Developing Stakeholder-Centric Sustainability Indicators for Plantation Agriculture - A Participatory Action Research Approach

DINISH NADARAJA

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Nottingham Trent University
School of Animal, Rural and Environmental Sciences
Brackenhurst Campus, Southwell, Nottingham

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Copyright statement

Dissemination activities from this research

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Declaration

I declare that this research is completely my own work. This thesis submitted for the Degree of Doctor of Philosophy at Nottingham Trent University. It has not been submitted before for any university or degrees.

(Signature of candidate)

Date: **12/09/21**

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Abstract

Plantation agriculture is one of the fastest growing agricultural sub-sectors in the world and contributes significantly to national income and employment in many developing countries. However, plantation agriculture has also aroused significant sustainability concerns and as such, sustainability assessments have emerged as crucial for the survival and viability of plantation companies. This has given rise to the need for suitable sustainability indicators. Although a wide variety of sustainability indicators have been developed to monitor and assess the sustainability of agricultural systems in general few, if any, have been developed specifically for plantation agriculture. Furthermore, most conventional research methodologies on sustainability often utilize a top-down approach.

One of the main criticisms regarding this approach is the lack of input from local stakeholders regarding sustainability indicator selection and development. As such, the indicators selected via the top-down approach do not necessarily reflect the value judgements of local stakeholders as well as address the sustainability issues specific to plantation agricultural systems. This can prevent the adoption of these indicators by the local stakeholders which in turn can hinder the development and implementation of an appropriate sustainability assessment toolkit for plantation agricultural systems. Therefore, the aim of this research is to develop user-friendly and stakeholder-consensus based sustainability indicators for plantation agricultural systems via a bottom-up, participatory action research (PAR) methodology.

An Abaca plantation system in Indonesia was used as a case study for this research. The implementation of the methodology for this research was carried out through a cycle involving four stages. Stage 1 involved utilizing a range of methods namely key informant interviews, document reviews as well as focus group discussions to identify a diverse range of stakeholder groups for this research (e.g. local community members, government officials, business organizations). The interest-influence matrix was then utilized to select and prioritize different stakeholders for this research from the list of stakeholder groups identified. Approximately 22 stakeholder groups were selected as key stakeholders for this research. Stage 2 involved utilizing the modified Delphi method to identify and select relevant sustainability indicators for this research from the perspectives of the identified and selected stakeholders (from Stage 1) to develop a draft set of sustainability indicators. A preliminary list of 33 sustainability indicators

were then selected by the stakeholders which encompassed the four main dimensions of sustainability.

The selected 33 sustainability indicators were then piloted tested collaboratively with the stakeholders to determine the effectiveness of the indicators in assessing the sustainability performance of the Abaca plantation system. This pilot testing process (Stage 3) resulted in the removal and modification of some of the initially selected sustainability indicators thereby resulting in the approval of 25 indicators by the stakeholders. The final 25 sustainability indicators also encompassed the four main dimensions of sustainability. The final stage (Stage 4) involved reflecting on the entire PAR process (from inception to completion) and understanding the appropriateness, effectiveness and success of the overall research process from the stakeholders' perspectives as well as lessons learnt for future research.

The final reflection stage (Stage 4) provided insights into the challenges and solutions regarding the use of a PAR approach towards the development of a user-friendly and stakeholder-consensus based sustainability indicators for plantation agricultural systems. This stage revealed that despite the numerous challenges associated with this research process, the PAR approach could enable the participants (stakeholders) to understand the diverse sustainability issues associated with the plantation agricultural system and integrate these issues with the wider context of sustainability. Therefore, the outcomes of this research supports the arguments made by proponents of the PAR approach in which this approach can ethically engage different stakeholders in decisions that can change their understanding of a sustainable agricultural system and thereby contribute to the long-term discussion about sustainability assessments within plantation agricultural systems. For this research, this approach also resulted in the development of a context-specific and stakeholder consensus-based sustainability indicators for plantation agricultural systems.

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Acronyms and abbreviations

CEC - Cation Exchange Capacity

CO_{2eq} - Carbon Dioxide Equivalent

GHGs - Greenhouse Gases

GNP - Gross National Product

GM - Genetically Modified

GBE - Grading and Baling Establishment

ha - Hectare(s)

hrs - Hour(s)

IDEA - Indicateurs de Durabilite des Exploitations Agricoles (toolkit)

IPM - Integrated Pest Management

IPCC - Intergovernmental Panel on Climate Change

NGO - Non-government organisation

NPV - Net Present Value

PG - Public Goods Tool (toolkit)

PAR - Participatory Action Research

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-analysis (toolkit)

RISE - Response-Inducing Sustainability Evaluation (toolkit)

SAFA - Sustainability Assessment of Food and Agriculture systems (toolkit)

UN - United Nations

UNCSD - United Nations Commission for Sustainable Development

WHO - World Health Organization

List of codes used (Chapter Five)

FG1 - Focus Group (Round 1)

FG2 - Focus Group (Round 2)

PM1 - 1st Representative from PT Viola Fibre International

PM2 - 2nd Representative from PT Viola Fibre International

PM3 - Purico Group Ltd

GO1 - Labour Division

GO2 - Farming Division

GO3 - Land Permit Division

DOC1 - Indonesian Government Meeting Record Contract

DOC2 - Plantation Worker Contract

P1 - Photograph 1

P2 - Photograph 2

P3 - Photograph 3

P4 - Photograph 4

P5 - Photograph 5

Chapter One

Introduction

1.1 Chapter Introduction

In this chapter, an overview of the background and rationale behind this investigation is provided. Following this, the sustainability issues faced by plantation systems as well as the problems of implementing the concept of sustainability within this system are described. Moving on, the participatory approach is then suggested and described as a potential solution to these issues. Finally, the closing sections of this chapter outlines the research questions as well as overall aim and objectives of the research.

1.2 Plantation Agricultural Systems: Growth and Issues

Plantation systems are amongst the fastest growing agricultural sub-sectors particularly within many tropical countries due to strong and increasing demand for plantation commodities worldwide (Gerber 2011). This increasing demand for plantation crops (e.g. palm oil, sugarcane, cocoa and rubber) has resulted in the rapid expansion of the plantation area particularly within tropical and subtropical countries, such as Malaysia, Indonesia, Thailand and Vietnam (Fitzherbert *et al.* 2008; Goldemberg *et al.* 2008; Gerber 2011).

The rapid expansion of the plantation area allows plantation crops to be produced in high volumes, as quickly as possible and at competitive prices in order to meet global demands (Gerber 2011). Such expansion may occur at the detriment of valuable ecological habitats, such as peat swamp forests and natural rainforests, as found in the case of palm oil and sugar cane plantations in southeast Asia (Wicke *et al* .2011). As a result of such land use changes, plantations have often been accused of various environmental issues, such as increased emissions of greenhouse gases (GHGs), loss of biodiversity, water cycle destabilization, soil erosion, nutrient loss as well as land and water pollution (Wicke *et al.* 2011; FAO 2013; Fitzherbert *et al.*

2008). Besides these, due to the scale of land required for plantation operations, plantations can also involve the forceful takeover of lands and related resources, thereby displacing local populations and resulting in land tenure conflicts (Hall *et al.* 2017). Furthermore, although plantations typically employ a considerable number of unskilled labourers and usually offer substantial scales of wage employment to hundreds of thousands of people due to their relatively large sizes, they have also been associated with serious labour issues ranging from unfair firing, violence as well as inadequate and inconsistent wage payments (FAO 2013).

Despite their downsides, when managed properly, plantation systems can be a profitable business and can contribute significantly to the gross national product (GNP) and wealth of countries (Hartemink 2005). For example, in Ghana, exports from cocoa accounts for approximately 60% of the country's earnings, while in Indonesia, the revenue from cocoa is approximately USD 600 million per year (Hartemink 2005). However, agribusinesses today are beginning to realize that their business performance should not only be based on financial performance alone but needs to take into account the social and environmental implications of their business operations within different markets (Sheth *et al.* 2011). This is because consumers are not only becoming more aware of their purchasing choices but are also beginning to perceive certain agricultural products as being environmentally unfriendly (Ostfeld *et al.* 2019). For example, (Ostfeld *et al.* 2019) found that many British consumers perceived palm oil as more environmentally unfriendly compared to any other vegetable oil.

Furthermore, environmental NGOs such as Greenpeace are also beginning to link environmental issues with the brand labels of major agribusinesses such as Nestle and Unilever thereby compelling these businesses to ban and remove unsustainably produced agricultural products from their supply chains (Edwards & Laurance 2012). The change in consumer preferences, consistent pressure from environmental NGOs as well as purchasing boycotts by large, multinational agribusinesses are now forcing primary producers (plantation companies) to incorporate sustainable production policies within their business operations (Edwards & Laurance 2012). As such, both plantation companies and agribusinesses are beginning to recognise the significance of sustainability within their business models and that the way they respond to different sustainability challenges can determine both their market competitiveness and overall survival (Sheth *et al.* 2011).

1.3 The Challenges of Implementing Sustainability in Plantation Agricultural Systems

In order for plantation businesses to track and monitor their sustainability performance, sustainability indicators are required. A sustainability indicator can be defined as a measurable aspect of environmental, economic or social systems that is useful for monitoring changes and providing information relevant to the continuation of human and environmental well-being (EPA 2012). As such, sustainability indicators are not only a tool for measurement but also serve as a guide for how to comprehend the concept of sustainability (Alkan Olsson *et al.* 2009). Such indicators are typically used as part of a sustainability assessment toolkit to allow agricultural businesses to formulate strategies, track progress as well as refine policy and decision-making regarding sustainability issues (Yli-Viikari 1999; EPA 2012). Although a wide variety of sustainability assessment toolkits such as the Sustainability Assessment of Food and Agriculture Systems (SAFA), Response-Inducing Sustainability Evaluation (RISE), Public Goods Tool (PG) and Indicateurs de Durabilite des Exploitations Agricoles (IDEA) are available for agriculture in general, a limited number of these toolkits have actually been developed specifically for plantation agricultural systems.

Furthermore, most conventional sustainability assessments of plantation systems typically utilize a top-down approach to select sustainability indicators. In such an approach, an externally developed research design is utilized by a team of experts to modify and adapt a set of established sustainability indicators to the local situation without input from local stakeholders. (Khadka & Vacik 2012; Sturtevant *et al.* 2007). As such, one of the main criticisms with the top-down approach is that the unique characteristics of sustainability issues are often not sufficiently reflected in existing indicators (Khadka & Vacik 2012). Therefore, this approach is unlikely to be able to address the sustainability issues specific to plantation agricultural systems.

On this note, the indicators developed via a top-down approach may not necessarily reflect the value judgement of local stakeholders (e.g. plantation managers, farmers) and therefore, may be perceived as irrelevant or useless by them (de Olde *et al.* 2016). On this note, it is observed that the indicators developed via a top-down approach are criticized by local stakeholders as being complicated and time consuming with many of them being unable to understand the meaning and subsequent rationale for the indicators (de Olde *et al.* 2016). Therefore, sustainability indicators and the subsequent sustainability assessment toolkits that are developed via a top-down approach can often lack legitimacy and ownership in the eyes of local stakeholders (Khadka &Vacik 2012). This in turn can prevent the adoption and implementation of such toolkits.

As such, it is argued that sustainability toolkits must be context-specific and be as simple as possible while still addressing the complexity of the plantation system concerned (Binder *et al.* 2010; de Olde *et al.* 2016). In addition, such toolkits must also reflect the value judgements of local stakeholders in order to stimulate a response on-site by encouraging the stakeholders to take action to improve the sustainability of a plantation system (Khadka &Vacik 2012; de Olde *et al.* 2016).

1.4 Potential Solutions to Plantation Sustainability Assessment Issues

In order to develop an unambiguous and context-specific set of sustainability indicators for plantation agriculture, which is also perceived as legitimate by local stakeholders, a bottom-up approach is often proposed (Fraser *et al.* 2006).

In a bottom-up approach, local communities actively engage in the development process in a participatory manner by proposing criteria and indicators based on their perception of the individual situation (Khadka & Vacik 2012). Within the context of sustainable agricultural systems, this approach can hold the key in terms of raising relevant queries from different stakeholders regarding sustainable agro-ecological practices (Kumaraswamy 2012). This is because this approach allows diverse stakeholder perspectives to be expressed, confronted and negotiated to reveal a comprehensive picture of the social, economic and environmental complexities of the issues investigated (Binder *et al.* 2010). As this approach engages and involves stakeholders throughout the research process, it can ensure that their knowledge is fully integrated throughout the process (Schwilch *et al.* 2012). The local knowledge and values acquired from the stakeholders through this bottom-up approach are considered invaluable in designing, planning, implementing and monitoring complex and detail-specific resource management systems (e.g. agricultural systems) (Mutimukuru 2010). As such, through a bottom-up process involving diverse stakeholders, it is likely that the results obtained can have greater applicability which in turn can support the development of a sustainable agricultural system (Binder *et al.* 2010).

Although 'participation' has been a sought-after approach in sustainability interventions, especially in agriculture and natural resources management since as early as the 1990s, achieving participation in practice has been replete with challenges (Cohen 1997; Warner 1997; Neef & Neubert 2011; Schwilch *et al.* 2012).Firstly, whether local stakeholders participate in the research project depends to a great extent on their own characteristics, their expectations from the project and their opportunity cost of time (Neef & Neubert 2011). Time is a precious commodity not only for researchers but also for other stakeholders (Neef & Neubert 2011). As such, poorer stakeholders (e.g. plantation workers) in particular may be more concerned with meeting their basic requirements and thus, may not have time to get involved in the research process (Neef & Neubert 2011).

Secondly, local stakeholders tend to observe the behaviour of researchers, categorize their social position and use this classification in their interaction with the researcher (Neef & Neubert 2011). As such, the perception of the stakeholders regarding the researcher can greatly influence not only their willingness but, level of participation in the research process itself (Neef & Neubert 2011; Schwilch *et al.* 2012).Thirdly, as different stakeholders have different levels of interest and influence over the research project, there is a danger that more powerful and well-connected stakeholders can have greater influence regarding decision-making outcomes compared to more marginalized stakeholder groups (Reed *et al.* 2009). As such, due to the different power dynamics of different stakeholder groups, care must be taken to prevent abuse of power or marginalization of certain groups (Reed *et al.* 2009). Besides this, other challenges also include; wishful thinking regarding stakeholder collaboration, unclear targets and procedures, methods tailored to a single context as well as use of simplified cause and effect decision chains to address complex problems (Schwilch *et al.* 2012).

Despite these challenges, Brett (2003) argues that a bottom-up approach involving greater participation can work if it can be reconciled with expertise, low cost decision making and discipline within the selected organizational system (e.g. plantation system). This is because this approach views stakeholders as agents of change and allows the local knowledge generated to be reconciled with academic research (Neef & Neubert 2011). This in turn allows the local context to be effectively considered in the criteria regarding indicator development (Khadka & Vacik 2012). Therefore, through a bottom-up approach and extensive stakeholder involvement, it is likely that the sustainability indicators and subsequent sustainability assessment toolkit developed can have greater applicability which it turn, can support its adoption and implementation by the stakeholders.

1.5 Research Problems and Questions

With the research context set out, I now consider two interrelated research problems. The first is the lack of practical understanding regarding the specific sustainability issues within plantation agricultural systems from the perspective of different stakeholders. The second is the challenges to developing an unambiguous and context-specific set of sustainability indicators that is also perceived as legitimate by the stakeholders to measure the identified sustainability issues.

The first research problem stems from the definition of sustainability. Sustainability can be defined as an ideology or philosophy, a set of strategies, the capacity to fulfil a set of goals, or the ability to continue making improvements over time under changing conditions (Dale *et al.* 2013). The reason for this ambiguity is that 'sustainability' itself is a constantly evolving science and therefore, its definition depends on local conditions and stakeholders (Dale *et al.* 2013; Bell & Morse 2008). As different stakeholders have different criteria to measure sustainability, it is often difficult to identify specific sustainability issues within plantation systems that are relevant to them.

The second research problem interacts with the first in that as different sustainability issues within plantation systems are relevant to different stakeholder groups, there is often a disagreement among them regarding what to measure and subsequently, the selection of an unambiguous set of sustainability indicators (IISD 2009). The third research problem is that, although participatory approaches are proposed or at least in theory, to be a potential solution to address these issues and challenges, there are very few examples of its application in the plantation sector. A possible reason for this is because the conventional academic training of agricultural scientists with its strong emphasis on so-called 'hard science' approaches, makes it difficult for them to relinquish some control of the research process to local stakeholders, thereby reducing their active input into the research (Neef & Neubert 2011).

As such, these problems raise a number of questions namely:

- How can a participatory approach be designed and implemented for sustainability assessments in plantation agriculture?
- What are the potential benefits and challenges of implementing such an approach?
- What lessons and insights can be learned from the application of such an approach?
- What would a sustainability assessment toolkit that has been developed via a participatory approach look like?

1.6 Research Aims and Objectives

This research aims to answer these questions. Accordingly, the primary aim of this research is to develop a suit of context-specific and stakeholder centric sustainability indicators for plantation agricultural systems via a Participatory Action Research (PAR) approach. For this, the research utilises an Abaca plantation in Indonesia as a case study. Based on the application of the PAR in Indonesia, the research also aims to draw lessons regarding the application of participatory approaches in plantation sustainability assessment.

Towards the aims, the research seeks to achieve the following objectives.

i. Identify and select relevant stakeholders connected with the plantation system in Indonesia;
ii. Identify possible sustainability indicators that can be used in assessing the sustainability of the Abaca plantation;
iii. Collaboratively select and pilot test the suitability of the indicators together with the stakeholders; and
iv. Collaboratively reflect on the findings and the entire research process together with the stakeholders.

1.7 Thesis Structure

The subsequent chapters of this thesis are organized in the following way.

Chapter One highlights the sustainability issues within plantation systems as well as the growing demand from different interest groups (e.g. NGOs, consumers, agribusinesses) for better sustainability practices within this system. This chapter also outlines the issues regarding the selection of suitable sustainability indicators for plantation systems and subsequently the development of an appropriate sustainability indicators for plantation agricultural systems. Chapter Two presents the methodology for this research and also describes and discusses why a participatory approach is used as well as detailing the methods used.

Chapter Three, Chapter Four, Chapter Five, Chapter Six, Chapter Seven and Chapter Eight present the results of the investigation, divided into the four objectives to achieve the aim of this research. Chapter Three presents the diverse range of stakeholder groups identified for this research. This chapter also outlines and describes the methods used in identifying and prioritizing these stakeholder groups for involvement in this research process. Chapter Four presents the diversity of potential sustainability indicators for plantation systems present in the global literature. This is achieved via a systematic review of a sample of the global literature regarding sustainability indicators for plantation systems.

A modified Delphi process is then used to identify and select potentially relevant sustainability indicators for plantation systems from the perspectives of the stakeholders. The results of the modified Delphi process are divided between Chapter Five and Chapter Six due to the size of the results. Chapter Five presents the diversity of potential sustainability indicators for plantation systems identified from the perspectives of the stakeholders. Chapter Six presents the diversity of potential sustainability indicators for plantation systems selected by the stakeholders.

Chapter Seven presents the results of the pilot testing process in which the selected sustainability indicators are collaboratively tested with the stakeholders to assess the effectiveness of the selected indicators in assessing the sustainability of the plantation system. Chapter Eight acts as both a result and general discussion chapter. Chapter Eight presents the results of the evaluation of the participatory approach used for this research and also discusses the findings of the entire process as well as potential avenues for further work. Finally, Chapter Nine provides a conclusion to this investigation.

Chapter Two

Methodology- An Overview

2.1 Chapter Introduction

In the previous chapter, the background and rationale for this investigation were described and explained. In this chapter, the rational for the use of the Participatory Action Research methodology is explained. This next section of this chapter then describes the research area selected for this project.

In the subsequent sections of this chapter, the Participatory Action Research methodology used for this investigation is presented. Following on from this, the four stages of this investigation with respect to the methodology used are outlined and explained. The objectives as well as the methods employed for each of the four stages are also briefly explained.

2.2 Participatory Action Research

The primary use of a participatory approach is to be able to understand the preferences, values and attitudes of the stakeholders (participants) in order to understand the 'hows' and whys' of the underlying issue (Scott & Marshall 2009). This in turn allows the researcher to gain a close familiarity with a particular area of study through intensive involvement with people in their natural environment (Scott & Marshall 2009). As such, this strategy can create a space for non-academic community members to contribute to knowledge construction regarding the issues being investigated (Fletcher & Marchildon 2014). Therefore, this approach can be used to empower local community members to participate in resource management activities (Khadka & Vacik 2012). This is essential in building ownership regarding the whole process, which ultimately results in the development of more practical and meaningful indicators (Khadka & Vacik 2012). As noted by Mutimukuru (2010), it is essential to delegate authority to the local level, so that in effect, the rights and responsibilities related to the management of the resources are taken up by the local stakeholders.

In this research, I utilized a type of participatory approach known as Participatory Action Research (PAR) as my methodology to achieve the research aim and objectives. PAR is a collaborative partnership between a researcher and the stakeholders whom participate in the action research process (Rose *et al.* 2014). This process emphasizes on acquiring community knowledge (local knowledge) and therefore relies on local expertise (stakeholders) (Raza 2017). As previously mentioned, (see Section 1.3), one of the main reasons for using this methodology is due to the inadequacy and dissatisfaction with the top down approach of most conventional research methodologies on sustainability. This is because these methodologies (top down) rarely allow the researcher to understand the community needs which are necessary to design, implement and monitor detail specific and complex resource management systems (e.g. plantation agricultural systems) (Mutimukuru 2010). As the PAR approach respects diversity and focuses on understanding communities in relation to their distinct contexts, the results obtained from this investigation can have greater applicability which in turn can support the development of a more sustainable agricultural system (Binder *et al.* 2010; Raza 2017).

Figure 1 indicates a typical PAR cycle.

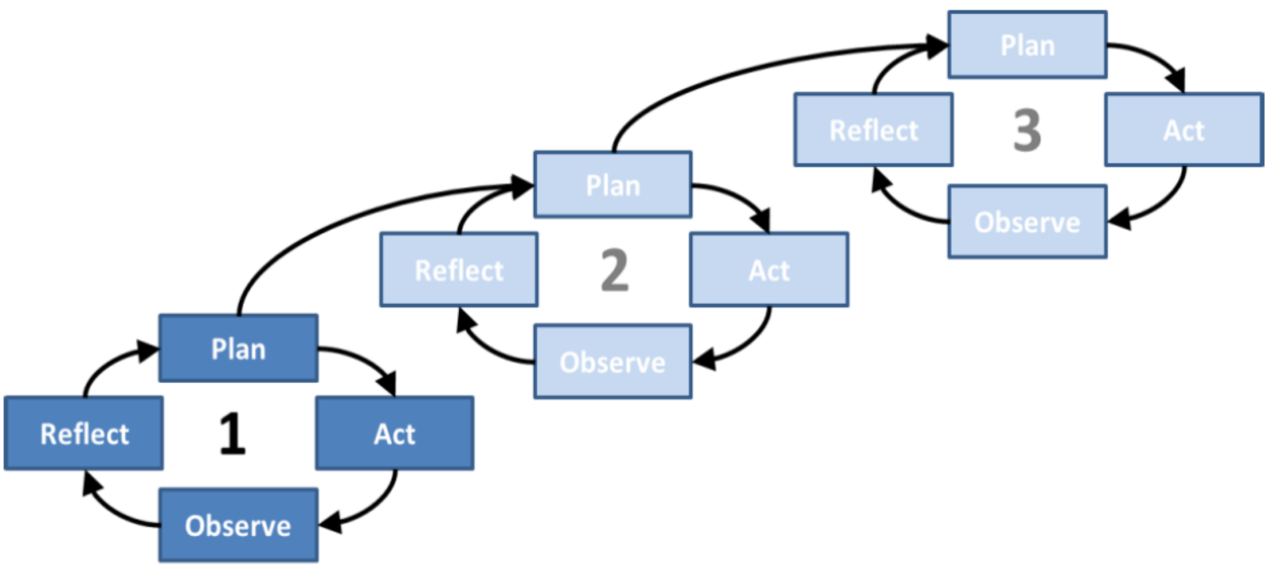

Figure 1: Participatory Action Research (PAR) Cycle (Rose *et al.* 2014)

As indicated in Figure 1, PAR follows a joint cycle of planning, action, observation and reflection (Rose *et al.* 2014). The first stage of the PAR cycle is the planning stage (Rose *et al.* 2014). During this stage, an action plan to achieve the research aims and objectives are developed (Scott & Marshall 2009). The second stage of the PAR cycle refers to the action stage (Rose *et al.* 2014). During this stage, the action plan designed during the planning stage is implemented with the understanding that flexibility is required as it may be necessary to revert to the planning stage if the initial action plan cannot be implemented (Fletcher & Marchildon 2014). The next stage of the cycle refers to the observation stage (Rose *et al.* 2014). During this stage, the results obtained from the implementation of the action plan during the action stage are monitored and observed (Rose *et al.* 2014). The 'last stage' in this cycle refers to the reflection stage (Rose *et al.* 2014). During this stage, the results of the observations during the observation stage are collaboratively analyzed and interpreted by the researcher and participants (stakeholders) to draw conclusions (Neef & Neubert 2011). As indicates in Figure 1, depending on the outcome of the analysis during the reflection stage, another action research cycle may be required (Rose *et al.* 2014). As such, this action research process can continue on indefinitely.

Within the context of a sustainable agricultural system, the PAR approach can help to promote social learning in which there is a co-production of knowledge by all the stakeholders involved (Schwilch *et al.* 2012). As such, this approach can ethically engage different stakeholders in decisions that can change their understanding of a sustainable agricultural system (Kindon *et al.* 2007). This in turn allows both the researcher and stakeholders to work collectively to achieve an equitable and more sustainable outcome (Kindon *et al.* 2007).

2.3 Research Location

This research was carried out on an Abaca plantation belonging to Purico Group Ltd in North Sulawesi (a province of Indonesia). Only a single plantation site was chosen as a case study for this research. As the level of engagement required between both the researcher and the stakeholders is relatively high, multiple case studies are not practical for this research. The willingness of the company (Purico Group Ltd) to engage in this research process as well as the company's influence over the other stakeholders within the region (Indonesia) made it easier to integrate both the company and other stakeholders into the participatory process. Figure 2 indicates the size and location of the plantation within the province of North Sulawesi (Indonesia).

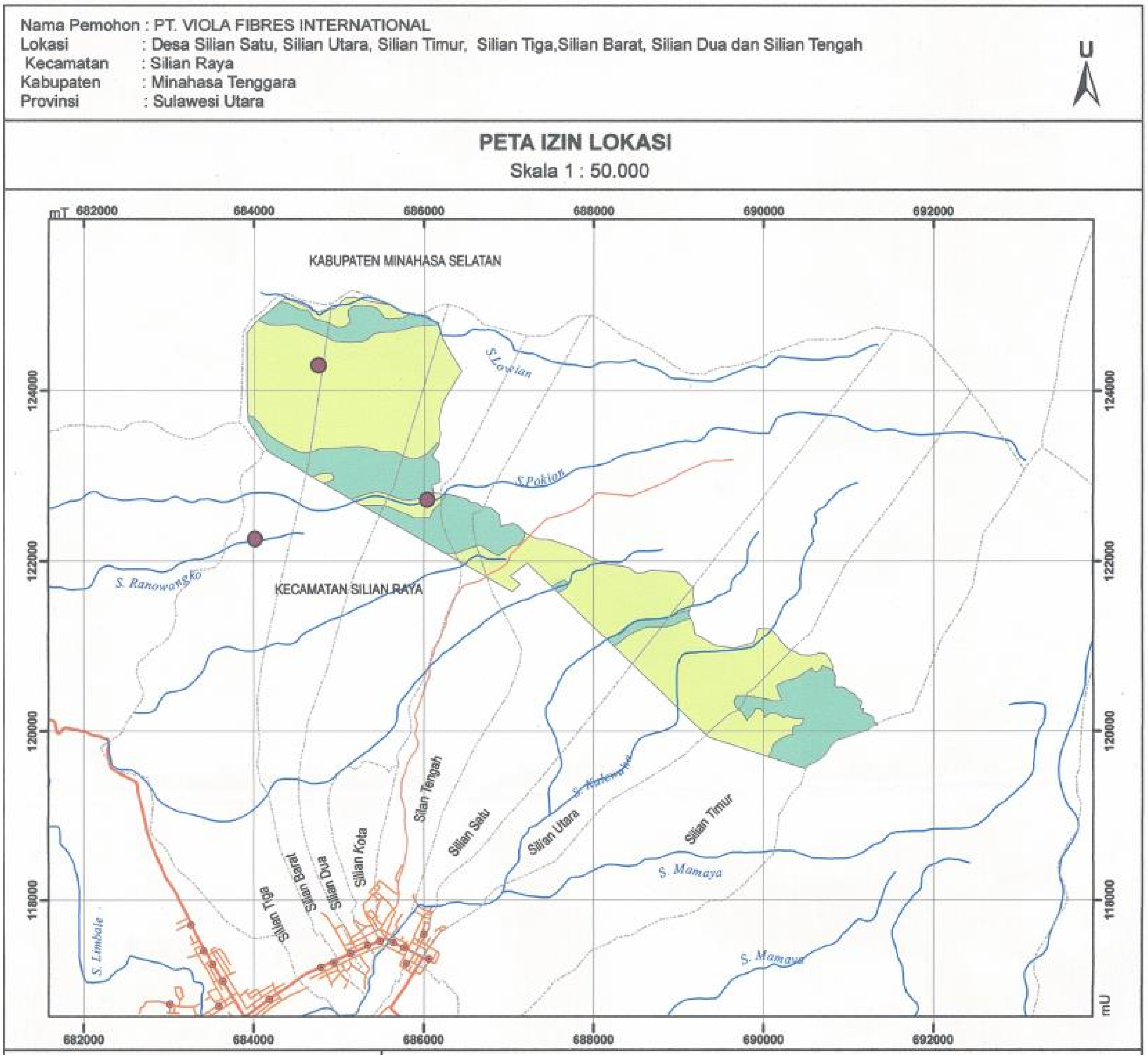

Figure 2: Size and location of the Abaca plantation in North Sulawesi (Indonesia) (source: Plantation Management; PT Viola Fibre International)

As indicated in Figure 2, the plantation site is located in the sub district of Silian Raya, within the district of southeast Minahasa. The plantation size encompasses an area of 1507 ha. The sub district of Silian Raya consists of 7 villages namely:

i. Silian Satu
ii. Silian Utara
iii. Silian Timur
iv. SilianTiga
v. Silian Barat
vi. SilianDua

vii. Silian Tengah.

These villages consist of hundreds of rural communities whom depend on and utilize the natural resources within the region (e.g. rocks, sand). Figure 3 and Figure 4 indicate the natural resources collected and utilized by the villagers.

Figure 3: Rocks collected by the local villagers (photo credit: researcher)

Figure 4: Sand collected by the local villagers (photo credit: researcher)

The natural resources (as indicated in Figure 3 and Figure 4) are utilized by the villagers to build their homes.

The local community members within this region primarily depend on agriculture particularly coconut farming as a source of livelihood. Figure 5 indicates coconuts being harvested by a local community member (villager).

