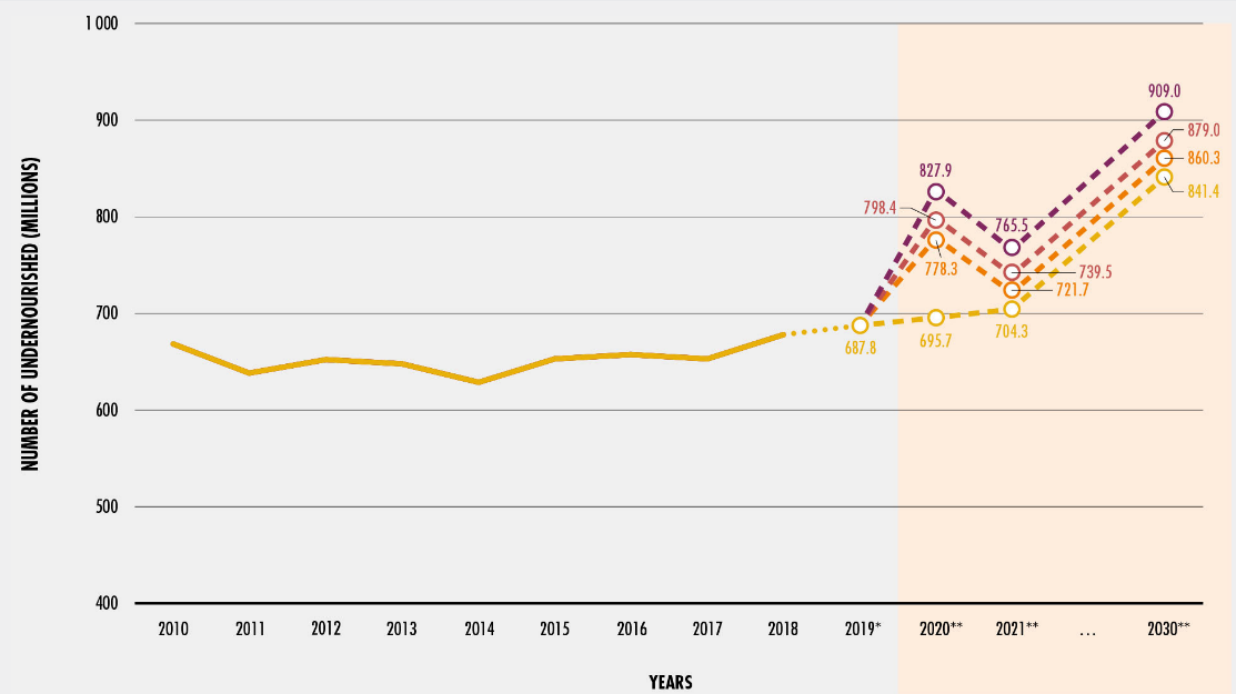
1.1.1 Global hunger

Globally, hunger is still an existing problem. According to a flagship report jointly prepared by United Nations Food and Agriculture Organization (FAO), The International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), United Nations World Food Programme (WFP), and World Health Organization (WHO) (2020), the current magnitude and status are as follows.

- Number of undernourished people in the world is 690M (or, 8.9% of the world's population) in 2019 [1].
- The world is not on track to achieve the target of the Sustainable Development Goals "2.1. Zero Hungry by 2030".

Due to the Covid-19 pandemic, undernourished people may increase by 83-132M (11-19% of the without-Covid scenario) in 2020, 17-61M (2-8%) in 2021, and 19-68M (2-8%) in 2030 (Figure 1).

[1] FAO updated the statistics of China in 2020, which changed the number from 820M to 690M.



Yellow line stands for the scenario without considering COVID-19 impact, whereas the other three lines indicate different scenarios with COVID-19 impact. (FAO, IFAD, UNICEF, WFP, and WHO (2020).

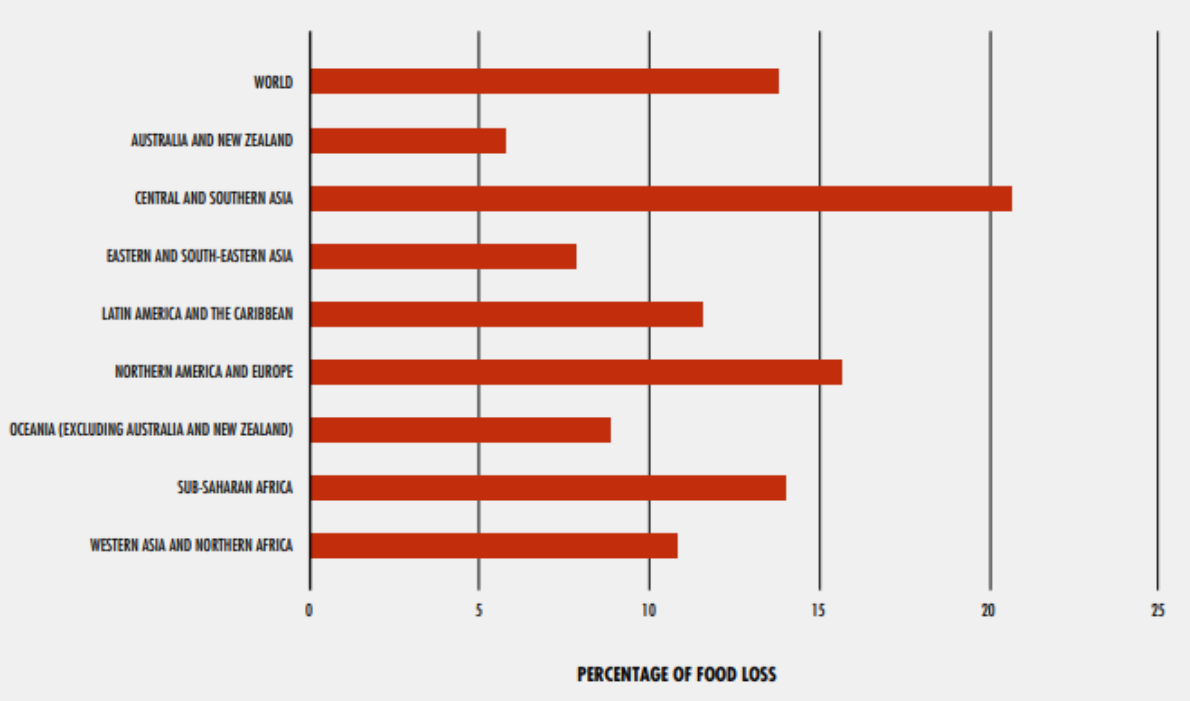
Figure 1 The time series of the number of undernourished from 2010 to 2030 (projection).

1.1.2 Global food waste situation

While several people are facing hunger, a significant amount of food is wasted globally. FAO published a report, stating that about a third of all food (1.6B tons including 1.3B edible tons) was lost or wasted, and contributed 3.3B tons of greenhouse gas emissions in 2007 (FAO, 2011 and FAO, 2013). For more accurate information, FAO divided and re-defined food loss (loss after harvest and before retail) and food waste (loss in retail and after) in the food supply chain, and developed the following indicators (FAO, 2019). According to the latest report, current situation is as follows.

- FAO calculated Global Food Loss Indicator at 14% in 2019 and now is developing the Global Food Waste Index

- Asia and south Asia are the frontrunners with the Food Loss Indicator surpassing 21% (Figure 2).



The figure is cited from FAO (2019).

Figure 2 Food Loss from post-harvest to distribution in 2016, percentages by region

To tackle the situation, many governments take a variety of actions, such as food waste ban in France (The Guardian, 2016), landfill tax in UK (GOV.UK), and tax exemption / legal protection for food donation (ex., Riches, 2018).

1.1.3 Foodbanks as a solution for both hunger and food waste

Food bank, which collects excess food and redistributes it to those in need, is considered as a solution of both hunger and food waste problems. Considering the number of impoverished people and wasted edible food, it is theoretically possible to eradicate hunger if all wasted food that would otherwise be wasted is re-distributed[2]. Indeed, food re-distribution, including the action of food banks, is positioned as the "second favorable" method of food waste

[2] Assuming 1meal = 0.35kg, 1.3B tons of food can provide 3 meals to 3.3B people, which is more than four times the estimated number of hungry people in the world (690M).

reduction after "prevention" in "Food Waste Hierarchy" (Papargyropoulou et al., 2014) (Figure 3).

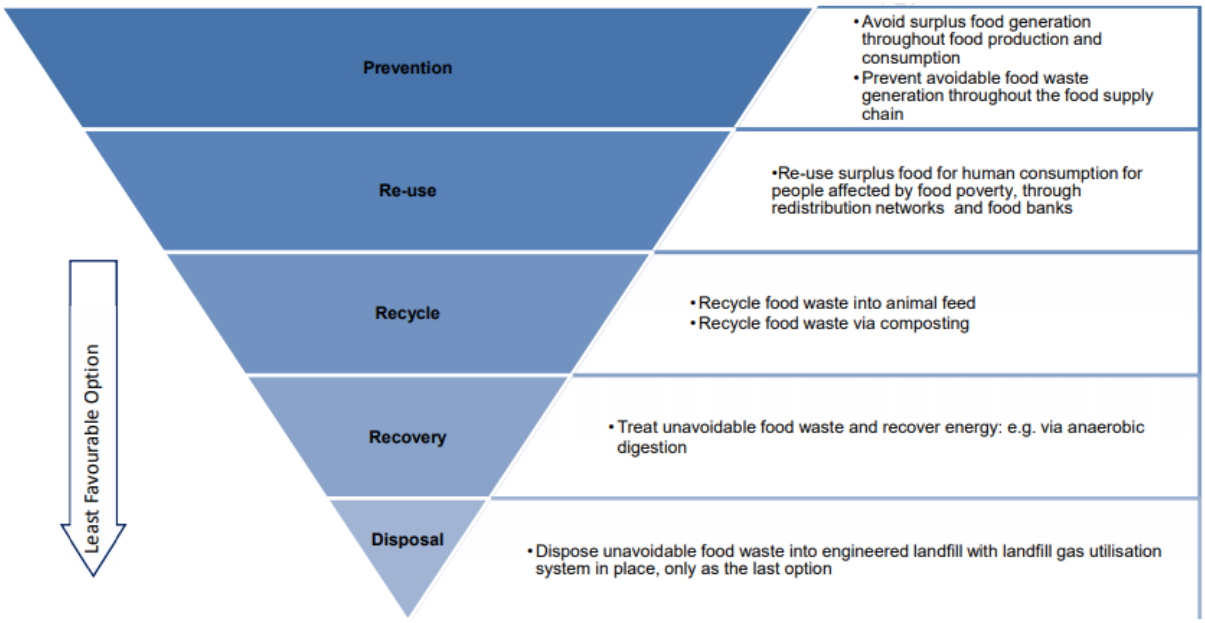


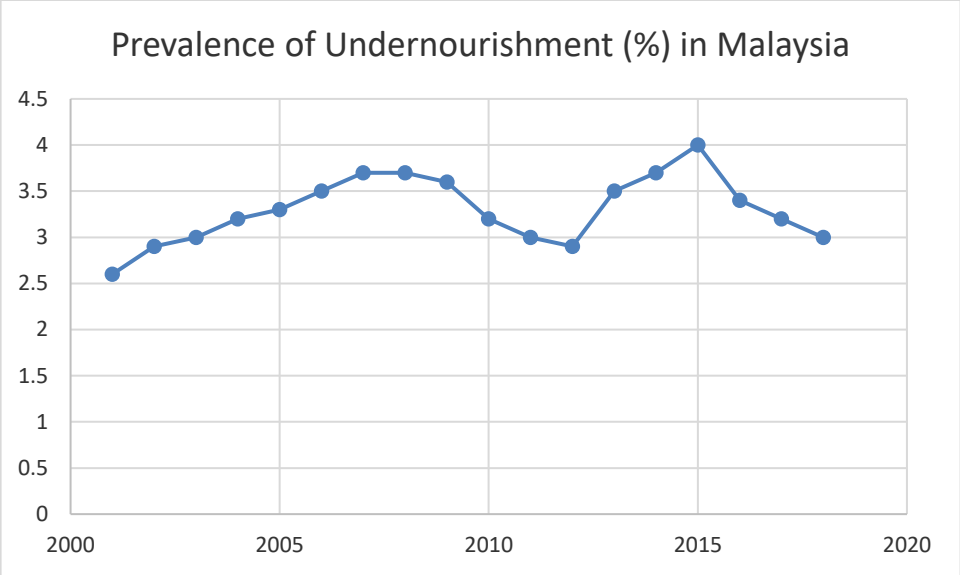
Figure 3 A map of "Food Waste Hierarchy" described in Papargyopulou et al. (2014).

1.1.4 Situation in Malaysia

Like other parts of the world, the dual challenge of hunger and food waste also exists in Malaysia.

1.1.4.1 Hunger in Malaysia

According to FAO, IFAD, UNICEF, WFP, and WHO (2020), the number of undernourished people in Malaysia is 1.0M (3.2% of the population) in 2019. The data from FAO website shows that the number marked highest at 4.0% in 2015 since the data collection began in 2001, then decreased (Figure 4). Global Hunger Index of Malaysia is 13.1, a "moderate" level, but not "low" (Figure 5; modified from von Grember et al. ,2019).



The data is from FAO website (https://www.fao.org/fileadmin/user_upload/faoweb/statistics/SDG/2.1.1_Prevalence_of_undernourishment____.xlsx)

Figure 4 Past 20 years of Prevalence of Undernourishment in Malaysia.