Figure 5: Coconuts being harvested by a local community member (villager) (photo credit: researcher)

2.3.1 Abaca Plantation Agriculture

Abaca (*Musa textilis* Nee), is a tropical plant that is native to both the Philippines and northern Indonesia (Lalusin & Villavicencio 2015). Figure 6 indicates the young Abaca growing on the company's plantation in Indonesia.

Figure 6: Young Abaca growing on the company's (Purico Group Ltd) plantation in Indonesia (photo credit: researcher)

Abaca is the source of the biodegradable fibre known internationally as Manila hemp (Lalusin & Villavicencio 2015). This fibre is more resistant to saltwater decomposition compared to other natural fibres and also possesses higher tensile strength and lower elongation in both dry and wet states compared to synthetic fibres (Armecin *et al.* 2014; Lalusin & Villavicencio 2015). As such, it was often traditionally used as raw material for cordage and for making fishing nets (Lalusin & Villavicencio 2015).

Currently, Manila hemp is commercially used in making specialty papers such as tea bags and currency notes (Armecin *et al.* 2014). This fibre is also being used in making the upholstery of luxury automobiles (Armecin *et al.* 2014). With the current interest for sustainable and biodegradable products, the Abaca plantation industry is beginning to thrive in the international markets (Lalusin & Villavicencio 2015).

2.4 The Participatory Action Research Cycle Used in this Research

In order to achieve the research aim and objectives, a participatory action research methodology involving four stages was designed and applied for this project. The design of this PAR cycle followed the same principles of a typical PAR methodology (see Raza 2017; Rose *et al.* 2014). As with a typical PAR approach, the PAR methodology used in this investigation also had the potential to continue on indefinitely. However, due to the time constraints of this research, only a single cycle was carried out.

Each of the four stages of the PAR cycle for this research are listed in Figure 7 and explained below.

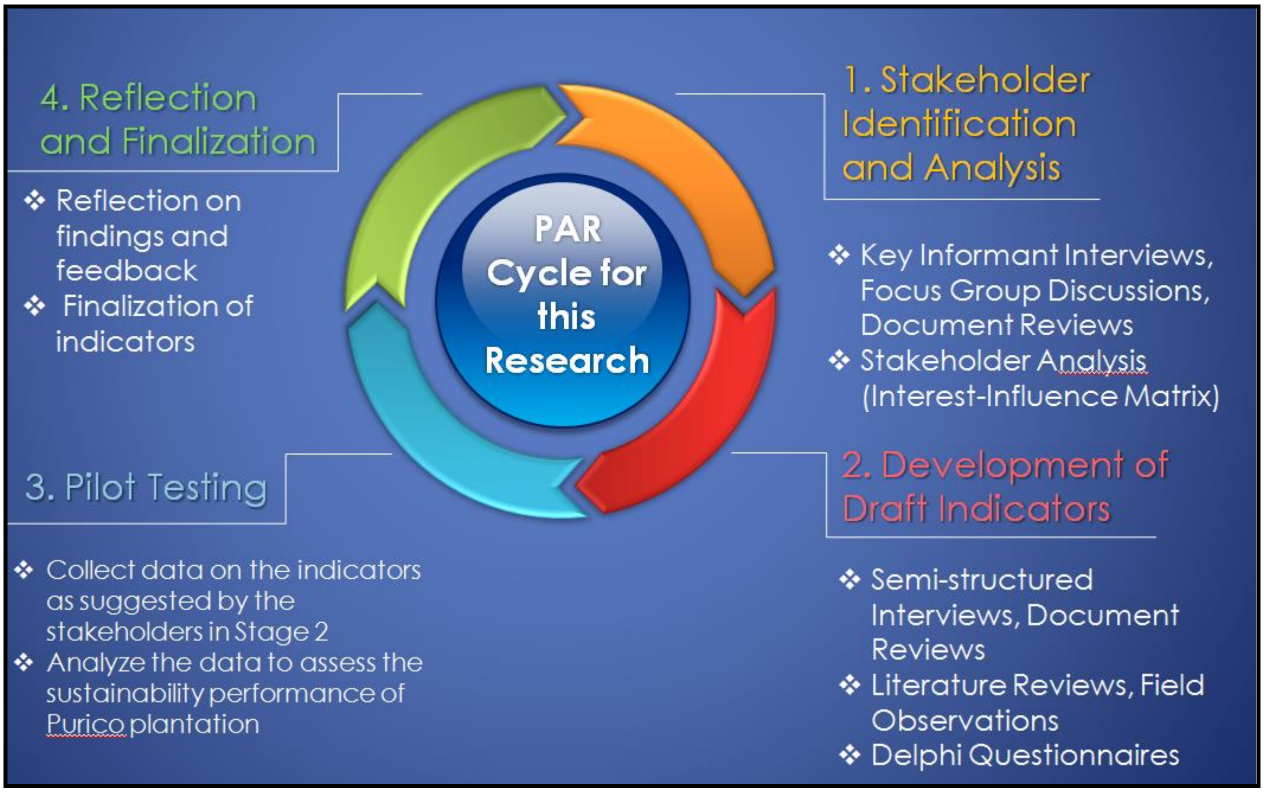

Figure 7: The Participatory Action Research Cycle used in this investigation

2.4.1 Stage 1: Stakeholder Identification and Analysis

Stage 1 involved both stakeholder identification and stakeholder analysis. As noted by Kesby (2007), problems or issues of concern must be established at the start of the research cycle. However, both the problem and desire to acquire a suitable and mutually acceptable solution must come from the stakeholders themselves and not forced upon them by the researcher (Walter 2009). As such, a major activity at this stage was the identification and selection of relevant stakeholders for this project.

Stakeholders for this research were identified using a range of methods namely key informant interviews, document reviews and focus group discussions (Colvin *et al.* 2016). The interviewees were identified for this research via the snowballing approach (Colvin *et al.* 2016). These methods are further elaborated in Chapter Three. The methods used helped in identifying a diverse range of stakeholders in order to fulfil one of the research's objectives which is to understand the sustainability concerns of different stakeholders from their perspectives. This is because a narrowly defined group of stakeholders is likely to exclude those who have little or no influence on the project but may possess experiential knowledge as well as value-based morals that can be invaluable to the project (Meppem 2000; Kaatz *et al.* 2006).

A stakeholder analysis was then carried out on the identified stakeholders in order to select relevant stakeholders for this research. The identified stakeholders were classified according to the typology developed by Eden & Ackermann (1998) in which the stakeholders were sorted into four separate categories based on their influence and interest regarding the project. These categories include 'Key Players', 'Context Setters', 'Subjects' and 'Crowd' (Reed *et al.* 2009). These categories are also further elaborated in Chapter Three. Through this analysis, it became easier to prioritize different stakeholders for involvement in the action research process of the project. As such, this process allowed stakeholders to be selected for a purpose in order to apply their knowledge to the problem under investigation (Hasson *et al.* 2000).

2.4.2 Stage 2: Development of Draft Sustainability Indicators

Stage 2 involved an application of a modified Delphi method to identify sustainability issues in Abaca plantation agriculture and subsequently develop indicators in order to monitor the identified issues respectively based on the perspective of the stakeholders identified from Stage 1. The Delphi Method is a particularly suitable method for identifying stakeholder consensus (Verhagen *et al.* 1998). It is particularly useful when an investigation requires the inputs of busy, geographically distant individuals (Geist 2010). The Indonesian participants are, overall, time-poor and geographically disparate. It was difficult for them to attend the multiple, face-to-face, group discussions required as part of this investigation. Thus, the Delphi method was an appropriate method for this investigation.

The modified Delphi method involved a combination of qualitative and quantitative methods with the identified stakeholders (Biggs *et al.* 2013). The Delphi method involved two parts. This first part was a pre-Delphi process. The pre-Delphi process involved the use of literature reviews, semi-structured interviews, documents reviews and field observations (see Chapter Three, Chapter Four and Chapter Five). The qualitative data obtained from these methods were then thematically analysed using the NVIVO^{TM} 11.0 software. The purpose of the pre-Delphi process and thematic analysis was to identify:

i. Sustainability issues relevant to the Abaca plantation system in Indonesia
ii. Sustainability indicators that are suitable for assessing the sustainability of this system

In the second part of the modified Delphi process, the sustainability indicators identified during the pre-Delphi process were designed into a structured questionnaire (Delphi Round 1) (see Chapter Six).

The questionnaire was used to facilitate controlled debates between the different groups of stakeholders in order to select suitable indicators that can be used to assess and monitor the sustainability of the selected Abaca plantation system. Descriptive analyses were then carried out on the data from the initial questionnaire by using IBM SPSS Version 25 (a statistical software package). A second questionnaire (Delphi Round 2) was then designed based on the results of the descriptive analyses conducted on the data from the initial questionnaire. The second questionnaire had the same number of questions but included a summary of the responses of the stakeholder groups from the initial questionnaire.

The stakeholders were then given the opportunity to reconsider their original answer (i.e. original selection of indicators) after examining the group response. Descriptive analyses were then carried out on the data from the second questionnaire and the results were processed. The purpose of the second Delphi Round (Delphi Round 2) was to identify a consensus among the stakeholders regarding the selection of suitable sustainability indicators to assess the sustainability of the Abaca plantation system (see Chapter Six). During the Delphi investigation, the anonymity of the participants was maintained. This was to prevent the deleterious effects of group interactions (Verhagen *et al.* 1998), such as confrontation between participants, forceful individuals overwhelming the group, as well as participants 'going with the flow' rather than giving their opinions in front of individuals of higher status (Glass *et al.* 2013; Fletcher & Marchildon 2014).

Consensus among the participants was then measured using Kendall's W. Kendall's W was chosen because it has been suggested in the literature as the most appropriate statistical method to measure consensus in a Delphi study (Okoli & Powlowski 2004), and because it can provide an indication of the strength of the consensus achieved (Schmidt 1997). The mathematical expression of Kendall's W is shown in equation 1.

$$W = \frac{12S}{m^2\,(n^3 - n) - mT} \quad \text{........... (1)}$$

Where,

S = the sum of the squares of the deviations of the rankings from the mean rankings

m = the number of participants

n = the number of propositions being ranked

T = the correction factor for tied ranks

The value of W ranges from 0 to 1, with higher values indicating a greater degree of consensus (Schmidt 1997). Schmidt (1997) suggests that a consensus may be considered to have been reached when the W value reaches 0.5 or greater.

2.4.3 Stage 3: Pilot Testing of Draft Sustainability Indicators

Stage 3 involved pilot testing the indicators (obtained from Stage 2) on the company's (Purico Group Ltd) Abaca plantation in Indonesia. During this stage, the indicators were pilot tested jointly by me and the relevant stakeholders (identified in Stage 1), using the company's Abaca plantation as a case study.

During this stage, data on each of the indicators were collected using the methods and sources of evidence suggested by the stakeholders and from data gathered via literature review (see Chapter Seven). As understood by now, the earlier stages of the PAR cycle mainly focussed on the identification of key stakeholders and critical issues connected with this research as well as the appropriate methods to collect information. In this stage, the focus shifted towards the appropriate methods to test and apply the collected information regarding the sustainability indicators used.

As such, a major output of this stage was the generation of information which answered the list of problems identified in the earlier stages of this research (see Section 1.5). For this research, the output, included the effectiveness of the indicators in assessing the sustainability of the plantation system, the sustainability score of the plantation system in relation to each respective indicator as well as the challenges of carrying out a joint pilot testing process and its respective solutions (see Chapter Seven).

Although the use of multiple case studies would have been useful for this research, however given the bottom-up and participatory based approach of this research, this would not have been possible. This is because it would have been difficult to gain access to stakeholders associated with other plantation systems without the approval of the respective plantation company first. As the company (Purico Group Ltd) has agreed to be part of this research, engaging with the stakeholders connected with this plantation system was possible.

2.4.4 Stage 4: Reflection and Finalization

Stage 4 involved reflecting on the entire PAR process from inception to completion regarding the research process in terms of the appropriateness of the research process, the efficiency of the research process and the overall effectiveness (success) of the research process. It also included my reflections on the entire research process as both a researcher and facilitator of the action research process. As such, this stage was important in understanding if the research process was useful in understanding and addressing the research questions.

The information discussed and evaluated during the reflection stage were based of the notes recorded by me in a reflection journal throughout the research process. Therefore, during this stage, the concept of ‘reflexivity’ was applied. As noted by Koch & Harrington (1998), this concept is important in order to ensure that the researcher can identify his/her feelings and pre-conceptions regarding the research and put aside these feelings in order to incorporate a ‘many voiced' account (i.e. participants' voices) rather than a 'lone voiced' account (i.e. researcher's voice only).

2.5 Chapter Conclusion

In this chapter, the methodology and methods used by this investigation were described. The rationale for taking a participatory approach particularly the use of a PAR methodology was also elaborated. The four stages of the PAR methodology used for this investigation were described along with the objectives of each stage as well methods used for each stage.

Chapter Three

Stakeholder Identification and Analysis

3.1 Chapter Introduction

In the previous chapter, the PAR methodology used in this investigation was illustrated and described. In this chapter, the first stage of the PAR methodology (Stakeholder Identification and Analysis) is described. In the subsequent sections of this chapter, the methods used to identify and categorize the relevant stakeholders associated with the Abaca plantation system in Indonesia are explained.

This chapter also outlines the identified stakeholders associated with the Abaca plantation system in Indonesia. This chapter then concludes with the challenges associated with stakeholder identification and analysis and describes potential solutions to those issues.

3.2 Importance of Stakeholder Identification and Analysis

For this research, I chose to use the normative definition of *stakeholder* which refers to anyone (individuals, groups and organizations) that can affect or be affected by an action or decision (Reed & Curzon 2015; Leventon *et al.* 2016). This normative definition does create the potential for a broad selection of individuals to be considered as stakeholders in the plantation agricultural system.

I argue that a broad selection of stakeholders is necessary as decision making regarding sustainability requires the integration of various types of knowledge and perspectives due to its complex and multidimensional nature (Meppem 2000; Bell & Morse 2008). Therefore, a narrowly defined group of stakeholders can likely exclude those that have little or no influence but, have experiential as well as value-based knowledge that can be invaluable to the project (Shepherd & Bowler 1997; Meppem 2000; Kaatz *et al.* 2006). When implementing the concept of sustainability within plantation agricultural systems, the input of different stakeholders associated with the agricultural system must be considered (Dale *et al.* 2013). By involving a wide range of stakeholders in the decision-making process, the various concerns and expectations of different stakeholders can be understood, which in turn can help facilitate mutual learning and negotiations as well as expose potential conflicts that can appear in the future (Leventon *et al.* 2016; Santoso & Delima 2017). As such, the stakeholder identification process must secure the participation of a wide range of stakeholders to incorporate the various kinds of knowledge including indigenous, non-technical and layperson's experiences into the decision-making process (Kaatz *et al.* 2006). Furthermore, as the participatory action research (PAR) approach utilized in this research emphasizes on diversity and acquiring community knowledge (local knowledge), a wide selection of stakeholders is necessary to not only discover the major issues and misconceptions regarding sustainability issues within plantation agricultural systems, but to also find the best solutions to those issues (Raza 2017).

Stakeholder analysis is then required to select relevant stakeholders from the list of stakeholders identified through the stakeholder identification process. Through the stakeholder analysis process, it becomes possible to not only determine which stakeholders should be involved but also how to prioritize the selected stakeholders for involvement in the decision-making process of the research (Maguire *et al.* 2012). Without stakeholder analysis, there is a risk that particularly powerful stakeholders can have greater influence over the decision-making outcomes compared to more marginalized and less influential stakeholders (Reed *et al.* 2009). Therefore, through the stakeholder analysis process, the level of power (influence) and interest of each identified stakeholder over the research can be understood. This in turn can help in the selection of relevant stakeholders to effectively involve in the decision-making process of the research (Reed *et al.* 2009).

3.3 Methods

The stakeholder identification process utilized a qualitative research design to identify stakeholders associated with the Abaca plantation system in Indonesia. The methods used for stakeholder identification are outlined as below.

3.3.1 Key Informant Interviews

Key informants are individuals who possess either special status, knowledge or communication skills and are willing to provide insight or information regarding a particular issue, region or target population to the researcher (Kumar 1989; Crabtree & Miller 1999). Key informant interviews are useful when descriptive information is required to understand the research area in greater detail (Kumar 1989). For this research, two interview sessions with two different key informants were conducted separately and one-on-one at their respective offices. Figure 8 indicates a key informant interview carried out with one of the key informants (company representative) in Indonesia.

Figure 8: Key informant interview with the company representative in Indonesia (photo credit: researcher) (note: photographs have been blurred to protect stakeholder's identity)

Before the start of each interview session, an explanation guide was provided and explained to the key informants. The explanation guide provided details of the project including the purpose of the project, the importance of sustainability within plantation agricultural systems as well as potential sustainability issues within plantation agricultural systems (see Appendix 1). The purpose of the explanation guide was to provide the key informants with an in-depth understanding of the direction and development of the project (Leventon *et al.* 2016). The interviews were conducted based on a semi-structured format using an interview guide which listed the topics to be covered during each interview session (see Appendix 7). Throughout the interview process, prompts were also used to subtly probe the informants to expand on each of the information discussed and to extract more information in greater detail. Key notes from each interview session were recorded in a 'Reflection Journal' and each interview session was also audio recorded and then manually transcribed later on.

At the end of each interview session, the snowballing approach was applied in which each of the key informants were asked to identify and list any stakeholders they thought were important or useful for the research. In this approach, each stakeholder encountered can act as an informant to identify other stakeholders for the research through established networks (Colvin *et al.* 2016).

3.3.2 Document Reviews

This method of stakeholder identification involved reviewing Indonesian policy and legal documents to identify additional stakeholders for this research. As noted by Colvin *et al.* (2016), the document review process can help identify parties whom are either interested or related specifically to the research or issue of concern.

The list of documents reviewed for this research include:

i. Indonesian Government Location Permit Contract

ii. Indonesian Government Meeting Record Contract

Details of these sources are provided in Appendix 2 and Appendix 3.

The document review process was used to complement the information provided by the key informants.

3.3.3 Focus Group Discussion

A focus group discussion was carried out with the plantation workers as suggested by the key informants (see Figure 9).

Figure 9: Focus group discussion with the plantation workers on the plantation grounds (photo credit: researcher) (note: photographs have been blurred to protect stakeholders' identities)

As indicated in Figure 9, the focus group discussion with the plantation workers was conducted on the plantation grounds within the worker resting area. As suggested by Satcher (2005), focus group discussions which are carried out in settings familiar to the participants can help ease stakeholders that may be intimidated by one-on-one encounters. Similar to the key informant interviews (see section 3.3.1), the focus group discussion was also conducted based on a semi-structured format using an interview guide. Key notes from the focus group discussion were recorded in a 'Reflection Journal' and the discussion was also audio recorded and then manually transcribed later on. Before the start of the discussion, an explanation guide was also provided and explained to the plantation workers.

Approximately 15 plantation workers attended the focus group discussion. Throughout the discussion process, prompts were also used to subtly probe the workers to expand on each of the information discussed. As stated by Varvasovszky & Brugha (2000), focus group discussions with a semi-structured format can help structure data collection while keeping the focus sufficiently broad to allow for hidden or emerging themes. At the end of the discussion, the snowballing approach was also applied in which the plantation workers were asked to identify and list any stakeholders they thought were important or useful for the research.

3.3.4 Interest-influence Matrix

The identified stakeholders were then classified using the typology developed by Eden & Ackermann (1998). Through this typology, it became possible to determine who should be involved and how to prioritize these stakeholders for involvement in the decision-making process of the project (Maguire *et al.* 2012; Reed & Curzon 2015). Without this form of stakeholder analysis, there is a danger that particularly powerful and well-connected stakeholders will have a greater influence on decision making outcomes compared to more marginalized groups (Reed *et al.* 2009). As such, this stakeholder analysis is crucial to be able to involve as many possible relevant stakeholders in the research project as well as prioritize these individuals and groups for involvement in the decision-making process (Spangenberg *et al.* 2018).

Through stakeholder analysis, the relevance and motivation of each of the identified stakeholders as well as their required level of involvement in the project can be understood (Spangenberg *et al.* 2018). Only by understanding who has a stake in an initiative and through understanding the nature of their claims and interrelationship with each other, can the appropriate stakeholders be effectively involved in decision making (Reed *et al.* 2009).This in turn can allow stakeholders to be selected for a purpose in order to apply their knowledge to the problem under investigation (Hasson *et al.* 2000).

In this typology, Eden & Ackermann (1998) used interest and influence to classify the identified stakeholders into four separate categories as illustrated in the interest-influence matrix in Figure 10. These categories include ‘Key Players’, ‘Context Setters’, ‘Subjects’ and ‘Crowd’ (Reed *et al.* 2009).

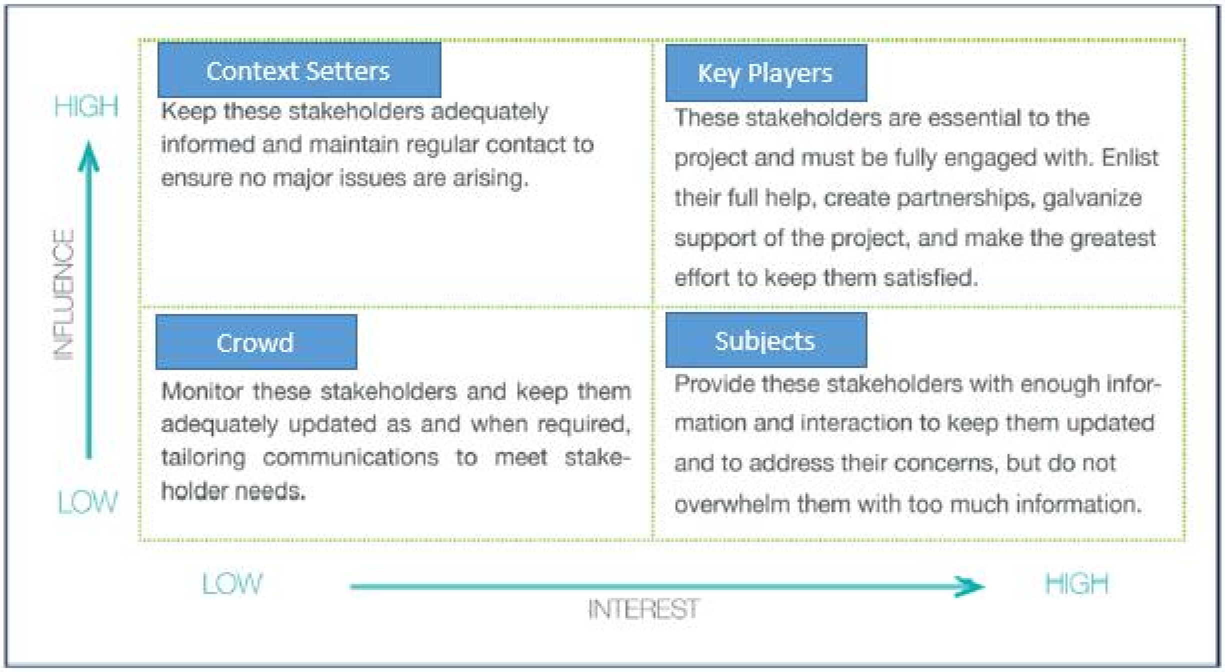

Figure 10: Classification of stakeholders according to interest and influence (Adapted from Spangenberg *et al.* 2018)

Stakeholders with high levels of interest and influence are termed 'Key Players' and are given the highest priority (Eden & Ackermann 1998). As indicated in Figure 10, these stakeholders are essential to the project and must fully be engaged with (Spangenberg *et al.* 2018). 'Context Setters' are stakeholders with high levels of influence but have low levels of interest (Reed & Curzon 2015). As such, they may have significant influence over the success of an initiative or decision but might be difficult to engage with in the decision-making process (Reed & Curzon 2015). However, as indicated in Figure 10, these stakeholders must still be regularly contacted and adequately informed to prevent major conflicts in the future (Spangenberg *et al.* 2018).

'Subjects' are stakeholders with high levels of interest but low levels of influence (Reed & Curzon 2015). Although they lack the capacity for impact, they may become influential by forming alliances with other more influential stakeholders (Reed & Curzon 2015). They are often the marginal stakeholders that might warrant special attention to secure their engagement and to empower them to engage as equals in any decision-making process (Reed & Curzon 2015). As indicated in Figure 10, these stakeholders should be updated regularly regarding the progress of the project to address any concerns they might have (Spangenberg *et al.* 2018). The 'Crowd' are stakeholders who have little interest in or influence over desired outcomes (Reed & Curzon

2015). However, these stakeholders should still be monitored and updated regarding the progress of the project as and when necessary (Spangenberg *et al.* 2018).

3.4 Results and Discussion

As indicated in Table 1, a total of 26 stakeholder groups were identified for this research using the methods explained previously (see section 3.3). These stakeholder groups encompassed four broad sectors namely; government, business, local community and public. As such, the stakeholder groups identified in this research encompassed the sectors as identified by Leventon *et al.* (2016) and Santoso & Delima (2017) to ensure that a wide range of stakeholder perspectives can be discussed and contested. The highest number of stakeholder groups were identified from the government sector while the public sector had the least number of identified stakeholder groups.

Table 1: Stakeholder groups identified in this research encompassing the government, business, local community and public sector

Government	Business	Local Community	Public
•Bupati (District Officer) (G1) •Regional Secretary (G2) •Assistant to the Regional Secretary (G3) •Spatial Planning Coordination Board (G4) •Public Works Division (G5) •Research and Development Division (G6) •Permit Division (G7) •Farming Division (G8) •Forestry Division (G9) •Living Resources Division (G10) •Labour Division (G11) •Investmentand One Stop Integrated Service Division (G12) •Division of Cooperatives and SMEs (G13) •Health Division (G14) •Land Use Division (G15) •Legal Division of Regioanl Secretariat (G16) •Governance and Regional Autonomy Division (G17) •Regency Head (G18) •Police Sector (G19) •Military Sector (G20)	•Purico Group Ltd (B1) •PT Viola Fibre International (B2) •Garuda Food (B3)	•Community Leaders (L1): Village Head (Silian 1) Village Head (Silian 2) Village Head (Silian 3) Village Head (West Silian) Village Head (East Silian) Village Head (Middle Silian) Village Head (North Silian) •Plantation workers (L2)	•National Youth Committee (NGO) (N1)

As indicated in Table 1, 20 stakeholder groups were identified from the government sector. These stakeholder groups include:

i. Bupati (District Officer)
ii. Regional Secretary
iii. Assistant to the Regional Secretary
iv. Spatial Planning Coordination Board
v. Public Works Division

vi. Research and Development Agency
vii. Permit Division
viii. Farming Division
ix. Forestry Division
x. Living Resources Division
xi. Labour Division
xii. Investment and One Stop Integrated Service Division
xiii. Division of Cooperatives and SMEs
xiv. Health Division
xv. Land Use Division
xvi. Legal Division of Regional Secretariat
xvii. Governance and Regional Autonomy Division
xviii. Regency Head
xix. Police Sector
xx. Military Sector

Two stakeholder groups were identified from the local community. These stakeholder groups include the community leaders and the plantation workers. Seven community leaders were identified namely:

i. Village Head of Silian 1
ii. Village Head of Silian 2
iii. Village Head of Silian 3
iv. Village Head of West Silian
v. Village Head of East Silian
vi. Village Head of Middle Silian
vii. Village Head of North Silian.

Three stakeholder groups were identified from the business sector. These stakeholder groups include:

i. Purico Group Ltd
ii. PT Viola Fibre International
iii. Garuda Food

Only one stakeholder group was identified from the public sector namely; the National Youth Committee.

The identified stakeholder groups were then tabulated into four tables (see Table 2, Table 3, Table 4 and Table 5). Table 2 represents stakeholder groups from the government sector, Table 3 represents stakeholder groups from the business sector, Table 4 represents stakeholder groups from the local community and Table 5 represents stakeholder groups from the public sector. The responsibility and level of influence (e.g. district, sub-district) of each stakeholder group as well as their respective interest and influence (e.g. high, medium or low) over the research project are also indicated in each table.

Table 2 indicates the stakeholder groups identified from the government sector as well as their respective responsibilities, level of influence and interest over the research project. Each of these stakeholder groups is assigned a code from G1 to G20.

Table 2: Stakeholder groups identified from the government sector

Code	Stakeholder Group	Responsibility of Stakeholder	Level of Influence of Stakeholder	Influence over the plantation's operation (High, Medium, Low)	Interest over the plantation's operation (High, Medium, Low)
G1	Bupati (District Officer)	• Highest authority in the district • Leads the administration of the Regency Council • Oversees laws that have been approved by the Regency Council	District of Southeast Minahasa (Indonesia)	High. Will have influence on all aspect of plantation development	High Will provide political support on all aspects of plantation development
G2	Regional Secretary	• Handles the organization and administration activities within the district • Approves business and organizational developments within the district • Reports directly to the Bupati	District of Southeast Minahasa (Indonesia)	High. Will have influence on all aspect of plantation development	High Will provide political support on all aspects of plantation development
G3	Assistant to the Regional Secretary	Assist the regional secretary in matters relating to: • Administration and economic development programs • Implementation of proper reporting, monitoring and evaluation activities in relation to the approved economic programs	District of Southeast Minahasa (Indonesia)	High. Will have influence over matters relating to the economic development of the plantation	High. Will provide political support to assist with the economic development of the plantation

G4	Spatial Planning Coordination Board	• Formulates the technical plans in regards to research and economic development within the district • Provides assistance to the assistant to the Regional Secretary in matters relating to economic development within the district	District of Southeast Minahasa (Indonesia)	High. Will have influence over matters relating to the technical aspect of plantation development	High. Will provide political support to improve the technical efficiency of plantation development
G5	Public Works Division	Formulate and implement policies in terms of: • Water resource management • Building administration • Drainage • Development and maintenance of roads	District of Southeast Minahasa (Indonesia)	High. Will have influence over matters relating to infrastructure development associated with plantation development	High. Will provide support to assist with infrastructure development in relation to plantation development
G6	Research and Development Agency	• Prepare technical policies as well as research and development programs • Monitor, evaluate and report on research and development progress • Coordinate with local agencies regarding the findings and progress of research and development programs	District of Southeast Minahasa (Indonesia)	High. Will have influence over matters relating to the agro-industrial development of the plantation	High. Will provide support to assist with the agro-industrial development of the plantation
G7	Permit Division	Responsible for providing industries with the necessary permits to carry out business activities within the district. Type of permits issued include: • Land allocation permit • Business activities permit	District of Southeast Minahasa (Indonesia)	High. Will have influence over matters relating to the compliance of the plantation with the policy requirements of the contract	High. Will provide support to ensure that the plantation complies with the policy requirements of the contract

G8	Farming Division	Responsible for overseeing farming operations and activities within the district. List of activities include: • Crop management • Chemical use (pesticides and fertilizers) • Machinery use (tractors) • Farming practices (soil and water management)	District of Southeast Minahasa (Indonesia)	High. Will have influence over matters relating to the farming activities of the plantation	High. Will provide support to ensure that the plantation complies with the farming laws and regulations within the district
G9	Forestry Division	• Identify and formalize the boundary of the forested area • Monitor and supervise forest activities (Reforestation programs) • Monitor and prevent illegal forest activities (Logging)	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to forestry activities	High. Will provide support to ensure that the plantation complies with the forestry laws and regulations within the district
G10	Living Resources Division	• Responsible for the preservation and maintenance of the living environment • Responsible for preventing polluting activities • Ensures that waste management programs are carried out effectively	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to environmental activities and practices	High. Will provide support to ensure that the plantation complies with the environmental laws within the district

G11	Labour Division	Responsible for overseeing and managing worker related issues within the district List of issues include: • Safety and Health • Salary Issues • Hiring Practices • Medical Insurance	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to worker recruitment and worker management within the district	High. Will provide support to ensure that the plantation complies with the employment laws and regulations within the district
G12	Investment and One Stop Integrated Service Division	Formulate and implement policies within the district regarding: • Licensing services • Foreign investments	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to the licensing and investment activities of the project	High. Will provide support to ensure that the plantation complies with the licensing and investment policies within the district
G13	Division of Cooperatives and SMEs	• Formulate and implement policies in relation to small and medium enterprises (SMEs) • Oversee the growth and development of SMEs within the district	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to the relationship between the project developers and the local SMEs	High. Will provide support to assist the plantation developers in providing assistance to the local SMEs within the district

G14	Health Division	• Formulate and implement technical policies regarding healthcare • Coordinate health development programs • Implement disease control and prevention programs	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to health matters	High. Will provide support to ensure that the plantation complies with the health regulations within the district
G15	Land Use Division	• Coordinate land use programs • Manage issues and conflicts regarding land affairs	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to land use and other land activities	High. Will provide support to ensure that the plantation complies with the land use policies and regulations within the district
G16	Legal Division of Regional Secretariat	• Implementation of legal policies within the district • Provide legal counselling • Settle legal disputes • Carry out research regarding new laws and regulations	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to the compliance of the project with local laws and regulations	High. Will provide support to ensure that the plantation complies with the local laws and regulations
G17	Governance and Regional Autonomy Division	• Organize and supervise government activities in urban areas • Determine urban level development policies • Coordinate and facilitate administrative activities within urban areas	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in relation to urban/village level activities	High. Will provide support to assist the plantation developers in regards to project development at the village/urban level

G18	Regency Head	• Maintenance of infrastructure and public service facilities • Implement government issued policies at the sub-district level	Sub-District of Silian Raya (Indonesia)	High. Will have influence over the development of the plantation in relation to the relationship between the project developers and local community	High. Will provide support to assist the plantation developers in regards to their relationship with the local communities
G19	Police Sector	• Provide protection services in a responsive and non-discriminatory manner • Coordinate peace keeping activities within the district • Enforce existing laws and regulations objectively and transparently	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the project in terms of ensuring that the plantation does not interfere with the peace and security of the district	High. Will provide support to assist the plantation developers in maintaining the peace and security in regards to project development
G20	Military Sector	• Ensure the peace and security of the region • Respond to national disasters	District of Southeast Minahasa (Indonesia)	High. Will have influence over the development of the plantation in terms of ensuring that the project does not interfere with the peace and security of the district	High. Will provide support to assist the plantation developers in maintaining the peace and security in regards to project development

As indicated in Table 2, the District Officer (G1), locally known as the Bupati is the highest authority in the district. The Bupati leads the administration of the Regency Council and also oversees and enforces the laws that have been approved by the council. As such, this stakeholder has district level influence. This stakeholder also has high levels of influence and interest over this project as the Bupati is able to provide political support on all aspects of plantation development.

The Bupati is assisted by the Regional Secretary (G2) whom handles the organizational and administration activities within the district. This stakeholder reports directly to the Bupati. Like the Bupati, this stakeholder also has district level influence. The Regional Secretary is assisted by the Assistant to the Regional Secretary (G3) whom is in charge of implementing proper reporting, monitoring and evaluation activities regarding economic programs that have been approved. This stakeholder also has district level influence. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to provide political support to assist with the economic development of this plantation.

The main responsibility of the Spatial Planning Coordination Board (G4) is to formulate technical plans regarding research and economic development within the district. This stakeholder has high levels of influence and interest over this project as this stakeholder is able to provide political support to improve the technical efficiency of plantation development. The main focus the Public Works Division (G5) is to formulate and implement policies in terms of water resource management, building administration, drainage and the development and maintenance of roads. This stakeholder has high levels of influence and interest over this project as this stakeholder is able to provide support to assist with infrastructure development in relation to the plantation.

The main responsibilities of the Research and Development Agency (G6) includes preparing and evaluating technical policies as well as research and development programs. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to assist with matters regarding the agro-industrial development of this plantation. The main focus of the Permit Division (G7) is to provide industries with the necessary permits (e.g. business permits) to carry out business activities within the district. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to provide support to ensure that this project complies with the policy and legal requirements of the permits granted for this plantation.

The main focus of the Farming Division (G8) is to oversee farming activities and operations within the district. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to provide support to ensure that the plantation complies with the farming laws and regulations within the district. The main responsibilities of the Forestry Division (G9) are to identify and formalize the boundaries of the forested areas within the district as well as prevent any illegal forest activities such as logging. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to ensure that the plantation complies with the forestry laws and regulations within the district.

The main focus of the Living Resources Division (G10) is to ensure the preservation and maintenance of the living environment. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to ensure that the plantation complies with the environmental laws within the district. The main responsibilities of the Labour Division (G11) are to oversee and manage worker related issues (e.g. hiring practices, salary disputes) within the district. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to ensure that the plantation complies with the employment laws and regulations within the district.

The main responsibilities of the Investment and One Stop Integrated Service Division (G12) are to formulate and implement policies within the district regarding licensing services and foreign investments. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to provide support to ensure that the plantation complies with the licensing and investment policies within the district. The main responsibilities of the Division of Cooperatives and SMEs (G13) are to formulate and implement policies in relation to small and medium enterprises (SMEs). This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to provide support to the plantation developers in providing assistance to the local small and medium enterprises (SMEs), as outlined in the plantation developers contract.

The main responsibilities of the Health Division (G14) are to formulate and implement technical policies regarding healthcare. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to ensure that the plantation complies with the health regulations within the district. The main responsibilities of the Land Use Division (G15) are to coordinate land use programs and manage issues and conflicts regarding land affairs. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to ensure that the plantation complies with the land use policies and regulations within the district.

The main responsibilities of the Legal Division of Regional Secretariat (G16) are regarding the implementation of legal policies within the district. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to ensure that the plantation complies with the local laws and regulations within the district. The main responsibilities of the Governance and Regional Autonomy Division (G17) are to organize and supervise government activities in urban areas. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to provide support to assist the plantation developers regarding plantation activities at the village (urban) level.

The main responsibilities of the Regency Head (G18) are to maintain infrastructure and public service facilities as well as implement government issued policies at the sub-district level. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to provide support to assist the plantation developers in building a better relationship with the local community. The main responsibilities of the Police Sector (G19) are to provide protection and coordinate peace keeping activities in a responsive and non-discriminatory manner within the district. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to the plantation developers in maintaining the peace and security in regard to plantation development. The main responsibilities of the Military Sector (G20) are to respond to any national disaster as well as ensure the peace and security of the region. This stakeholder also has high levels of influence and interest over this project as this stakeholder is able to enforce and provide support to the plantation developers in maintaining the peace and security in regard to plantation development.

Table 3 indicates the stakeholder groups identified from the business sector as well as their respective responsibilities, level of influence and interest over the research project. As indicated in Table 3, three stakeholder groups were identified from the business sector. Each of these stakeholder groups is assigned a code from B1 to B3.

Table 3: Stakeholders identified from the business sector

Code	Stakeholder Group	Responsibility of Stakeholder	Level of Influence of Stakeholder	Influence over the plantation's operation (High, Medium, Low)	Interest over the plantation's operation (High, Medium, Low)
B1	Purico Group Ltd	• Oversees and manages PT Viola's operation in Indonesia • Ensures that PT Viola is able to fulfil the necessary targets and expectations • Determines the yearly financial investments into PT Viola Fibre International	International (UK)	High. Will have influence on all aspect of plantation development Client for the project	High. Will provide support to assist on all aspect of plantation development Client for the project
B2	PT Viola Fibre International (Subsidiary of Purico Group Ltd)	• Oversees and manages the entire abaca plantation operation in Indonesia • Manages the relationship with other Indonesian organizations and communities • Includes government organizations, business organizations and local community members	District (Indonesia)	High. Will have influence on all aspect of plantation development Client for the project	High. Will provide support to assist on all aspect of plantation development Client for the project
B3	Garuda Food	• Purchases the peanuts grown on PT Viola's abaca plantation • Specify the size, quality and level of aflatoxin in the peanuts • Use peanuts purchased from PT Viola in their snack food production • Supplies snack food throughout Indonesia	Sub-District of Silian Raya (Indonesia)	Medium Will have influence over the type and quality of cover crops (peanuts) grown on the plantation	Low Only interested in the growth and development aspect of the cover crops (peanuts)

As indicated in Table 3, the main focus of Purico Group Ltd (B1) is to oversee and manage PT Viola Fibre International's (B2) operations in Indonesia. As such, this stakeholder (B1) ensures that PT Viola Fibre International is able to fulfil the necessary targets and expectations regarding crop (Abaca fibre) production. This stakeholder has international level influence particularly within the UK as Purico Group Ltd purchases the Abaca fibre from PT Viola Fibre International and sells the finished Abaca fibre products (e.g. tea bags) within the UK. This stakeholder has high levels of interest and influence over this project as this stakeholder is the main client and investor of this project. As such, this stakeholder is able to influence and provide support on all aspects of plantation development.

The main responsibility of PT Viola Fibre International (B2) is to oversee and manage the entire Abaca plantation operation in Indonesia. As a subsidiary of Purico Group Ltd, this stakeholder is also responsible for managing the relationship with other Indonesian organizations and communities within the region to avoid any conflicts or disputes. These organizations include government organizations and business organizations. This stakeholder also has high levels of interest and influence over this project as this stakeholder is also a client of this project and therefore can influence and provide support on all aspects of plantation development.

The stakeholder; Garuda Food (B3), is one of the main food and beverage manufacturers in Indonesia. This stakeholder is the main buyer of the cover crops (peanuts) which are also grown on the Abaca plantation. The peanuts purchased from PT Viola Fibre International (B2) are used to produce snack foods which are supplied throughout Indonesia. This stakeholder is able to specify the size, quality and level of aflatoxin in the peanuts. As such, this stakeholder only has medium level influence as they are only able to influence the type and quality of the cover crops (peanuts) grown on the plantation. This stakeholder also has a low level of interest in the project as this stakeholder is only interested in the growth and development of the peanuts on the plantation.

Table 4 indicates the stakeholder groups identified from the local community as well as their respective responsibilities, level of influence and interest over the research project. As indicated in Table 4, two stakeholder groups were identified from the local community. Each of these stakeholder groups is assigned a code from L1 to L2.

Table 4: Stakeholder groups identified from the local community

Code	Stakeholder Group	Responsibility of Stakeholder	Level of Influence of Stakeholder	Influence over the plantation's operation (High, Medium, Low)	Interest over the plantation's operation (High, Medium, Low)
L1	Community Leaders • Village Head of Silian 1 • Village Head of Silian 2 • Village Head of Silian 3 • Village Head of West Silian • Village Head of East Silian • Village Head of Middle Silian • Village Head of North Silian	• Each village head is responsible for the management of his/her village • Highest level of authority within each village • Responsible for addressing the community needs and issues	Sub-District of Silian Raya (Indonesia)	Medium Can influence the behaviour, thinking and attitudes of the local community (plantation workers)	High Willing to provide support and engage with the company (PT Viola) to improve stakeholder relationship
L2	Plantation Workers	• Carry out day-to-day plantation activities • Activities include: • Tillage activities, preparing seedbed, nursery maintenance, harvesting	Sub-District of Silian Raya (Indonesia)	Medium Can influence the progress of the on-the-ground plantation activities	High Willing to engage with the company (PT Viola) through the village head to improve employment relations

As indicated in Table 4, the main responsibility of the community leaders (L1) is to manage their respective villages in a safe and ethical manner for the benefit of the villagers. Each community leader is also known as the Village Head and is the highest level of authority within each village. The 7 villages within this region and as such, there are 7 Village Heads (Community Leaders) for each village. The community leaders have high interest and medium influence within the sub-district as they are able to influence the behaviour, thinking and attitudes of the local community which includes the plantation workers. They are also willing to engage and provide support to the company (PT Viola Fibre International) regarding improving relationship matters between the local villagers and the company.

The main responsibility of the plantation workers (L2) is to carry out the day-to-day plantation activities including tillage activities, seedbed preparation, nursery maintenance and harvesting. These stakeholders are local villagers and have high interest and medium influence as they are able to affect the progress of the on-the-ground plantation activities. However, they are willing to engage with the company (PT Viola Fibre International) through their respective Village Heads to improve employment relations. As such, these stakeholders have sub-district level influence.

Table 5 indicates the stakeholder group identified from the public sector as well as their respective responsibilities, level of influence and interest over the research project. As indicated in Table 5, one stakeholder group was identified from the public sector. This stakeholder is assigned the code N1.

Table 5: Stakeholder groups identified from the public sector

Code	Stakeholder Group	Responsibility of Stakeholder	Level of Influence of Stakeholder	Influence over the plantation's operation (High, Medium, Low)	Interest over the plantation's operation (High, Medium, Low)
N1	National Youth Committee	• Contribute towards the growth and development of youths within the district • Aid youths in securing employment • Provide aid and support to youths regarding entrepreneurship	District of Southeast Minahasa (Indonesia)	Medium Can influence the behaviour, thinking and attitudes of the local youths (plantation workers)	High Willing to provide support and engage with the company (PT Viola) to provide employment for the local youths

As indicated in Table 5, the National Youth Committee contributes towards the growth and developments of youths within the district. As such, this stakeholder group has high interest over this project as they aid youths in securing employment and also provide support to youths regarding entrepreneurship endeavours. This stakeholder has medium influence over the project as they can influence the behaviours, attitudes and thinking of the local youths (plantation workers). However, this stakeholder is willing to provide support and engage with the company to help secure employments for the local youths within the region. As such, this stakeholder has sub-district level influence.

Each identified stakeholder groups (see Table 2, Table 3, Table 4, and Table 5) were then categorized according to their respective level of interest and influence over this research project as illustrated in Figure 11.

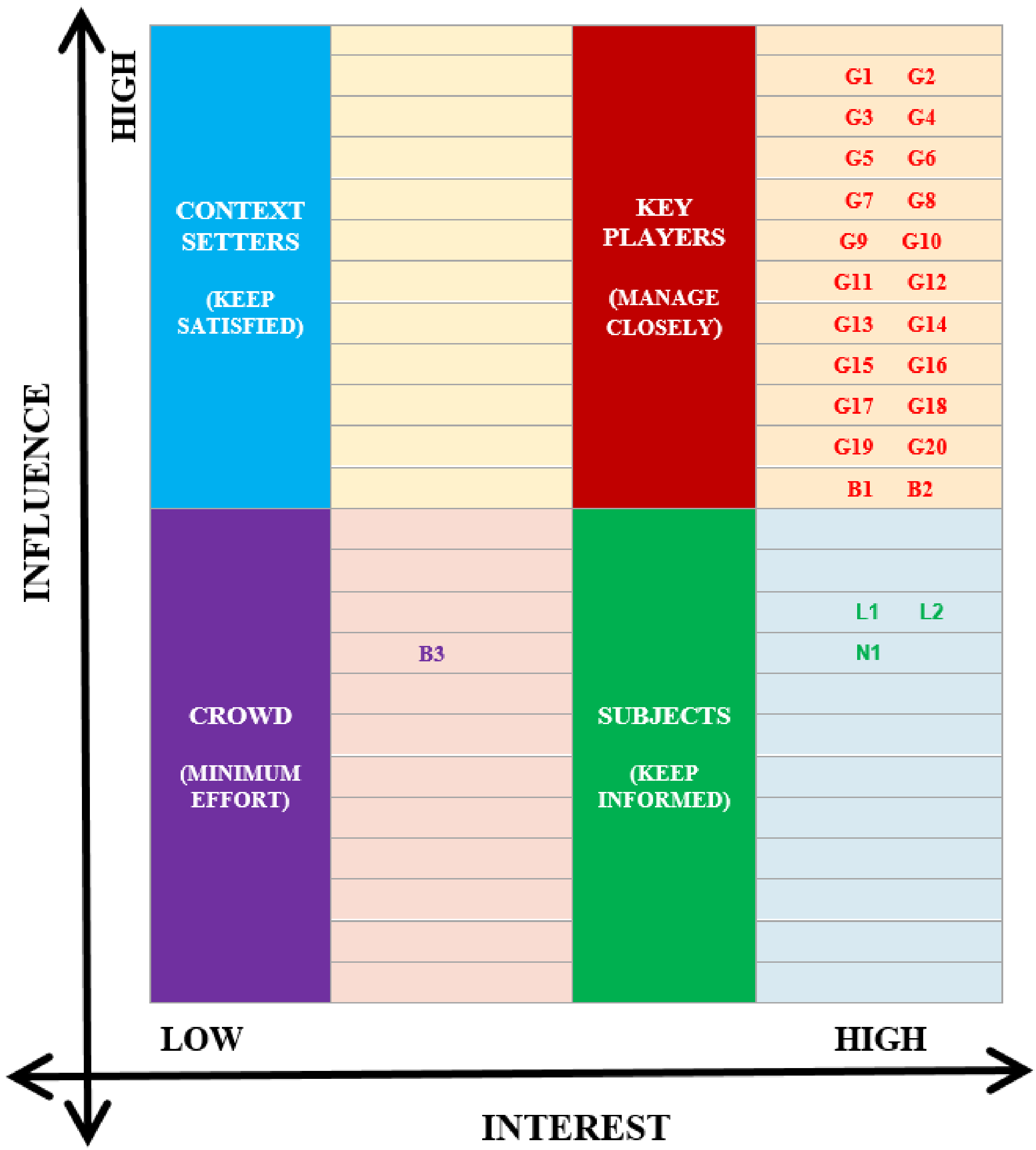

Figure 11: Classification of identified stakeholders according to their respective level of interest and influence over the research project(G = Government, B = Business, L = Local Community, N = Public)

As indicated in Figure 11, 22 stakeholder groups were identified as Key Players. These stakeholder groups are from both the government sector and business sector. These Key Players include:

i. District Officer (G1)
ii. Regional Secretary (G2)

iii. Assistant to the Regional Secretary (G3)
iv. Spatial Planning Coordination Board (G4)
v. Public Works Division (G5)
vi. Research and Development Agency (G6)
vii. Permit Division (G7)
viii. Farming Division (G8)
ix. Forestry Division (G9)
x. Living Resources Division (G10)
xi. Labour Division (G11)
xii. Investment and One Stop Integrated Service Division (G12)
xiii. Division of Cooperatives and SMEs (G13)
xiv. Health Division (G14)
xv. Land Use Division (G15)
xvi. Legal Division of Regional Secretariat (G16)
xvii. Governance and Regional Autonomy Division (G17)
xviii. Regency Head (G18)
xix. Police Sector (G19)
xx. Military Sector (G20)
xxi. Purico Group Ltd (B1)
xxii. PT Viola Fibre International (B2).

For this research, the stakeholder groups identified as Key Players are not only government officials but the clients for the project as well. As such, these stakeholder groups not only have a high interest in the development of this project but are also able to influence the progress of the project from both a political and business perspective (See Table 1 and Table 2). This is because the government officials are able to provide political support to assist with different aspects of plantation development while the management decisions made by the clients can determine the direction in which the plantation progresses. Therefore, the stakeholder groups in this category must fully be engaged with and regularly updated regarding the progress of the project to keep them fully satisfied.

As indicated in Figure 11, one stakeholder group; Garuda Food (B3), was identified as the Crowd. This stakeholder group is from the business sector and has a medium level of influence but a low of interest over the development of this project. This is because this stakeholder group is only interested in purchasing the cover crops (peanuts) grown on the plantation. As such, this stakeholder group is able to influence the management decisions in terms of the growth and development of the peanuts (cover crops) and not the other aspects of the plantation (See Table 2). As such, the stakeholder group in this category only needs to be monitored from time to time and updated as and when necessary regarding the progress of the project.

As indicated in Figure 11, three stakeholder groups were identified as Subjects, namely:

i. Community leaders (L1)
ii. Plantation workers (L2)
iii. National Youth Committee (N1)

These stakeholder groups have high levels of interest but medium levels of influence over the development of this project. The plantation workers can affect the on-the-ground plantation activities of the project, which in turn can affect the overall progress of this project. The plantation workers whom also make up part of the local community address their concerns and issues through their respective community leader (village head). The village heads in turn, work with the company (PT Viola Fibre International) to mitigate any forms of conflict and help improve stakeholder relationships especially with the plantation workers (local community). The National Youth Committee works closely with the youths within the region to provide aid particularly in securing employment. As some of the youths within the region are employed by the plantation, this NGO can influence the behaviour and thinking of these youths (plantation workers) which in turn can affect the plantation activities and the overall progress of this project. Therefore, the stakeholders in this category should be updated regularly regarding the progress of the project to address any concerns that they might have and to prevent potential conflicts in the future.

As indicated in Figure 11, no stakeholder groups were identified as Context Setters for this research.

For this research, the business organizations; PT Viola Fibre International and Purico Group Ltd, were the clients for this project. As such, the key informants were representatives from both these organizations. As noted by Rose *et al.* (2014), there can be possible tension between the clients and researcher especially when trying to balance between the client's specifications and academic requirements of the project. In order to avoid this, an explanation guide was used to help clarify any doubts or confusions that the clients might have had and to also ensure that the project incorporated the clients' specification as far as academically practical. As noted by Leventon *et al.* (2016), supporting documents such as these are often required to not only address any concerns of the stakeholders involved, but to also help introduce the project to any stakeholders that are contacted.

Besides this, Crabtree & Miller (1999) noted that key informants are useful as they can provide researchers with information that would otherwise be unavailable to the researcher. This statement is supported by this research as some of the information collected for this research would not have been possible without the aid of the key informants. For this research, the information included the characteristics of the research area before the set-up of the plantation as well as future plans for the expansion of the plantation area. This information helped in understanding previous, current and future plantation activities such as administrative and field activities including worker recruitment as well as land and crop management. This in turn helped in identifying additional stakeholders that can influence or be affected by the plantation activities.

Furthermore, as the key informants were also the clients for this project, they were able to use their influence within the research area to introduce me to other stakeholders for this research project. As the local stakeholders were more familiar with this organization (PT Viola Fibre International), this helped reduce their initial scepticism regarding the research project and me. This in turn helped to facilitate a more engaging conversation. It must be noted that the influence of the clients was key to the local stakeholders providing their time and input for this research. However, even with the influence of the clients, special care must be taken when interviewing some local stakeholders such as plantation workers.

As I was an outsider, some of the plantation workers were initially uncomfortable in discussing about the project one-on-one with me due to initial reservations and scepticism about me and the research project. In order to build rapport with the local community members (plantation workers) and to facilitate greater discussions, focus group discussions with the plantation workers were carried out on the plantation area. This helped to put the plantation workers at ease as they seemed more relaxed and willing to discuss further about the project. This approach is supported by Denzin & Lincoln (2011) whom indicated that focus group discussions can provide participants the opportunity to express and exchange opinions and ideas which in turn can help in generating rich information. Furthermore, Neef & Neubert (2011) also noted that the type and intensity of the researcher's interactions with the stakeholders are key to the success of the discussions. However, it must be noted that it was initially difficult to get the local stakeholders (plantation workers) to understand specific details regarding this project such as the importance of sustainability within plantation agricultural systems as well as the need for stakeholder input in this project. Compared to the key informant interviews with the clients, the explanation guide had to be explained in greater detail and in a simpler manner to get the plantation workers to understand. Neef & Neubert (2011) noted the limitations of the local knowledge of the stakeholders even when addressing localized problems.

The snowballing approach that was applied during the key informant interviews as well as focus group discussion was particularly useful in identifying additional local stakeholders for this research. As noted by Streeton *et al.* (2004), when utilizing the snowballing approach, it is necessary to target members of a network. As the initial stakeholders identified (e.g. key informants and plantation workers) are well aware of other stakeholders within the network (plantation system), the snowballing approach could be applied particularly well. The plantation workers helped identify other stakeholders from the local community such as village leaders whom can influence plantation activities. Furthermore, these plantation workers also helped clarify government officials whom frequented the plantation such as members of the labour division, forestry division, farming division and living resources division. This in turn helped identify essential stakeholders from the government sectors to engage with.

Therefore, by acting as informal research assistants, the stakeholders (e.g. key informants and plantation workers) were able to communicate the project needs to other stakeholders within the network. This in turn increased the interest of the other stakeholders regarding this project and also subsequently increased their willingness to participate in this research. As noted by Streeton *et al.* (2004) and Colvin *et al.* (2016), by using stakeholders (individuals or groups) as informal research assistants, identifying and gaining access to other stakeholders becomes easier as the stakeholders are able to communicate the needs of the researcher to their contacts (other stakeholders) and this in turn can reduce the initial reservation.

Apart from helping to identify additional stakeholders for this research, the key informants (PT Viola Fibre International and Purico Group Ltd) also provided essential documents for this research. These documents (see section 3.3.2) helped identify essential stakeholders for this research and complement the information provided during the key informant interviews. The Indonesian Government Location Permit Contract and Map of Plantation helped identify the boundary and size of the plantation. This in turn helped in identifying the number of villages the plantation area encompassed which in turn allowed potential stakeholders (plantation workers/villagers) that can be affected by the plantation activities at the local level to be identified. The Indonesian Government Meeting Record Contract was particularly useful in identifying stakeholders from the government sector to engage with. This is because this contract listed the government organizations involved in the set-up of the plantation as well as their respective roles and specific requirements in relation to plantation operations and development. As noted by Colvin *et al.* (2016), the use of documents can help identify interested parties that can relate specifically to the issue or research of concern.

The interest-influence matrix was then used to estimate the identified stakeholders' relevance to the research project based on two attributes, namely power (influence) and interest (see section 3.3.4). According to Bourne & Walker (2005), power (influence) can be divided into three categories namely personal power, position power and political power. Personal power is derived from human relationships or traits in which individuals have connections to networks or people with influence (Bourne & Walker 2005). Position power is usually associated with statutory or organizational authority while political power is typically derived from a formally vested or conveniently transient concurrence of objectives and means to achieve these: control over decision processes; coalitions; co-option and institutionalization (Bourne & Walker 2005). Conversely, interest simply refers to what the stakeholder is willing to contribute (Spangenberg *et al.* 2018). This can include the capacity and willingness to participate as well as knowledge and experience with the issues under investigation (Hung *et al.* 2008).

However, even with these definitions, it was initially difficult to appropriately classify the identified stakeholders according to their relevance to this research project. This was because there is little guidance in the literature on how these criteria (interest and influence) can be assessed or measured. As supported by Reed *et al.* (2009), even with stakeholder analysis tools (e.g. interest-influence matrix)it can be difficult to appropriately classify and prioritize different stakeholder groups for involvement in the decision-making process. To help overcome these issues, the list of documents reviewed (see section 3.3.2) helped clarify the respective roles, interests and requirements of some stakeholder groups particularly government organizations associated with this research. This in turn made it easier to understand their respective interest and influence over the project.

Furthermore, other methods such as key informant interviews and focus group discussions helped further clarify the level of influence as well as the willingness to participate in the research project of the other identified stakeholders. As such, these processes helped in terms of classifying the stakeholders according to their respective level of interest and influence over the research project. The research by Santoso & Delima (2017) regarding identifying relevant stakeholders for agricultural systems within Indonesia further helped in classifying the identified stakeholders for this research according to the interest-influence matrix.

3.5 Chapter Conclusion

In this chapter, I have presented the results of the first stage of the participatory action research cycle of this research. The main objective of this chapter is to identify and select relevant stakeholders associated with the Abaca plantation system in Indonesia. During the stakeholder identification process, the following methods namely key informant interviews, document reviews, focus group discussions and snowballing were used. The key informants helped provide information such as the administrative and field activities including worker recruitment as well as land and crop management. This in turn helped in identifying additional stakeholders that can influence or be affected by these activities including business and government organizations as well as local community members. Furthermore, document reviews of Indonesian documents helped in identifying government organizations associated with this plantation system.

Focus group discussions with the plantation workers helped identify other local community members associated with this system such as community leaders (Village Heads). The snowballing approach was also used for this research as the social circles within the research area are well established. This made it possible to identify a wide range of stakeholders for this research ranging from the local community to the government sector. Using these methods, 26 stakeholder groups encompassing four broad sectors namely government, business, public and local community were identified.

During the stakeholder analysis process, the identified stakeholders (26 stakeholder groups) were then classified based on the interest-influence matrix. Through this framework, it became possible to determine who should be involved and how to prioritize these stakeholders for involvement in the decision-making process of this project. The identified stakeholders were classified into 4 categories including ‘Key Players’, ‘Context Setters’, ‘Subjects’ and ‘Crowd’ (Reed *et al.* 2009). Approximately 22 stakeholder groups were identified as ‘Key Players’, 3 stakeholder groups as ‘Subjects’ and 1 stakeholder group as ‘Crowd’ for this research. However, no stakeholders were identified as ‘Context Setter’ for this research.

Chapter Four

Development of Draft Sustainability Indicators - Part 1

4.1 Chapter Introduction

Chapter One in this thesis described and discussed the rational and background behind this research. This chapter emphasized and highlighted the need for further research on sustainability within plantation agricultural systems to be more bottom-up and participatory. Following on from this, Chapter Two described the methodology and methods used to develop a consensus-based suite of sustainability indicators for plantation agricultural systems. Chapter Three then outlined and described the methods associated with the stakeholder identification and analysis process and presented the results of this process.

In this chapter, Stage 2 of the PAR cycle namely 'Development of Draft Sustainability Indicators' (see Figure 7) is provided. This first part of this stage comprises a systematic review of the global literature, analysing the most commonly suggested sustainability indicators for plantation agricultural systems. This review was conducted in order to address some of the confusions regarding sustainability within plantation systems and to identify the critical issues in the development of a comprehensive and unambiguous set of sustainability indicators for this system. This chapter has been published as a paper in the journal 'Sustainable Production and Consumption', volume 26, pages 892-910, in 2021 (doi: 10.1016/j.spc.2020.12.042).

The subsequent sections of this chapter present and discuss the methodology and results of the systematic review. The results and subsequent discussion of the results are presented together. The findings (results) correspond to the components of the UNCSD framework (analytical framework used) as indicated in section 4.2.1. The final section of this chapter presents the chapter conclusions and implications.

4.2 Methodology

4.2.1 Analytical Framework

In this research, I have used a modified version of the sustainability framework developed by the United Nations Commission for Sustainable Development (UNCSD) as my analytical framework (see Figure 12). The UNCSD framework has been used to assess the sustainability of agricultural systems (UN 2007). Moreover, this framework encompasses the institutional (governance) dimension of sustainability, in addition to the other three commonly accepted dimensions – including environmental, economic and social – and thereby represents a broad version of sustainability (Porio 2015). As governance is central to creating, implementing and enforcing decisions within the other dimensions, the absence of this dimension can hinder the overall progress of sustainability (FAO 2013; Porio 2015).