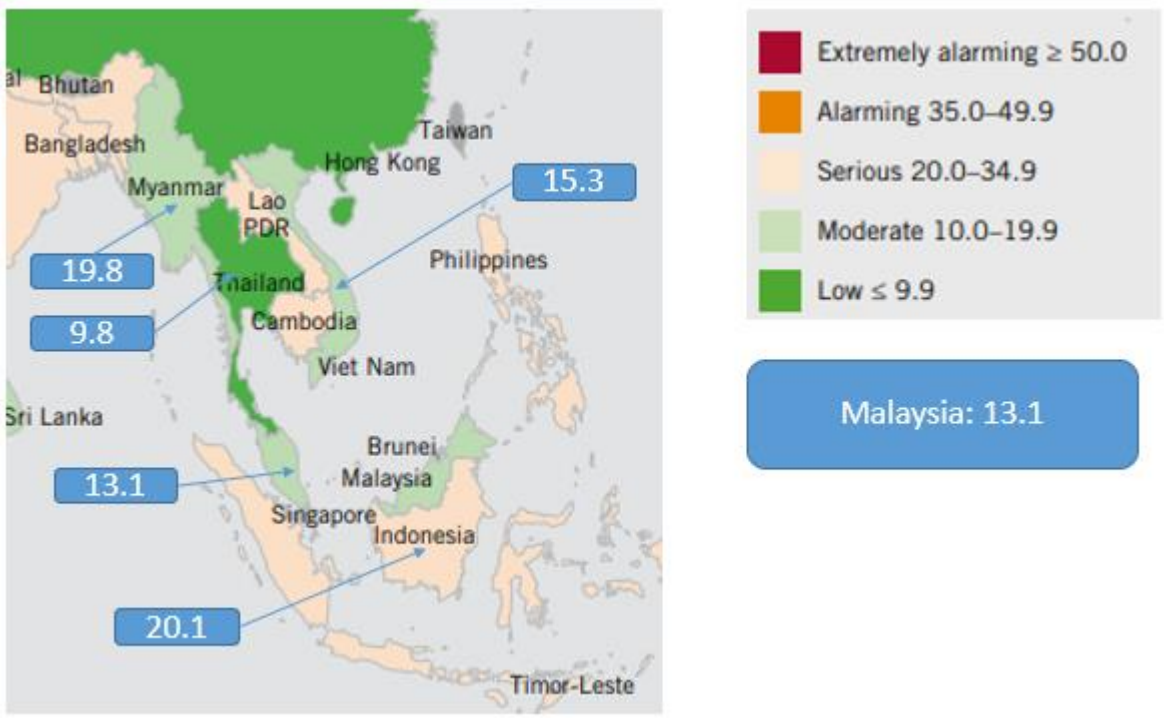


Figure 5 A map of Global Hunger Index in 2019.

1.1.4.2 Food Waste in Malaysia

Malaysian food waste reached 15,000 tons /day in 2015, including 3,000 tons still fit for consumption. The 3,000 tons of food can feed 1.8M people with 3-meals a day, assuming 0.35kg/meal. The number is on the rise as in 2017 became 16,668 tons/ day. Especially in Ramadan season, the amount of food waste is far greater than usual.

1.2 The NGO food bank industry

1.2.1 When and why foodbanks started

The first foodbank in the world was St.Mary's Food Bank founded in United States in 1967 (Riches, 2018). The foodbank was born when the founder to be, saw a young woman collecting discarded but still edible food from garbage.

1.2.2 How the industry developed over the years

The emergence of modern-day foodbanks as a temporary solution/ emergency act of alleviating hunger is said to have started in the US around the mid 1960's, Since the mid 1980's foodbanks have emerged in most countries, with early adopter countries like Canada, parts of western Europe, New Zealand and others.

Key milestones of the developments of food banks are described below.

- American Foodbank Network called Second Harvest (now Feeding America) was established in 1977.
- European Federation of Food Banks (FBEA) was launched in 1986.
- Foodbank Network in UK called Trussel Trust Network was established in 1997.
- Global Food Banking Network (GFN) was founded in 2006.

Another important event in the food bank industry is the Bill Emerson Good Samaritan Food Donation Act enacted in the United States in 1996, where donors' liability is eliminated for donation activity. This legal protection encourages donation, and some other countries like Canada and Australia adopt this kind of law (The Global Food Banking Network, 2019).

1.2.3 Current state and developments

1.2.3.1 Statistics on food handled globally, growth rates, etc.

Although there is no statistics that cover the whole world, the report from three major (two of those are multinational) foodbank networks represent the situation. Table 1 provides the covering countries, established years, food bank numbers, amount of food distribution, and the number of saved people in these three major food banking networks.

According to a GFN report in 2019, there are 943 food banks, 9.6M people saved, 503K tons of annual food distribution in its network. As for the growth rate, these figures were 16%, 6.6%, 23% increase, respectively, from the previous year.

FEBA reported 768K tons of food distribution in 2019 and Feeding America delivered/provided/distributed/use of these words instead of did 4.2B meals.

Food Bank Network	Countries	Established	Food Bank Numbers	Food Distribution	People Served
Global Food Banking Network	34 countries	2006	943	503K tons	9.6 M
European Federation of Food Banks	24 countries	1986	430	768,000 tons	9.5 M
Feeding America	US	1977	200	4.2 B meals	40 M

The figures are from annual reports from each network. Note that because the definition and metrics are different between them, the figures are not comparable.

Table 1 The statistics of three major food bank networks in 2019.

1.2.3.2 Major players

Existence of a major player depends on the degree of development in the food bank industry itself. Typically, at early stage, there are one or two major players in a country (e.g., Second Harvest Japan in a Japanese Foodbank Industry), who lead the industry itself. In a more advanced stage, a foodbank network becomes a representative of the industry, rather than an individual foodbank (e.g., Feeding America in the United States, Fareshare and Trussel Trust in the United Kingdom).

1.2.4 Foodbanks in Malaysia

While European, American, and Australian countries formed large networks, food banking models were least expanded in Asia, according to The Global Food Banking Network (2019). In Malaysia, history of foodbanks seems relatively new. Indeed, only a description of "independent foodbank" is seen in the above literature.

"The Food Donors Protection Bill" was passed by the Malaysian Parliament in 2019. The law stipulates legal protection for food donors otherwise they have to take full responsibility of donations, paving the way for more elaborate food bank activities. Before the law, foodbanks had to assure donors that they are safe for the consequence of donation by individual contract.

1.3 Relevant literature

1.3.1 Role of foodbanks in food waste

The report from the Global Food Banking Network (2019) described the primary role of a food bank as "a central hub for a specific geographical region or community". In order to collect surplus food from multiple sources, and to distribute to multiple hungry people, food banks operate "dynamic system of logistics and warehousing infrastructure" similar to wholesale food operations. Many food banks co-operate with governments, NGOs, and feeding programs. In some regions where public sectors are unable to play their role, food banks play supplementing or substituting governmental food security programs. This literature exemplifies that food banks in their network operate school meal program supplementing governmental program.

Food banks can also act as a platform of food emergency relief. A good example is seen in Johar et al (2020) where a community kitchen co-operated with a governmental program, scaled up their capacity in short-period, and distributed foods to Indian migrant workers.

1.3.2 Operating models of foodbanks

There are mainly two types of food banking models: "warehouse", and "front line" model. The former indirectly provides to those in need (i.e., provides food to charities, and the charities distributes to end-recipients), whereas the latter does so directly. The typical example

is seen in the United Kingdom where both types of large food bank network exist. These differences are described in detail in Riches (2018).

1.3.3 Issues of food banks

While food banks take a great role in food redistribution, there are some issues. Bazerghe et al. (2016) mentioned nutritional imbalance between donated food and recipients' need like dairy, vegetables, and fruits, lack of resource to deal with perishable items, needs of non-food items like diaper. Schneider (2013) mentioned stigmatization and over donation. Mejia et al. (2015) reviewed corruption of black market and risk of lawsuit for donated products.

1.4 Project sponsor: The Lost Food Project

1.4.1 About the company

The Lost Food Project (TLFP) is a Malaysian non-profit organization. The mission of this organization is to eliminate hunger, and to prevent excess food from going to landfill. So this organization typically collects edible excess food and distributes it to those in need. It was founded in 2016 and it is headquartered in Kuala Lumpur. The organization consists of committee members (president, general manager, government liaison, etc.) who take decision-making of the organization and volunteers in 12 teams who take charge in every task in operation.

1.4.2 Company's operations

TLFP's operations can be understood better by looking at the following items. The involved parties, the operation flows, the way of doing business as well as its impact.

1.4.2.1 Stakeholders

In order to achieve their goals through their operation, TLFP co-operates with various parties. The involved stakeholders can be largely classified as follows.

- Food Donors: donate food / hygiene products
- Sponsors: donate trucks / durable equipment / money
- Strategic Partners: holistically tackle local issues on saving food and reducing waste with TLFP, such as governmental agencies, not a giving-receiving food relationship.

- Volunteers: provide workforce in various domains
- Charities: receive food from TLFP and distribute to individual recipients, support individuals for other than food
- People's Housing Project (*Program Perumahan Rakyat*; Low-cost Flat of 2-20K people) Residents, B-40 (Income bottom 40%) groups: direct recipients who receive food from TLFP

1.4.2.2 Operation flows

There are three main workflows; (1) Collect food (mainly vegetables) from a wholesale market and grocery stores, sort at a warehouse, and deliver to / picked up by charity partners (Figure 6) (2) Collect baked breads and deliver to / picked up by charity partners / PPRs (3) Collect dried food, hygiene products from donors, store at a warehouse, then deliver to charity partners/PPRs. Other than these workflows, TLFP distributes ad-hoc donation. The end-to-end supply chain is described in Figure 7. In all processes, in a planning phase, TLFP planners call different charities informing available goods and asking needs, then matching demand and supply.

Figure 6 The illustration of the operation flow of food.

The top right two pictures illustrate collection of surplus food. The bottom right shows sorting process. The bottom left describes food is loaded on a car, which is to be delivered to beneficiaries.

1.4.2.3 How the company works

TLFP handled nearly 33,000 meals a week and supported over 50,000 people through direct support and indirect support through charities in 2020. In addition to the food collection and redistribution, TLFP organizes food waste education sessions for young students, holds fund-raising events for a new revenue source. TLFP relies significantly on volunteers for all operational tasks ranging from food delivery and warehouse operation to marketing and event management. The number of active volunteers in December 2020 is approximately 250 compared to only a handful few paid staff members (truck driver, warehouse manager, general manager, and business admin). Some volunteers work almost full time and hold key roles in key departments such as managers in procurement or management. For example, allocating work to volunteers according to their skills and availability is also done by volunteers, and school education programs are completely managed by volunteers from a planning phase to a conduct phase.

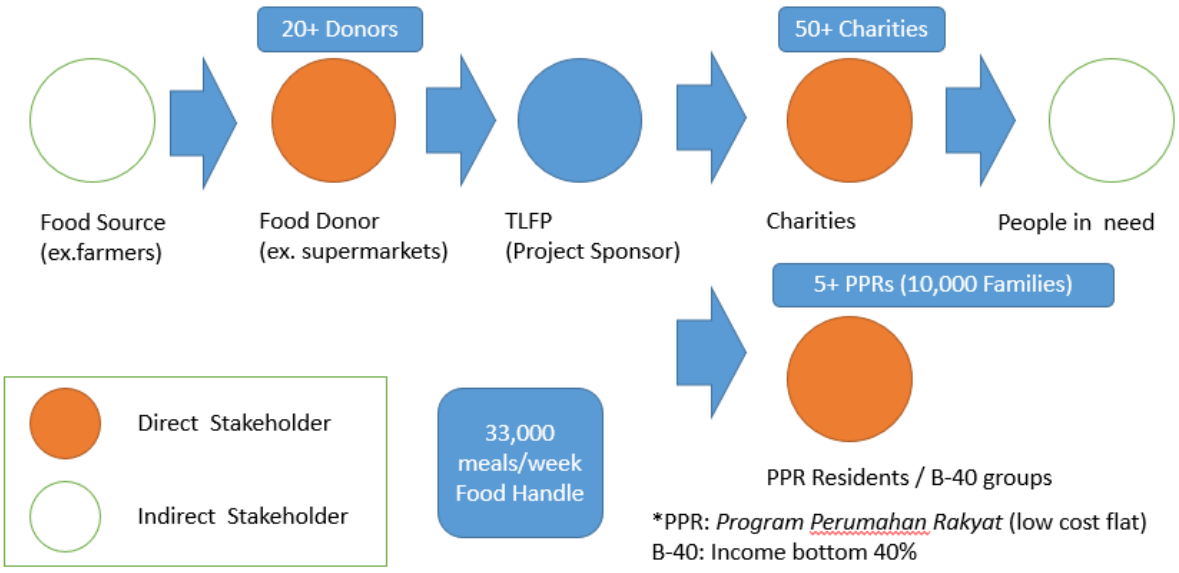


Figure 7 End-to-end supply chain map of the food collection and distribution.

1.4.3 Impact

Since its founding circa 2016 till December 2020, TLFP has managed to save more than 1,500 tons of food collected from more than 20 donors. It has redistributed the saved food to more than 50 charities and PPRs. Though with COVID-19 the amount of food collected has slightly gone down as operations of the sources of surplus food were either closed or placed on restricted working hours. TLFP has adapted to the new situation and managed to not stop its operations and redistribute a substantial number of meals.

1.4.4 Strategic Plan

TLFP made a strategic plan to measure their progress and develop a strategy to move forward. It describes what TLFP see themselves and what they want to do in few years as five goals. Goal 1 is increasing capacity and building a more effective network (triple handling amount, operating three new states). Goal 2 is building organizational capacity (effective volunteer management, filling 100% of lead staff in volunteers, placing executive and management committees). Goal 3 is ensuring operational excellence and enhanced services (logistics improvement, annual plans, website restructuring). Goal 4 is establishing an efficient and sustainable funding model (charitable tax-exemption status, fundraising strategy, multi-year funding model). Goal 5 is inspiring community engagement and advocacy (mapping partner network, increasing educated people, participating local/global initiatives).

1.5 Motivating question

TLFP tries to eliminate both hunger and food waste by connecting supply and demand. Despite the only few years since its establishment, TLFP has expanded the scope and made an impact to society. Although the thesis sponsor is not earning any money from their activity, their activity creates some value to the food donors to food beneficiaries, and to all other stakeholders. Our research project aims at answering three related questions:

- What is the value created through TLFP’s activity?
- How much are the stakeholders benefited through the activity?
- How can these values be defined and measured?