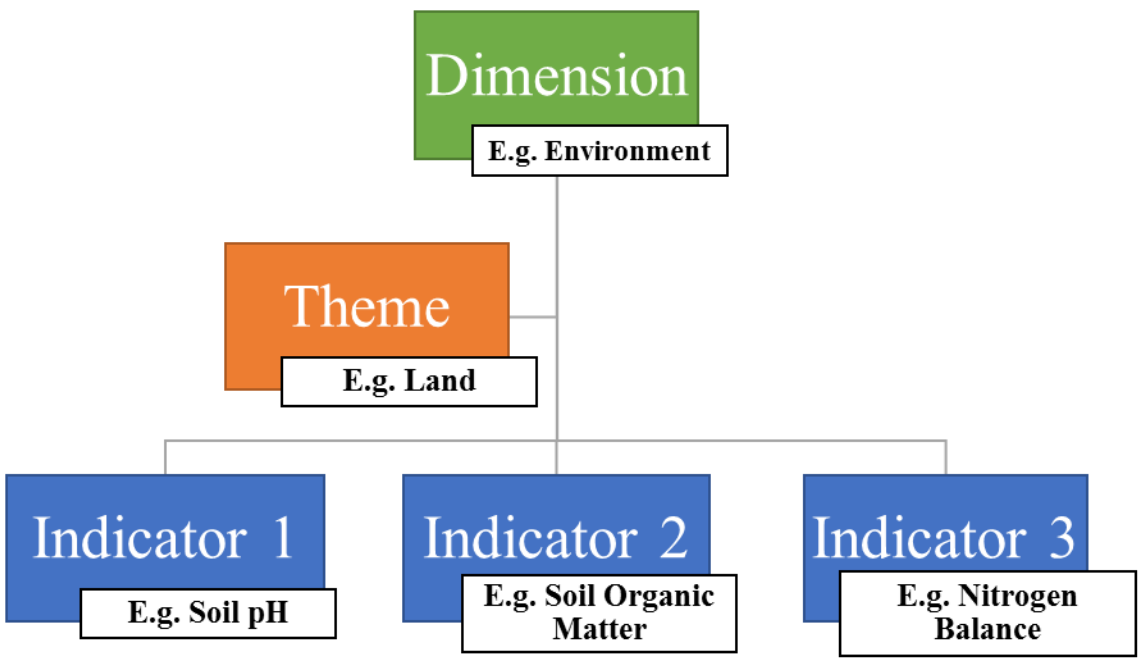

Figure 12: The UNCSD sustainability indicator framework used in this investigation to structure data analysis (Adapted from de Olde *et al.* 2016)

As indicated in Figure 12, dimensions are the highest and most general level in the framework (FAO 2013). Within agricultural systems, the dimensions include Environmental, Economic, Social and Governance (de Olde *et al.* 2016). As each of these dimensions are broad and encompass many different aspects, they are translated into universally agreed goals (themes) of sustainability (Van Cauwenbergh *et al.* 2007). Therefore, themes sit below the dimensions level and help provide an understanding of the practical definition of sustainability (FAO 2013). For example, under the environmental dimension, some common themes include land, water and atmosphere (FAO 2013).

Indicators sit at the lowest level in the framework and are measurable variables to evaluate sustainability performance within specific themes (de Olde *et al.* 2016; Van Cauwenbergh *et al.* 2007). Indicators describe features of the agricultural system and provide a representation of the sustainability of the system with respect to the environmental, economic, social and governance dimensions of that system (de Olde *et al.* 2016; FAO 2013; Van Cauwenbergh *et al.* 2007). For example, under the land theme within the environmental dimension, some common indicators to monitor the productivity of agricultural lands include tillage practices and fertilizer use (FAO 2013).

4.2.2 Data Acquisition and Analysis

The Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) flowchart was used to identify and select articles for this analysis (see Appendix 4). PRISMA is an evidence-based checklist developed to act as a guideline for conducting systematic reviews (See Liberati *et al.* 2009). The PRISMA framework is widely used in order to improve the clarity, transparency and completeness of systematic review reporting (Li *et al.* 2020). Two scientific databases - Scopus and Web of Science - were initially used to select articles for this analysis. Successively, it was noticed that Web of Science was giving approximately the same number of hits and the same articles as Scopus. Therefore, Web of Science was not included in the final search.

Articles were identified via abstract, title and keyword searches. The search terms were put into triplets to improve the specificity of the search results and to identify a wide range of articles specific to sustainability within plantation agriculture (see Appendix 5). The records identified via the database search were supplemented with grey literature obtained from Google Scholar and Google searches for a more comprehensive coverage of the indicators used to assess the sustainability of plantation agricultural systems.

For this research, I primarily followed the definition of plantation agriculture as provided by Hartemink (2005) and Hall *et al.* (2017).

As such, peer-reviewed articles were assessed to identify the: type of crop, plantation size area, size of workforce, amount of capital invested, type of management system, and type of indicators (empirical or prescriptive) suggested. Articles were only included into the final assessment if they stated the type of crop, and one or more of the other criteria. As most of the grey literature identified were on sustainability assessment toolkits used by different organizations, these articles were only included into the final assessment if they provided relevant examples of sustainability indictors for plantation agriculture. After the eligibility assessment, 40 documents were considered suitable to be included in the analysis.

The peer-reviewed articles included in this research are listed in Table 6. The criteria; Capital Investment, was omitted from the table as none of the articles included in this research stated it.

Table 6: List of the peer-reviewed articles included in this research

References*	Crop Type	Size of Cultivation Area	Size of Workforce	Management type
Bonilla *et al.* 2010	Bamboo	1 ha	Not Stated	Not Stated
Bellamy *et al.* 2016	Banana	120 - 320 ha	Not Stated	Top Down
Coote *et al.* 2013	Pine, Oak, Sitka spruce	x > 5 ha	Not Stated	Not Stated
Chopin *et al.* 2015	Banana	Average area is 4 ha	Not Stated	Not Stated
Chopin *et al.* 2016	Banana	Not Stated	Not Stated	Top Down
Dantsis *et al.* 2010	Olives and citrus trees	Cultivation area covered more than 25,844,000 ha	Not Stated	Not Stated
Diaz-Balteiro *et al.* 2016	Eucalyptus	20 - 400 ha	Not Stated	Top down
Elfkih *et al.* 2012	Olive	Average is 100 ha	Not Stated	Not Stated
Fleskens *et al.* 2009	Olive	1.2 - 2.1 ha	Not Stated	Not Stated

Gómez-Limón & Riesgo 2009	Maize, barley, wheat	40 - 60 ha	Not Stated	Not Stated
Gartzia-Bengoetxea *et al.* 2009	Pine	1 ha	Not Stated	Not Stated
Giménez *et al.* 2013	Eucalyptus	166.6 ha	Not Stated	Not Stated
Gaudino *et al.* 2014	Maize, winter cereal, soybeans	36 - 80 ha	Not Stated	Not Stated
Hartemink 1998	Sugarcane	6030 ha	Not Stated	Not Stated
Ingram *et al.* 2016	Pine and Eucalyptus	Not Stated	51 workers	Top down
Jacobi *et al.* 2015	Cocoa	1-5 ha	Not Stated	Not Stated
Munyanduki *et al.* 2016	Forest (Timber)	92.7 ha	Not Stated	Top down
Pineda *et al.* 2005	Coffee	41- 104 ha	Not Stated	Not Stated
Pretty *et al.* 2008	Tea	3000 - 8000 ha	Not Stated	Top down
Prasara-A & Gheewala 2016	Sugarcane	2 - 32 ha	10 to 30 workers	Not Stated
Rodrigues *et al.* 2018	Coconut	60 - 6000 ha	Not stated	Top down
Smith *et al.* 2008	Sitka and Ash	4 ha	Not Stated	Not Stated
Sydorovych *et al.* 2009	Walnut	1.2 - 3.8 ha	Not stated	Not stated
Singh & Benbi 2016	Rice	2 - 10 ha	Not Stated	Not Stated
Sun *et al.* 2017	Ginkgo	30,000 ha	Not Stated	Not Stated
Safitri *et al.* 2018	Palm oil	22, 457 ha	Not Stated	Not Stated
Schweier *et al.* 2018	Pine	14, 000 ha	Not Stated	Not Stated
Tellarini & Caporali 2000	Olive, wheat, barley, oat	2 - 4 ha	Not Stated	Not Stated
Thivierge *et al.* 2014	Wheat, oat, barley	41 - 348.2 ha	Not Stated	Not Stated
Testa *et al.* 2015	Lemon	22 ha	Not Stated	Not Stated
Utomo *et al.* 2016	Cocoa	Not Stated	Not Stated	Top down
Van Eijck *et al.* 2014	Jatropha	80, 000 ha	35, 000 workers	Top down

Vanhove *et al.* 2016	Cocoa	61 ha	Not Stated	Not Stated
Xu *et al.* 2008	Bamboo	1 - 1.5 ha	Not Stated	Not Stated
Yi *et al.* 2014	Rubber	15, 100 ha	Not Stated	Not Stated
Zhang *et al.* 2017	Citrus	200, 000 ha	Not Stated	Not Stated

The articles were analyzed using the NVIVO™ 11 software following a thematic analysis approach (See Braun &Clarke 2006). The articles were coded into specific themes, namely the definition of sustainability suggested by the authors, sustainability indicators suggested, methods to measure the suggested sustainability indicators, potential issues in the application of the identified sustainability indicators and whether the suggested indicators were tested or prescribed. The themes were categorized using the UNCSD framework.

4.3 Results and Discussion

A total of 307 indicators were identified covering all the four dimensions of sustainability within the UNCSD framework (see Appendix 6). Figure 13 illustrates the proportion of indicators identified by sustainability dimension.

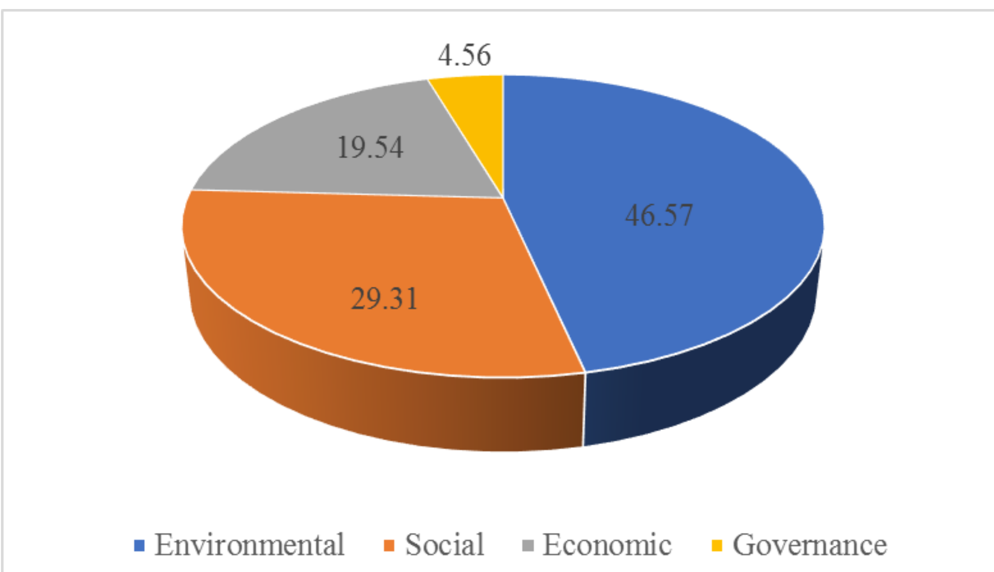

Figure 13: Proportion of indicators by sustainability dimension

As indicated in Figure 13, the highest proportion (46.57%) of these indicators related to the 'Environmental' dimension of sustainability, followed by the 'Social' dimension (29.31%) and the 'Economic' dimension (19.54%). The lowest proportion (4.56%) belonged to the 'Governance' dimension.

During the analysis, it was indicated that despite being termed differently, many of the identified indicators could be grouped under a single indicator. For example, the indicators; 'GHG Reduction Target' and 'GHG Mitigation Practices' all relate to GHG emissions. Therefore, these indicators can be grouped under the indicator 'Life Cycle GHG Emissions'. As such, during the analysis process, similar indicators were grouped under a single indicator within a particular theme for simplicity. During this process, it was indicated that the indicators that could be grouped together were also more commonly used/suggested compared to the indicators that could not be suggested together.

In the subsequent sections, I discuss only the most commonly suggested indicators. For this, I used the number of articles within our sample as an indication of whether an indicator was commonly used/suggested or not. The indicators must have been used/suggested by at least 2 articles to be included.

4.3.1 Environmental Indicators

A total of 143 indicators were identified under the 'Environmental' dimension (see Appendix 6). A portion of these indicators could be grouped together into 18 indicators (See Table 7, Table 8 and Table 9). These indicators were further categorized into five sustainability themes. These five themes include: atmosphere, water, land, biodiversity and materials and energy.

Four indicators; 'Life cycle GHG emissions', 'Water conservation measures', 'Water contamination prevention practices' and 'Amount of water needed for irrigation' were suggested under the atmosphere and water theme within the environmental dimension (See Table 7).

Table 7: Indicators suggested under the atmosphere and water theme within the environmental dimension

Theme: Atmosphere and Water		
Indicator	**Measurement**	**References**
Life cycle GHG emissions	Satellite data calibrated with field measurements of GHG emissions using IPCC methodology	Gaudino *et al.* 2014; Van Eijck *et al.* 2014
Water conservation measures	No specific methods provided	COSA 2013; FAO 2013
Water contamination prevention practices	No specific methods provided	COSA 2013; FAO 2013
Amount of water needed for irrigation	(1) Blaney-Griddle method based on the irrigation technology adopted by the farm. (2) Aggregation of cropping system needs for water based on quantity of rainfall and average crop needs per month	Pretty *et al*. 2008; Gómez-Limón, & Riesgo 2009; Dantsis *et al.* 2010; Gaudino *et al.* 2014; Chopin *et al*. 2015

The indicator 'Life cycle GHG emissions' refer to the emissions of GHGs such as CO_2, CH_4 and N_2O at each stage of the supply chain (Van Eijck *et al.* 2014). Plantation agriculture contributes to GHG emissions through various practices including land clearance, deforestation and high use of fossil fuels (FAO 2013). It is now widely evident that these emissions contribute to climate change and global warming, which in turn could affect yields and productivity (Johnson *et al.* 2007). This indicator therefore is highly relevant to the sustainability of plantation systems.

However, only two studies were found to have tested this indictor (See Table 7). In the sampled articles, life cycle GHG emissions from plantation systems was measured as carbon dioxide equivalents (CO_2eq) through satellite data and calibrated with field measurements using the IPCC methodology (Gaudino *et al.* 2014; Van Eijck *et al.* 2014). There may be several issues with this method. Access to satellite data may not be available, particularly in many developing countries due to high costs and inadequate international coordination (DeFries *et al.* 2007). Furthermore, as this indicator considers N_2O emissions from diesel consumption only, it does not provide an accurate estimation of GHG emissions (Gaudino *et al.* 2014). Other factors such as changes in land use (e.g. deforestation) can also contribute to GHG emissions (DeFries *et al.* 2007).

The indicators ‘Water conservation measures’ and ‘Water contamination prevention practices’ refer to the practices necessary to reduce freshwater use and water pollution respectively (FAO 2013). One of the main factors limiting crop production within agricultural systems is the availability of freshwater (FAO 2013). As the global population is expected to increase to 9 billion by 2050 (Béné 2015), more freshwater will be required to increase agricultural productivity to keep up with global demand and consumption. Therefore, both these indicators are highly relevant to the sustainability of plantation systems.

However, the use of both these indicators are questionable as the two studies that have mentioned both these indicators have only prescribed them (See Table 7). As such, both these indicators have not been tested. In the sampled articles, no specific methods were suggested to measure both water conservation measures and water contamination prevention practices. There may be several issues with this. Although the sampled articles (See COSA 2013; FAO 2013) provided guidelines regarding ‘best’ and ‘worst’ practices, it was ultimately up to the assessor to determine the types of practices as well as the minimum number of practices required to be sustainable (FAO 2013). As such, different users can determine the type and number of practices to apply without a reliable benchmark to ensure that these practices actually meet the necessary sustainability requirements (Williams & Walcott 1998).

The indicator ‘Amount of water needed for irrigation’ refer to the quantity of water required to irrigate the crops within the plantation systems (Pretty *et al.* 2008; Dantsis *et al.* 2010). Unsustainable use of water for irrigation purposes can cause environmental issues such as salinization, desertification as well as leaching and runoff of nutrients and pesticides to ground and surface water (Pretty *et al.* 2008; Singh 2009). Furthermore, as different crops have different water requirements, the amount of water used for irrigation may affect both crop growth and yield (Kahlown & Ashraf 2005). This indicator therefore is highly relevant to the sustainability of plantation systems. A total of five studies were found to have tested this indictor (See Table 6).

In the sampled articles, amount of water needed for irrigation was measured either using the Blaney-Griddle method based on the irrigation technology adopted by the farm or by aggregation of cropping system needs for water based on quantity of rainfall and average crop needs per month (See Table 7). There may be several issues with these methods. Some of these methods (e.g. Blaney-Griddle) are typically utilized in arid and semi-arid environments (Zhao *et al.* 2013). As such, this method might not be suitable to measure the water requirements of most plantation crops as many plantation systems are typically establish within tropical regions. Other methods (e.g. aggregation of cropping system needs) do not consider the type of irrigation system used by farms (Chopin *et al.* 2015). Type of irrigation system can significantly influence the water use requirements of a plantation as irrigations systems such as drip irrigation have been proven to not only reduce water use but increase crop yields as well (Al-Omran *et al.* 2005).

The land theme had the highest number of indicators within the environmental dimension with a total of 8 indicators (See Table 8). These indicators include 'Manure management', 'Amount of fertilizer used', 'Intercropping', 'Tillage practices', 'Crop rotation', 'Soil Nutrient Content', 'Soil Physical Properties' and 'Soil Chemical Properties'.

Table 8: Indicators suggested under the land theme within the environmental dimension

Theme: Land		
Indicator	**Measurement**	**References**
Manure management	Management of manure is based on the crop and land area over which the manure is applied.	Dantsis *et al*. 2010; Thivierge *et al.* 2014
Amount of fertilizer used	Determined as the average amount of N and P used in each farm. Measured in kg/ha	Sydorovych *et al.* 2009; Dantsis *et al.* 2010; Elfkih *et al.* 2012
Intercropping	Randomized block design with two different crop species grown together	Chopin *et al.* 2016; Zhang *et al.* 2017
Tillage practices	(1) Calculated as the percentage of the utilized agricultural area cultivated with conventional practices. (2) Average number of tillage operations over the years	Sydorovych *et al.* 2009; Gaudino *et al.* 2014; Thivierge *et al.* 2014
Crop rotation	Measurements not mentioned	Dantsis *et al*. 2010; Chopin *et al.* 2016
Soil Nutrient Content	Soil tested by lab analysis	Hartemink 1998; Pretty *et al.* 2008; Sydorovych *et al.* 2009; Gómez-Limón &Riesgo 2009; Thivierge *et al*. 2014; Jacobi *et al.* 2015; Singh & Benbi 2016; Utomo *et al.* 2016; Zhang *et al*. 2017; Rodrigues *et al.* 2018
Soil Physical Properties	Soil tested by lab analysis	Hartemink 1998; Pretty *et al.* 2008; Jacobi *et al.* 2015; Zhang *et al.* 2017; Rodrigues *et al.* 2018;

		Schweier *et al.* 2018
Soil Chemical Properties	Soil tested by lab analysis.	Hartemink 1998; Sydorovych *et al.* 2009; Singh & Benbi 2016; Zhang *et al.* 2017; Rodrigues *et al.* 2018

The indicator 'Manure management' refers to the application and management of organic manure as part of the plantation's agro-ecological management practices (Dantsis *et al.* 2010). Plantation activities such as excessive use of chemical fertilizers have been successful in increasing food production (crop output) but, have caused extensive environmental damage particularly to soil health and quality (Byron Houser & Pitt 2008). Excessive use of chemical fertilizers can lead to on-site soil degradation as well as nutrient pollution (Chandran *et al.* 2019). As such, this indicator is highly relevant to reduce dependency on chemical fertilizers (Ning *et al.* 2017).

However, only two studies were found to have tested this indicator (See Table 8). In the sampled articles, manure management was measured based on the crop and land area over which organic manure is applied (Dantsis *et al*. 2010; Thivierge *et al*. 2014). Farms that apply manure over a large area and on growing crops are considered to have good manure management (Dantsis *et al.* 2010). One of the potential issues in the application of this indicator is that, as this indicator is not widely prevalent it may lack legitimacy among other stakeholder groups such as agribusinesses whom may refuse to adopt this indicator (Chandran *et al.* 2019). Although organic fertilizers (manure) have become an interesting issue in sustainable agriculture, it is evident that mostly the scientific community (e.g. academicians) whom are concerned with its use and application due to the increasing number of scientific papers regarding the subject (Chandran *et al.* 2019).

The indicator 'Amount of fertilizer used' refers to the amount fertilizers particularly chemical/inorganic fertilizers used as part of the plantation's land management practices (Sydorovych *et al.* 2009). Chemical fertilizers are extensively used for plantation agricultural crops as not only are they inexpensive, but they also provide immediate availability of nutrients (Chandran *et al.* 2019). However, excessive use of chemical fertilizers can contribute to various environmental issues including greenhouse gas emissions, eutrophication and soil degradation

(Byron Houser & Pitt 2008). Therefore, this indicator is highly relevant to prevent the excessive use of inorganic fertilizers.

A total of three studies were found to have tested this indicator (See Table 8). In the sampled articles, amount of fertilizer used was measured in kilograms per hectare based on the amount nitrogen (N) and phosphorus (P) used in each farm (Sydorovych *et al.* 2009; Dantsis *et al*. 2010; Elfkih *et al*. 2012). One of the potential issues in the application of this indicator is that stakeholder groups such as agribusinesses may not necessarily heed the application guidelines regarding fertilizer application quantity (Patra *et al.* 2016). This is unsurprising as with the rise in the global population, more fertilizers will likely be utilized to obtain more agricultural products to meet the growing demand for food consumption (Savci 2012). As such, agribusiness may have to use more than the recommended amount of fertilizers for crop production to keep up with supply demands (Patra *et al.* 2016).

The indicator 'Intercropping' refers to the practice of growing two or more crops together in the same field (Zhang *et al.* 2017). Intercropping can not only increase crop yields but also provide other ecosystem services including reducing the need for chemical inputs such as inorganic fertilizers and pesticides as well as lessening greenhouse gas emissions linked with industrial nitrogen fixation (Martin-Guay *et al.* 2018). Therefore, this indicator is highly relevant to the sustainability of the plantation agricultural system.

However, only two studies were found to have tested this indicator (See Table 8). In the sampled articles, intercropping was measured using a randomized block design with two different crop species grown together (Chopin *et al*. 2016; Zhang *et al.* 2017). One of the potential issues in the application of this indicator is the lack of guidelines regarding growing specific crop species together. Thierfelder *et al.* (2012) indicated that growing incompatible species together can result in reduced crop yields, increased susceptibility to pests as well as complete failure of the overall cropping system. Furthermore, farmers may also be hesitant to grow crops of no immediate economic benefit which makes the practice of intercropping highly challenging (Thierfelder *et al.* 2012).

The indicator 'Tillage practices' refers to the type of tillage practices carried out by the plantation as part of its land management practices (Sydorovych *et al.* 2009; Gaudino *et al.* 2014). Tillage has multiple roles in crop production including seed placement, seedbed preparation as well as pest and water management (Lobb *et al.* 2007). As such, the type of tillage practices carried out can not only affect crop production but also cause environmental impacts such as soil erosion, land degradation and water pollution (Lobb *et al.* 2007; Gaudino *et al.* 2014). Therefore, tillage will always be essential to crop production within plantation agricultural systems.

However, only three studies were found to have tested this indictor (See Table 8). In the sampled articles, tillage practices were measured either by calculating the percentage of the utilized agricultural area cultivated with conventional tillage practices or by estimating the average number of tillage operations over a period (Sydorovych *et al.* 2009; Gaudino *et al.* 2014; Thivierge *et al*. 2014). One of the potential issues in the application of this indicator is that it only considers either the size of the cultivation area or the number of tillage practices carried out (Sydorovych *et al.* 2009; Gaudino *et al.* 2014). As such, the type of tillage practices carried out is not considered. Different tillage practices (e.g. no tillage, conventional tillage and conservation tillage) can have different environmental impacts (Lobb *et al.* 2007). Therefore, data on the type of tillage practices carried out should also be considered to accurately reflect trends in environmental impacts which in turn can affect crop productivity and yield (Lobb & Kachanoski 1999; Lobb *et al.* 2007).

The indicator 'Crop rotation' refers to the practice of growing a series of similar or different crop types in the same area over different seasons (Chopin *et al.* 2016). Like intercropping, crop rotation can not only increase yield quantity but also help with pest and disease management by breaking the life cycle of crop-specific pathogens (Kirkegaard *et al.* 2008). Furthermore, crop rotation can also provide other benefits including improving soil fertility, reducing crop failure risks as well as providing additional income to farmers (Kirkegaard *et al.* 2008; Thierfelder *et al.* 2012).

However, only two studies were found to have tested this indicator (See Table 8). In the sampled articles, no specific methods to measure this indicator were stated (Dantsis *et al*. 2010; Chopin *et al.* 2016). Due to the vagueness of the measurement methods, a potential issue in the application of this indicator is the lack of knowledge by agribusiness on how to grow and manage different crop types under different growing seasons (Thierfelder *et al.* 2012). This in turn can cause agribusinesses to avoid carrying out crop rotation practices within their plantation management system (Chopin *et al.* 2016).

The indicator 'Soil Nutrient Content' refers to the nutrients within the soil that are essential for plant growth (Bouajila & Gallali 2010). Of the many types of nutrients within the soil, the macronutrients (nitrogen, phosphorus and potassium) are highly essential for plant growth as they can greatly influence crop yields (Biswas & Naher 2019). In regard to soil nutrient content, soil organic matter plays an important role as it is the storehouse for a wide range of plant nutrients especially nitrogen and phosphorus (Bouajila & Gallali 2010; Biswas *et al.* 2014). However, these soil nutrients and soil organic matter are often the most limiting factors in crops production and therefore must be managed using chemical fertilizers or organic manure (e.g. cow-dung, poultry manure) on a crop-by-crop basis (Rossel *et al.* 2011).

A total of ten studies were found to have tested this indicator (See Table 8). In the sampled articles, soil nutrient content was measured by lab analysis, however, the type of lab analysis used was not stated. The soils were most commonly tested for nitrogen, potassium, phosphorus and organic matter levels (Hartemink 1998; Pretty *et al.* 2008; Sydorovych *et al.* 2009). A potential issue in the application of this indicator is that it requires extensive lab analysis which can be costly and time consuming (Dunn *et al.* 2002).

The indicator 'Soil Physical Properties' refers to physical properties of the soil including soil structure, texture, density, porosity, colour, density, consistency, air and temperature (Osman 2013). Of these properties, soil structure and soil texture are considered to be more important (Osman 2013). Soil structure refers to the arrangement of soil particles (silt, sand and clay) into different geometric patterns within the soil (Lipiec & Hatano 2003). Soil texture refers to the relative proportions of these particles within the soil (Osman 2013). Together, both these soil properties regulate density, compactness, porosity, retention and movement of air and water in the soil (Jat *et al.* 2018).

A total of six studies were found to have tested this indicator (See Table 8). In the sampled articles, soil physical property was also measured by lab analysis, however, the type of lab analysis used for soil testing was not stated. The soils were most commonly tested for clay, sand and silt levels (Zhang *et al.* 2017; Rodrigues *et al.* 2018; Schweier *et al.* 2018). A potential issue in the application of this indicator is that it requires lab analysis or the use of special equipment's (e.g. penetrometer) which can be costly (Dunn *et al.* 2002). Although simple field tests (e.g. Spade Test) can be carried to assess the physical properties of the soil, knowledge on different soil profiles is necessary to accurately carry out soil assessments (Ingram *et al.* 2010).

The indicator 'Soil Chemical Properties' refers to chemical properties of the soil including pH, cation exchange capacity (CEC), exchangeable cations as well as heavy metal concentrations. Of these properties, soil pH and CEC are considered more important. Soil pH measures the alkalinity or acidity of the soil which in turn can influence both plant growth as well as other soil characteristics such as soil nutrient solubility and microbial activity (Sydorovych *et al.* 2009; Gentili *et al.* 2018). Soil CEC refers to the ability of the soil to adsorb exchangeable cations that are available to the plant (Lipson & Stotzky 1983). This in turn helps in determining the frequency and amount of cations required during fertigation (Lipson & Stotzky 1983).

A total of five studies were found to have tested this indicator (See Table 8). In the sampled articles, soil chemical property was measured by lab analysis, however, the type of lab analysis used was not stated (Singh & Benbi 2016; Zhang *et al.* 2017; Rodrigues *et al.* 2018). A potential issue in the application of this indicator is that the lab analysis can have a high error rate thereby resulting in inconsistent and inaccurate measurements (Sumner 1994). Furthermore, measurements via lab analysis can be costly and time consuming (Dunn *et al.* 2002).

Six indicators; 'Diversity and Abundance of Key Species', 'Tree Species Diversity', 'Diversity of crops across the landscape', 'Total area of natural vegetation converted for production', 'Existence of recycling programs' and 'Energy saving practices' were suggested under the biodiversity and materials and energy theme within the environmental dimension (See Table 9).

Table 9: Indicators suggested under the biodiversity and materials and energy theme within the environmental dimension

Theme: Biodiversity and Materials and Energy		
Indicator	**Measurement**	**References**
Diversity and Abundance of Key Species	Insects: Pitfall traps and Yellow bowl traps. Animals: Appropriate sampling method depending on the species	Pineda *et al.* 2005; Jacobi *et al.* 2015; Bellamy *et al.* 2016
Tree Species Diversity	Categorizing all tree species with a diameter of more than 5cm at breast height. Assistance of forestry staff is recommended.	COSA 2013; Jacobi *et al.* 2015
Diversity of crops across the landscape	Survey farmers about the number of crop varieties on the site	Elfkih *et al.* 2012; Jacobi *et al.* 2015; Chopin *et al*. 2016

Total area of natural vegetation converted for production	Quantify and determine whether there has been any conversion from ecologically valuable to less valuable habitats by the enterprise.	COSA 2013; FAO 2013
Existence of recycling programs	No specific methods mentioned	COSA 2013; FAO 2015
Energy saving practices	No specific methods provided	COSA 2013; FAO 2013

The indicator 'Diversity and Abundance of Key Species' refers to the abundance and state of diversity of key species including vulnerable and threatened wild species (animals and insects only) due to the setup and activities of the plantation agricultural system (Pineda *et al.* 2005; Jacobi *et al.* 2015). Plantation agricultural activities are altering natural ecosystems at unprecedented intensities and scales (FAO 2013). Most of the land conversion activities for plantation expansion primarily occurs within forested areas (FAO 2013). For example, in Southeast Asia, palm oil plantations have replaced large areas of tropical rain forests to meet the growing demand for palm oil (Fitzherbert *et al.* 2008; Danielsen *et al.* 2009). However, these plantations only support a limited number of animal and insect species compared to natural forests (Fitzherbert *et al.* 2008; Danielsen *et al.* 2009). As such, the indicator 'Diversity and Abundance of Key Species' is essential to ensure that plantation expansion does not further threaten endangered or vulnerable animal and insect species which in turn can cause further biodiversity loss.

However, only three studies were found to have tested this indicator (See Table 9). In the sampled articles, diversity and abundance of key species was measured either using pitfall and yellow bowl traps for insects or appropriate sampling methods depending on the type of animal species being assessed (Pineda *et al*. 2005; Jacobi *et al.* 2015; Bellamy *et al*. 2016). A potential issue in the application of this indicator is that this indicator heavily relied on expert consultation to correctly identify and classify different species (Pineda *et al.* 2005; Jacobi *et al.* 2015). This can be problematic particularly within developing nations due to the lack of data regarding key species within that agricultural system (Ban *et al.* 2009).

The indicator 'Tree Species Diversity' refers to the state of diversity of key wild or native tree species within the plantation agricultural system (Jacobi *et al.* 2015). The presence of wild or native tree species within the plantation agricultural landscape helps support a diverse variety of animal and insect species (Hartley 2002). Furthermore, the presence of wild and native tree species also helps increase decomposition rates which in turn allows for faster nutrient release into the soil thereby aiding soil nutrient recycling (Byard *et al.* 1996). Besides this, some native tree species with rapid canopy closure can also limit weed growth which can decrease the cost of weeding over time (Byard *et al.* 1996). Therefore, this indicator is highly relevant to the sustainability of the plantation system.

However, only two studies were found to have tested this indicator (See Table 9). In the sampled articles, tree species diversity was measured by categorizing all tree species within the agricultural landscape with a diameter of more than 5cm at breast height (COSA 2013; Jacobi *et al.* 2015). Like the indicator 'Diversity and Abundance of Key Species', a potential issue in the application of this indicator is that this indicator also heavily relied on expert consultation to correctly identify and classify different species (Jacobi *et al.* 2015). This can be problematic particularly within developing nations due to lack of expertise and data regarding the relationship between ecosystem functioning and diversity (Ban *et al.* 2009; Li *et al.* 2014).

The indicator 'Diversity of crops across the landscape' refers to the number of different crop species under production within the plantation agricultural system (Elfkih *et al.* 2012). A mixed-species plantation has been indicated to be more productive compared to a single species (monoculture) plantation (Petit & Montagnini 2004). Furthermore, a mixed-species plantation is able to provide farmers with more flexibility by producing a variety of products to supply an uncertain market (Petit & Montagnini 2004). Besides this, mixed-species plantations can also reduce the incidences of diseases or insect attacks (Nichols *et al.* 2006).

However, only three studies were found to have tested this indicator (See Table 9). In the sampled articles, diversity of crops across the landscape was measured by surveying farmers regarding the number of crop species on site (Elfkih *et al.* 2012; Jacobi *et al.* 2015; Chopin *et al*. 2016). A potential issue in the application of this indicator is that the lack of interest from investors and plantation managers can be an obstacle to the adoption of a mixed-species plantation system (Forrester *et al.* 2006). A possible reason for this is the lack of education and enough evidence regarding the benefits of a mixed-species plantation system over a monoculture plantation system (Forrester *et al.* 2006).

The indicator 'Total area of natural vegetation converted for production' refers to the size of the natural or near-natural habitats (e.g. primary forests, wetlands or protected waterways) that have been replaced by ecologically less valuable forms of land use due to the plantation's operations (FAO 2013). Humans interact with natural systems for agricultural purposes by altering land for crop production (FAO 2013). According to the Food and Agriculture Organization (2011), arable land for crop production is projected to increase by 5% resulting in an expansion of 70 million ha. Almost all these land use changes are taking place in natural habitats such as tropical forests (Wicke *et al.* 2011). Therefore, this indicator is essential to ensure that plantation expansion does not result in further loss of natural habitats (Fitzherbert *et al.* 2008).

However, the two studies that have mentioned this indicator have only prescribed it (See Table 9). As such, this indicator has not been tested. In the sampled articles, total area of natural vegetation converted for agricultural production was measured by quantifying the area affected by the plantation's operations and then determining whether any conversion from ecologically valuable to less valuable habitats have occurred (COSA 2013; FAO 2013). A potential issue in the application of this indicator is that the ecological value of a habitat can be difficult to ascertain as it can depend on the values of the local stakeholders (FAO 2013). Therefore, stakeholder opinion must be considered to determine if a particular area has undergone any ecological 'upgrading' or 'downgrading' (FAO 2013).

The indicator 'Existence of recycling programs' refers to whether the enterprise carries out recycling practices and activities to reduce waste generation and dependence on virgin (non-renewable) materials (FAO 2013). Food supply studies worldwide have indicated that in the near future, essential increases in global food production will be required in order to feed the growing global population (Nonhebel 2005). This can only be achieved by either cultivating more crops on larger tracts of land or by cultivating high yielding crop varieties on existing arable lands (Nonhebel 2005). Both these options will require increased material and energy inputs into the agricultural system which in turn, can result in the generation of large amounts of wastes and underused by-products (Padam *et al.* 2014). Therefore, the recycling of waste particularly agricultural waste is essential as it can not only help overcome issues of waste generation but resource preservation as well (Okafor 1991)

However, the two studies that have mentioned this indicator have only prescribed it (See Table 9). As such, this indicator has not been tested. In the sampled articles, no specific methods to measure this indicator were stated (COSA 2013; FAO 2015). A potential issue in the application of this indicator is that some materials cannot be recycled at economically feasible cost (FAO 2013). Furthermore, due to the vagueness of the measurement methods, it can be difficult to list, classify and quantify materials that can be recycled safely, efficiently and at reduced cost (FAO 2013).

The indicator 'Energy saving practices' refers to practices carried out by the enterprise to reduce the energy needs and consumption of the plantation over time (FAO 2013). Plantation activities such as irrigation, fertilizer application, transportation as well as machinery use contribute towards higher energy consumption (Prueksakorn *et al.* 2010). As the size of plantation systems are expected to increase due to the worldwide demand for plantation commodities, the energy demand and consumption of these plantations will likely increase as well to due to the increase in plantation operational activities (Prueksakorn *et al.* 2010; Padam *et al.* 2014; Ludin *et al.* 2014). Therefore, this indicator is essential to ensure that practices and activities that can effectively reduce the energy consumption and needs of the plantation are implemented by the enterprise (FAO 2013).

However, the two studies that have mentioned this indicator have only prescribed it (See Table 9). As such, this indicator has not been tested. In the sampled articles, no specific methods to measure this indicator were stated (COSA 2013; FAO 2013). Like the indicator 'Existence of recycling programs', a potential issue in the application of this indicator is that compiling a list of suitable and effective energy-saving practices for the enterprise can be challenging (FAO 2013). As such, consultation with stakeholders particularly energy consultants are required to ensure that the list of practices can be used as a guidance for future energy-saving practices (FAO 2013).

4.3.2 Social Indicators

A total of 90 indicators were identified under the 'Social' dimension of sustainability (see Appendix 6). A portion of these indicators could be grouped together into 11 indicators. These indicators were further categorized into their respective sustainability themes (See Table 10 and Table 11). These four themes include; labour rights, decent livelihood, equity as well as safety and health.

Six indicators; 'Child labour', 'Forced labour', 'Access to adequate protective equipment', 'Access to health care insurance', 'Access to potable water' and 'Number of worker incidences per year' were suggested under the labour rights and safety and health theme within the social dimension (See Table 10).

Table 10: Indicators suggested under the labour rights and safety and health theme within the social dimension

Theme: Labour Rights and Safety and Health		
Indicator	**Measurement**	**References**
Child labour	Interviews with management and workers. Reviewing company documents	FAO 2013; Van Eijck *et al.* 2014
Forced labour	Interviews with management and workers. Reviewing company documents	FAO 2013; Van Eijck *et al*. 2014
Access to adequate protective equipment	Measurements not mentioned	FAO 2013; FAO 2015
Access to health care insurance	Measurements not mentioned	COSA 2013; FAO 2013; FAO 2015
Access to potable water	Measurements not mentioned	COSA 2013; FAO 2015
Number or worker incidences per year	Measurements not mentioned	COSA 2013; FAO 2015; Schweier *et al.* 2018

The indicator 'Child labour' refers to work that is harmful to the physical and mental development of children as well as deprives them of their childhood (FAO 2013). In today's capitalist system that strives for profits by reducing costs of inputs such as labour and capital, labour exploitation is an inherent and common risk (Marras 2003). Worldwide, more children are 'employed' in the agricultural sector compared to any other sector of the economy (Ramos 2018). Despite this high rate of employment, child labour issues within this sector remain relatively unaddressed (Lecours *et al*. 2012). This is due to a combination of factors namely; parents, employers, governments as well as weak national and international legal structures which continue to allow such practices to exist (Marlenga *et al.* 2007). As such, this indicator is essential to ensure that under aged 'workers' (children) are not employed and exploited by agricultural enterprises (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 10). In the sampled articles, child labour activities were measured either by interviewing plantation workers and management as well as reviewing company documents and policies regarding child labour activities (FAO 2013; Van Eijck *et al.* 2014). A potential issue in the application of this indicator is that this indicator heavily relied on interviews and employment documentations to assess child labour issues within plantation systems (FAO 2013; Van Eijck *et al.* 2014). This can be problematic particularly within developing countries as employment records might not be available and the 'workers' (children) may be unwilling to provide details of their employment due to a variety of reasons such as the need for cash or family situation (Bales 2012).

The indicator 'Forced labour' refers to modern slavery in which workers are forced to work against their will, often in deplorable conditions with little to no pay (Gold *et al.* 2015). Slavery or forced labour is fairly common within the plantation sector despite numerous laws prohibiting the practice (Chesney *et al.* 2019). One of the main reasons for this is due to the informal employment practices of this sector (Gold *et al.* 2015). Most labourers within this sector are often promised reasonable pay and conditions without formal documentation (Gold *et al.* 2015). In most cases, the promises are never fulfilled and as most of the labourers are illegal immigrants, the fear of deportation prevents most of them from voicing out against this injustice (Bales 2012). As such, this indicator is necessary to ensure that forced labour practices are not carried out within the enterprise (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 10). In the sampled articles, forced labour activities were measured either by interviewing plantation workers and management as well as reviewing company documents and policies regarding forced labour activities (FAO 2013; Van Eijck *et al*. 2014). Similar to the 'Child labour' indicator, the 'Forced labour' indicator also heavily relied on interviews and employment documentations to assess forced labour issues within plantation systems (FAO 2013; Van Eijck *et al.* 2014). This can again be problematic as employment records might not be available and the workers may be unwilling to provide details of their employment due to a variety of reasons such as the need for cash or fear of persecution or deportation (Bales 2012). Furthermore, the assessor whom verifies the forced labour issues must not only be able to speak the language of the employees but also be able to conduct interviews confidentially (FAO 2013).

The indicator 'Access to adequate protective equipment' refers to the provision of sufficient and adequate protective gear and safety equipment to the workers by the enterprise (FAO 2013). Plantation work exposes labourers to multiple hazards, particularly chemical hazards such as pesticides (McCurdy & Carroll 2000).Pesticide exposure was the most cited hazard within the agricultural literature, with the World Health Organization (WHO) estimating that approximately 3 million cases of pesticide related intoxications are reported annually (McCurdy & Carroll 2000; Ecobichon 2001; Villarejo 2003). Therefore, this indicator is necessary to ensure that agricultural labourers are provided with adequate protective equipment to minimize health and safety risks (Reddy *et al.* 2016).

However, the two studies that have mentioned this indicator have only prescribed it (See Table 10). As such, this indicator has not been tested. In the sampled articles, no specific methods to measure this indicator were stated (FAO 2013; FAO 2015). A potential issue in the application of this indicator is that compiling a list of essential gear and safety equipment that must be provided to the workers by the enterprise can be challenging (FAO 2013). This is because, the safety equipment provided must meet the standard requirements and regulations of the region as well as offer adequate protection against specified hazards (Karlson & Noren 1979; FAO 2013). This can be problematic particularly within developing nations where safety and health issues are less regulated (Awwad *et al.* 2016).

The indicator 'Access to health care insurance' refers to the health and medical care coverage provided to the workers by the enterprise (FAO 2013). Although the agricultural sector has progressed in reducing work related injuries and deaths through advancements in machinery, technology and better farming techniques, it still remains as one of the most dangerous industries in the world (McCurdy & Carroll 2000). As such, this indicator is essential to ensure that workers have access to employer-provided protection particularly health care insurance (Shreck *et al.* 2006)

However, the three studies that have mentioned this indicator have only prescribed it (See Table 10). As such, this indicator has not been tested. A potential issue in the application of this indicator is that assessing the coverage of the health care insurance provided by the enterprise to the workers can be difficult (FAO 2013). This is because, the health care insurance provided must meet both the local and regional laws as well as offer adequate protection depending on the type of work activities the workers are engaged in (FAO 2013). However, this can be challenging to implement particularly within developing countries where safety and health issues are less regulated (Awwad *et al.* 2016).

The indicator 'Access to potable water' refers to whether workers have access to sufficient amounts of clean, drinking water for their hydration needs (FAO 2015). As most plantations are located within tropical regions and with plantation activities being highly strenuous, health risks such as heat stroke and dehydration are a serious concern (FAO 2013; Santika *et al.* 2019). Therefore, this indicator is required to ensure that workers are provided with sufficient amounts of clean, drinking water by the enterprise to prevent heat-related illnesses (Jackson & Rosenberg 2010).

However, the two studies that have mentioned this indicator have only prescribed it (See Table 10). As such, this indicator has not been tested. In the sampled articles, no specific methods to measure this indicator were stated (COSA 2013; FAO 2015). A potential issue in the application of this indicator is that, simply providing enough potable water is insufficient to ensure adequate hydration (Jackson & Rosenberg 2010). Workers often experience 'costs' of access to drinking water in the form of co-worker or supervisory disdain, foregone piece-work earnings as well as the physical effort to cover long distances (Jackson & Rosenberg 2010). Therefore, potable water facilities should be kept close to work sites to encourage greater consumption (Jackson & Rosenberg 2010).

The indicator 'Number of worker incidences per year' refers to the number of non-fatal worker incidences on the plantation within a year (FAO 2015). The unfavourable working conditions of some plantation systems as well as negligence among workers in developing nations contribute to the risk of occupational accidents (Naveen *et al.* 2013). This in turn, can increase the number of incidences on the plantation (Naveen *et al.* 2013). As such, this indicator is required to monitor trends in worker incidences in order to implement appropriate corrective measures to reduce the number or incidences (occupational accidents) over time (FAO 2015).

However, the three studies that have mentioned this indicator have only prescribed it (See Table 10). As such, this indicator has not been tested. In the sampled articles, no specific methods to measure this indicator were stated (COSA 2013; FAO 2015; Schweier *et al.* 2018). A potential issue in the application of this indicator is that it can be challenging to acquire a true estimate of the number of incidences that occur within the plantation system (Villarejo *et al.* 2010). This is because, the figures currently reported mostly include direct-hire employees and farm operators while seasonal or temporary labourers are excluded (Villarejo *et al.* 2010). Plantation agriculture relies on seasonal labour particularly during the harvest season to compensate for the additional workload (Bossen 1982). However, in most cases, these seasonal labourers are mostly undocumented (Bossen 1982). Furthermore, these labourers often never report farm-related incidences (injury or death) for fear of deportation and, in most cases must follow the harvest to the next crop to look for employment (McMahon 2002).

Five indicators; 'Discrimination in employment', 'Gender wage differentials for the same quantity of work', 'Training for workers' 'Wage categories of employees' and 'Average working hours per week' were suggested under the equity and decent livelihood theme within the social dimension (See Table 11).

Table 11: Indicators suggested under the equity and decent livelihood theme within the social dimension

Theme: Equity and Decent Livelihood		
Indicator	**Measurement**	**References**
Discrimination in employment	Document review and interviews with workers and management	Van Eijck *et al.* 2014; Prasara-A & Gheewala 2016
Gender wage differentials for the same quantity of work	Document review and interviews with workers and management	FAO 2013; Prasara-A & Gheewala 2016
Training for workers	Review company records. Interviews with management	Elfkih *et al.* 2012; Van Eijck *et al.* 2014; Ingram *et al.* 2016
Wage categories of employees	Review company records. Interviews with workers and management	FAO 2013; Van Eijck *et al.* 2014; Prasara-A & Gheewala 2016
Average working hours per week	Review company records. Interviews with workers and management	Van Eijck *et al.* 2014; Prasara-A & Gheewala 2016

The indicator 'Discrimination in employment' refers to discriminatory practices particularly gender discrimination in employment opportunities (Prasara-A & Gheewala 2016). Within agricultural systems, the most common discriminatory practice is gender differentials in employment opportunities as men are more likely to be employed compared to women particularly as permanent workers (Yaro *et al.* 2017). Besides this, agricultural systems are also largely patriarchal gendered system and as such, women tend to occupy lower positions compared to men (Apusigah 2009). As such, this indicator is essential to ensure that discriminatory practices regarding employment opportunities are not carried out (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 11). In the sampled articles, discrimination in employment practices were measured either by interviewing plantation workers and management as well as reviewing company documents and policies regarding discriminatory activities (Van Eijck *et al.* 2014; Prasara-A & Gheewala 2016). A potential issue in the application of this indicator is that, as this indicator heavily relied on interviews and employment documentations, this can be problematic as employment records might not be available particularly in developing countries and the female workers might not be willing to discuss any discriminatory practices due to a variety of reasons such as the need for cash, fear of persecution or harassment as well as family situation and needs (Bales 2012; Prasara-A & Gheewala 2016). Furthermore, the assessor carrying out the assessment must also be familiar with the local language, customs, traditions and values of the region to carry out interviews and assessments effectively (FAO 2013).

The indicator 'Gender wage differentials for the same quantity of work' refers to whether both men and women are paid equally for the same or similar work (FAO 2013). Apart from employment opportunities, another common discriminatory practice is gender wage payments (Garikipati 2008; Yaro *et al.* 2017). It has been indicated that for some agricultural work such as harvesting and threshing, women are more preferred as they can be employed for lower wages compared to their male counterparts (Garikipati 2008). In some case, women are paid 30% less on average compared to their male colleagues for the same quantity of work (Yaro *et al.* 2017). As such, this indicator is required to ensure that wages are paid fairly based on the type and quantity of work carried out irrespective of gender (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 11). In the sampled articles, gender wage differentials were measured either by interviewing plantation workers and management as well as reviewing company documents and policies regarding discriminatory activities (FAO 2013; Prasara-A & Gheewala 2016). Like the indicator 'Discrimination in employment', a potential issue in the application of this indicator is that, as this indicator heavily relied on interviews and employment documentations, this can be problematic as payment records might not be available particularly in developing countries and the workers might not be willing to discuss any discriminatory practices due to a variety of reasons such as the need for cash or fear of persecution (Bales 2012; Prasara-A & Gheewala 2016).

The indicator ‘Training for workers’ refers to the necessary trainings that must be provided by the enterprise in order to equip the workers with the necessary skills to carry out the required task or activity efficiently and safely (FAO 2013). With the rise in the global demand for plantation commodities as well as climatic vulnerabilities (e.g. droughts, floods, unusual rainfall patterns), appropriate training for plantation workers is becoming more essential in order for plantation enterprises to ensure that their workforce is equipped with the necessary knowledge and skills to adapt to the changing environmental and global demands (FAO 2013; Gerber 2011; Alam *et al.* 2012). As such, the performance of plantation systems in terms of crop production and yield largely depends on the type of training that is given to the workforce (Silici *et al.* 2011). This is because the appropriate training can ensure the coordinated and timely management of all farming activities which in turn influences the overall performance of the plantation (Silici *et al.* 2011).

However, only three studies were found to have tested this indicator (See Table 11). In the sampled articles, training for workers was measured either by interviewing plantation management as well as reviewing company documents and policies regarding training programs (Elfkih *et al.* 2012; Van Eijck *et al.* 2014; Ingram *et al.* 2016). A potential issue in the application of this indicator is that the training provided by plantation enterprises has been criticized as being mostly narrow (Lim & Douglas 2000). This is because these training programs are often inherited from colonial structures which usually focuses solely on economic profitability with little consideration for environmental impacts (Grossman & Iyigun 1995). Therefore, the training provided should not solely focus on crop yield and production but should also focus on wider issues of sustainable development such as natural resource management to ensure that the plantation can be managed more sustainably (Lim & Douglas 2000).

The indicator ‘Wage categories of employees’ refers to whether workers are paid according to the standard wage laws of the region the enterprise operates in (Elfkih *et al.* 2012). Although plantation industries are often considered profitable agribusinesses that earn a foreign exchange, the profits generated by plantation industries do not necessarily reflect the income or wages paid to the workers (Hartemink 2005; Linton 2005). Leitner (1976) indicated that plantation workers are not only some of the most degraded workers particularly within developing countries but, their wages are also below subsistence. As such, this indicator is required to ensure that workers are paid accordingly based on the regional wage laws (FAO 2013).

However, only three studies were found to have tested this indicator (See Table 11). In the sampled articles, wage categories of employees were measured either by interviewing plantation management as well as reviewing company documents and policies regarding wage payments (FAO 2013; Van Eijck *et al.* 2014; Prasara-A & Gheewala 2016). However, a potential issue in the application of this indicator is that the wages paid by the enterprise may not necessarily be consistent (Moretti & Perloff 2002). Economic conditions (e.g. recession, market fluctuations) may temporarily prevent enterprises from paying a living wage which in turn can affect the livelihood of plantation workers whom are dependent on the day to day living wage (FAO 2013).

The indicator 'Average working hours per week' refers to the number of hours workers are expected to work on average within a given work week (Prasar & Gheewala 2016). Mingorría *et al.* (2014) indicated that although plantation companies can provide additional income for plantation workers, some of these companies do overwork their workers. As such, some plantation companies can burden their workers with increasing labour and additional workload thereby preventing them from having adequate rest or other social activities (Mingorría *et al.* 2014). As such, this indicator is essential to ensure that workers have sufficient time for rest from work and to prevent workers from being overworked (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 11). In the sampled articles, average working hours per week of employees were measured either by interviewing plantation management and workers as well as reviewing company documents and policies regarding working hours (Van Eijck *et al.* 2014; Prasara-A & Gheewala 2016). A potential issue in the application of this indicator is that this indicator may not necessarily apply to all plantation workers especially seasonal workers whom are mostly undocumented (illegal immigrants) (Ecobichon 2001). As such, these workers may be subjected to more severe treatments including longer working hours due to the lack of regulations particularly within developing countries regarding labour laws (Bossen 1982).

4.3.3 Economic Indicators

A total of 60 indicators were identified under the 'Economic' dimension of sustainability (see Appendix 6). These indicators were then grouped together into 15 indicators. These indicators were further categorized into their respective sustainability themes (See Table 12 and Table 13). These three themes include; investments, local economy and product quality.

Ten indicators; 'Overall farm revenue', 'Net Income', 'Profit', 'Crop Yield', 'Selling Price', 'Internal rate of return', 'Net Present Value', 'Gross Margin', 'Internal Investment' and 'Production Costs' were suggested under the investment theme within the economic dimension (See Table 12).

Table 12: Indicators suggested under the investment theme within the economic dimension

Theme: Investment		
Indicator	**Measurement**	**References**
Overall farm revenue	Interviews with management. Review company records	Fleskens *et al.* 2009; Chopin *et al.* 2015; Sun *et al.* 2017; Rodrigues *et al.*2018
Net Income	Review the income statement of the organization	COSA 2013; FAO 2013
Profit	Farm surveys. Interviews.	Gómez-Limón & Riesgo 2009; Testa *et al.* 2015; Ingram *et al.* 2016; Sun *et al.* 2017
Crop Yield	Interviews or focus group discussions	Pretty *et al.* 2008; Sydorovych *et al.* 2009; Rodrigues *et al.* 2018
Selling Price	Document review or interviews with management	Fleskens *et al.* 2009; Rodrigues *et al.* 2018
Internal rate of return	Review company documents	Van Eijck *et al.* 2014; Testa *et al.* 2015; Sun *et al.*2017
Net Present Value	Review company documents	Giménez *et al.* 2013; Van Eijck *et al.* 2014; Yi *et al.* 2014; Testa *et al.* 2015; Diaz-Balteiro *et al.* 2016; Sun *et al.* 2017
Gross margin	Farm survey	Gómez-Limón & Riesgo 2009; Dantsis *et al.* 2010
Internal Investment	Review company records	FAO 2013; FAO 2015
Production Costs	Review company records	Fleskens *et al.* 2009; Van Eijck *et al.* 2014; Schweier *et al.* 2018

The indicator 'Overall farm revenue' refers to the total income generated from the normal business operations of the enterprise (plantation company) before subtracting costs (Chopin *et al.* 2015). Farm revenue is an essential indicator of economic sustainability in order to track the financial performance of the enterprise from year to year (Chopin *et al.* 2015). Generally, enterprises' whose revenues increase over time have better financial performance compared to those whose revenues remain the same or decrease over time (Rai *et al.* 2006).

A total of four studies were found to have tested this indicator (See Table 12). In the sample articles, overall farm revenue was measured either by interviewing plantation management or reviewing company financial records regarding business performance (Fleskens *et al.* 2009; Chopin *et al.* 2015; Sun *et al.* 2017). A potential issue in the application of this indicator is that this indicator cannot be used as a stand-alone indicator and must be combined with other indicators such as 'Production Costs' and 'Selling Price' to provide a true picture of the financial performance of the enterprise (FAO 2013). This is because this indicator has not accounted for the production and operational costs of the enterprise which is required to provide a true picture of profitability (FAO 2013).

The indicator 'Net Income' refers to the income of the enterprise after accounting for additional costs including business expenses and taxes (FAO 2013). It is a useful indicator for businesses to assess how much revenue exceeds the costs of a business (Hitt *et al.* 2002). However, the two studies that have mentioned this indicator have only prescribed it (See Table 12). As such, this indicator has not been tested. The legitimacy of this indicator was found to be medium as two stakeholder groups (UN institutions and NGOs) have prescribed this indicator. In the sampled articles, net income was measured by reviewing company financial records regarding business performance (COSA 2013; FAO 2013). Similar to the 'Overall farm revenue' indicator, this indicator also requires other indicators such as 'Return on Equity' and 'Earnings per Share' to provide a true picture on the actual income and profitability of the enterprise (FAO 2013).

The indicator 'Profit' refers to the financial benefits realized when the revenue generated through the enterprise's operations exceeds the expenses, taxes and costs involved in sustaining the operations and activities of the business (Gómez-Limón & Riesgo 2009). This indicator is essential to measure the long-term profitability of the enterprise thereby allowing the enterprise to determine which operations must be increased or reduced to generate, maintain and increase the enterprise's long-term profits (FAO 2013).

A total of four studies were found to have tested this indicator (See Table 12). In the sampled articles, profit was measured either by interviewing plantation management or surveying different farmers regarding the profits generated through the operational activities of the enterprise (Gómez-Limón & Riesgo 2009; Testa *et al*. 2015; Sun *et al*. 2017). A potential issue in the application of this indicator is that the type of profit measured was not stated in all the mentioned studies. This can be problematic as different types of profits (e.g. Gross Profit, Operating Profit and Net Profit) provide assessors with different information regarding the enterprise's performance (FAO 2013). This is essential when comparing the enterprise's performance to other competitors within the same time period (FAO 2013).

The indicator 'Crop Yield' refers to the total quantity of crops produced by the enterprise for sale (e.g. export) within a given time period (Sydorovych *et al.* 2009; Rodrigues *et al.* 2018). This indictor is essential as crop yield greatly influences the revenue and subsequently the profit of the enterprise as higher yields generally results in higher financial returns (Pretty *et al.* 2008; Rodrigues *et al.* 2018).

However, only three studies were found to have tested this indicator (See Table 12). In the sampled articles, crop yield was measured either by interviewing plantation management or through focus group discussions with farmers regarding the annual crop yields of the plantation (Pretty *et al*. 2008; Sydorovych *et al*. 2009; Rodrigues *et al*. 2018). A potential issue in the application of this indicator is that the quality of the crops produced also plays a role in terms of financial returns as higher quality crops can be sold at a higher selling price (FAO 2013). As such, this indicator must be paired with other indicators such as 'Crop Quality' and 'Selling Price' to accurately determine the financials returns of the enterprise (FAO 2013; Rodrigues *et al.* 2018).

The indicator 'Selling Price' refers to the price at which the products (e.g. crops) of the enterprise are sold for (Rodrigues *et al.* 2018). The selling price is essential in ensuring that the products are not only sold above the break-even point but, the price of the products have also been marked up to ensure that enterprise makes a profit (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 12). In the sample articles, selling price was measured either by interviewing plantation management or reviewing company financial records regarding business performance (Fleskens *et al*. 2009; Rodrigues *et al*. 2018). A potential issue in the application of this indicator is that this indicator is dependent on other factors such as market stability and supply demands (FAO 2013). This is because market stability and supply demands can be influenced by issues such as customer behaviour, global pandemic as well as natural disasters which in turn can influence the selling price of the products and subsequently the profits generated as well (FAO 2013).

The indicator 'Internal rate of return' is an economic metric that is used to estimate the profitability of potential investments of the enterprise (Testa *et al.* 2015). As such, this indicator is essential for businesses to plan future growth and investments (Van Eijck *et al.* 2014). However, only three studies were found to have tested this indicator (See Table 8). In the sampled articles, internal rate of return was measured by reviewing company financial records regarding business performance (Van Eijck *et al.* 2014; Testa *et al*. 2015; Sun *et al.* 2017). A potential issue in the application of this indicator is that this indicator is technical and requires prior financial and investment knowledge to understand and utilize accurately (Juhász 2011).

The indicator 'Net Present Value' is used to evaluate the projected earnings of the enterprise's activities in present time/day (Sun *et al.* 2017). Based on this indicator, activities that have a positive NPV will be profitable and those with a negative NPV will generate a loss (Sun *et al.* 2017). The 'Net Present Value' indicator is also essential in estimating the profitability of potential investments and is often used together with the 'Internal rate of return' indicator (Testa *et al.* 2015; Sun *et al.* 2017).

A total of six studies were found to have tested this indicator (See Table 12). In the sampled articles, net present value was measured by reviewing company financial records regarding business performance (Giménez *et al*. 2013; Van Eijck *et al*. 2014; Yi *et al*. 2014). Similar to the indicator 'Internal rate of return', this indicator is also technical and requires prior financial and investment knowledge to understand and utilize accurately (Juhász 2011; Sun *et al.* 2017).

Within agricultural systems, the indicator 'Gross margin' refers to the difference between the gross agricultural value and a variable crops cost (e.g. seeds, pesticides, fertilizers) (Dantsis *et al.* 2010). However, as the costs do not include fixed assets and labour costs, this indicator is only useful for measuring the profitability of the enterprise in the short term and not the long term (Gómez-Limón & Riesgo 2009). As such, this indicator is not as essential in measuring the profitability of the plantation agricultural systems compared to the other listed indicators.