.

2 Literature review

In this chapter, we first discuss volunteering and the NGOs in general, in order to underline their importance. We then introduce food banks and discuss what kind of value they create. We then introduce social impact measurement by classification, examples, and indicators. Finally, we describe a gap in the literature.

2.1 Value of foodbanks

Foodbanks are typically NGOs. NGOs are seen as a value-adding mechanism not only because they directly help the beneficiaries, but also because they benefit society in total by engaging and influencing an array of stakeholders through cooperation/ collaboration and through advocacy and activism. Indeed, NGOs have changed even global corporations' behavior to society's benefit as described by Spar and La Mure (2003), who assessed the influence of NGOs by exemplifying three case studies. Another example is seen in a study where NGOs have historically changed projects and policies of the World Bank (Fox & Brown, 1998). These results demonstrate that NGOs can add tremendous value to our society.

Similarly, when it comes to foodbanks and their impact, there are several research studies focusing on the role food banks play in addressing hunger alleviation and food insecurity. Bazerghi, McKay, and Dunn (2016) summarized 33 articles related to food banks and discussed the gap between increasing demand of food and limited supply in form of foodbanks. As discussed earlier some in Chapter-1, they discussed that many food banks and recipients struggle with insufficient capacity of handling enough quantity of items, matching needs, proper handling of food delivery, especially perished items. Vittuari et al. (2017) categorized the 45 types of impact of food redistribution activity in Italian region by four stakeholder groups (those in need, donors, workers, and community) and measured via questionnaire. These papers are good examples of understanding what kind of value food banks create as we refer to in Chapter-3. While many papers focus on the role of food banks in general, a few papers have focused on the economic value of rescued food in particular. Some examples are those of (Reynolds, Piantadosi, & Boland, 2015) which calculated the market/ nominal value of the wasted food and included environmental associated costs.

Another example is that of Nahman's attempt to calculate the economic value by market price and disposal cost (Nahman, 2011). Koshy and Phillimore (2008) calculated total impact of Australian foodbank in terms of landfill cost, logistics cost, food value, and volunteers' support. These papers are good example of calculating economic and environmental value of food banks, which we refer to our calculation methodology, discussing further in Chapter-3. However, none of them or other papers has tried to capture the overall social impact and its economic extensions.

2.2 Value of volunteering

Volunteering is what fuels charitable organizations, such as foodbanks. Volunteering has an immense presence in a global level (Salamon, Sokolowski, & Haddock, 2011). The paper estimated that 971 million people volunteer globally, exceeding the population of older than 15 years old people of India, as well as the economic size of volunteers is 1.348 trillion USD, exceeding the GDP of Canada, at the time of writing the 7th highest GDP of the world. They also estimated 36% of volunteers helps through organizations, such as NGOs as opposed to direct volunteering for the rest. The value of volunteers, is accepted and recognized as an important part of the labor force (in the US) as Brown suggested back in 1999 (Brown, 1999). Although the value is based on individual volunteers, research is also focusing on volunteering facilitation platforms like NGOs that have been stepping and adding value to society sometimes even by substituting the government and by building capacity (Ulleberg, 2009).

2.3 Social Impact Measurement

Quantifying social impact is not straightforward. A large variety of models and frameworks has been used for different targets and objectives, and there seems to be not simple nor widely accepted measurement criteria for assessing the social impact.

2.3.1 Definition and Classification of Social Impact

There are several papers who try to define and classify social impact assessment (SIA). Maas (2009) summarized the definitions of SIA from existing papers, and six out of seven papers refer SIA as likes of "consequence", "results", "changes", and "outcome".

Clark et al. (2004) defined it as the difference between observed result and an assumption if the activity did not happen, which is known as “Impact Value Chain”. Grieco et al. (2014) Found that there were at least 76 models of SIA and classified them into four categories using cluster analysis. Cluster 1, “Simple, Social, Quantitative” which aims at measurement, assessment, reporting, certification, and management for general sectors. Cluster 2, “Holistic Complex” is used mainly for assessment and reporting. Cluster 3, “Qualitative Screening” is used for specific sectors. Cluster 4, “Management” pertains to internal management or certification. As one can notice, the impact is measured by different standards, point of views and for different uses (e.g., end results or further inputs).

2.3.2 Examples of Frameworks of Social Impact Measurement

Zappala and Lyons (2003) stated three examples of frameworks of SIA, Social Accounting and Audit (SAA), Logic Models, and Social Return on Investment (SROI). Another way of measuring impact is through the social value indicators (ex. Miller et al.,2007).

2.3.2.1 Social Accounting and Audit

Social Accounting and Audit is a tool both for profit and not for profit organizations as a way of measuring, understanding, reporting and ultimately improving an organization’s social and ethical performance. Organizations may use their existing documents for accounting their social performance but need to submit an official public report and be verified by a third-party auditor. In order to use this tool, organizations have to clarify their values and analyze their stakeholders as a first step, then collect specific indicators at the second step (Zappala & Lyons, 2003).

2.3.2.2 Logic Models

Logic Model is a visualization tool to understand the causal (if-then) link among input resources, activities, completed outputs, observed changes or outcomes, and impacts. The main objective of using the model is to embed the assessment criteria into the project design phase, rather than after the project is completed. It is widely used when applying for government funding (Zappala & Lyons, 2003).

2.3.2.3 Social Return on Investment

Social Return on Investment is a value estimation tool in monetary terms. The main objective of using this is to assess how much monetary impact is generated compared to the initial investment on the project. In addition to defining the metrics and measuring procedures, they need to calculate their net impact (deducing the impact without their activity) (Zappala & Lyons, 2003).

Due to the difficulty of measuring the impact in monetary value, a monetary measurable proxy such as a reduction of governmental spending is used as "socio-economic value" instead of purely "social value" (Emerson & Cabaj, 2000).

2.3.2.4 Social Value Indicators

Some papers describe indicators to measure social value. Miller et al. (2007) stated social value can be classified into "Individual Wellbeing" and "Social Wellbeing", and the latter includes participation in local community, proactivity in a social context, tolerance of diversity, feeling of trust and safety, neighborhood connections, family and friends, and work connections. Hall et al. (2015) exemplified increased earning potential of beneficiaries, increased spending in the local community, personal development of volunteers, improved community access to communal facilities, increased access to nutrition, and greater opportunities for social interaction.

On the other hand, there is an example of monetary-measurable indicators for measuring SROI of a UK food bank network (NEF Consulting, 2018); people avoiding malnutrition and nutritional deficiency, reduction in the prevalence of cardiovascular diseases/type 2 diabetes/obesity, and reduction in mental-health hospitalization.

2.4 The research gap

Although some researchers have focused on food banks' roles, positive/negative impacts, economic and environmental aspects, and social impact measurement not specific for foodbanks, there is no single established framework to measure the overall value food banks create. As such, we cannot simply use some measurement frameworks to some food banking activities. In this paper, we will attempt to bridge this gap and come up with an answer on

what is the total value of foodbanks by examining the thesis sponsor, The Lost Food Project, a prominent foodbank in Malaysia.

3 Methodology

In this chapter, we first introduce our approach and framework of measuring "economic", "environmental", and "social" value of TLFP. Next, we introduce the methodology of calculating economic and environmental value. After that, we introduce the overall processes of measuring social value, as well as the methodologies of each step.

3.1 Our approach in measuring "economic", "environmental", and "social" value

In order to measure the holistic value, we took a mixed methods approach consisting of both qualitative and quantitative data and analysis. We used qualitative approach first to create a framework for measuring the value and then a quantitative approach to calculate the value. In order to collect data, we conducted interviews with stakeholders, researched and analyzed academic articles and performed quantitative analysis to calculate monetary value (where possible). We considered that TLFP creates three types of value, economic, environmental, and social value. According to Emerson and Cabaj (2000), "economic value" is "products or services that have greater market value at the next level of the value chain" and "is easily measured in terms of a range of metrics", whereas "social value" is difficult "to assess in terms of dollars". We used these terms as follows: (1) economic value; added value related to saving and distributing food, (2) environmental value; saved environmental cost, by saving food from landfill, (3) social value; how much society is benefited. For economic and environmental value, we calculated from data provided by TLFP. For social value, we first identified the value of each stakeholder through creating a stakeholder's map, to identify all relevant stakeholders, then developed hypothesis-based metrics, and conducted a survey.

This approach is consistent with Koshy and Phillimore (2008), who measured food value, volunteer support, and saved cost from landfill, though they measure logistic effect that is not measured in our research due to the marginal contribution of the total value.

3.2 Our Framework

Our framework of measuring overall value is described in Figure 8. As Vittuari et al. (2017) stated, "no consensus has been reached on the social impacts of [Food Redistribution Activities] and no comprehensive framework for assessment exists". After reviewing existing literature, we found that economic and environmental value can be measured as monetary value, whereas measuring social value in monetary terms is not that straightforward.

Economic value consists of the value of the saved food itself and the volunteering services of the food redistribution activity as well as other products and monetary or monetary equivalent donations, as described in Figure 8.

Throwing food into landfill does not only generate disposal cost, but also causes damage to the environment through landfill gas (mainly methane) emission, as well as "disamenities" (i.e., nuisance) to people living near the landfill site. Saving edible food from going to landfill is considered to save these costs. As such, environmental value was estimated as a sum of financial cost (direct disposing cost), transportation cost and external cost (landfill gas emission, transport, noise, odor, etc) (Nahman, 2011). As for the "disamenity" cost like of noise and odor, Nahman (2011) calculated it by capturing the decreasing price of household near landfill sites.

Social value consists of health improvement, individual wellbeing, and others. Estimating social value is difficult because it is not well recognized what kind of value should be measured. For example, health improvement can be measured by observed decrease in hospital spending in some cases. However, estimating the money value is difficult, and distinguishing the merit of TLFP's contribution requires a lot of assumptions. Therefore, we aim at identifying the value that TLFP creates by investigating what stakeholders perceive to be value. To sum up, we calculate the economic and environmental value as monetary value and identify the social value that TLFP creates as prioritized concept of stakeholders' perception.

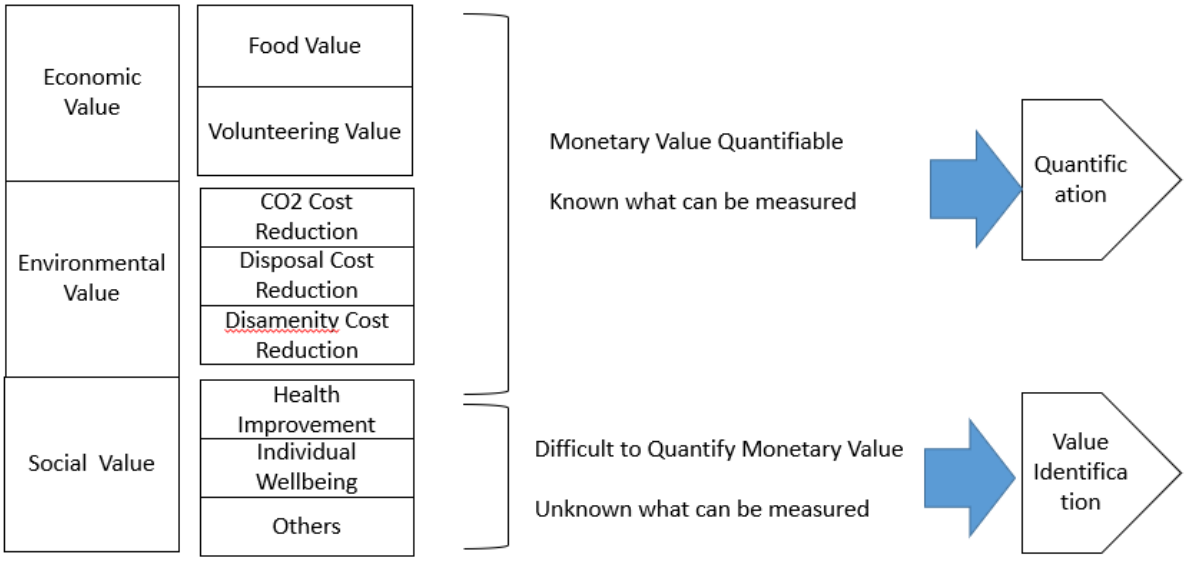


Figure 8 The framework of overall value measurement.

3.3 Measuring economic value

3.3.1 Food Value

TLFP re-distributes collected food to those in need. For the beneficiaries, the only way to obtain food is to purchase from a market as discussed by Koshy and Phillimore (2008). In this sense, economic value related to food was estimated based on the food market price, calculated from food quantity times the unit market price. This approach was used by Reynolds et al. (2015), in an assumption that rescued food has the same value as the market price, and Nahman (2011), stating "Costs associated with the loss of a potentially valuable resource were valued in terms of wasted food that could have been used to feed the hungry; using a weighted average market price of the wasted food.". The definitions and explanations of food value are summarized in Table 2.

Literature	Area	Definition of Food Value	Explanation
Nahman (2011)	South Africa	Market Price	Costs associated loss of a potentially valuable resource were valued in terms of wasted food that could have been feed the hungry. Assume that all food waste has gone through the formal market

Literature	Area	Definition of Food Value	Explanation
Reynolds et al. (2015)	Australia	Market Price	rescued food has the same value as the market price
Koshy & Phillimore (2008)	Australia	Market Price - Collection Cost	the primary alternative [for providing food] is to purchase food products direct from retailers

Table 2 A summary of definition of food value used in relevant literatures.

Reynolds et al. (2015) uses food quantity from annual reports of each food bank, and unit market price from FAOSTAT database and governmental and industrial reports. Our study follows this method, because using official statistics is the most objective as market price is varying daily and food quantity data is aggregated by category. Food quantity is obtained from a report of TLFP in 2020, and the unit price is obtained from official statistics. For estimating category averaged market price, we used household expenditure, food supply quantity per capita, and average household size. Calculation is as follows:

Unit price [RM/ton] = (Annual household expenditure / household size) [RM/capita/yr] / annual food supply quantity per capita [ton/capita/yr].

Household expenditure is obtained from Department of Statistics Malaysia (eStatistik), household size is obtained from statista, and food supply quantity per capita is available from FAOSTAT. Detail calculation is described in Appendix. A.

3.3.2 Volunteering Value

There are three approaches to measure volunteering value (1) Replacement Cost approach, (2) Opportunity Cost approach, (3) Societal benefits approach (Salamon et al., 2011). Replacement Cost approach is the most widely used, and it calculates volunteer value from volunteer hours x wages if the organization would replace them with paid workers (Salamon et al., 2011). Opportunity Cost approach calculates volunteers value from workers' wage of their regular job (Salamon et al.,2011). It is used for the perceived value of volunteers themselves (Brown, 1999). Societal benefits approach is output-based approach if there is no market proxy. In this approach, "willingness to pay" (how much money beneficiaries are willing to pay for the volunteering work) is used for the estimation (Salamon et al., 2011).

Considering applicability of our research, the “replacement cost approach” is the most applicable, because it is the most objective and has observable criteria among the three approaches (Table 3).

Approach	Definition	Applicability
(1) Replacement Cost	wages if an organization replace volunteers to paid workers	objective, observable
(2) Opportunity Cost	volunteers' wage of their regular job	not observable
(2) Societal Benefits	"willingness to pay" for volunteering services	subjective, not observable

Approaches and definitions are from Salamon et al. (2011).

Table 3 A summary of three different approaches and our judgement of applicability.

In order to calculate the volunteering value from the “replacement cost approach”, both “volunteer hours” and “unit wages” are necessary. We use volunteer hours from TLFP’s report. As for the wages, we adopt the “minimum wage” as a “conservative” estimation (Koshy & Phillimore, 2008). This approach is also used in an annual report of a food bank in another country.

At the date of 2021/02/22, the minimum wage is 1200 MYR/Month. (https://tradingeconomics.com/malaysia/minimum-wages). Assuming 7 hours / day and 20 days / month, the minimum hourly wage is 8.57 MYR/hour.

On the other hand, some TLFP’s volunteers work on a regular basis and take some managerial roles. For them, applying the minimum wage seems not appropriate. One alternative is applying an average wage in Malaysia. According to “Salaries & Wages Survey Report 2019” by The Department of Statistics Malaysia (p3), the median monthly salary in urban area in Malaysia in 2019 are 2,565 MYR. The former can be converted to 18.32 MYR/hour.

3.4 Measuring environmental value

Nahman (2011) estimated the unit environmental cost as 351 ZAR/ton (about 24.3 USD/ton using the exchange ratio of 0.125[3]) in South Africa, where 240 ZAR for disposal cost and 111

[3] Currency exchange ratio of ZAR/USD became 0.06923 in 2021.

ZAR for external costs (28.41ZAR for gas emission, 24.22 ZAR for transportation, 57.46 ZAR for disamenity, according to Nahman, 2011b). Another paper estimated Australian landfill cost, which is 2.53 USD/ton (Reynolds et al., 2015). BDA Group (2009) summarized the external cost of CO2 from existing papers, varying from almost 0 to 200 AUD, with a volume range of 10-50 AUD. They estimated the Australian urban landfill external cost of up to 24 AUD (13 AUD for greenhouse gas and 11 AUD for disamenities). Koshy and Phillimore (2008) estimated 83 AUD of disposal cost and 17 AUD of transportation cost. In Malaysian situation, Rahman (2013) stated 110-130 MYR for disposal cost including collection process.

On another side, pricing of gas emission is done in a market. According to the World Bank Group (2020), the unit price of EU Emission Trading Systems, the most covered, is 30.14 USD/ton in 2020. Although there is no data of carbon price in Malaysia, Joshi (2019) proposed that Malaysia should adopt gradually increasing carbon tax starting from 35 MYR/ton in 2020 based on the environmental cost in 2014 in Malaysia to 150 MYR/ton in 2028, to be consistent with other countries. We use this 35MYR/ton as minimum range and 30.14USD/ton as maximum range of CO2 emission cost.

The numbers described in this section are summarized in Table 4.

Source	Disposal Cost / ton	Transport Cost / ton	CO2 Cost / ton	Disamenity Cost / ton	Total Cost/ ton	Notes
Nahman (2011)	240ZAR				350.62 ZAR	
Nahman (2011b)		24.22 ZAR	28.94 ZAR	57.46 ZAR		
Reynolds et al. (2015)	2.53 USD				2.53 USD	
BDA Group (2009)					0-200 AUD	Summary of Review
			13 AUD	11 AUD	24 AUD	Australian Urban
Koshy & Phillimore (2008)	83 AUD	17 AUD			100 AUD	
World Bank Group (2020)			30.14 USD		-	Cost / CO2 ton
Rahman (2013)	110-130 MYR				-	
Joshi (2019)			35-150 MYR			

Our Study	110-130 MYR	35MYT-30.14USD	-

Table 4 Summary of Environmental Cost

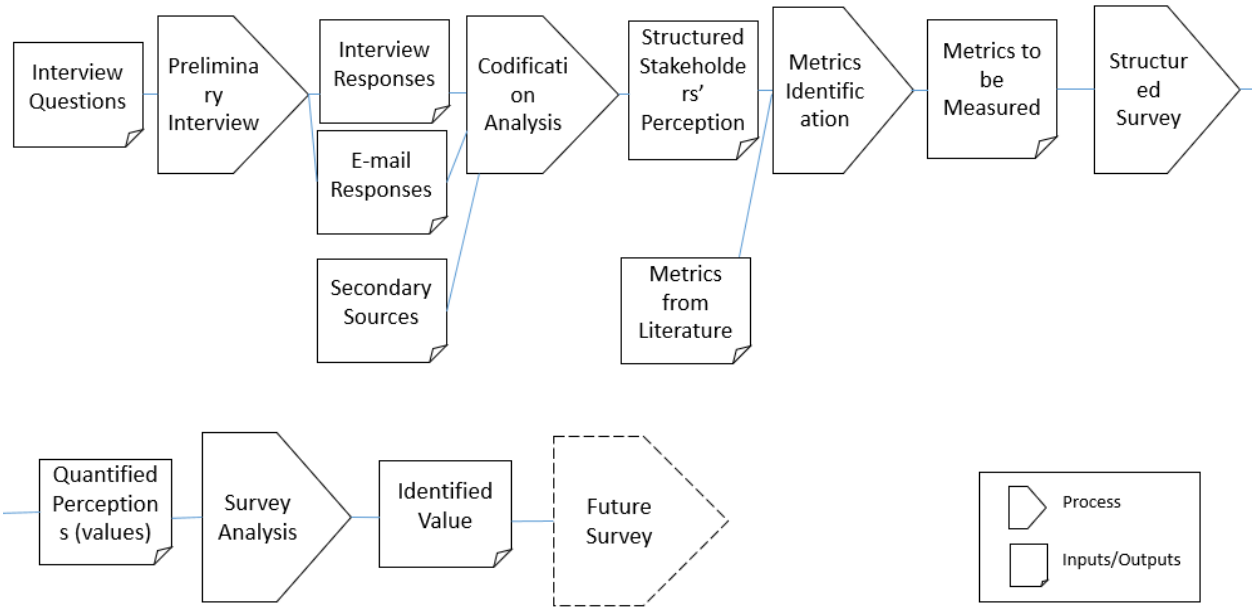
Quantity of emission of harmful gas is reported from TLFP's report. According to the report, TLFP saved 1,110 tons of CO2 equivalent greenhouse gas from 565 tons of food collected (CO2 = food-ton x1.96). This rational is consistent with FAO (2013), where 1.6B tons of food waste contributes 3.3B tons of greenhouse gas, but rather higher compared to the study of BDA Group (2009), which showed that the range is between 0.65 to 1.53 tons per tons of landfill waste.

In summary, we use the environmental value as the sum of disposal cost, transportation cost, greenhouse emission cost, and disamenity cost. For disposal and transportation cost, we use Malaysian value of 110-130MYR (27.5-32.5 USD /ton). For greenhouse emission cost, we use 35 MYR (8.75USD) - 30.14 USD/CO2ton, and 1.96 of multiplier of CO2ton/food-ton. For disamenities, we omit the calculation due to the difficulties of data collection. However, a rough estimate according to reports in other countries, is that it is usually less than 10USD /ton.

3.5 Measuring social value

Theoretically, there are no single governing method of social value measurement. When it comes to the value of foodbanks, like other NGOs, there are no standard models of social value measurement. According to Edmondson and McManus (2007), a study that stated that when are little or no established hypotheses and methodologies such research domains are classified as "nascent", and the suitable methodologies are qualitative research by open-ended questions, and the suitable objective is to develop theory. A good example of a study at this stage is seen in Phadnis et al (2017), who split a research into two stages; semi-structured interview, and structured questionnaire based on the first result. Our study follows the aforementioned methodology and splits the research into two phases. The first phase is identifying stakeholders' perceived value through open-ended interviews, and the second phase is structured survey.

The overall flow is described in Figure 9. Our research starts from (1) semi-structured interview, following (2) codification analysis of the interview responses, (3) identification of metric used in questionnaire, (4) structured survey, and ends (5) analysis of the survey result.



Pentagon arrows represent major processes, and squares represent major inputs / outputs. Our final deliverable is "Identified Value", which would be used for future research.

Figure 9 A methodology flow of social value measurement.

3.5.1 Stakeholders Map

We first created a stakeholders map in order to understand the give-and-take relationship by analyzing the documents and discussing with TLFP's thesis counterpart. The overview of the stakeholders map is described in Figure 10. The major types of stakeholders are "Donors" (food & beverage, grocery stores, food markets, Customer Packaged Goods), "Sponsors/ Partners" (banks, telecommunication companies (fund-raising platform), governments, NGOs, individual financial sponsors, e-commerce platforms), "Volunteers", and "Beneficiaries" (Charities, B-40[4] community members).

[4] "B-40" represents a group of people whose income is bottom 40% in Malaysia.

Based on this map, we created interview questions and an interview plan. Considering the degree of relationship and accessibility, we selected donors, volunteers, and charities for the target of the interviews.

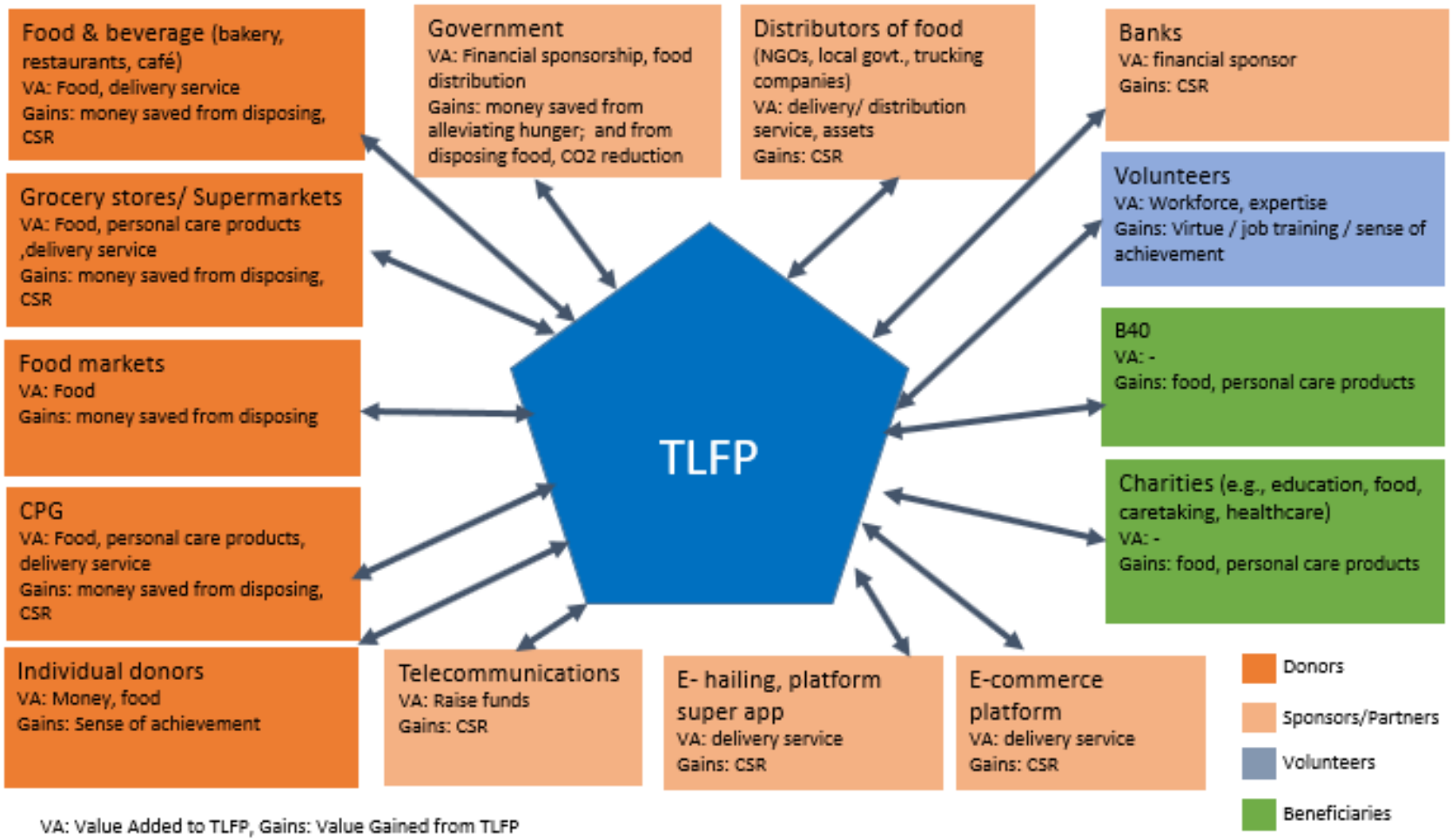


Figure 10 An overview stakeholders map. It describes the give-and-take relationship.