However, only two studies were found to have tested this indicator (See Table 12). In the sampled articles, this indicator was measured by surveying different farmers regarding the gross margin value per year of different farms (Gómez-Limón & Riesgo 2009; Dantsis *et al.* 2010). A potential issue in the application of this indicator is that this indicator does not provide a true measure of profitability as it does not include costs such as interests, taxes and other relevant expenses (Gómez-Limón & Riesgo 2009; Dantsis *et al.* 2010).

The indicator 'Internal Investment' refers to the investments made by the enterprise to improve its environmental, social, governance and economic performance (FAO 2013). As such, this indicator is essential to ensure that the enterprise has implemented essential investments into its internal structure to ensure the long-term sustainability of the enterprise (FAO 2013). However, the two studies that have mentioned this indicator have only prescribed it (See Table 12). As such, this indicator has not been tested. In the sampled articles, this indicator was measured by reviewing company financial records regarding business performance and investments (FAO 2013; FAO 2015). A potential issue in the application of this indicator is that this indicator does not measure if the practices implemented by the enterprise have successfully improved the enterprise's sustainability performance (FAO 2013). As such, this indicator does not guarantee progress in sustainability and should just be taken as the enterprise's initial step towards improvements in sustainability performance (FAO 2013).

The indicator 'Production Costs' is a comprehensive performance and accounting indicator that is essential to make business decision plans particularly investment plans (FAO 2013). Some of these investments include mechanization and use of green technology to reduce both labour and power costs respectively (Strijker 2005; Huang *et al.* 2013). As such, this indicator is essential to determine which investments are required within its supply chain to reduce costs in order to lower its product price and to make it more competitive (Klassen & McLaughlin 1996).

However, only three studies were found to have tested this indicator (See Table 12). In the sampled articles, this indicator was measured by reviewing company financial records regarding business performance and investments (Fleskens *et al.* 2009; Van Eijck *et al.* 2014; Schweier *et al*. 2018). A potential issue in the application of this indicator is that the accounting practices to measure production costs must be adapted over time to meet the changing needs and plans of the enterprise over time (FAO 2013).

Five indicators; ‘Agricultural employment’, ‘Type of pesticide applied’, ‘Use of pest resistant cultivar’, ‘Amount of pesticide used’ and Integrated pest management plan’ were suggested under the local economy and product quality theme within the economic dimension (Table 13).

Table 13: Indicators suggested under the local economy and product quality theme within the economic dimension

Theme: Local Economy and Product Quality		
Indicator	**Measurement**	**References**
Agricultural Employment	Company employment records. Interviews with communities	Dantsis *et al.* 2010; Elfkih *et al.* 2012; Van Eijck *et al*. 2014; Munyanduki *et al.* 2016; Sun *et al*. 2017; Schweier *et al.* 2018
Types of pesticide applied	No of replication used per growing season per pesticide. Data obtained through survey of farm area.	Pretty *et al*. 2008; Dantsis *et al*. 2010; Elfkih *et al*. 2012; FAO 2015; Chopin *et al*. 2016
Use of pest resistant cultivar	Farm survey	FAO 2015; Chopin *et al.* 2016
Amount of pesticide used	Measurements not mentioned	Pretty *et al.* 2008; COSA 2013
Integrated Pest Management Plan	Data obtained through interviews and questionnaires.	COSA 2013; Thivierge *et al.* 2014; FAO 2015

The indicator ‘Agricultural Employment’ refers to the level of employment provided by the enterprise within the plantation agricultural system (Dantsis *et al.* 2010). Agribusinesses particularly plantation agriculture are usually associated with job creation (Charnley 2006). This is because, these agribusinesses typically employ a relatively large number of unskilled labourers thereby contributing to the local economic development of a region (Hartemink 2005). This is particularly relevant for the sustainable development of rural areas (FAO 2013). Therefore, agribusinesses like plantations are in a good position to contribute to the local economic development of rural areas where value creation is highly required (Charnley 2006).

A total of six studies were found to have tested this indicator (See Table 13). In the sampled articles, this indicator was measured either by reviewing company employment records or interviewing local communities regarding the employment opportunities provided by the enterprise (Dantsis *et al.* 2010; Elfkih *et al.* 2012; Van Eijck *et al*. 2014). A potential issue in the application of this indicator is that jobs associated with the plantation sector are more frequently being given to outsiders rather than to local/rural residents (Charnley 2006). As such, the origin of the workers should also be considered to measure the number of non-regional employees hired and justification should also be provided regarding the use of non-local labour (FAO 2013; Van Eijck *et al.* 2014).

The indicator 'Type of pesticide applied' refers to the type of pesticides applied on the crops within the plantation agricultural system (Chopin *et al.* 2016). Agricultural products can become contaminated within the supply chain through a variety of ways including through the use of chemicals such as pesticides (COSA 2013). Some of these pesticides are highly hazardous as they can cause a variety of health effects in humans even at low exposure levels (FAO 2013). As such, the type of pesticide applied can affect the quality of the crops produced (FAO 2013).

A total of five studies were found to have tested this indicator (See Table 13). In the sampled articles, this indicator was tested by surveying farmers regarding the number of replications used per growing season per pesticide (Pretty *et al*. 2008; Dantsis *et al*. 2010; Elfkih *et al*. 2012). A potential issue in the application of this indicator is that the data on the type of pesticides applied or approved for use might not be available particularly within developing nations (FAO 2013).

The indicator 'Use of pest resistant cultivar' refers to the use of crops which have a reduced susceptibility to certain pest populations (Chopin *et al.* 2016). These crops have been genetically modified and are usually toxic to some pest (e.g. insects) populations (Dawson *et al.* 1989). The use of these pest resistant crops (cultivars) can help reduce the use and dependence on chemicals such as pesticides which can affect crop quality and subsequently human health as well (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 13). In the sampled articles, this indicator was measured through farm surveys (FAO 2015; Chopin *et al.* 2016). A potential issue in the application of this indicator is that, as this indicator is not widely prevalent it may lack legitimacy among other stakeholder groups such as NGOs whom may refuse to adopt this indicator (Aerni 2005). Aerni (2005) indicated that while some stakeholder groups such as agribusinesses and government organizations believe in the benefits of pest resistant crops (GM crops), other stakeholder groups such as some NGOs are more hesitant.

The indicator 'Amount of pesticide used' refers to the amount of pesticides applied on the crops within the plantation agricultural system (Pretty *et al.* 2008). Chemical pesticides are often used in excess within developing nations to reduce endemic as well as insect-borne diseases (Ecobichon 2001). The excessive use and sometimes misuse of these pesticides often create serious health problems as well as local and global environmental pollution (Ecobichon 2001). Therefore, this indicator is essential to ensure that the guidelines regarding the application quantity of the pesticides are adhered to.

However, only two studies were found to have tested this indicator (See Table 13). In the sampled articles, no specific methods to measure this indicator were stated (Pretty *et al.* 2008; COSA 2013). A potential issue in the application of this indicator is that the lack of rigorous regulations and legislation to control pesticide use particularly within developing nations can make it challenging for assessors to inspect and monitor pesticide use (Ecobichon 2001).

The indicator 'Integrated Pest Management Plan' refers to the activities carried out by the enterprise to reduce reliance on chemical usage and increase reliance on eco-friendly pest management methods (e.g. biocontrol) (Thivierge *et al.* 2014). Concerns over the type of pesticides used and their impacts on agricultural crops as well as the subsequent effects on the health of consumers have prompted various actor groups to recommend the use of integrated pest management (IPM) plans (Pretty *et al.* 2008).

However, only three studies were found to have tested this indicator (See Table 13). In the sampled articles, this indicator was measured using questionnaires as well as interviews with plantation management regarding the use of IPM plans (COSA 2013; Thivierge *et al.* 2014; FAO 2015). A potential issue in the application of this indicator is that it can be difficult to directly measure the effectiveness of each activity within the IPM plan in terms of pest control (FAO 2013).

4.3.4 Governance Indicators

A total of 14 indicators were identified under the 'Governance' dimension of sustainability (see Appendix 6). These indicators were then grouped together into 3 indicators. These indicators were further categorized into their respective sustainability themes (See Table 14). These two themes include; Transparency and Stakeholder participation.

Table 14: Indicators suggested under the transparency and stakeholder participation theme within the governance dimension

Theme: Transparency and Stakeholder Participation		
Indicator	**Measurement**	**References**
Transparency	Review company documents and policy	FAO 2013; Van Eijck *et al.* 2014
Implementation of stakeholder engagement strategies	Interviews with plantation management and workers	FAO 2013; Ingram *et al.* 2016
Participation of stakeholders in plantation activities	Interview plantation management	FAO 2013; FAO 2015

The indicator 'Transparency' refers to whether the enterprise provides information regarding its business operations to the relevant stakeholders in a complete and accessible manner (FAO 2013). Over the past few years, stakeholders have been putting increasing accountability pressures on multinational companies due to suspicions about the environmental and social implications of the business operations of these enterprises within different markets (Cooper & Owen 2007; Kolk 2008). As such, this indicator is essential to ensure that relevant stakeholders are provided with essential information about the enterprise's operations thereby allowing them to make more appropriate decisions (FAO 2013).

However, only two studies were found to have tested this indicator (See Table 14). In the sampled articles, this indicator was measured by reviewing company records and policies regarding business transparency (FAO 2013; Van Eijck *et al.* 2014). A potential issue in the application of this indicator is that the articles that mentioned this indicator did not state the guidelines regarding which information was deemed relevant to be disclosed as well as how much information to disclose to different stakeholders (FAO 2013;Van Eijck *et al.* 2014). For example, shareholders require information regarding the firm's financial health while community and regulatory stakeholders require information of the firm's sustainability-friendly practices (Wu *et al.* 2019). The type and amount of information disclosed is essential as a careful balance is required to satisfy the information requirement needs of different stakeholders (Wu *et al.* 2019).

The indicator 'Implementation of stakeholder engagement strategies' refers to the engagement strategies utilized by the enterprise to engage with different groups of relevant stakeholders (FAO 2013). Stakeholder engagement is essential for plantation enterprises to comprehend the needs and interests of various stakeholders in order to make informed decisions as well as the potential risks of those decisions (Roome 2005).

However, only two studies were found to have tested this indicator (See Table 14). In the sampled articles, this indicator was measured by interviewing plantation management and workers regarding the different engagement strategies utilized (FAO 2013; Ingram *et al.* 2016). A potential issue in the application of this indicator is that engaging with different stakeholders might be difficult due to the various engagement barriers with different stakeholders in different regions (FAO 2013). Furthermore, in developing regions, regulations and laws regarding effective engagement with different stakeholder groups may not be strictly enforced (FAO 2013). As such, enterprises may be less willing to engage and acquire feedback particularly from rural stakeholders regarding the decision strategies implemented by the enterprise thereby marginalizing some stakeholder groups and potentially causing further conflicts in the future (Obidzinski *et al.* 2012).

The indicator 'Participation of stakeholders in plantation activities' refers to the ways the enterprise incorporated the views of different stakeholders in any decisions made (FAO 2013). This indicator is essential to help facilitate mutual learning and negotiations regarding the decisions made as well as avoid potential conflicts regarding business decisions among different stakeholder groups (Meppem 2000; Leventon *et al.* 2016; Santoso & Delima 2017).

However, the two studies that have mentioned this indicator have only prescribed it (See Table 14). As such, this indicator has not been tested. In the sampled articles, this indicator was measured by interviewing plantation management regarding the different decisions that have been made in response to the input from different stakeholders (FAO 2013; FAO 2015). A potential issue in the application of this indicator is that it can be challenging to confirm if the views of the stakeholders have actually influenced the decisions made by the enterprise (FAO 2013).

4.4 Chapter Conclusion

The main aim of this chapter was to identify a suite of indicators that can be used to assess the sustainability of plantation agricultural systems from the global literature. Through this research a total of 47 common indicators covering the four sustainability dimensions – environmental, social, economic and governance within the UNCSD framework were identified.

Although it was possible to identify relevant indicators to assess the sustainability of plantation agricultural systems from the global literature, it was difficult to conclusively identify a universal set of relevant indicators. This is unsurprising as the definition of 'sustainability' is dependent not only on local conditions but stakeholders as well (Bell & Morse 2008). As such, it was challenging to find a universal set of indicators that is not only applicable across different geographic regions but also accepted by different stakeholder groups. Furthermore, as indicated in this chapter, each of the identified indicators have different potential application issues. Most of these issues often relate to complexity of use, lack of data as well as vague guidelines regarding the use of the indicators.

These issues can affect their subsequent utilization by different stakeholder groups .As such, when selecting sustainability indicators for use, a careful balance between simplicity of use as well as clarity and efficiency of the selected sustainability indicator is required. Therefore, both a '*one size fits all*' and '*top down*' approach might not be the most effective way to select relevant indicators to assess the sustainability of plantation systems as both these approaches have been known to restrict the number of factors (e.g. social factors) taken into consideration during the selection process.

I conclude by arguing that the selection of sustainability indicators for plantation agriculture must take a more '*tailored*' approach (i.e. bottom up and participatory based approach) to address the different opinions and concerns of various stakeholder groups. As such, I argue that future research must place more emphasis on the participation and engagement of diverse and relevant stakeholder groups in order to select a universal set of sustainability indicators for plantation agriculture that can be widely accepted.

Chapter Five

Development of Draft Sustainability Indicators - Part 2

5.1 Chapter Introduction

In Chapter Three, both stakeholder identification and analysis were carried out to identify and select relevant stakeholders for this research. In the previous chapter (Chapter Four), a suite of indicators that can be used to assess the sustainability of plantation agricultural systems were identified from the global literature.

The focus of this chapter is on the steps in the first part of the modified Delphi process used in this research. The steps in the first part of this modified Delphi process are collectively termed as 'pre-Delphi'. In the subsequent sections of this chapter, the methods used in this 'pre-Delphi' process to identify possible sustainability indicators for the Abaca plantation system are outlined and explained. This chapter also examines the potential issues as well as respective solutions when identifying indicators for this plantation system

5.2 Modified Delphi Method

I used the modified Delphi method to identify relevant sustainability indicators for this research. The Delphi method is an iterative process to elicit anonymous opinions by experts (participants) using a series of data collection and analysis techniques combined with controlled feedback (D'Agostino *et al.* 2020). The Delphi method was selected for this research as it has previously been used in various research on sustainability (Roy *et al.* 2014; Etxeberria *et al.* 2015). Furthermore, the Delphi method has also been used in the development of sustainability indicators (Bélanger *et al.* 2012; Jónsson *et al.* 2016).

Each step of the modified Delphi method used in this research is outlined in Figure 14. As indicated in this figure, the modified Delphi process is divided into two parts. The first part is qualitative while the second part is quantitative (Biggs *et al.* 2013). For this research, the first part (qualitative) is termed as 'pre-Delphi'. It must be noted that apart from the literature review process, all other steps of the 'pre-Delphi' process are described below. The literature review process has already been explained in Chapter Four.

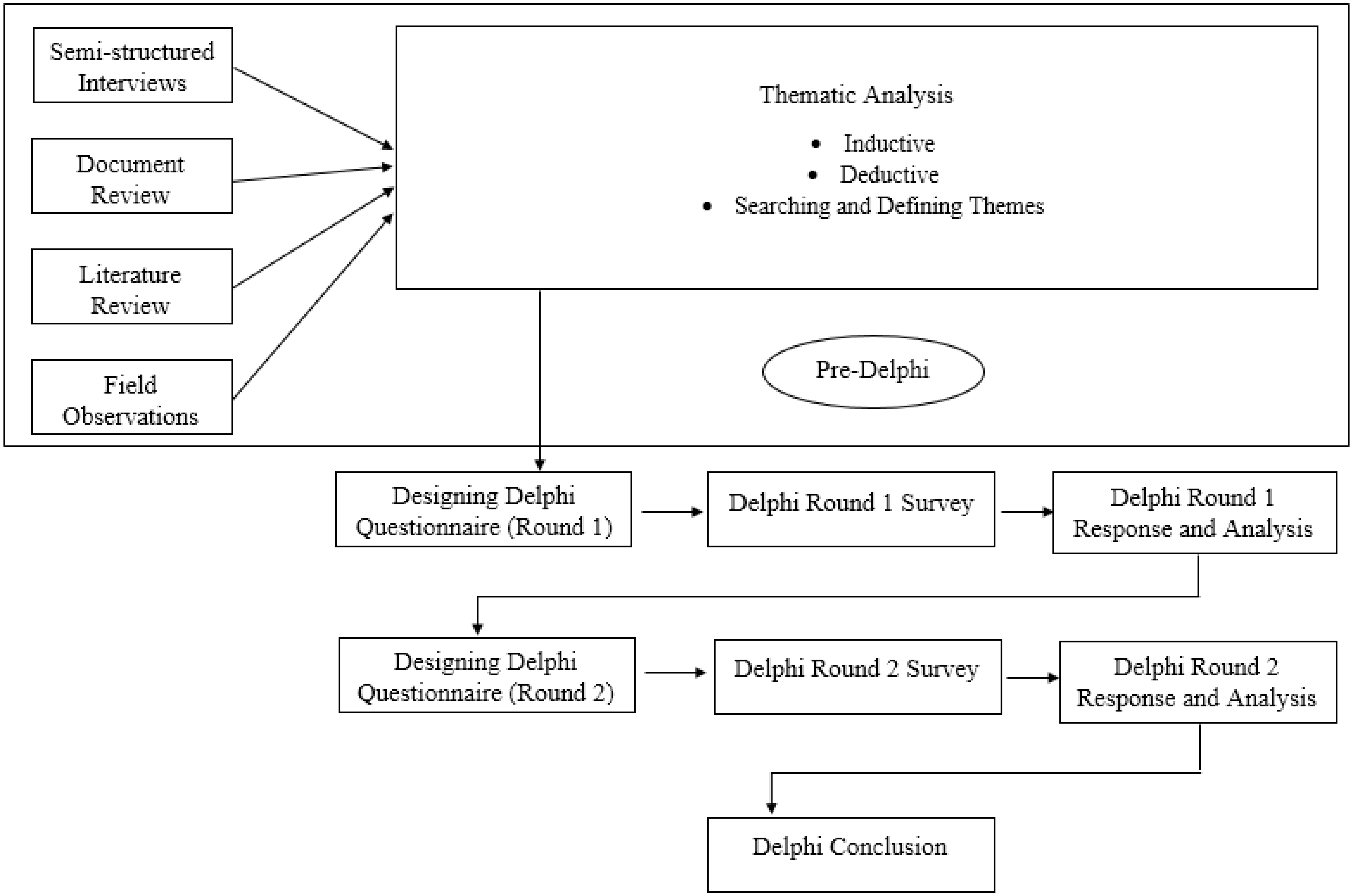

Figure 14: The modified Delphi method used in this research (Adapted from Biggs *et al.* 2013)

5.2.1 Semi-structured Interviews

The aim of the semi-structured interviews was to understand the various sustainability issues that were of concern to different stakeholder groups and subsequently identify indicators that can be used to assess those issues respectively. The emphasis of the interviews was on facilitating an engaging conversation to enable participant (stakeholder) input and meaning from the stakeholder's perspective in order to obtain text that was rich enough for analysis (Colvin *et al.* 2016).

As such, during the interview process, an interview guide was used with a set of open questions to help guide the discussion and prevent it from going off topic (see Appendix 7). The participants were actively encouraged to express their visions regarding sustainability as well as any issues that were of concern to them. The participants were also encouraged to suggest indicators that could be used to assess the issues that were raised respectively. Prompts were also used during the interview process to elicit more information and to explore each issue that was raised in more detail (see Appendix 7). As noted by Colvin *et al.* (2016), a semi-structured interview process allows participants to express their views regarding the research topic without potentially leading questions. This in turn can help produce interview content that is directly grounded in the participants experience thereby allowing the researcher to understand the research interest of the project from the participants perspective (Colvin *et al.* 2016).

An explanation guide was also provided to the participants prior to the start of each interview session (see Appendix 8). The explanation guide listed some of the common sustainability issues within different plantation systems as well as indicators frequently used to assess those issues. The explanation guide also included pictures and descriptions of sustainability issues and respective sustainability indicators to help the participants engage with the subjects discussed as well as aid their thinking process. As indicated by Hasson *et al.* (2000), written information is beneficial to the participants to enable them to understand the research process better. All interviews with different stakeholder groups were conducted separately. This was to avoid the usual problems associated with different group dynamics in which dominant contributors (contributors with more power or influence) can inhibit or contradict individual views (Verhagen *et al.* 1998).

Two rounds of interviews were carried out. The interviews with participants from different stakeholder groups were conducted either one-on-one or as part of a focus group discussion; in the case of plantation workers.

As indicated in Table 15, seven interview sessions including one focus group discussion were carried out during the first interview round.

Table 15: A list of interviews carried out with different stakeholder groups during the first round

Stakeholder Group	Sector	Interview Type	No of participants
Plantation Workers	Local Community Members (Indonesia)	Focus Group Discussion	20
Community Leader		Key Informant Interviews	1
PT Viola Fibre International	Business Organization (Indonesia)		2
Purico Group Ltd	Business Organization (UK)		1
Labour Division	Government Organization (Indonesia)		1
Land Permit Division			1
Total			**26**

The stakeholder groups interviewed during the first round included:

i. Plantation workers
ii. Community leaders
iii. PT Viola Fibre International
iv. Purico Group Ltd
v. LabourDivison
vi. Land Permit Division

Approximately 20 plantation workers participated during the focus group discussion. One representative each from Purico Group Ltd, Labour Division and Land Permit Division agreed to participate in a one-on-one interview separately. Two representatives from PT Viola Fibre International also agreed to participate in a one-on-one interview separately. Only one community leader agreed to participate in a one-on-one interview for this study. Although all stakeholders previously identified (See Chapter Three) were contacted to participate in the interview sessions, only the ones listed in Table 15 agreed to participate in the first round.

As indicated in Table 16, seven interview sessions including one focus group discussion were also carried out during the second interview round.

Table 16: A list of interviews carried out with different stakeholder groups during the second round

<table>
<tr><th>Stakeholder Group</th><th>Sector</th><th>Interview Type</th><th>No of participants</th></tr>
<tr><td>Plantation Workers</td><td rowspan="2">Local Community Members (Indonesia)</td><td>Focus Group Discussion</td><td>15</td></tr>
<tr><td>Community Leader</td><td rowspan="5">Key Informant Interviews</td><td>1</td></tr>
<tr><td>PT Viola Fibre International</td><td>Business Organization (Indonesia)</td><td>2</td></tr>
<tr><td>Purico Group Ltd</td><td>Business Organization (UK)</td><td>1</td></tr>
<tr><td>Labour Division</td><td rowspan="2">Government Organization (Indonesia)</td><td>1</td></tr>
<tr><td>Farming Division</td><td>1</td></tr>
<tr><td colspan="3">Total</td><td>21</td></tr>
</table>

The stakeholder groups interviewed during the second round included:

i. Plantation workers
ii. Community leaders
iii. PT Viola Fibre International
iv. Purico Group Ltd
v. Labour Divison
vi. Farming Division

Approximately 15 plantation workers participated during the focus group discussion in the second round. One representative each from Purico Group Ltd, Labour Division and Farming Division agreed to participate in a one-on-one interview separately. Two representatives from PT Viola Fibre International also agreed to participate in a one-on-one interview separately.

Apart from the Farming Division, the same representatives whom participated in the first round agreed to participate in the second round. This also included the community leader and representatives from PT Viola Fibre International, Purico Group Ltd and the Labour Division. Although all stakeholders previously identified (see Chapter Three) were contacted to participate in the interview sessions, only the ones listed in Table 15 agreed to participate for the second round.

All interviews (first and second round) were audio-recorded and then manually transcribed.

5.2.2 Document Review

In order to complement the data acquired from the interview process, document reviews were also carried out. These documents include:

i. Indonesian Government Meeting Record Contract
ii. Plantation Worker Contract

(see Appendix 3 and Appendix 9)

The Indonesian Government Meeting Record Contract listed the specific requirements and expectations of each government organization involved in the set-up of the plantation as well as plantation operations and development. The Plantation Worker Contract specified the employment terms and conditions of the plantation workers (local community) employed by the company. As such, the information in these documents helped complement the information acquired from the interview process.

5.2.3 Field Observations

In addition to the interviews as well as document review process, field observations were also carried out throughout the research process. Photographs of different aspects of the Abaca plantation were taken which included the type of plantation activities carried out, infrastructure present, type of chemicals and machinery used as well as the type of cropping system present (see Appendix 10). Detailed field notes were also taken to record all observations made.

5.2.4 Thematic Analysis

All interview data were then transcribed into written form before a thematic analysis was carried out. The transcription process, although time-consuming helped in understanding and becoming familiar with the data. As noted by Fletcher & Marchildon (2014), the close attention needed to transcribe the data can help facilitate the close-reading and interpretative skills needed to analyse the data.

5.2.4.1 Coding Data (Inductive Thematic Analysis)

The data from the interview transcripts, Indonesian documents and field observations (photographs and field notes) were analysed using the NVIVO™ 11.0 software. The data were coded following an inductive thematic analysis approach (see Braun & Clarke 2006). This form of thematic analysis is data-driven as the data were coded for as many potential themes (patterns) as possible without trying to fit the codes into pre-existing coding frames or the researcher's analytic preconceptions (Braun & Clarke 2006). An inductive thematic analysis was carried for this data set to become more familiar with the data and to generate a rich description of the data overall without excluding any data that might be of value in the later stages of the research.

5.2.4.2 Searching and Defining Themes

The codes (coded data) from the data sets (transcripts, documents, field observations) were compiled and then sorted under the four dimensions of sustainability namely environment, social, economic and governance. The codes within each dimension were then screened and reconsidered to ensure that the codes formed a coherent pattern within their respective dimension. The codes within each dimension were then compared with the data set (interview transcripts, documents, photographs and field notes) to ensure that the codes not only fit within their respective dimension but with the overall theme of the data set (i.e. sustainability).

5.3 Results and Discussion

A total of 44 sustainability indicators were identified during the pre-Delphi process (semi-structured interviews, field observations and document reviews). As such, these indicators were identified from the perspectives of the stakeholders. These indicators encompassed the four major dimensions of sustainability namely environmental, economic, social and governance. The highest proportion of these indicators related to the ‘Environmental’ dimension of sustainability, followed by the ‘Social’ dimension and the ‘Economic’ dimension. The lowest proportion belonged to the ‘Governance’ dimension.

The identified sustainability indicators were then tabulated under their respective sustainability dimension together with their respective method of identification and sources of evidence used. Photographs used as sources of evidence are listed in Appendix 10.

Within the ‘Environmental’ dimension, a total of 17 sustainability indicators were identified as indicated in Table 17.

Table 17: List of sustainability indicators identified within the environmental dimension

Indicator	Method of Identification	Sources of Evidence*
Number of herbicide applications per year	Field observations (photographs)	P1
Number of pesticide applications per year	Interviews with plantation management	PM1
Amount of fertilizer used per growing area	Interviews with plantation management	PM2
Amount of pesticide applied per growing area	Interviews with plantation management	PM1 and PM2
Number of different cover crop varieties	Field observations (photographs) and interviews with plantation management	PM1 and P2
Type of fertilizer used per growing area	Interviews with plantation management	PM1 and PM2
Timing of treatment applications	Interviews with plantation management	PM1 and PM2
Species conservation practices	Interviews with plantation management	PM1
Number of water conservation practices	Field observations (photographs) and interviews with plantation management	PM1 and P3
Number of GHG mitigation practices	Interviews with plantation management	PM3
Type of waste management programs	Interviews with government officers	GO3
Type of recycling programs carried out	Interviews with plantation management	PM2

Waste reduction target of the plantation	Interviews with plantation management	PM2
Type of tillage practices carried out	Field observations (photographs)	P4
Diversity of crops	Field observations (photographs)	P5
Percentage of pesticides used that are nationally registered	Interviews with plantation management	PM1
Presence of soil erosion	Interviews with plantation management	PM2

*Sources of Evidence: P = Photograph, PM = Plantation Management, GO = Government Officer

The indicators 'Number of herbicide applications per year', 'Number of pesticide applications per year', 'Amount of fertilizer used per growing area', 'Amount of pesticide applied per growing area' , 'Timing of treatment applications', 'Percentage of pesticides used that are nationally registered' and 'Type of fertilizer used per growing area' refer to the plantation's use of chemicals to control pest populations (e.g. herbicides/pesticides use) and improve crop yields (e.g. fertilizer use) (FAO 2013). These indicators were mostly identified through field observations (photographs) and interviews with plantation management.

The use of pesticides and herbicides in agriculture has helped control agricultural pest populations thereby contributing to the increase in crop yields worldwide (Henriques *et al.* 1997). However, uncontrolled use of these chemicals can have detrimental effects on both human and wildlife populations as these chemicals can be dispersed over a large area where their toxic effects can still be experienced by different organisms far from the agricultural site (Kendall *et al.* 1996). Continuous exposure to pesticides can reduce reproductive success, impair immune function and cause abnormal cell growth (Jeyaratnam 1990). This is especially worrying as untrained farmers living in agricultural areas and utilizing pesticides/herbicides can often be poisoned through improper handling of these chemicals (Ambridge 1991). Even more worrying is the fact that pesticides that have been banned by developed nations such as the United States are still purchased by developing nations for agricultural use (Henriques *et al.* 1997). As such, pesticide-related poisonings are generally more common in developing countries as safety and health issues are less regulated (Henriques *et al.* 1997; Awwad *et al.* 2016).

In terms of fertilizer use, chemical fertilizers are commonly used for plantation agricultural crops as they are not only inexpensive, however, they also provide immediate availability of minerals and nutrients to the crops as well (Chandran *et al.* 2019). With the rise in the global population, more fertilizer will likely be utilized to obtain more agricultural products to keep up with supply demands (Savci 2012). However, excessive use of chemical fertilizers can contribute to various environmental issues including soil degradation, greenhouse gas emissions and eutrophication (Byron Houser & Pitt 2008). As such, indicators regarding pesticide/herbicide use and fertilizer use make up half of the indicators within the environmental dimension (see Table 16) as they are essential in monitoring the chemical use of the plantation which in turn can affect both human and environmental health.

The indicators 'Type of waste management programs', 'Type of recycling programs carried out' and 'Waste reduction target of the plantation' refer to the activities and programs set up by the plantation to manage waste production (FAO 2013). These indicators were mostly identified through interviews with government officers and plantation management. In order to feed the growing global population in the near future, food supply studies worldwide have indicated that essential increases in global food production will be required (Nonhebel 2005). This can only be achieved by either cultivating high yielding crop varieties on existing arable land or cultivating more crops on larger tracts of lands (Nonhebel 2005). However, both these options will require increased material input into the plantation agricultural system which in turn can result in large amounts of waste generation (Padam *et al.* 2014). For example, within palm oil plantations, biomass including palm trunks and fronds are produced during replanting while palm bunches are produced during harvest (Hambali & Rivai 2017). As such, indicators regarding waste management are essential to minimize the waste produced during plantation activities.

The indicator 'Number of GHG mitigation practices' refers to the activities carried out by the plantation to reduce greenhouse gas (GHG) emissions (FAO 2013). This indicator was identified through interviews with plantation management. Plantation agriculture contributes to GHG emissions though various plantation activities including land clearance, high use of fossil fuels and deforestation (FAO 2013). It is now widely evident that GHG emissions contribute to global warming and climate change which in turn, can affect yields and agricultural productivity (Johnson *et al.* 2007). This in turn has caused plantation industries such as the rubber industry to identify measures to reduce fuel use and energy consumption in order to reduce GHG emissions such as CO_2 output (Jawjit *et al.* 2010). On this note, one interviewee expressed a similar concern, stating,

"…I believe that since we have started to plant more trees in the area, the plants are obviously producing oxygen by taking in carbon dioxide. So, I believe, in 2-3 years' time more oxygen will be produced, and carbon dioxide levels will drop which can help in terms of global warming…" (PM1)

As such, this indicator is relevant to ensure that activities that can reduce the GHG emissions of the plantation are implemented and carried out.

The indicators 'Type of tillage practices carried out' and 'Presence of soil erosion' refer to the land management practices of the plantation (FAO 2013). Both these indicators were mostly identified through field observations (photographs) and interviews with plantation management. Land management practices particularly the type of tillage practices carried out (e.g. conventional tillage, no tillage and conservation tillage) can have different environmental impacts (Sydorovych *et al.* 2009; Gaudino *et al.* 2014). Some of these impacts include land degradation, water pollution and soil erosion (Lobb & Kachanoski 1999; Gaudino *et al.* 2014). On this note, one interviewee expressed concern regarding soil erosion, stating.

"…this plantation can help the land retain more water. This prevents the excess water from simply being washed off and is now retained within the soil. This can also help in soil conservation and prevent soil erosion as the plantation helps to protect against excessive runoff…." (PM2)

As such, both these indicators are essential in ensuring that proper land management activities are carried out to reduce land degradation effects.

The indicators 'Number of different cover crop varieties' and 'Diversity of crops' refer to the cropping practices of the enterprise to increase crop yields (e.g. planting different crop species) and improve environmental services (FAO 2013). These indicators were mostly identified through field observations (photographs) and interviews with plantation management.

By planting different crop species (i.e. intercropping), the plantation can not only increase crop yields but also reduce material input into the agricultural system (Martin-Guay *et al.* 2018). Some of these include reducing the need for chemical inputs such as fertilizers and pesticides which in turn can reduce greenhouse gas emissions linked with industrial nitrogen fixation (Martin-Guay *et al.* 2018). In terms of cover crop use, cover crops have been known to improve agronomic services including increasing biological diversity, increasing soil organic matter, improving weed control and increasing nutrient cycling (Wortman *et al.* 2012). On this note, one interviewee expressed interest regarding the use of cover crops, stating,

"….we will consider other cover crops, but all of this is dependent on which will give us the best results for Abaca…" (PM3)

As such, both these indicators are essential in ensuring that cropping practices that can improve both crop yields and agronomic services are applied (Martin-Guay *et al.* 2018).

The indicator 'Number of water conservation practices' refers to the practices carried out by the plantation to reduce freshwater use (FAO 2013). This indicator was mostly identified from interviews with plantation management. In many agricultural systems, availability of freshwater is one of the main limiting factors of crop production (FAO 2013). As the world population is expected to increase to 9 billion by 2050, more freshwater will be required to increase agricultural productivity to keep up with consumption and global demand (FAO 2013; Béné *et al.* 2015). As highlighted by two interviewees,

"...the water levels do drop particularly during the dry season…" (PM2)

"…we do need a lot of water when the plants are young and as you have seen it is very hot there…." (PM3)

Furthermore, unsustainable use of freshwater primarily for irrigation purposes can cause environmental issues such as desertification and salinization (Pretty *et al.* 2008; Singh 2009). As such, this indicator is essential to ensure the sustainable use of freshwater for plantation activities.

The indicator 'Species conservation practices' refers to the practices carried out by the plantation to protect wild or native species within its agricultural ecosystem (FAO 2013). This indicator was mostly identified through interviews with plantation management. Plantation agricultural activities are altering natural ecosystems at unprecedented scales and intensities (FAO 2013). For example, in Southeast Asia, palm oil plantations have replaced large areas of tropical rain forests to meet the growing demand of palm oil (Fitzherbert *et al.* 2008; Danielsen *et al.* 2009). However, most plantations only support a limited number of animal and tree species compared to natural forests (Fitzherbert *et al.* 2008; Danielsen *et al.* 2009). As stated by one interviewee,

"…wild boars may be attracted to the peanuts that we grow on the plantation. So generally, we build a barrier using ropes to prevent them from disturbing our crops…" (PM1)

As such, this indicator is essential to ensure that 'best practices' are implemented to support the protection of wild and native species within the plantation agricultural ecosystem (FAO 2013).

Within the 'Economic' dimension, a total of 7 sustainability indicators were identified as indicated in Table 18.

Table 18: List of sustainability indicators identified within the economic dimension

Indicator	**Method of Identification**	**Sources of Evidence***
Business tax reports	Interviews with plantation management	PM1
Annual yield of each business product	Interviews with plantation management	PM1 and PM3
Business product diversification	Interviews with plantation management	PM1, PM3 and P5
No of procurement channels to source inputs	Interviews with plantation management	PM3
Market stability analysis	Interviews with plantation management	PM1 and PM3
Price determination of the business products	Interviews with plantation management	PM1 and PM3
Percentage of input from each supplier	Interviews with plantation management	PM3

*Sources of Evidence: P = Photograph, PM = Plantation Management

The indicator 'Business tax reports' refer to the reporting practices of the plantation regarding its tax obligation (Bird & Davis-Nozemack 2018). This indicator was mostly identified through interviews with plantation management. A business tax report not only allows a business to understand its gross profits but more importantly, its retained profits as well after considering its corporate tax rate (Bird & Davis-Nozemack 2018). A business's retained profits are important to determine the amount that can be paid to the shareholders as dividends and also the amount that can be reinvested into the business to sustainably grow the business (Fairfield & Jorratt De Luis 2016). As highlighted by one interviewee,

"…we do provide a copy of our accounts to the finance department in Indonesia to look over our tax records…" (PM1)

As such this indicator is necessary to ensure that businesses understand their tax obligations but also their retained earnings for future growth (Fairfield & Jorratt De Luis 2016).

The indicator 'Annual yield of each business product' refers to the quantity of each product (e.g. crop) produced by the plantation within a given year (FAO 2013). This indicator was mostly identified through interviews with plantation management. This indicator is essential as crop yield greatly influences the revenue and subsequently the profit of the enterprise as higher yields generally results in higher financial returns (Pretty *et al.* 2010; Rodrigues *et al.* 2018).

The indicator 'Business product diversification' refers to the activities carried out by the plantation to diversify its income streams by producing different products (e.g. different crops) (FAO 2013). This indicator was mostly identified through interviews with plantation management and field observations (photographs). By diversifying its business products, the plantation can generate income all year round thereby reducing its dependence on seasonal crops as well as minimizing the risk of mono-cultivation (FAO 2013). This in turn allows for additional income sources and spreads the risks across multiple markets and products instead of concentrating the risk within a single product or market (Griess *et al.* 2016). As noted by one interviewee,

"…with these crops, we are able to maximize our yields from this one plantation and do not just need to rely on Abaca…" (PM1)

As such, this indicator is necessary to ensure that the plantation does not solely rely on one product (crop) for income generation (FAO 2013; Griess *et al.* 2016).

The indicators 'Number of procurement channels' and 'Percentage of input from each supplier' refer to the steps set up by the enterprise to obtain inputs (e.g. seeds, fertilizers, etc.) from different sources (FAO 2013). These indicators were mostly identified through interviews with plantation management. This indicator is essential to ensure that the enterprise does not solely rely on a single procurement channel (e.g. supplier) (Neven & Reardon 2004). By diversifying its procurement channels, the enterprise can ensure that the necessary inputs can be delivered on time thereby reducing the risk to the enterprise's production and overall operations (Kanani & Buvik 2018).

The indicator 'Market stability analysis' refers to the steps taken by the plantation to ensure its stability within the market (FAO 2013). This indicator was mostly identified through interviews with plantation management. This indicator is essential to ensure the enterprise has established a stable business relationship with a diversified number of buyers (Liu *et al.* 2008). This in turn can allow the enterprise to sell its products (e.g. crops) even during market fluctuations due to climate change, customer preferences and natural disasters (Marten 1988). As such, the enterprise can then maintain a more consolidated income structure (FAO 2013).

The indicator 'Price determination of the business products' refers to the price at which the products (e.g. crops) of the plantation are sold for (FAO 2013). This indicator was mostly identified through interviews with plantation management. However, care must be taken when pricing the products as price can be influenced by issues including global pandemic and supply demands which in turn can affect consumer preferences (FAO 2013). As highlighted by one interviewee,

"…the price is very high which means the consumer will have to pay…" (PM3)

As such, this indicator is essential to ensure that the products are not only sold above the breakeven point but, the price of the products have also been marked appropriately to ensure that a profit can be made (FAO 2013).

Within the 'Social' dimension, a total of 14 sustainability indicators were identified as indicated in Table 19.

Table 19: List of sustainability indicators identified within the social dimension

Indicator	Method of Identification	Sources of Evidence*
Monthly income of workers	Document review, interviews with plantation management and government officers	DOC2, GO1, PM2
Type of employment benefits provided	Focus group discussions with plantation workers and interviews with government officers	FG1, FG2, GO1
Fair wages and allowances	Document review, interviews with government officers and plantation management	GO1, DOC2, PM1
Total working time per week	Document review, interviews with plantation management	DOC2, PM2,
Total working days per year	Document review, interviews with plantation management	DOC2, PM2,
Provision of employment contracts	Interviews with government officers	GO3
Provision of a pension scheme	Focus group discussions with plantation workers	FG1, FG2
Provision of work equipment	Interviews with plantation management, focus group discussions with plantation workers	PM1, PM2, FG1, FG2
Compliance with regional labour laws	Document reviews	DOC1
Number of regional employment opportunities	Document reviews and interviews with government officers	DOC1, GO1
Equal participation in training and skill development	Document reviews and interviews with plantation management and government officers	PM1, DOC1, GO2
Type of training and development courses organized	Document reviews	DOC1, GO2
Compliance with regional fair hiring regulations	Document reviews	DOC1
Number of investments made for community development	Interviews with government officers	GO3

*Sources of Evidence: FG = Focus Group, PM = Plantation Management, GO = Government Officer, DOC = Indonesian Documents

The indicators 'Monthly income of workers' and 'Fair wages and allowances' refer to whether the plantation pays its employees (e.g. plantation workers) according to the standard wage laws of the region (FAO 2013). These indicators were mostly identified through document reviews and interviews with government officers and plantation management. Although plantation industries are often considered profitable agribusinesses as they earn a foreign exchange, the profits earned by these industries do not necessarily reflect the wages paid to the workers (Hartemink 2005; Linton 2005). As stated by one interviewee,

"…we have also discussed with Purico that in terms of payment or salary, the wages must be equal to the standard wages we have here in Indonesia…" (GO1)

As indicated by Leitner (1976), plantation workers are not only some of the most degraded workers particularly within many developing nations but are also generally paid below the national wage laws of the region. As such, these indicators are necessary to ensure that enterprises consistently pay their workers a standard living wage even during unfavourable economic conditions (e.g. recession, market fluctuations) (FAO 2013).

The indicators 'Type of employment benefits provided', 'Provision of a pension scheme', 'Total working time', 'Total working days', 'Compliance with the regional labour laws', 'Provision of work equipment' and 'Provision of employment contracts' refer to whether the plantation meets the standard worker welfare regulations and employment conditions of the region (Krumbiegel *et al.* 2018). These indicators were mostly identified though document reviews, interviews with plantation management and government officers as well as focus group discussions with plantation workers. Employment conditions and worker welfare in agriculture are becoming an increasing concern especially for consumers (FAO 2013). This is because plantation workers are considered as one of the most vulnerable groups in the global trade system as they are often exposed to hazardous working conditions and usually lack the bargaining power for better employment conditions (Krumbiegel *et al.* 2018). In some cases, written contracts are not provided thereby allowing employers to take advantage of the workers (Gold *et al.* 2015).

As such, some plantation companies can burden their workers with increasing workload thereby preventing them from having adequate rest (Mingorría *et al.* 2014). This in turn can lead to health implications especially if the workers are not provided with the necessary work and safety equipment (Mingorría *et al.* 2014; Reddy *et al.* 2016). This is because, apart from being incredibly demanding, plantation work also exposes workers to multiple hazards, particularly chemical hazards such as pesticides (McCurdy & Carroll 2000). As stated by an interviewee,

"…contracts must also be given which specifically outlines their work as well as benefits provided to avoid any problems…" (GO3)

As such, these indicators are necessary to ensure that labour laws including social security (e.g. pension plan) are enforced (Krumbiegel *et al.* 2018).

The indicators 'Compliance with regional fair hiring regulations' and 'Equal participation in training and skill development' refer to the discriminatory practices particularly gender discrimination in employment opportunities (FAO 2013). These indicators were mostly identified through document reviews and interviews with plantation management and government officers. Within agricultural systems, the most common discriminatory practice is gender differentials in employment opportunities and training (Yaro *et al.* 2017). Agricultural systems are largely patriarchal gendered system and as such, women are not only less likely to be employed compared to their male counterparts but also tend to occupy lower positions compared to men (Apusigah 2009; Yaro *et al.* 2017). As stated by one interviewee,

"…we have also stressed that there should be no gender discrimination in terms of worker recruitment. Women must also be given the opportunity to work…" (GO1)

As such, these indicators are necessary to ensure that discriminatory practices regarding employment and training opportunities are not practiced (FAO 2013).

The indicators 'Number of regional employment opportunities' and 'Type of training and development courses organized' refer to the level of employment and training provided by the enterprise (plantation) to the workers (Dantsis *et al.* 2010; FAO 2013). These indicators were mostly identified through document reviews and interviews with government officers. Agribusinesses such as plantation agricultural systems are usually associated with job creation as they typically employ a relatively large number of unskilled labourers from the local region (Hartemink 2005; Charnley 2006). This in turn helps to contribute to the local economic development of the region (Hartemink 2005). On this note, with the rise in the global demand for plantation commodities as well as climatic vulnerabilities (e.g. droughts, unusual rainfall patterns), appropriate training must also be given to the plantation workers in order for plantation enterprises to ensure that their workforce is equipped with the necessary skills and knowledge to adapt to the changing global and environmental demands (Alam *et al.* 2012; FAO 2013).

However, many jobs within the plantation agricultural system are increasingly being given to outsiders rather than locals (Charnley 2006). Furthermore, the type of training provided to the workers are usually inherited from colonial structures and as such typically focuses solely on economic profitability (Grossman & Iyigun 1995). Therefore, both these indicators are necessary to ensure that more workers are employed from the local region and the workers are also provided with training that also focuses on the wider issues of sustainable development such as natural resource management to also ensure that the plantation can be managed more sustainably (Lim & Douglas 2000).

The indicator 'Number of investments made for community development' refers to the investments made by the enterprise (plantation) to address community needs (FAO 2013). Agricultural industries including plantation industries often share the same environment with the locals within the region (FAO 2013). As such, the enterprise's operations have an influence on the local community (Gordon *et al.* 2012). Therefore, this indicator is necessary to ensure that investments that can benefit and contribute to the sustainable development of the local community are implemented (Szulecka *et al.* 2016).

Within the 'Governance' dimension, a total of 6 sustainability indicators were identified as indicated in Table 20.

Table 20: List of sustainability indicators identified within the governance dimension

Indicator	Method of Identification	Sources of Evidence*
Access rights of the plantation	Document review, interviews with plantation management	PM1, DOC1
Holistic audits	Interviews with plantation management and government officers	GO3, PM1, PM2
Conflict resolution	Document review	DOC2, GO1
Grievance procedures for workers	Document review	DOC2
Compliance with regional business laws	Document review	DOC1
Quality control report	Interviews with plantation management	PM1

*Sources of Evidence: PM = Plantation Management, GO = Government Officer, DOC = Indonesian Documents

The indicators 'Access rights of the plantation' and 'Compliance with regional business laws' refer to whether the enterprise (plantation) adheres to the regional business laws including its use of the natural resources within the region (FAO 2103). These indicators were mostly identified through document reviews and interviews with plantation management and government officers. With the increasing demand for plantation commodities worldwide, plantation areas have seen a rapid expansion in recent years to keep up with customer demands (Fitzherbert *et al.* 2008; Gerber 2011). The rapid expansion of the plantation area has sometimes resulted in the forceful takeover of lands and related resources (Hall *et al.* 2017). This in turn has sometimes caused local populations to become displaced thereby disrupting their livelihood as they no longer have access to food, water or building materials (Mingorría 2018). As stated by one interviewee,

"…we hope that all of these must comply with Indonesian laws and regulations…" (GO1)

As such, these indicators are necessary to ensure that the enterprise complies with the regional laws and also utilizes to the resources within the region properly (FAO 2013).

The indicators 'Holistic audits' and 'Quality control reports' refer to the monitoring and reporting practices of the enterprise (plantation) regarding its business practices (e.g. operations, production, management, etc) (FAO 2013). These indicators were mostly identified through interviews with plantation management and government officers. Recently, stakeholders (e.g. NGOs, governments, consumers, etc) have been putting increasing accountability pressures on multinational corporations due to suspicions about the social, environmental and economic implications of their business practices within different markets (Cooper & Owen 2007; Kolk 2008). Therefore, essential stakeholders must be provided with relevant information about the enterprise's business practices in order for their business implications and performance to be monitored (Wu *et al.* 2019). As highlighted by one interviewee,

"…we must also emphasize on good reporting practices as we expect all the reports to be handed in on time to the respective departments…" (GO3)

As such, these indicators are necessary to satisfy the informational requirement of the relevant stakeholders involved and also ensure that the enterprise's business practices are monitored periodically.

The indicators 'Conflict resolution' and 'Grievance procedures for workers' refer to the steps implemented by the enterprise (plantation) to both report on and resolve any conflicts between different parties (e.g. stakeholders) (FAO 2013). These indicators were mostly identified through document reviews and interviews with government officers. Conflicts between different parties can occur when the rights or interests of the parties involved have not been addressed thereby leading to disputes (Kröger & Nylund 2012). As highlighted by one interviewee,

"…if such a conflict should occur, what we try to do is set up a meeting between the company and the workers here, at this office, and try to solve the issues by discussing openly about them. We strive to keep the issues a small as possible to prevent it from escalating…" (GO1)

As such, both these indicators are necessary to ensure that the appropriate steps have been taken by the enterprise to identify and resolve any conflicts between different parties as efficiently (e.g. collaborative dialogue) and as quickly as possible (Dhiaulhaq *et al.* 2018).

One of the major issues during the first interview round was trying to get the stakeholders interested and actively involved in the research. This proved particularly challenging as many of the stakeholders were still not familiar with the term '*sustainability*' as well as the importance of its application within the plantation agricultural sector. As such, during this interview round, setting up interview sessions with different stakeholder groups proved challenging as many of them were not interested in participating or cancelled interview sessions at the very last minute even after agreeing to participate initially. As indicated by Neef & Neubert (2011), whether local stakeholders participate in the research project depends to a great extent on their own characteristics, their expectations from the project and their opportunity cost of time. Time is a precious commodity not only for scientists but also for stakeholders as well (Neef & Neubert 2011).

This lack of interest was rather surprising as during the initial phase of the research (i.e. stakeholder identification process) (see Chapter Three), the aim, importance and other details of this project were explained clearly to the stakeholders. These details were not only explained verbally (face to face), but a written explanation guide was also provided which included details of the project as well. As noted by Glass *et al.* (2013), face to face interviews usually gives researchers the opportunity to invest in the front end of the process and develop rapport with the participants (stakeholders). Furthermore, Hasson *et al.* (2000) indicated that written information is also effective and beneficial to the participants not only in terms of developing a research relationship but also providing an overall understanding of the research process.

A possible reason for the lack of interest may be due to the style in which details of the project were explained to the stakeholders. During the stakeholder identification process, questions were asked directly from the interview guide. This could have made it difficult for the participants to comprehend the questions and subsequently understand the relevance and importance of this project not only to the plantation agricultural system within Indonesia, but to the participants themselves. Another possible reason could be that the participants may have thought of this project as being entirely academically based and therefore had no 'immediate benefits' to them. As noted by Collins (2003), the way in which the researcher reads or asks the questions as well as the way in which the respondents relate to the interviewer can determine the rate of response and interest of the participants.

To overcome this lack of interest and to encourage the stakeholders to participate in the research, support was requested from PT Viola Fibre International. After discussing with a representative from PT Viola Fibre International regarding the challenges faced, the representative agreed to make a few calls to different stakeholder groups, particularly to different government departments to encourage them to participate in the project. The company also encouraged the plantation workers (local community members) to participate in the research by reminding the workers of the benefits of the project to them, the plantation and the region as well. As the local stakeholders including many of the government officials in the region were very familiar with the company, the support and encouragements from the company influenced many of the stakeholders within the region to participate in the research. As previously noted, by using stakeholders as informal research assistants, gaining support from different stakeholder groups becomes easier (Streeton *et al.* 2004; Colvin *et al.* 2016).

During the first interview session, the use of an interview guide proved useful in keeping the discussions on point and preventing it from going off topic. Unlike the interview sessions during the stakeholder identification process (see Chapter Three), more care was taken to explain each question clearly and as simple as possible for the benefit and understanding of the stakeholders. As noted by Walton & Rivers (2011), the aim of a semi-structured interview is to identify and enable an understanding of the issues that concern the stakeholders. As such, more emphasis was placed on 'actively' generating information and not simply 'passively' collecting it. During this entire process, care was taken to ask sufficiently detailed questions and to avoid vague questions that can confuse the participants. In order to do this, we followed the format as indicated by Walton & Rivers (2011), in which probing questions were used to elicit materials that can be analyzed. Therefore, initial questions such as the participants understanding of sustainability as well as how they felt sustainability could be applied to current issues within the plantation system were asked first. However, these questions were only asked after a detailed explanation of the project's aim and purpose as well as the potential benefits of the research to the plantation and the community within the region was given.

In order to reinforce the purpose of this research, an explanation guide was also provided to the participants which listed common sustainability issues within plantation systems, indictors that can be used to measure different sustainability issues, how sustainability can be applied within a plantation system and the importance of sustainability within plantation agricultural systems. The explanation guide also included pictures to help the participants visualize the entire research and aid their thinking process in order to better answer the questions asked. Although these methods did make the participants (stakeholders) more aware of the research and the overall importance of sustainability within plantation agricultural systems, it was still rather difficult to get them interested in the research.

During the interview sessions (one-on-one and focus group discussions), most of the participants often provided 'one-word answers' (e.g. yes or no). Apart from the business organizations (PT Viola Fibre International and Purico Group Ltd), the other stakeholders found it rather difficult to provide a detailed explanation for their answers. As indicated by Neef & Neubert (2011), the researcher needs to keep in mind that the knowledge of local stakeholders is often tacit and difficult to articulate, describe and validate. Furthermore, there is also evidence regarding the limitations of the local stakeholders' local knowledge even when addressing localized problems (Neef & Neubert 2011). Besides this, the plantation workers (local community members) still thought that sustainability issues should be managed by the plantation company (PT Viola Fibre International and Purico Group Ltd) and the respective government departments (e.g. Labour Division, Farming Division, etc). As such, many of them still did not acknowledge sustainability as being the responsibility of everyone involved with the plantation agricultural system. As for the government departments, many of the government officials assumed that as there is an official contract between the plantation company and the Indonesian government, sustainability issues would not likely occur. As such, the first interview round was not highly productive.

However, during the first interview round, documents that were identified as being useful to the research were obtained from the respective stakeholders (see section 5.2.2). Analysis of the Indonesian Government Meeting Record Contract and Plantation Worker Contract provided information that could be used to ask more specific and relevant questions to different stakeholder groups. Within the Indonesian Government Meeting Record Contract, the specific requirements and expectations of each government department involved in the set-up and development of the plantation were listed. Each of these requirements and expectations related to a specific sustainability theme. For example, the Labour Division required the plantation management to employ locals from the region and minimize foreign labour as far as possible.

The Farming Division required the plantation management to comply with the regional farming laws and practices. Based on both these example, two common sustainability themes include local employment and good farming practices. Within the Plantation Worker Contract, the employment terms and conditions of the company are listed and specified. Some of these terms and conditions include salary payments, working hours, holiday leave, etc. Based on the listed terms and conditions, some common sustainability themes include employment relations and labour conditions.

By identifying common sustainability themes specific to different stakeholder groups, specific questions that were more relevant to each stakeholder (participant) could be asked. As such, during the second interview round, the plantation workers (local community members) were mostly asked questions relating to the social aspect of sustainability including working hours, salary payments, working conditions, etc. Different government officials were asked questions specifically relating to their respective departments. For example, officials from the labour department were asked questions relating to local employment, timely salary payments, enforcement of employment contracts, etc. Officials from the farming departments were asked questions relating to the farming practices and laws of the region. This same approach was also applied to other stakeholder groups.

This 'tailored' approach worked better compared the 'one size fits all' approach that was applied during the first interview round. During the second interview round, the stakeholders were more interested in sharing and explaining about different sustainability issues as it was more relevant and important to them. This made it easier to explore each issue that was raised in greater detail and depth.

Apart from the interview sessions, field observations were also carried together with both the plantation workers (local community members) and a representative of the company (PT Viola Fibre International). Both these stakeholders were able to provide an informative tour of the plantation. The field observations were very useful as evidence regarding some of the sustainability issues faced by the plantation could be observed directly. Every aspect of the plantation's operations including nursery and seedling management, seedbed preparation, planting, irrigation, pesticide and herbicide management and land preparation (clearing) were explained during the tour.

Onsite field observations are a useful way to identify essential sustainability issues and collect relevant information for the research. This is because the stakeholders are able to explain some of the issues faced by the plantation more clearly as evidence regarding these issues can be shown directly. Furthermore, it was observed that the stakeholders particularly the plantation workers were more relaxed and enthusiastic during the field observations (tour) compared to the interview sessions. As such, many of them became more vocal about the sustainability issues faced by them and the plantation system such as water management, weed and pest management, working hours, salary payments, etc. This made it easier to probe and ask more detailed questions as well as explore other sustainability issues in greater depth. The information collected during both interview sessions could also be clarified during the field observations.

5.4 Chapter Conclusion

The main aim of this chapter was to identify relevant indicators from the perspective of the stakeholders for the Abaca plantation system in Indonesia.

Through this research, it was understood that many of the identified stakeholders particularly government officials and local community members (plantation workers) were not familiar or highly interested in sustainability issues associated with the plantation system. Many of the stakeholders felt that sustainability was someone else's responsibility and therefore failed to acknowledge the responsibility that each individual carry regarding sustainability. One of the most useful methods to encourage greater interest and participation from different stakeholder groups is to use influential stakeholders. Stakeholders such as PT Viola Fibre International were able to use their influence to coax different stakeholder groups (government officials, local community members) to take part in the research.

Besides this, interviews alone are not sufficient to pique the interest of different stakeholder groups. Informal methods such as field observations can help put the participants in a more relaxed and less 'academic' setting thereby allowing them to fully express issues that are of concern to them. This method also allowed me to understand the issues faced by the participants (stakeholders) directly as evidence can be provided by the participants directly. Documents such as explanation guides can also aid the research process by helping the participants visualize potential sustainability issues as well as potential indicators to asses those issues.

However, throughout the research process encouragement and support must continuously be given to the participants to convince them regarding the importance of their input towards the success of this research. As such, the social skill of the researcher is a crucial factor in keeping the participants interested and responsive.

Through these challenges and methods of overcoming them, a list of 44 sustainability indicators covering the four dimensions of sustainability were then identified from the stakeholders' perspective.

Chapter Six

Development of Draft Sustainability Indicators – Part 3

6.1 Chapter Introduction

In Chapter Three, both stakeholder identification and analysis were carried out to identity relevant stakeholders associated with the Abaca plantation system in Indonesia. In Chapter Four, common sustainability indicators for plantation agricultural systems were identified from the global literature through a systematic literature review. In the previous chapters (Chapter 4 and Chapter Five), the initial steps in the modified Delphi process (i.e. pre-Delphi) were examined to identify and develop sustainability indicators for the Abaca plantation system in Indonesia from the perspectives of the stakeholders.

In this chapter, the remaining steps of the modified Delphi process are explained. Through this process, the methods used to select relevant indicators for the Abaca plantation system in Indonesia from the perspectives of the stakeholders are presented. This chapter also outlines the potential issues as well as respective solutions when selecting relevant indicators for this plantation system.

6.2 Modified Delphi Method

As previously mentioned in Chapter Five, I used the initial steps in the modified Delphi process (i.e. pre-Delphi) to identify relevant indicators for this research from the perspectives of the stakeholders. In this chapter, I explain the remaining steps of this modified Delphi process to select relevant sustainability indicators for this plantation system from the perspectives stakeholders.

Each step of the modified Delphi process is outlined in Figure 15 and the remaining steps (after the pre-Delphi process) are explained below.