3.5.2 Identifying Stakeholders' value with interviews

We conducted exploratory semi-structured interviews in order to identify the value TLFP creates. It was conducted through online interviews/e-mail communication. The respondents were balanced in type of stakeholders, donors, recipients, and volunteers, because the perceived value may vary from different types of stakeholders. The content of question is summarized in Table 5.

Q1.	How long have you/ your organization been working with TLFP? How familiar are you with what they do?
Q2.	How are you or your organization helping TLFP?
Q3.	How do you or your organization are benefited from engaging with TLFP?
Q4.	Do you have any other questions or comments or me?

Table 5 Questions conducted in a stakeholder's interview

Prior to the interview, we informed the research purpose to the interviewee and ensured that their responses would be anonymous, and only aggregated results will be communicated to TLFP. Likewise, we requested whether they would permit recording the interview, and we recorded the interview only when consent was explicitly obtained. When there was something, we wanted to know more in detail, we asked follow-up questions or interviewed again after the interview.

When creating an interview protocol, we referred to the methodology of Phadnis et al (2017) and Edmondson & McManus (2007). According to the former, interviewers first tell the interviewee about "there are no right and wrong answer" and anonymity, questions are generic, picking up keywords, then summarizing after their answer, following confirmation of something to add. They also emphasized not to make interviewees influenced by existing literature (Phadnis et al, 2017). The latter mentioned that the purpose of the "nascent" stage of interview is to grasp the overall idea, and interviewers should not "fish" interviewees (Edmondson & McManus, 2007).

3.5.3 Analyzing Interview Results

After the semi-structured interview was completed, we analyzed their answers, picked-up relevant key-words, then identified metrics to be measured in the next survey. For those stakeholder groups whom we were unable to contact, we used existing documents provided by TLFP as a supplementary source.

We used codification methods described in Gioia et al. (2013) for analysis, which extracts "1st Order Concept" from interviews, then classified into "2nd Order Theme" and "Aggregate Dimensions" (Figure 11; adapted from Gioia et al. 2013). For example, when a respondent said, "we know the recipients, because we had supported them before the connection with TLFP", the statement was converted into "donor knows the recipients" as 1st Order Concept, then "Visibility of Recipients" as 2nd Order Theme and "Traceability" as aggregate dimension.

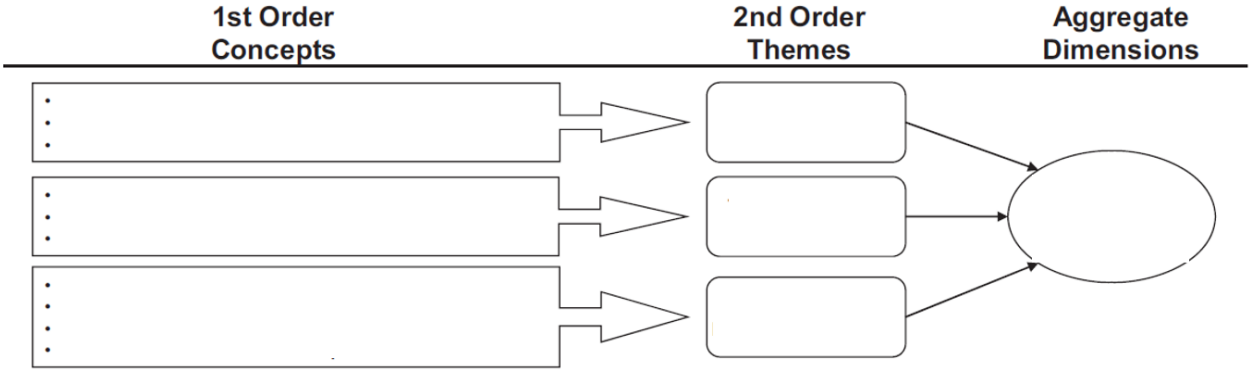


Figure 11 A skeleton data structure of a qualitative analysis called "Gioia Methodology".

3.5.4 Identifying Metrics to be measured

After the analysis of the semi-structured interview, we selected metrics from the 2nd Order Theme. The criteria are (1) measurability (2) balance between stakeholders (3) applicability to a broad context. We also added some metrics from existing literature after judging the applicability to TLFP. One major external source is Vittuari et al. (2017), who classified major 45 metrics of food redistribution activities by four types of stakeholders.

3.5.5 Measuring the metrics through a structured survey

We first created a questionnaire for the structured survey. This questionnaire consisted of the question statement based on the metrics, and the Likert Scale varying from 1 (strongly disagree) to 7 (strongly agree).

This survey was conducted via online platform. We created the form using “google forms”, on the cloud, and sent a link to the stakeholders. The questionnaire is provided in (Appendix B) with raw results.

The result analyzed which metrics scored a larger point than others for each stakeholder category. After the validation of the results, we identified the value that TLFP creates.

4 Results

In this chapter, we first provide the results of calculated economic (food and volunteering) value and environmental value as monetary value. Next, we provide the results of semi-structured interview, value metrics, and structured questionnaire for identifying what each stakeholder perceives the TLFP's value to be.

4.1 Economic and Environmental value

We used time period of 2000 for food quantity and volunteering hours. However, as an estimation of food unit price, we used the combination of household expenditure data in 2019 and food consumption data in 2018 due to the data availability (household expenditure data is given in 2014, 2016, and 2019, whereas food consumption data was up to in 2018). Likewise, we estimated the unit price of disposal cost based on the data in 2013.

4.1.1 Food Value

The result of the food value calculation is shown in Table 6. Food category and the quantity is based on TLFP's data. According to the data, TLFP handled 127,596kg of vegetables, 296,905kg of dry goods, and 34,033kg of bakeries in 2020. Unit price is estimated from average expenditure of household in 2019 and total supply quantity in 2018. As a result, the total annual food value is 2,023,757 MYR, or 505,939 USD, assuming 1MYR=0.25USD.

Food Category	Food Quantity (kg/year)	Unit Price (MYR/MT)	Food Value (MYR/year)
Vegetables	127,596	3,767	480,654
Dry Goods	296,905	4,437	1,315,593
Bakeries	34,033	6,685	227,511
Total	458,134		2,023,757

Table 6 Rescued food value based on market value.

4.1.2 Volunteering Value

The result of the volunteering value calculation is shown in Table 7. According to TLFP's data, the annual input of volunteer hours in 2020 is 21,786 (14,560 hour for "volunteers in

operation teams" and the rest is for "ad-hoc volunteers" who take charge in driving or warehouse works). The Malaysian minimum wage is calculated 8.57 MYR/hour, and median wage is 18.32 MYR/hour. Therefore, volunteering value is at least 328,666 MYR, or 82,167 USD.

Type of Volunteer	Volunteer Hours (hours/ year)	Unit Wage (MYR/ hour)	Volunteer Value (MYR/year)
Team Volunteer	14,560	18.32	266,739
Ad hoc Volunteer	7,226	8.57	61,927
Total	21,786		328,666

Table 7 Volunteering Value

4.1.3 Environmental Value

The result of the Environmental value calculation is shown in Table 8. TLFP reported they saved 458.34 tons of food and 870.85 tons of CO2 equivalent greenhouse gas in 2020. We use 30 USD / MT as an average of disposal cost in Malaysian landfill, and 8.75-30.14 USD/MT as CO2 price, as described in Chapter-3. We did not include disamenity cost due to the lack of data to measure properly. In total, TLFP saved 21,370-39,997 USD as an environmental contribution.

Category	Quantity (MT/year)	Unit Price (USD/MT)	Environmental Value (USD/year)
Disposal & Transportation Cost	458.34	30	13,750
Greenhouse Gas Emission Cost	870.85	8.75-30.14	7,620-26,248
Disamenity Cost	-	-(<10)	-
Total	-	-	21,370-39,997

Table 8 Environmental value (cost saving) of rescuing food from going to landfill.

4.2 Social Value Measurement

4.2.1 Results of Semi-Structured Interviews

We have asked to conduct interviews through TLFP, got approval from 14 stakeholders, and got actual reply from nine of them. We conducted an online interview with five stakeholders and got reply via email from four of them.

Aggregating by the type of stakeholders, we got three answers from donors, four from volunteers, and two from charities. As for the working/ collaboration duration with TLFP, one respondent worked less than 6 months, two worked 6-12 months, and six worked more than 12 months.

4.2.2 Results of Interview Analysis

We analyzed the interview results using "Gioia Methodology" (Gioia et al, 2013), which is described earlier in Chapter 3. As for the input sources, we add 10 statements from 6 existing documents provided by TLFP in order to have a balance of the type of stakeholders. In summary, we analyzed 15 inputs with 201 "1st Order Concepts", extracted 124 "2nd Order Themes", and 27 "aggregated dimensions".

4.2.3 What is the value stakeholders perceive?

We extracted 62 values and information related to direct benefits and key contributors (indirect elements that contribute stakeholders' satisfaction), as summarized in Figure 12, Figure 13, and Figure 14, respectively. Full results are presented in Appendix C.

4.2.3.1 Value for Donors

We extracted "Exposure on website" (D8), "Brand Image" (D6) as direct benefits to donors. Some of them mentioned that "Reducing Waste" itself is the value (D2, D16). We also extracted "Traceability" (D10-D12), "Visibility" (D9), "Continuity" (D16, D17), "Volunteers' Morale" (D20) as key contributors.

For Donors

Food Waste	Network
D1 Issues with Surplus perishables	D13 Leveraging Existing Donation Culture
D2 Satisfaction of non-waste	D14 Connecting to TLFP via Human Network
Food Donation	D15 Direct channel when operation is unavailable
D3 Willingness to Donate	Continuity
D4 Contribution to a community	D16 Operation Certainty
D5 Help Children	D17 Activity during COVID-19
Brand	D18 Logistics Bottleneck
D6 Positive Brand Image	About TLFP
D7 Less Priority of a Business Merit	D19 Activity known
D8 Exposure on social media	D20 Volunteer Morale
Traceability	
D9 Visibility of Recipients	
D10 Recording Quantity	
D11 Reporting	
D12 Not-Visual Reporting	

Figure 12 A summary of the interview analysis for donors

4.2.3.2 Value for Volunteers

We extracted “Interaction with Other Volunteers” (V9), “Variety of Job Allocation” (V1, V3), “Place of using Skill-Sets” (V2), “Education” (V11-V13) as direct benefits to volunteers.

For Volunteers

Job Allocation	Education
V1 Experience of Multiple Roles	V11 Exposure to societal issues of concern
V2 Using Skillsets	V12 Educating Self
V3 Suitable Job Allocation	V13 Learning Management
Job Coordination	Morale
V4 Clear Instruction of Work	V14 Sharing the same goal
V5 Coordinators with frontline volunteers	V15 Company's cause
V6 Detail information of volunteering procedure	V16 Previous experience of Volunteering
V7 Quick Response to Volunteers' questions	V17 Change of Perspective
Interaction	V18 Rewarding Job
V8 Various background of Volunteers	Sense of Contribution
V9 Meeting Like-minded People	V19 Sense of Achievement
V10 Helping Other Sections	V20 Satisfaction of Helping people
	V21 Contribution to a community

Figure 13 A summary of the interview analysis for volunteers

4.2.3.3 Value for Beneficiaries

We extracted “Food Security” (B7), “Food Quality” (B9), “Overall Support other than Food Provision” (B19, B20), “Focus on core Support” (B10) as direct benefits to recipients.

For Beneficiaries

Food Provision		Network	
B1	Accessibility of Fruits	B12	Quick Response to the needs
B2	Fruits and Vegetables Aid	B13	Organizing to direct connect
B3	Non-Food Aid	B14	Finding a right person to meet the needs
B4	Provided cooked meals	Overall Support	
B5	Dry/Wet foods and non-foods	B15	Activity during COVID-19
Health		B16	Visiting Charities
B6	Safe for Consuming	B17	Perspective Other than Food
B7	Nutritional balance	B18	Supporting Social Concerns
B8	Good Quality of Food	About TLFP	
Budgeting		B19	Activity known
B9	Concentration on other issues	B20	Volunteers Morale
B10	Enabling of Budgeting	B21	Aid Visibility
B11	Covering Charity's Limitation		

Figure 14 A summary of the interview analysis for beneficiaries

4.2.3.4 Other Findings

Many stakeholders valued volunteers' quality and high-morale (D20, B20), and continuity during the COVID-19 pandemic when resource availability was limited (D17, B15). Three stakeholders stated that recommendation or experiences of other people connected them with the organization (D14, B19).

4.2.4 Value Metrics

We selected 29 metrics from existing literatures and 28 metrics from the interview. The result is in Table 9. After the metrics identification, we reorganized (divided separate elements, integrate similar elements, and reworded) the metrics for questionnaire. For example, Vittuari et al. (2017) classified "Impact on skills, education, and training" for volunteers as one category, but we divided these three and further divided "job training" into "work related skills" and "social related skills".

Q. No.	Metrics	Source	Interview No.
For Donors			
1	Achievement of Social Goals (CSR)	[1]	
2, 3, 4, 12	Efficiencies and Cost Savings in the value chain, More Profits, Tax Deduction	[5][6]	
5	Improved Quality	[6]	
6, 7, 8	Enhanced Customer Royalty, "free" advertising, Brand Image	[1][5][6]	D6, D8
11	Retaining Talent, Employee Motivation, Employee Satisfaction	[5][6][7]	
9,10	Increase Barriers to entry, Differentiation	[5][6]	
11	Increased Awareness on Food Waste, Desire to do good	[1][6]	
13	Avoiding Government Regulation, Avoiding Legal Actions	[6]	
13	Risk Mitigation, Compliance, Brand Degradation	[4][6]	
14	Sense of Contribution	[1][7]	D4
15	Amount of handling Capacity	[3]	D16
16	Distribution of Perishables	[3]	D1
17	Traceability		D9, D11
For volunteers			
1, 2, 8, 9	Impacts on Skills, Education, Job Training	[1]	V2, V6, V12
4	Social Integration, Social wellbeing	[1][8]	
6	Satisfaction, Happiness	[1][9]	V18, V20
5	Sense of Contribution	[1]	V21, V24
7	Improved Physical Wellbeing	[8]	
6	Improved Mental Wellbeing	[8]	
3	Interaction with other colleagues		V13
10	Job Variety, Job Allocation		V1, V3
For Beneficiaries			
1	Covering Basic Needs	[1]	B2, B5
7	Food Security	[1]	B6

Q. No.	Metrics	Source	Interview No.
2	Nutritional Balance	[1]	B7
3	Quality of Food	[1]	B8
4	Quantity / Frequency of Food	[3]	
5	Services Other than food / non-food provision	[2]	B3, B5
6	Budget Savings	[1]	B9, B10, B11
1	Satisfaction of Needs	[1]	
9	Overcoming Social Exclusion	[1]	
9	Stigmatization Free	[1]	
9	Sense of Autonomy	[1]	
8	Quick Response		B12

Q. No; corresponding to the questionnaire no, Interview No; corresponding to the interview analysis, [1] Vittuari et al. (2017), [2] Schneider (2013), [3] Bazhergi et al. (2016), [4] Mejia et al. (2015), [5] Sprinkle & Maines (2010), [6] Ksiezak (2016), [7] Hansen & Spitzeck (2011), [8] O'Brien et al. (2010), [9] Moll et al. (2006).

Table 9 Selected value metrics.

4.2.5 Results of Structured Questionnaire

The survey was conducted from 2021/05/07 to 2021/05/20. The results shared below are the "concept" listed in the survey, and the full content of questionnaire is given in Appendix B . Perceived values are summarized in Figure 15, Figure 16, and Figure 17, respectively.

4.2.5.1 Distribution of Respondents

The number of respondents is 155 (23 donors, 102 volunteers, 28 beneficiaries, 2 others) out of 260-280+ asked respondents (40+ donors, 180-200 volunteers, and 40+ beneficiaries). The response rate was ~57.5% for donors, 51-56.7% for volunteers, and ~70% for beneficiaries. The numbers of respondents of donors by segments are 4 bakeries, 6 FMCG companies, 2 grocery and supermarkets, 5 restaurants, 3 individual donors, and 3 other segments. The distribution of working duration with TLFP is in Table 10.

Working duration	donors	volunteers	charities	total
less than 6 months	11	39	2	52
6 - 12 months	7	16	5	28
1 - 2 years	5	15	9	29
more than 2 years	0	32	12	44

Table 10 The distribution of respondents of the structured questionnaire

4.2.5.2 Donors' Result

Out of 17 questions, the highest scores were the sense of contribution (6.17) and traceability (6.17), followed by the reliability of distribution of perishable items (6.13), capacity of handling a large amount of donation (5.87), and CSR (5.74). On the other hand, compliance (3.22), capital access (3.39), profits (3.57) were the least scores. Interestingly, direct benefits like cost savings, brand image, and advertising are not ranked high, which were 9th (4.74), 7th (5.09), and 12th (4.13), respectively.

Looking at the result, three out of top five elements are related to supply chain. This substantiates the interview result of "not asking for a business merit" (D7) and "operational certainty" (D16). The result implies that supply chain creates value.

Looking at the coefficient of variance, clear gap is seen between 1-6th rank and afterwards.

A difference between segments is seen in the result. For "Improved Profit" element, groceries marked 6.0, whereas bakeries, FMCG companies, and restaurants marked below 4.0 (Figure 15).

Rank	Concept	Average	Coef.Var.	Bakery	FMCG	Grocery	Restaurant	Individual
1	**Contribution**	**6.17**	**0.19**	6.0	6.5	7.0	5.8	5.7
1	**Traceability**	**6.17**	**0.22**	6.3	6.5	6.5	5.4	6.7
3	**Perishable Distribution**	**6.13**	**0.20**	6.8	6.5	6.5	5.4	5.7
4	Amount Capacity	5.87	0.29	6.5	6.2	6.5	5.2	5.0
5	CSR	5.74	0.22	5.8	6.2	6.0	5.2	5.7
6	Efficiency	5.39	0.26	6.0	5.5	6.0	5.0	5.3
7	Brand Image	5.09	0.30	4.8	5.3	6.5	4.2	5.7
8	Customer Royalty	4.87	0.34	4.8	5.2	5.5	5.2	4.7
9	Cost Saving	4.74	0.33	4.3	4.8	6.5	4.4	5.3
10	Quality of goods	4.52	0.38	4.3	4.2	6.0	5.4	5.0
11	Differentiation	4.52	0.40	5.0	4.8	6.5	3.4	5.0
12	Advertising	4.13	0.41	4.3	4.8	5.5	3.0	4.7
13	Motivation	4.09	0.31	4.0	4.5	4.0	4.0	4.0
14	Entry Barriers	3.74	0.41	4.0	4.0	4.0	3.0	4.3
15	**Profits**	**3.57**	**0.48**	3.8	3.2	6.0	2.4	5.3
16	**Capital Access**	**3.39**	**0.48**	3.5	3.5	3.0	3.0	3.7
17	**Compliance**	**3.22**	**0.44**	3.8	3.2	2.5	3.4	3.3

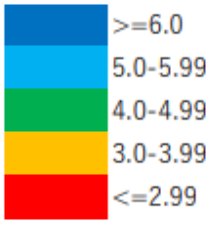


Figure 15 A map of the score of donors' perceived value with a breakdown by segments

4.2.5.3 Volunteers' Result

Out of ten questions, the highest score was the sense of contribution (6.48), followed by satisfaction (6.13), and education (5.88). The least scores were related to gaining work skills (4.64), improving physical wellbeing (4.77), and high job variety (5.27). Unlike the donors' result, the least high scores are marked higher than 4, so closer to "agree". As for the skills, gaining "social related skills" (5.55) ranked higher than "work related skills", and "using skills" (5.76) ranked higher than those two.

Looking at the result, top two concepts are related to "morale", and these two outpaced other concepts. This result implies that mission, vision, and leadership are essential part of TLFP,

and these are the basis of “high-morale” of volunteers acknowledged by other stakeholders (D20, B20) and “quick response” to the beneficiaries’ needs (B12) in the interview results.

Looking at the coefficient of variance, top two ranked elements showed low while bottom two showed high.

Rank	Concept	Average	Coeff. Var.
1	**Contribution**	**6.48**	**0.12**
2	**Personal Satisfaction**	**6.13**	**0.18**
3	**Education**	**5.88**	**0.22**
4	Interaction	5.81	0.24
5	Suits Skill	5.76	0.23
6	Social Skill	5.55	0.27
7	Social Integration	5.53	0.27
8	**Job Variety**	**5.27**	**0.31**
9	**Physical Wellbeing**	**4.77**	**0.34**
10	**Work Skill**	**4.64**	**0.36**

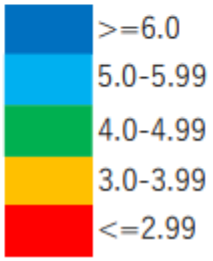


Figure 16 A map of the score of volunteers’ perceived value.

4.2.5.4 Beneficiaries’ Result

The beneficiaries’ respondents are all charities who receive food and services from TLFP and distribute it food to individuals in need. Out of nine questions, the highest score was the quick response (6.07), followed by basic food needs (5.86), money saving (5.57) and food security (5.57). The least scores were provision of 3 meals a day (4.30), non-food products (4.63), and overcoming loneliness (4.92). Similar to the volunteers’ result, even the least high score exceeded 4 (the middle between 1 to 7).

Looking at the result, the most significant value is not psychological or nutrition, but covering basic needs and responsiveness, which are deeply related to supply chain management. The result indicates that TLFP is not merely a food providing company, but a partner to solve the beneficiaries’ needs, and the quick response is the core competence of TLFP.

Looking at the coefficient of variance, bottom three concepts showed high, meaning more deviated opinions.

Rank	Concept	Average	Coef.Var.
1	**Quick Response**	**6.07**	**0.23**
2	**Basic Food Needs**	**5.86**	**0.24**
3	**Save Money**	**5.57**	**0.31**
3	**Food Security**	**5.57**	**0.28**
5	Quality of Food	5.46	0.30
6	Balanced Meals	5.22	0.35
7	**Overcome Loneliness**	**4.92**	**0.41**
8	**Non-Food**	**4.63**	**0.46**
9	**3 Meals a Day**	**4.30**	**0.46**

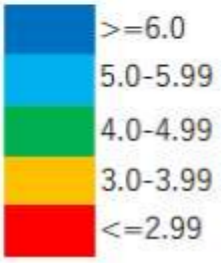


Figure 17 A map of the score of beneficiaries' perceived value.

5 Discussion

In this chapter, we discuss the new findings from the results, suggestion to the sponsor company, benefits to the food bank industry, limitations, and opportunities for future research.

5.1 Theoretical Implications

5.1.1 New Findings from the Results

From our research results, what is interesting is that stakeholders seem to categorize as direct value, items that make engaging with charitable organizations easier or better. For example, “visibility” and “traceability” were not expected to score that high, as in the semi structured interviews we did not detect any significant emphasis. Some donors and recipients valued “volunteers’ morale”, which potentially means that volunteers make a larger positive contribution than they expect, beyond the mere volunteering job itself. As for the volunteers’ perception, “Interaction with other volunteers”, “variety of job” and “clear instruction” were quite interesting findings. Their perceptions may be summarized as “job training” or “job satisfaction”, which can explain the volunteers’ high motivation. “Food safety” as a positive perception is also interesting, because in the existing literature “food safety” has a negative connotation (for example, Bazerghi et al, 2016).

Although overall tendency of scoring is similar between donor types, a great contrast is seen in profits improvement (“Profits”), where groceries marked it high, and others marked it low. For other type of stakeholders, there was no segmentation data.

We found what are the values that each stakeholder perceives and difference between stakeholder segments. A further research is needed to identify the reason why they think so.

5.2 Practical Implications

5.2.1 Suggestions to the Company

Our research is valuable to TLFP because we shed some light on understanding what is the value they create. TLFP has to ensure that it provides the best service along the criteria of

contribution, traceability, and reliability of handling perishable items. TLFP's processes need to be well documented and reported transparently to the donors. In order to achieve this, TLFP should create deeper and more meaningful relationships with stakeholders. Specifically, they should work closer together with donors to understand better the level of traceability required and understand how they define reliable operations as for TLFP to deliver accordingly. Finally and especially for donor businesses, TLFP could work closer with them to identify opportunities for profit improvements, better access to capital, and increased compliance.

They should also work closer with beneficiary organizations to make sure they can provide the food security that is needed. What would specifically improve TLFP's position would be to try to provide 3 meals a day to beneficiaries as well as provide non-food items. Finally, managers should adopt human resources tools and techniques to make sure they understand deeper what makes volunteer engagement satisfactory and fulfilling so as to offer a better value proposition to volunteers. In turn this will enhance performance, awareness, and motivation. Additionally, when it comes to volunteers, TLFP could work towards enabling them to learn or improve work-related skills.

To achieve the above, managers can develop relevant KPIs and other metrics for monitoring and decision-making purposes.

5.2.2 Benefits of the Discovery to the Industry

By knowing what works and what does not work, the industry as a whole can create certification standards (ex. for operation excellence). Specifically, the industry, through certification bodies can train and monitor companies like TLFP to ensure maximum performance and effectiveness.

Additionally, we suggest that the industry adds social related metrics in measuring value apart from the traditional, usual suspects of the value of food saved, volunteering time, and environmental impact, some examples can be sense of contribution (for volunteers and donors), feeling happier (for volunteers), etc.

5.3 Limitations

An important limitation is that we had no face-to-face interviews. We only had interviews through video calls (five out of nine), and the rest via email. As a result we had to resort to literature to complement our understanding and construct the questionnaire. Due to time constraints, we did not have the opportunity to have enough follow-up, clarification interviews with some of the interviewees, again issues attributed to the fact that we did not have enough face-to-face interviews to ask follow ups and clarifications on the spot. Additionally, we could not interview all types of stakeholders described in the stakeholder map of Chapter 3. For example, we could not conduct an interview of governments, financial donors, delivery providers, PPR (low-cost housing) and B-40 (income bottom 40%) Community groups.

Respondents of interviews did not cover all types of companies. As discussed in Chapter 4, the number of organizations who responded is relatively low, only three different donors and two charities. So we had to rely on literature which means that we missed an opportunity to potentially find new insights and update or expand the literature on this front. Additionally, the respondents of donors are all bakeries. Finally, we could not get any responses from wholesale markets and individual beneficiaries.

A limitation on the survey is that questionnaire potentially limited the respondents' perception within the listed questionnaire, and we could not elicit information outside the list.

5.3.1 Analysis limitations

For estimating food value, we did not know exact categories of donated food, so we assumed some aggregated categories. For the volunteering value, since we do not have the exact breakdown of the different positions, we assumed conservatively a median urban wage rate which potentially downplays the true value of the volunteering workforce engaged. (e.g., many of the volunteers are well qualified holding top management roles – most likely worth more than the assumed wage rate). For estimating environmental value, landfill and disamenity cost we did not have access to appropriate data. Finally, a limitation on social value is that the qualitative analysis we undertook is inherently subjective.

5.3.2 Limitations Caused by COVID-19

Due to the COVID-19 pandemic, communication was very limited. All research was done remotely, because entering Malaysia was restricted. Therefore, we could not conduct a face-to-face interview, and we could not visit TLFP, and see in actions the actual operations. We had to rely on email-based communication, missing out the benefits of face-to-face interaction. How to overcome these situations is a future task, not only for our research, but also for all research made during this period.

5.3.3 Replicability

Our research is based on the narrow context of the specific sponsor company, not based on a wider research among the overall industry, region, etc. As our research is based on a single company, it is not certain whether it is applicable to a food bank network. Our research is based on a Malaysian context, which may differ from other countries (e.g., the level of poverty, availability of volunteers, ease of transportation, average income, market prices of food, wages, and level of food waste, other competing charities and food banks, government support, etc.). What makes our research even more narrow is that TLFP is not a typical foodbank but rather a platform trying to address both food waste and hunger.

5.4 Opportunities for Future Research

5.4.1 Research to address limitations

To overcome the short sample size and limited variety of stakeholder groups, it is necessary to include a wider and more complete stakeholder group for inputs for future research.
We conducted semi-structured interview and structured questionnaire for data collection.
For future research, other techniques such as workshops with NGOs should be included as to facilitate a conversation among stakeholders resulting in a more well thought response from stakeholders' side.

Future research should attempt to quantify the social impact elements in a structured and universally accepted way so that the value can be used as a basis of comparing performance in a way of different NGOs.

Future research could enrich current methods / models to validate and improve the findings (both on the semi structured interviews (e.g., more open-ended questions to perhaps differentiate motives form preferences, question from different angles such as what-if, reason, or pros-cons, etc.) and on the structured interviews.

This research is based on one organization in one country. To assess general applicability of our findings, future research needs to apply our method to other contexts (other type of NGOs or similar NGOs in other countries).

5.4.2 New Questions raised by our research

There are new questions raised by our research as follows.

- Why donors (corporates) prioritize traceability, reliability, contribution to society over cost and brand benefits?
- To what extent knowing stakeholders' preferences can improve the value created from the organization?
- What is more important for donors and volunteers, the cause itself or the ease of "doing good" (quick response, ability to handle perishable foods, reliability of operations) by engaging with charities?
- What is the best way to address hunger and food waste
    - Raising public awareness
    - Develop food banking network, develop network with other NGOs
    - Collaborate with food banking networks in other countries
    - Create industry standard measurement and report with the standard

5.4.3 Untested Hypotheses

Major hypothesis is that knowing stakeholders' preferences and values, NGOs operations and overall value create increases.

Other hypotheses are as follows:

- There is room for improvement for TLFP to meet Stakeholders' identified needs

-Vegetable-rich donation composition helps nutritional improvement

-Some of the donated food does not meet the demand requirements (beneficiaries might expect certain type of food, but TLFP provides different types of food).

- Education activity, e.g., information sessions, campaigns, etc., can influence behavior and reduce food waste as well as increase food donation.

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7 Appendices

7.1 Appendix A. Food Unit Price Calculation

TLFP categorized food collection into vegetables, dry goods, and bakery. We assume fruits are categorized in vegetables.

- Household Expenditure

We use Selected Mean Monthly Household Consumption Expenditure, Malaysia, 2004-2019 ("Table 47"). According to it, the average monthly expenditure (food and non-alcoholic beverages) in 2019 was 783 RM, including 108 RM of bread and other cereals, 86 RM of vegetables and 53 RM of fruits. We subtract the bakeries, vegetables and fruits from the total as the expenditure of dry goods.

- Household Size

According to Statista2021 (Average household size in Malaysia from 2016 to 2019), the average household size is 4 in 2019, and the number is stable in the past 4 years.

- Food Supply per Capita

We use FAOSTAT data (Food Balance Sheet) and extracted Malaysian "Food supply quantity (kg/capita/yr)" in 2018. The raw data and the classification are Table 11 (value less than 1.00 kg/capita/yr is omitted from the table):

Item Code	Item	Unit	Value	[CATEGORY]
2511	Wheat and products	kg	47.44	Bakery
2805	Rice and products	kg	109.62	Dry
2514	Maize and products	kg	15.59	Dry
2516	Oats	kg	1.45	Dry
2520	Cereals, Other	kg	1.02	Bakery
2532	Cassava and products	kg	1.51	Dry
2531	Potatoes and products	kg	14.42	Dry
2534	Roots, Other	kg	1.7	Dry
2542	Sugar (Raw Equivalent)	kg	42.2	Dry
2543	Sweeteners, Other	kg	2.77	Dry

Item Code	Item	Unit	Value	[CATEGORY]
2546	Beans	kg	1.25	Dry
2556	Groundnuts (Shelled Eq)	kg	1.6	Dry
2560	Coconuts - Incl Copra	kg	6.16	Dry
2571	Soyabean Oil	kg	2.46	Dry
2576	Palm kernel Oil	kg	4.49	Dry
2577	Palm Oil	kg	6.88	Dry
2578	Coconut Oil	kg	1.23	Dry
2586	Oil crops Oil, Other	kg	1	Dry
2601	Tomatoes and products	kg	5.21	Vegetable
2602	Onions	kg	16.64	Vegetable
2605	Vegetables, Other	kg	46.93	Vegetable
2611	Oranges, Mandarines	kg	5.14	Vegetable
2615	Bananas	kg	8.35	Vegetable
2617	Apples and products	kg	3.4	Vegetable
2618	Pineapples and products	kg	8.7	Vegetable
2620	Grapes and products (excl wine)	kg	1.32	Vegetable
2625	Fruits, Other	kg	13.18	Vegetable
2635	Tea (including mate)	kg	1.04	Dry
2641	Pimento	kg	1.36	Dry
2645	Spices, Other	kg	2.87	Dry
2656	Beer	kg	8.99	Alcoholic
2731	Bovine Meat	kg	5.75	Dry
2733	Pig meat	kg	8.15	Dry
2734	Poultry Meat	kg	39.04	Dry
2744	Eggs	kg	17.9	Dry
2848	Milk - Excluding Butter	kg	5.02	Dry
2761	Freshwater Fish	kg	6.36	Dry
2762	Demersal Fish	kg	13.09	Dry
2763	Pelagic Fish	kg	18.16	Dry
2764	Marine Fish, Other	kg	10.61	Dry
2765	Crustaceans	kg	4.57	Dry
2766	Cephalopods	kg	2.53	Dry

Item Code	Item	Unit	Value	[CATEGORY]
2767	Mollusks, Other	kg	1.52	Dry
2680	Infant food	kg	1.69	Dry

Bakery total: 48.46 [kg/capita/yr], Dry total: 362.37 [kg/capita/yr], Vegetables total: 110.69 [kg/capita/ yr].

Table 11 Malaysian "Food supply Quantity" in Food Balance Sheet of FAOSTAT

- Unit Price Calculation

As a result, unit price of each category can be calculated as follows (Table 12).

Category	Household Expenditure [RM / household /mon]	Household Size	Food Supply [kg /capita /yr]	Unit Price [RM/ton]
Vegetables	139	4	110.69	3767.278
Dry	536	4	362.37	4437.453
Bakeries	108	4	48.46	6685.927

Table 12 Unit Price Calculation by Category

7.2 Appendix B. Structured Questionnaire and Result

We provide questionnaire by types of stakeholders. The first part of the questionnaire is asking the type of stakeholders as follows:

(1) I am a donor (me / my organization, donates food and / or other goods and services)
(2) I am a volunteer (I volunteer full or part time for [the organization] and its objectives)
(3) I am a beneficiary – Individual (I receive food donations from [the organization])
(4) I am a beneficiary – Charity (my organization receives food donations from [the organization])

For donors, we asked further classification as follows:

(1) A bakery company
(2) A FMCG/ CPG company
(3) A grocery store / supermarket
(4) A wholesale food market
(5) A restaurant company
(6) An independent / Individual donor
(7) Other

For each stakeholder, we asked the duration of working with TLFP as follows:

(1) Less than 6 months
(2) 6 – 12 months
(3) 1 – 2 years
(4) More than 2 years

The raw questions, the number of responses, average scores, and standard deviations are as follows (Table 13,Table 14, and Table 15):

For Donors

Seq	Concept	Survey Item	Num.	Ave.	Std. Dev.
1	CSR	By donating to TLFP I/ my organisation meet(s) my/ our Corporate Social Responsibility (CSR) requirements	23	5.74	1.25
2	Efficiency	By donating to TLFP I/ my organisation observe(s) efficiencies in my/ our organisation	23	5.39	1.41
3	Cost Saving	By donating to TLFP I/ my organisation realise(s) cost savings in my/ our organisation	23	4.74	1.54
4	Profits	By donating to TLFP I/ my organisation realise(s) more profits from my/ our goods/ services	23	3.57	1.73
5	Quality of goods	By donating to TLFP I/ my organisation achieve(s) improved quality in my/ our goods/ services	23	4.52	1.73
6	Customer Royalty	By donating to TLFP I/ my organisation achieve(s) enhanced customer royalty	23	4.87	1.63
7	Advertising	By donating to TLFP I/ my organisation achieve(s) "free" advertising	23	4.13	1.69
8	Brand Image	By donating to TLFP I/ my organisation enhance(s) our Brand's image	23	5.09	1.53
9	Differentiation	By donating to TLFP I/ my organisation differentiate(s) ourselves from competitors	23	4.52	1.81
10	Entry Barriers	By donating to TLFP I/ my organisation raise(s) the "entry barriers" of our industry	23	3.74	1.54
11	Motivation	By donating to TLFP I/ my organisation attract(s), motivate(s) and retain(s) talents	23	4.09	1.28
12	Capital Access	By donating to TLFP I/ my organisation increase(s) firm's access to capital and /or leads to more favorable lending terms	23	3.39	1.62
13	Compliance	By donating to TLFP I/ my organisation enjoy(s) favorable treatment from government, minimize(s) risks, increase(s) compliance, avoid(s) legal actions against me/ us, etc.	23	3.22	1.41
14	Contribution	By donating to TLFP I/ my organisation gain(s) a sense of contribution to society	23	6.17	1.19
15	Amount Capacity	We value TLFP because TLFP are able to handle / distribute a large enough amount of donation	23	5.87	1.69

Seq	Concept	Survey Item	Num.	Ave.	Std. Dev.
16	Perishable Distribution	We value TLFP because TLFP can guarantee the distribution of perishable goods with no/ minimum spoilage	23	6.13	1.22
17	Traceability	We value TLFP because TLFP traces where the donated goods are distributed	23	6.17	1.34

*Num: the number of responses, Ave: average scores, Std. Dev: standard deviation.

Table 13 Raw questions and scores for donors

For Volunteers

Seq	Concept	Survey Item	Num.	Ave.	Std. Dev.
1	Work Skill	By volunteering with TLFP I improve work related skills (e.g., project management, accounting, negotiations, etc.)	101	4.64	1.66
2	Social Skill	By volunteering with TLFP I improve social related skills (e.g., communication, empathy, relationship management, etc.)	102	5.55	1.51
3	Interaction	By volunteering with TLFP I meet like-minded people	102	5.81	1.40
4	Social Integration	By volunteering with TLFP I integrate into society (e.g.., understand local culture, meet local people, etc.)	102	5.53	1.48
5	Contribution	By volunteering with TLFP I contribute to society	102	6.48	0.78
6	Personal Satisfaction	By volunteering with TLFP I get personal satisfaction, I feel happier and I improve my overall mental well being (e.g., reductions in stress, mental fatigue, etc.)	102	6.13	1.09
7	Physical Wellbeing	By volunteering with TLFP I improve my physical well being (e.g., feel fitter, feel connected to my body, etc.)	102	4.77	1.65
8	Suits Skill	By volunteering with TLFP I can volunteer on a role that suits my skills	102	5.76	1.34
9	Education	By volunteering with TLFP I educate myself (learn more about the area/ topics TLFP is working on)	102	5.88	1.31
10	Job Variety	By volunteering with TLFP I find a variety of different jobs/ projects that helps me learn, grow, socialise more, etc.	102	5.27	1.63

*Num: the number of responses, Ave: average scores, Std. Dev: standard deviation.

Table 14 Raw questions and scores for volunteers

For Beneficiaries (Charities)

Seq	Concept	Survey Item	Num.	Ave.	Std. Dev.
1	Basic Food Needs	TLFP's donations help my organisation's members/ my community cover basic food needs	28	5.86	1.43
2	Balanced Meals	TLFP's donations help my organisation's members/ my community to have varied and balanced meals (e.g., meals including vegetables, meat, poultry, fish, fruits, cakes, etc.)	27	5.22	1.85
3	Quality of Food	TLFP's donations help my organisation's members/ my community to increase the overall quality of food consumed (e.g., more fresh food instead of packaged/ canned food, healthier food, etc.)	28	5.46	1.67
4	3 Meals a Day	TLFP's donations help my organisation's members/ my community to have 3 meals a day	27	4.30	1.96
5	Non-Food	TLFP's donations help my organisation's members/ my community with non-food goods and services (hygiene products, etc.) donations	27	4.63	2.11
6	Save Money	TLFP's donations help my organisation's members/ my community save money	28	5.57	1.73
7	Food Security	TLFP's donations help my organisation's members/ my community have a sense of food security	28	5.57	1.57
8	Quick Response	I value TLFP because they respond to our questions/demands quickly	28	6.07	1.39
9	Overcome Loneliness	TLFP's donations helps my organisation's members/ my community to overcome loneliness	26	4.92	2.04

*Num: the number of responses, Ave: average scores, Std. Dev: standard deviation.

Table 15 Raw questions and scores for beneficiaries

7.3 Appendix C. The result of the analysis using "Gioia Methodology"

The full result of the interview analysis are provided below (Table 16).

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
3	Donor took actions to reduce waste	Taking action to reduce waste	11.Food Waste
3	"Price down" or "produce to be eaten" have detrimental effects	Uneconomical alternatives of food waste	
11	the donor feels sense of fulfillment and satisfaction because their high-quality foods are not wasted and re-distributed to those in need	Satisfaction of non-waste	
3	surplus breads had been an issue	Issues with Surplus perishables	
3	donor struggled surplus bread issue for years		
3	freshness is a key value of bread		
3	Surplus breads were thrown away for a long time		
3	Surplus breads waste is inevitable and uncontrollable		
3	surplus breads are durable for 2-3 days		
3	surrounding community is the most important	Contribution to a community	12.Food Donation
11	The donor appraised TLFP for the contribution to the community		
11	TLFP distribute to hard-core poor around Klan Valley	Distributes to those in need	
11	donation sometimes includes B grades or rejected by shape	Donation of B grades or out shaped	

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
2	support TLFP with unsold breads	Donation of Unsold Breads	
11	donates unexpired breads, cinnamon rolls, cookies		
2	to help less fortunate children	Help Children	
3	donor did not know "donation"	Donor's awareness of donation	
3	When TLFP asked support, donor agreed on the spot	Willingness to Donate	
3	donor is willing to donate		
2	the donor get exposure from the campaign site through reference of TLFP	Exposure on social media	13.Brand
11	creates brand image by sharing in social media		
3	donor do not ask a business merit	Less Priority of a Business Merit	
2	exposure of the website to create a positive image	Positive Brand Image	
11	these efforts bring positive image and create more brand awareness		
3	traceability is important	Importance of Traceability	14.Traceability
3	the report does not tell the whole activity visually	Not-Visual Reporting	
3	when picking-up, donor and TLFP note the quantity	Recording Quantity	
3	they receive statistic donation report regularly	Reporting	

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
3	the report provides quantity as weight		
2	the donor knows TLFP sends breads to orphanage	Visibility of Recipients	
3	donors are familiar with recipients		
3	TLFP choose recipients in the donor's list		
3	donors want to support within a visible range		
3	Shop customer cared and supported the donor a lot	Caring and supporting customer	15.Network
3	A customer of the donor connected TLFP and the donor	Connecting to TLFP via Human Network	
11	When TLFP do not pick-up, the donor donate directly to their recipients	Direct channel when operation is unavailable	
3	donor supported charities before the connection	Leveraging Existing Donation Culture	
3	there are local charity events		
3	the local charity events were held twice a year		
3	Shop customers sometimes informed charity events		
3	TLFP asked the existing charity events		
3	There is a local charity network		
3	A customer becomes a volunteer of TLFP	Joining as a Volunteer	

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
2	volunteers are active during CMCO	Activity during COVID-19	16.Continuity
3	A staff member once supported food pick-up, but he was unable to continue	Continuity of Food redistribution activity	
3	Recipients are located in a driving distance	Logistics Bottleneck	
3	logistic burden of the donor prohibits donation		
3	it is thankful to bring surplus breads actually	Operation Certainty	
11	The donor hopes more companies can join in	Hoping more companies join	17.Scale-up
3	the volunteers are busy, which hampers changing the routine	Human Resource Bottleneck	
11	operation frequency increased to 4-5 days/week	Increased Operation Frequency	
3	donor apprehended operational burden on staff members	Operational Burden of Staff members	
3	A customer knows TLFP's activity well and are willing to support	Activity Known	18.About TLFP
11	The donor understands the scope and mission of TLFP		
2	impressive to see volunteers in their passion	Volunteer Morale	
3	TLFP driver picks breads at their timing in the next morning	Inbound Pick-Up Operation	19.Operation
3	Unpacked breads must be packed for delivery	Sort and Pack at a Donor's Premise	
3	donor sorts, packs unsold breads before delivery		

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
3	Some breads are unsuitable to eat at next morning	Unsuitable bread to donate	
2	during weekends	Working hours	
3	donor is not willing to operate donation every day at the first stage		
3	donate once a week.		
3	operation hours become a routine		
3	shop closes 17:00-19:00		
3	Increase the frequency is a possible expansion		
11	once a week donation at the beginning		
10	Work for campaigns	Campaign	31.Job Allocation
13	The volunteer changed the role from warehouse to events, and to management and procurement	Experience of Multiple Roles	
10	Work for money donation	Fundraising	
10	Work for a Point Program		
1	The committee in TLFP consists of multiple departments varying from warehouse management to government liaisons	Multiple Departments of Volunteers	
10	Work for Marketing, Education, Procurement, Warehouse, and join the Operation Meetings		

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
13	The volunteer started working as a warehouse, because this is the basic thing	Starting from a Basic Job	
10	Team allocates volunteers to a suitable job	Suitable Job Allocation	
10	Volunteer can do a work using his/her skill matches	Using Skill-Sets	
10	volunteers offer time skills and collaboration		
15	The learned skills in the past such as presentation skill are still used		
10	The volunteer takes multiple roles in multiple departments	Variety of Jobs	
10	TLFP offers a variety of projects ways for people to get involved		
1	There are many coordinators who work with frontline volunteers in TLFP.	Coordinators who work with frontline volunteers	32.Job Coordination
1	instructions are clear	Clear Instruction of Work	
1	The coordinators in TLFP respond quickly and they inform clearly what the volunteers should do next.		
1	TLFP informs volunteers the detail procedure (where, when, how) of food collection	Detail information of volunteering procedure	
1	They also inform when help is needed		
1	TLFP react promptly to volunteers ask or questions	Quick Response to Volunteers' questions	
13	TLFP replied to the volunteer's message first		
1	enjoy work together of other volunteers	Cozy Volunteering Environment	33.Interaction

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
1	volunteers, staff members are pleasant		
15	The volunteer also helps other sections	Helping Other Sections	
10	Feels nice to work with other volunteers	Meeting Like-minded People	
10	working with likeminded people		
10	nice to meet likeminded people		
1	TLFP has a very organized network of volunteers	Organized Volunteer Networks	
1	Volunteers consists of all walks of life including students, retirees, foreign people	Various background of Volunteers	
1	Interacting those who have different background is a good experience		
10	Team has a diverse backgrounds/visions of volunteers		
10	benefit of engaging is educating self	Educating Self	34.Education
10	education is one of the benefits		
15	Through teaching kids, the volunteer learns a lot at the same time		
10	Working TLFP educates how to support in key areas of sustainability	Exposure to societal issues of concern	
10	TLFP gives an insight of operating a Non-Profit	Learning Management	
10	Volunteer can learn more detailed, strategic level		

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
15	The volunteer changed the lifestyle to be more environmentally-friendly.	Change of Perspective	35.Morale
15	Another impact for the volunteer is a change of the lifestyle not to buy waste generating product.		
15	The biggest takeaway is to be responsible and not to make a waste in the first place		
13	The volunteer was fascinated by TLFP's cause	Company's cause	
15	When the volunteer saw TLFP's cause, she thought that it was the most related.		
15	The biggest impact for the volunteer is to be able to affect other people's lifestyle	Impact to Others	
10	one of the TLFP objectives is to increase awareness	informing / educating society	
10	Could not continue the work at another NPO due to the COVID-19	Previous experience of volunteering	
13	The volunteer worked in another NGO before working with TLFP		
10	Jobs are interesting and rewarding	Rewarding Job	
15	The volunteer never regrets to be in an education team as teaching children is important		
10	Seeking something to contribute during the covid	Searching Volunteering Job	
10	TLFP has video call to introduce new volunteers		
13	The volunteer searched and sent messages to several NGOs		

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
1	Whenever working at the warehouse, the volunteers get to meet old and new other volunteers, which is a positive sense, because they are looking at the same goal and trying to be efficient as possible.	Sharing the same goal	
10	TLFP members are passionate about the cause		
10	common objectives with other people		
10	Have a charity experience before the connection with TLFP	Socially concerned person	
1	feel great to be part of a community of food reduction	Contribution to a community	36.Sense of Contribution
10	sense of community		
10	innate urge to feel worthy	Innate Nature of Doing worthwhile	
15	The volunteer feels benefit to make an impact to a number of families and charities through the work.	Making an impact on Society	
13	The volunteer feels satisfied by helping as much as possible	Satisfaction of Helping People	
10	The impact of TLFP makes volunteers feel that they are achieving something	Sense of Achievement	
15	The volunteer contributes to TLFP by doing own research and helping others		
10	Corporates do it with CSR obligations in mind	Donors' CSR perspective	37.Other
15	TLFP made a strategic partnership with ISEC to reach out local schools	Partnership with other NGOs	38.Background
13	The job in management team is allocating work to volunteers according to their areas and available time	Allocating Operation	39.Operation

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
13	Every Thursday from 09:00, the volunteer works for sorting and collecting vegetables	Collecting Vegetables in Warehouse	
13	The job in management team is adding data from a list of new volunteers	Data input of new Volunteers	
1	weekly pickup and delivery of bread from bakery to charities	Deliver Bread	
15	Some schools are not welcome, and some schools are welcome	Different Acceptance of Schools	
15	TLFP does not sell their provision. Therefore, fundraising is important	Importance of Fundraising	
13	The job in procurement team is adding in daily delivery notes data and monitoring the delivery until sending to charity homes	Monitoring delivery	
1	delivery vegetables from a warehouse to the charity	Outbound Delivery	
13	Charity homes representatives pick up allocated vegetables and dry goods	Outbound Delivery	
13	Warehouse job has procedures and rules to follow up	Ruled procedures in warehouse job	
13	Every Wednesday evening, the volunteer works in another group where they segregate out different types of vegetables	Segregating vegetables in Warehouse	
1	weekly sorting and packing of vegetables at a warehouse	Sort and Pack at a Warehouse	
15	The volunteer's role is to engage student and raise their awareness about food waste	Volunteer's role	
15	In education activity, volunteers do talks, programs, challenges, and quizzes		
15	For university and master students, volunteers also teach marketing and		

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
	corporate strategy with some awards for competition		
15	Education activity is made of talks, challenges, and mini projects		
15	First, volunteers talk the size of food waste, which is surprising for many students		
15	Volunteers talk statistics, then relate to the familiar things in order to capture the size of the waste problem		
15	After talking, volunteers let students think what they can do and make some challenges in school next day.		
1	work for few hours every week	Working hours	
4	recipient cannot buy fruits in their life	Accessibility of Fruits	51.Food Provision
14	Refugees are struggling, because they have no jobs	Aid for jobless people	
14	TLFP also support food aid directly to individual home	Direct support for individuals	
12	TLFP donates dry/wet foods and non-foods	Dry/Wet foods and non-foods	
5	partner with TLFP to provide food aid	Food Aid	
5	donates meals/dry foods on a spot basis		
6	donate food packages of fruit and vegetables	Fruits and Vegetables Aid	
12	The charity receives meat, poultry, vegetables, exotic food, cakes and cookies		

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
5	collect other supplies like schoolbooks, etc.	Non-Food Aid	
7	donate food aid and hygiene packs		
12	The charity also receives household products, washing liquids, instant foods, specific items for children or girls, depending on the donation.		
12	Some restaurants and individuals provide cooked meals	Provided cooked meals	
14	TLFP gives "good food" such as food ready to cook or fresh	Good Quality of Food	52.Health
12	these cooked meals contribute to the limited protein supplies	Nutritional balance	
8	recipients feel safe in consuming donated food	Safe for Consuming	
8	ensures donated food is sanitized, dated and packaged		
14	The food provision enables the charity to see other issues such as family issues and registration	Concentration on other issues	53.Budgeting
12	The charity has to spend their money on educational purpose, not buying food.	Covering Charity's Limitation	
14	The charity covers education and other expenses but does not cover food, so end-recipients cannot eat well		
12	Despite the provided donation varies, it is enough for the charity to make a budget	Enabling of Budgeting	
12	The charity contributes to TLFP by helping them find out how to use their resource	Charity's Role	54.Role
14	The charity contributes to TLFP for connecting end-recipients distribution	Connecting end-recipients	

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
14	The charity knows who are in needs, as they know individually.		
14	The charity mainly helps refugees and low-income family	Helping End-Recipients	
12	the charity has a limited opportunity to contribute to TLFP	limited opportunity of a charity	
12	TLFP find donors and provide the charity's needs when the charity had needs	Finding a right person to meet the needs	55.Network
12	The charity appraises TLFP for networking	Networking Ability	
12	when TLFP could not correct foods, they organized the charity to collect from the closer bakeries	Organizing to direct connect	
12	The charity calls a TLFP's liaison when they have special needs		
12	TLFP connects the charity to e-haling supermarket and allow the charity to collect the e-hailer's warehouse		
12	The liaison can find a person to help immediately	Quick Response to the needs	
12	During MCO, TLFP takes an important role to help the residents in need	Activity during COVID-19	56.Overall Support
12	Even when pandemic, TLFP continued to support in another way such as sending directly or connecting the charity to a bakery		
12	TLFP contacted and assured the charity during the pandemic		
12	The charity gets an idea of another perspective of what to do, by interacting volunteers	Perspective Other than Food	
12	TLFP compile their resources and social concerns coming from the charity	Supporting Social Concerns	

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
12	TLFP visits the charity at least once a year	Visiting the charity	
12	The charity knows well TLFP's activity	Activity Known	59.About TLFP
14	The charity got to know TLFP and approached to them.		
14	The charity got to know TLFP from a Facebook and other people's experience		
14	The end-recipients know somebody is helping	Aid Visibility	
12	The charity appraises TLFP for people and services	Volunteers Morale	
12	The charity appraises volunteers' sincerity and commitment		
12	The core resource of TLFP is not only material, but also people who can do something		
12	The charity is under a catholic church where a lot of people can help	Charity's background	68.Background
12	The charity has their own sources of single donors and two other organizations	Other NGOs	
12	Once pandemic started, everything is shut down	Pandemic Effect	
12	The charity is satisfied the weekly basis donation	Frequency of Donation	69.Operation
14	The charity has 6-7 areas, and choose one area for TLFP to provide	Selection of who are to be received	
12	The charity goes to a warehouse and pick up on a weekly basis	Weekly picking up to a warehouse	
5	donates surplus bread 3 times a week	Working hours	

Who	1st Order Concept	2nd Order Theme	Aggregate Dimensions
9	drivers and volunteers are busy		

Aggregated Dimensions number: 11-29, donors, 31-49, volunteers, 51-69, beneficiaries.

Table 16 Full result of Interview Analysis

Respondents' profiles are below (Table 17).

Respondent No.	Category	Communication	Source
1	Volunteer	Email	Primary
2	Donor	Email	Primary
3	Donor	Interview	Primary
4	Recipient	-	Secondary
5	Charity	-	Secondary
6	Charity	-	Secondary
7	Charity	-	Secondary
8	Charity	-	Secondary
9	Charity	-	Secondary
10	Volunteer	Interview	Primary
11	Donor	Email	Primary
12	Charity	Interview	Primary
13	Volunteer	Email	Primary
14	Charity	Interview	Primary
15	Volunteer	Interview	Primary

Table 17 Respondents' profiles of the interview