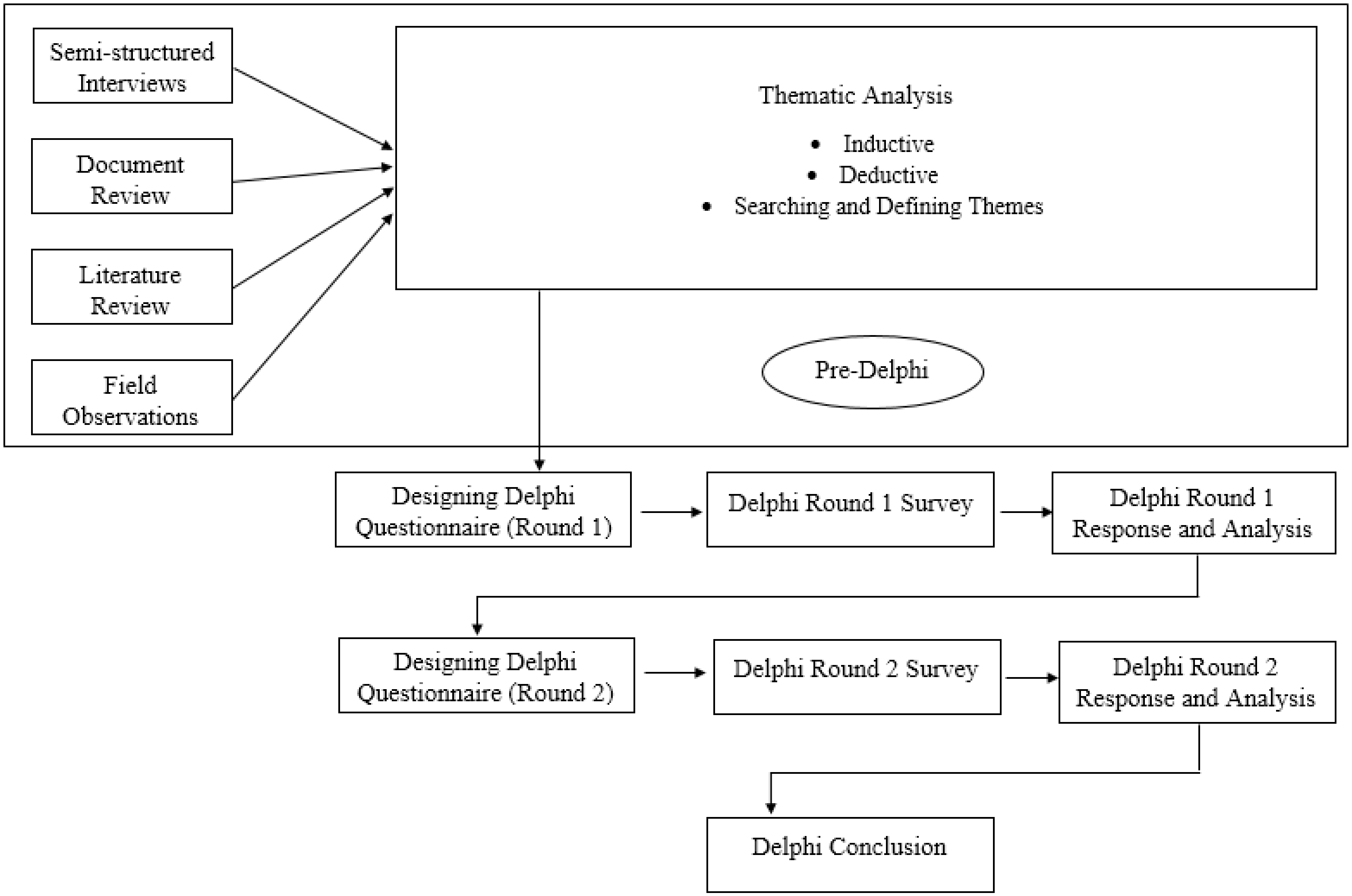

Figure 15: The modified Delphi method used in this research (Adapted from Biggs *et al.* 2013)

6.2.1 Designing Delphi Questionnaire (Round 1)

A total of 44 sustainability indicators were identified from the perspectives of the stakeholders (see Chapter Five). These indicators corresponded to the four dimensions of sustainability namely; Environment, Economic, Social and Governance. These indicators were then combined with the 307 indicators identified during the systematic review process (see Chapter Four). The full list of sustainability indicators identified for this research is indicated in Appendix 11. During this stage, it was noticed that despite being termed differently, many of the identified indicators could be grouped under a single indicator. As such, during this stage similar indicators were grouped under a single indicator for simplicity. Furthermore, duplicate indicators and indicators that were too broad or vague and not relevant to the plantation agricultural system were also removed during this process.

A structured decision-oriented Delphi questionnaire was then designed based on the final set of 103 fully worked out indicators (see Appendix 12). As noted by Hung *et al.* (2008), the objectives of a decision- oriented Delphi questionnaire are to not only explore opinions but to also reach a consensus among a diverse range of stakeholder groups regarding the indicators to be used to assess the sustainability of the Abaca plantation system in Indonesia. The questionnaire included four main sections namely:

i. Section A: Environmental Indicators
ii. Section B: Economic Indicators
iii. Section C: Social Indicators
iv. Section D: Governance Indicators.

Within each section, there was only one set of questions namely:

i. Set 1

In Set 1 of each section, participants were asked to select one option regarding the extent to which the suggested indicators are relevant to assessing the sustainability of the Abaca plantation system in Indonesia. A 5-point Likert scale was used. The options included:

i. Very Irrelevant (1)

ii. Irrelevant (2)
iii. Neutral (3)
iv. Relevant (4)
v. Very Relevant (5)
vi. Not Applicable (N/A) (0)

Likert scales are a commonly used tool in Delphi studies and have been used in a wide variety of research including medicine, education and agriculture (Duffield 1993; Albanese *et al*. 1997; Angus *et al.* 2003; Spooren *et al.* 2007; Galanis 2018). A 5-point Likert scale was used for the Round 1 Delphi survey as practical applications of Likert scales have usually favoured the use of a 5-point scale (Armstrong 1987; Allen & Seaman 2007). As such, a 5-point Likert scale was selected for this round to uncover the participants' opinions on the whole suite of indicators identified.

6.2.2 Delphi Round 1 Survey, Response and Analysis

A total of 40 participants from the 26 stakeholder groups identified in Chapter Four were invited to participate as experts in this research. The 26 stakeholder groups encompassed four broad sectors namely government, business, local community and public sectors as identified by Leventon *et al.* (2016) and Santoso & Delima (2017) (See Chapter Three). The stakeholders whom participated in the Round 1 survey are listed in Table 21.

Table 21: Total list of stakeholders whom participated during the Round 1 survey

Participant ID	Stakeholder Group	Sector	Number of Participants
1	Plantation Workers	Local Community (Indonesia)	6
2	Plantation Workers		
3	Plantation Workers		
4	Plantation Workers		
5	Plantation Workers		
6	Plantation Workers		
7	PT Viola Fibre International	Business Sector (Indonesia)	3
8	PT Viola Fibre International		

9	PT Viola Fibre International		
10	National Youth Committee	NGO (Indonesia)	2
17	National Youth Committee		
11	Department of Public Works and Spatial Planning	Government Sector (Indonesia)	6
12	Department of Manpower and Transmigration		
13	Investment and One Stop Integrated Service Department		
14	Department of Cooperatives and SMEs		
15	Department of Health		
16	Department of Farming and Agriculture		
18	Purico Group Ltd	Business Sector (UK)	1
Total			**18**

As indicated in Table 21, a total of 18 participants from 10 stakeholder groups responded out of the 40 participants from 26 stakeholder groups whom were sent the invitation (18/40 = 45% response rate). The stakeholder groups included in the Round 1 survey still represented the four broad sectors as identified by Leventon *et al.* (2016) and Santoso & Delima (2017). As noted by Nguyen *et al.* (2017), the participants (stakeholders) included in the Delphi process must not only include experts (local authorities and business organizations) but non-experts (local community members) as well.

Physical copies of the questionnaire were given to the stakeholders to be filled in during Round 1 (see Appendix 13). The stakeholders were informed about the aim of the project as well as the purpose of the questionnaire. An information sheet was also provided to all stakeholders which explained in detail regarding the purpose and objectives of the research project and questionnaire respectively as well as the sustainability indicators within each section of the questionnaire (see Appendix 14). The stakeholders were informed to answer the questions as honestly as possible and to not discuss the answers with other stakeholders as individual responses are required for each questionnaire. The stakeholders were also reminded that the questionnaire is entirely opinion based and that they are to only select the indicators that they felt were suitable.

In most cases, the stakeholders preferred to fill in the questionnaire later and return the completed questionnaire to me at a later date due to their relatively busy schedules. Each questionnaire had a unique ID to be able to identify each individual respondent if required. The participants identity as well as their individual responses to the questions within the questionnaire were not disclosed to the other participants and were kept confidential. The completed questionnaires were then collected from the participants on an agreed upon date. The participants were thanked for their time and input in the research. A small gift (keychain) was given to all the participants whom completed and returned the questionnaires as a token of appreciation for their participation in the research.

6.2.3 Designing Delphi Questionnaire (Round 2)

In the second round, the indicators used in the Round 1 questionnaire were also used in the Round 2 questionnaire. During the design of the Round 2 questionnaire, no indicators were eliminated or removed as a consensus had not been reached among the stakeholders (see Section 6.3).

The Round 2 questionnaire was designed according to the Round 1 questionnaire but with two changes. These changes include:

i. A summary of the responses of the group (i.e. group response) and the individual respondent's own response from the first questionnaire were included in the second questionnaire.
ii. A 7-point Likert scale was used in Set 1 of each section regarding the extent to which the suggested indicators are relevant to assessing the sustainability of the Abaca plantation system in Indonesia. Values closer to 1 indicated less relevant indicators while values closer to 7 indicated more relevant indicators.

A 7-point Likert scale was used in Round 2 as initial examinations of the Round 1 questionnaires indicated that many of the respondents preferred to select the neutral option in Round 1 thereby making it difficult for most of the indicators to be eliminated and a consensus to be reached. Therefore, a larger scale was used in Round 2 to give the respondents a greater number of values/options to choose from thereby discouraging them from simply selecting the neutral option (Habibi *et al.* 2014).

The group response and individual respondent's own response provided in the second Delphi questionnaire gave the participants the opportunity to reconsider their original answer after examining the group response. Although each respondent had access to the group response in the second Delphi questionnaire, each respondent only had access to their own individual responses. Therefore, the anonymity of the other group members and their respective individual responses was maintained as well in the second round.

6.2.4 Delphi Round 2 Survey, Response and Analysis

The original 40 participants from the 26 stakeholder groups identified in Chapter Three were again invited to participate as experts in Round 2. The stakeholders whom participated in the Round 2 survey are listed in Table 22.

Table 22: Total list of stakeholders whom participated during the Round 2 survey

Participant ID	Stakeholder Group	Sector	Number of Participants
3	Plantation Workers	Local Community (Indonesia)	1
7	PT Viola Fibre International	Business Sector (Indonesia)	3
8	PT Viola Fibre International		
9	PT Viola Fibre International		
10	National Youth Committee	NGO (Indonesia)	2
17	National Youth Committee		
11	Department of Public Works and Spatial Planning	Government Sector (Indonesia)	4
12	Department of Manpower and Transmigration		
13	Investment and One Stop Integrated Service Department		
16	Department of		

	Farming and Agriculture		
18	Purico Group Ltd	Business Sector (UK)	1
Total			**11**

A total of 11 participants from 8 stakeholder groups responded out of the 40 participants from 26 stakeholder groups whom were sent the invitation (11/40 = 27.5% response rate). As indicated in Table 22, the stakeholder groups included in the Round 2 survey still represented the four broad sectors as identified by Leventon *et al.* (2016) and Santoso & Delima (2017). As noted by Glass *et al.* (2013), there is little empirical evidence of the effect of the number of participants on the reliability of the Delphi process. As such, it has been argued that number of participants should be determined by the nature of the subject of inquiry and availability of expertise as some panel sizes (number of participants) have been as small as 10 members (Verhagen *et al.* 1998; Flanagan *et al.* 2016).

Physical copies of the questionnaires were again given to the stakeholders to be filled in during Round 2 (see Appendix 15). The stakeholders were again informed about the aim of the project as well as the purpose of the questionnaire. An information sheet was also provided to all stakeholders which explained in detail regarding the purpose and objectives of the research project and questionnaire respectively as well as the sustainability indicators within each section of the questionnaire (see Appendix 14). The stakeholders were again informed to answer the questions as honestly as possible and to not discuss the answers with other stakeholders as individual responses are required for each questionnaire. The stakeholders were also reminded that the questionnaire is entirely opinion based and that they are to only select the indicators that they felt were suitable. However, the stakeholders were also reminded to select each option carefully instead of simply selecting the neutral option as this made it difficult for a consensus to be achieved in Round 1.

The participants were informed that as many of them chose to select the neutral option in Set 1 of the questionnaires used in Round 1, it made it difficult to remove some of the indicators from the questionnaire for Round 2 as irrelevant indicators could not be conclusively identified. Therefore, a 7-point Likert scale was used in Set 1 of each section of the questionnaire used in Round 2 instead of the previous 5-point Likert scale. The participants were informed that a larger scale would provide them with a greater number of values/options to choose from thereby discouraging them from simply selecting the neutral option. The participants were also informed that they were now able to view their individual response to the questions in the Round 1 questionnaire as well as the group's response to the same questions.

They were then informed that they could either change their answers or stick to their original answers to each question within the questionnaire after examining both sets of responses. The participants were again informed and encouraged to take their time and not simply rush through the questions as fast as possible. The participants were also informed of how valuable their input was to this research and the overall development of the sustainability indicators. The participants were also reminded to not discuss the answers with other stakeholders as individual responses are required for each questionnaire. The stakeholders were also reminded that the questionnaire is entirely opinion based and that they are to only select the indicators that they felt were suitable. Once again, most of them requested to complete the questionnaire later and without my presence.

The completed questionnaires were then collected from the participants on an agreed upon date. The participants were thanked for their time and input in the research. A small gift (keychain) was again given to all the participants whom completed and returned the questionnaires as a token of appreciation for their participation in the research. The use of questionnaires were useful for this part of the research due to its advantages including the ability to include individuals from a range of demographic backgrounds and with varying levels of experience, providing anonymity to stakeholders to share their opinions as well as preventing direct interactions among stakeholders thereby avoiding the uncontrolled psychological influences among stakeholders (Akbari *et al.* 2020; D'Agostino *et al.* 2020).

6.3 Results and Discussion

The data from both Delphi rounds were then analyzed using IBM SPSS (Version 25).

Table 23 indicates the strength of the consensus (Kendall's W) regarding all identified indicators (environmental, economic, social and governance) in both Delphi rounds among the stakeholders.

Table 23: Consensus (Kendall's W) regarding all identified indicators in both Delphi rounds among the stakeholders

Round Number	Kendall's W	p-value
Delphi Round 1	0.331	$p < 0.001$
Delphi Round 2	0.496	$p < 0.001$

Consensus for both Delphi rounds were measured using Kendall's W. Kendall's W was chosen for this research as it not only gives a measure of consensus but can also indicate the change in consensus (increasing or decreasing) between both rounds thereby also indicating the strength of the consensus achieved (Schmidt 1997). The value of W ranges from 0 to 1, with higher values indicating a higher degree of consensus (Schmidt 1997). Values of 0.3 and under indicate weak consensus, values of 0.5 indicate moderate consensus whereas values of 0.7 and above indicate strong consensus (Schmidt 1997).

As indicated in Table 23, the consensus in Round 1 was measured using Kendall's W which indicated a score of 0.331. According to Schmidt (1997), knowing when to stop the Delphi rounds is important as if the Delphi rounds are stopped too soon, the results produced may not be meaningful, if the rounds go on too long, it can cause sample fatigue and can tax resources. According to Schmidt (1997), the value (0.33) acquired during Round 1 only indicated a weak consensus. As such, a second Delphi round was required to acquire a higher value to indicate a stronger consensus among the participants.

As indicated in Table 23, the consensus in Round 2 was also measured using Kendall's W which indicated a score of $0.496 \approx 0.50$. According to Schmidt (1997), the value (0.50) acquired during Round 2 indicated moderate consensus. A third Delphi round was not conducted as Schmidt (1997) suggested that the Delphi rounds can be concluded when a moderate consensus among the participants is obtained. Furthermore, the response rate and the number of participants for each Delphi round were decreasing as well and it was likely that an insufficient number of participants would be obtained for a third round.

Descriptive analysis particularly measures of central tendencies (mean) and level of dispersion (standard deviation) were also carried out regarding the **relevancy scores** given by the stakeholders (participants) to all identified indicators in both Delphi rounds (Round 1 and Round 2). The full result of this analysis is provided in Appendix 16. In order to select the indicators relevant to the stakeholders, I used two criteria based on the results of Round 2 (see Appendix 16). These criteria include:

i. Mean Relevancy Value: $X \geq 5$.

Indicators with mean relevancy values from 1 – 3 were considered irrelevant. Indicators with mean relevancy values of 4 were considered neutral. Indicators with relevancy values of 5 and above were considered relevant.

ii. The standard deviation value was $X \leq 1.64$

The standard deviation values of the indicators had to also be equal to or less than 1.64.

As indicated by Giannarou & Zervas (2014), indicators that fulfilled both these criteria could then be selected. A preliminary list of 33 sustainability indicators were identified and sorted into the four dimensions of sustainability. These indicators are listed below according to their respective sustainability dimension.

Table 24 indicates the list of environmental indicators selected by the stakeholders based on the results of Round 2.

Table 24: List of environmental indicators selected by the stakeholders

Environmental Indicators	Mean	Standard Deviation	Min Value	Max Value
1. Total area of natural vegetation converted for agricultural production (ha)	5.18	1.537	3	7
2. Type of integrated pest management (IPM)	5.55	1.293	3	7
3. Type of recycling programs carried out by the plantation	5.09	1.300	3	7
4. Number of approved waste disposal sites used by the plantation	5.55	0.934	4	7
5. Waste reduction target of the plantation	5.36	1.120	4	7
6. Timing of treatment applications by the plantation	5.36	1.206	4	7
7. pH of the soil on the plantation	5.45	1.572	2	7
8. Infiltration rate of the soil on the plantation (mm/hr)	5.00	1.265	3	7
9. Water conservation target of the plantation	5.36	1.120	4	7
10. Water management training for farmers on the plantation	5.64	0.809	5	7
11. pH of water bodies on the plantation	5.36	1.286	3	7
12. Nutrient content of water bodies on the plantation	5.00	1.414	3	7
13. Oxygen content of water bodies on the plantation	5.00	1.342	3	7

As indicated in Table 24, 13 environmental indicators were selected by the stakeholders based on the results of Round 2.

Table 25 indicates the list of economic indicators selected by the stakeholders based on the results of Round 2.

Table 25: List of economic indicators selected by the stakeholders

Economic Indicators	Mean	Standard Deviation	Min Value	Max Value
1. Annual business cost	5.55	1.508	3	7
2. Price determination of the business products	5.45	1.368	4	7
3. Company business plan	5.64	1.567	3	7
4. Market stability analysis of the business products	5.18	1.471	3	7

As indicated in Table 25, 4 economic indicators were selected by the stakeholders based on the results of Round 2.

Table 26 indicates the list of social indicators selected by the stakeholders based on the results of Round 2.

Table 26: List of social indicators selected by the stakeholders

Social Indicators	Mean	Standard Deviation	Min Value	Max Value
1. Monthly income of workers on the plantation	5.36	1.629	2	7
2. Total working time per week of the plantation workers (hrs)	5.27	1.489	3	7
3. Total working days per year of the plantation workers (days)	5.18	1.471	3	7
4. Type of employment benefits provided by the plantation to the workers	5.45	1.572	3	7
5. Compliance of the plantation with the fair hiring regulations of the region	5.00	1.549	2	7
6. Provision of work equipment by the plantation for the workers	5.64	1.206	4	7
7. Compliance of the plantation with regional labour laws	5.73	1.489	3	7
8. Number of regional employment opportunities provided by the plantation	5.00	1.342	3	7
9. Percentage of regional workers employed by the plantation (%)	5.73	1.104	4	7

As indicated in Table 26, 9 social indicators were selected by the stakeholders based on the results of Round 2.

Table 27 indicates the list of governance indicators selected by the stakeholders based on the results of Round 2.

Table 27: List of governance indicators selected by the stakeholders

Governance Indicators	Mean	Standard Deviation	Min Value	Max Value
1. Access rights of the plantation to the resources within the region	5.36	1.120	4	7
2. Engaging with the stakeholders connected with the plantation's operations	5.09	1.446	3	7
3. Effective participation of the stakeholders connected with the plantation's operations	5.00	1.483	3	7
4. Resolving conflicts with potential stakeholders	5.64	1.502	3	7
5. Evidence of holistic audits by government departments	5.18	1.601	3	7
6. Transparency regarding company reports and policies	5.27	1.555	2	7
7. Awareness of workers regarding product and production quality standards	5.27	1.272	4	7

As indicated in Table 27, 7 governance indicators were selected by the stakeholders based on the results of Round 2.

As noted by Glass *et al.* (2013) and supported by this research, one of the major advantages of the Delphi process is the ability to take into account the viewpoints of a wide range of stakeholders by structuring the group communication process so that it allows a group of individuals as a whole to deal with an issue or topic. Therefore, by engaging a 'panel' of stakeholders (participants) in anonymous survey, this method can generate opinion and/or consensus about a particular topic over a series of iterative rounds (Glass *et al.* 2013).

However, it must be noted that special care must be taken when designing and preparing the questionnaires. This is because it was noticed during this process, many of the participants complained about the questionnaire being too long and incredibly tedious. Many of the participants also complained about the estimated time required to complete the questionnaire. Some participants even tried to bargain and ask if they really needed to answer all the questions within the questionnaire and if they could only answer the questions that were either relevant to them or ones that they were familiar with. As such, reassurance had to be given to the participants that the questionnaire is entirely opinion based. Therefore, they only had to choose the answers that they felt were right to them. They were also reassured that their identities would be kept anonymous and their individual response (answer) to each question would not be shared with the other participants.

Therefore, a lot of encouragements regarding the value of their opinions to the overall success of the research project had to be given first before most of participants finally agreed to complete the questionnaire fully. As noted by Neef & Neubert (2011), the successful integration of participatory methods in agricultural research programs highly depends on the personal characteristics of the researcher. However, most of the participants requested to complete the questionnaire privately and at a later time. The completed questionnaires were then collected from the participants after approximately 1 week on an agreed upon date. However, upon examining the questionnaires it was discovered that many of the participants had rushed through the questions and answered the questions without giving much thought about them.

As indicated in Section 6.2.4, many of the participants selected the neutral option in Set 1. This set is important in determining the relevancy of the suggested indicators to measuring the sustainability of the plantation system. As noted by Neef & Neubert (2011), the level of participation of local stakeholders in the research process also greatly depended on their own characteristics and their expectations from the project. As such, many of the stakeholders may have still perceived this project as being entirely academically based and therefore had no immediate value or significance to them.Furthermore, a consensus had not been reached among the participants regarding the selection of a suite of indicators for Abaca plantation agriculture in Indonesia (see Section 6.3). As such, the lack of careful selection and relatively low consensus during Round 1 (see Section 6.3) made it difficult to remove unnecessary or redundant indicators from the Round 1 questionnaire when designing the follow up (Round 2) questionnaire. Therefore, the Round 2 questionnaire had the same number of indicators as the Round 1 questionnaire as it was still difficult at that point in time to conclusively determine which indicators were considered irrelevant and should be removed.

In Round 2, the completed questionnaires were collected from the participants after approximately 2 weeks on an agreed upon date. A longer time frame was given to complete the questionnaires in Round 2 compared to Round 1 to prevent the participants from simply rushing through the questionnaires. Initial examination of the Round 2 questionnaires indicated that the participants were more selective of their answers compared to Round 1. The neutral option was not selected as frequently and on further inspection it was indicated that more thought was given by the participants when selecting each answer. A possible reason for the improved feedback in Round 2 could be due to the time lapse between Round 1 and Round 2. As noted by Fletcher & Marchildon (2014), the time lapse between Delphi rounds can allow the participants to reflect on their response and the group response before making any corrections if necessary. The time lapse between Round 1 and Round 2 for this research was approximately 1 month.

After Round 2, it was decided that no follow up survey rounds should be carried out. This was because, a consensus had been reached among the participants regarding the selection of a preliminary set of indicators that can be used to assess the sustainability of the abaca plantation system. The strength of the consensus increased from 0.33 (weak consensus) to 0.496 ≈ 0.50 (moderate consensus) from Round 1 to Round 2 respectively (see Section 6.3). Furthermore, the number of participants whom completed and returned the questionnaires decreased with each round. According to Schmidt (1997), knowing when to stop the Delphi rounds (survey rounds) is important as if the Delphi rounds are stopped too soon, the results produced may not be meaningful, if the rounds go on too long, it can cause sample fatigue and can tax resources.

In terms of panel size for each survey round, Day & Bobeva (2005) recommend using a panel size of between 15 – 35 people. Although a larger panel may lead to a more reliable judgement, a smaller panel can ensure that the material produced is kept to a manageable level and feedback is more accurate (Glass *et al.* 2013). However, it has been argued that the panel size should be determined by the nature of the subject of inquiry and availability of expertise (Verhagen *et al.* 1998). Some panel size has been as small as 10 members (Flanagan *et al.* 2016). In practice, there is little empirical evidence of the effect of the number of panel members on the reliability/validity of the process, with representativeness ultimately being assessed on the quality of the expert panel rather than its size (Glass *et al.* 2013). In the case of this research, the participants from each survey round encompassed the four main sectors (government, business, local community and public sectors) thereby insuring inclusiveness. The response rate suggested for each survey round varies between studies with some studies recommending a response rate of 70% while other studies insist that a response rate of just 12% is sufficient (Sumison 1998; Day & Bobeva 2005). In the case of this research, the response rate decreased between each round with Round 1 having a response rate of 45% and Round 2 having a response rate of 27.5%.

Descriptive analysis particularly measures of central tendencies (mean) and level of dispersion (standard deviation) was also carried out regarding the relevancy ratings given by the stakeholders (participants) to all identified indicators in both Delphi rounds (Round 1 and Round 2). A preliminary set of 33 sustainability indicators were then selected after the analysis of both sets of questionnaires (Round 1 and Round 2). The indicators were selected based on the mean and standard deviation values of the Round 2 results (see Section 6.3). The indicators selected encompassed the four dimensions of sustainability namely environmental, economic, social and governance. Approximately 13 environmental indicators, 4 economic indicators, 9 social indicators and 7 governance indicators were selected based on the analysis. The environmental dimension had the highest number of indicators while the economic dimension had the lowest number of indicators.

6.4 Chapter Conclusion

In this chapter, I have presented the results of the second part of the modified Delphi process for this research. The main objectives of this chapter are to select relevant indicators from the perspective of the stakeholders. This chapter also aimed to explain the challenges associated with the Delphi process and provide solutions to those challenges.

Through this research, it was understood that many of the stakeholders (participants) were not highly interested in sustainability issues associated with the plantation system. Many of the stakeholders felt that sustainability was someone else’s responsibility and therefore failed to acknowledge the responsibility that each individual carried regarding sustainability. As such, throughout the research process encouragement and support had to be continuously given to the participants to convince them regarding the importance of their input towards the success of this research. As such, the social skill of a researcher is a crucial factor in keeping the participants interested and responsive. The use of the Delphi questionnaires was useful for this research as the participants were able to fill in their answers on their own time. However, care must be taken in designing the questionnaires as a lengthy and complicated questionnaire can discourage many participants from completing the questionnaires or simply rushing through them without giving the questions much thought.

Through these challenges and methods of overcoming them, a preliminary list of 33 sustainability indicators covering the four dimensions of sustainability were selected by the participants (stakeholders).

Chapter Seven

Pilot Testing of Draft Sustainability Indicators

7.1 Chapter Introduction

In the previous chapters (Chapter Five and Chapter Six), the steps in the modified Delphi process were examined and explained. The modified Delphi process helped identify, develop and select relevant sustainability indicators for Abaca plantation agriculture in Indonesia from the perspectives of the stakeholders. The identified 33 sustainability indicators encompassed the four main dimensions of sustainability namely environment, economic, social and governance (see Chapter Six).

In this chapter, the methods used to test the sustainability indicators are explained. This 'pilot testing process' is crucial to understanding the effectiveness of the selected sustainability indicators in assessing the sustainability of the Abaca plantation agricultural system from the perspective of the stakeholders. Through this approach, insights into the tacit and explicit approaches used to test the effectiveness of the selected indicators in assessing the sustainability of this plantation system are presented and potential issues as well as respective solutions in collaboratively testing the sustainability indicators are outlined.

7.2 Methods

The pilot testing process was conducted with both the relevant stakeholders and myself on the company's Abaca plantation in Indonesia. Prior to this process, the relevant stakeholders identified for this research (see Chapter Three) were invited to participate through a series of phone calls and face-to-face invitations. However, only 3 stakeholder groups were present during the entire pilot testing process compared to the 26 stakeholder groups that were identified during the start of the project and invited to participate.

The stakeholder groups present included: Plantation Workers, PT Viola Fibre International and Purico Group Ltd.

During the pilot testing process, the selected indicators (see Chapter Six) were tested on the company's Abaca plantation in Indonesia. The pilot testing process served two purposes:

1. To determine the effectiveness of the indicators in assessing the sustainability of the plantation system.
2. To determine the sustainability score of the plantation system in relation to each respective indicator.

The entire pilot testing process took approximately 7 days to complete. The methods used to test each indicator were suggested by the stakeholders present and from data gathered via literature review.

The methods used to test each indicator are outlined below.

7.2.1 Environmental Indicators

1. *Total area of natural vegetation converted for agricultural production (ha)*

Assessment methods used:

- Delineate sites where the enterprise's operations impact on land use. For each site, delineate and quantify the area affected by the enterprise's operations.
- Review relevant documentation to determine whether there has been any conversion of natural vegetation by the enterprise's operations.
- Interview relevant stakeholders to determine if any natural vegetation has been removed from the permitted location due to the enterprise's operations.

2. *Pest Management Plan*

Assessment methods used:

- Review company records to determine if the enterprise has a schedule that specifies the dosage requirements and the timing of treatment application for each pesticide used.

- Interview relevant stakeholders to determine if the pesticides used and application methods including dosage requirements and timing of treatment application for each pesticide are appropriate for the region.

3. *Type of recycling programs carried out by the plantation*

Assessment methods used:

- Review company records to determine if the enterprise has a record of the type and amount of recyclable waste produced.
- Review company records to determine if the enterprise has a formal plan regarding the recycling activities carried out within its operations.
- Interview plantation workers and company staff members to determine the type of recycling activities carried out and the effectiveness of these activities towards waste reduction.

4. *Number of approved waste disposal sites used by the plantation*

Assessment methods used:

- Review company records to determine if the enterprise has a record of the type and amount of non-recyclable waste produced.
- Review company records to determine if the enterprise has a formal plan regarding the disposal of the non-recyclable waste generated from its operations.
- Interview plantation workers and company staff members to determine if the number and location of the disposal sites as well as method of disposal are appropriate for each type of non-recyclable waste generated from the enterprise's operations.

5. *Waste reduction target of the plantation*

Assessment methods used:

- Review company records to determine if the enterprise has a written plan with measurable targets and timelines for waste reduction.

- Interview company staff members and plantation workers to determine if the enterprise has implemented the steps outlined in the plan to fulfil the waste reduction objectives.

6. *pH of the soil on the plantation*

Assessment methods used:

- Delineate sites on which crops are planted as part of the plantation's operations.
- Interview plantation workers to assess the level crop growth for each site.
- Use field equipment such as a soil pH meter to assess the soil pH on sites where crops indicate stunted growth.

7. *Water conservation target of the plantation*

Assessment methods used:

- Review company records to determine if the enterprise has a written plan with measurable targets and timelines to reduce water use over time.
- Interview company staff members and plantation workers to determine if the enterprise has implemented the steps outlined in the plan to fulfil the water reduction objectives.

8. *Water management training for farmers on the plantation*

Assessment methods used:

- Review company records to determine if the enterprise has a written plan regarding water management training provided to the workers. The records should also include training dates as well as past training attended by the workers.
- Interview company staff members and plantation workers to determine if the enterprise has organised formal training sessions for employees regarding proper water management.
- Assess whether the employees found the training to be effective and understood the necessary steps to take for better water management.

7.2.2 Social Indicators

1. *Monthly income of workers on the plantation*

Assessment methods used:

- Review company records to determine if formal working contracts are provided to all employees of the enterprise. Inspect the contracts to determine if the contracts specify payments including basic pay, overtime as well as holiday pay for the employees.
- Interview relevant stakeholders to determine if the payments provided by the enterprise are sufficient and meet the minimum wage laws of the region.

2. *Total working time per week of plantation workers*

Assessment methods used:

- Review company records to determine if formal working contracts are provided to all employees of the enterprise. Inspect the contracts to determine if the contract specifies the working time (hours) and break times for employees.
- Interview relevant stakeholders to determine if the working hours set by the enterprise meets the employment laws of the region or if it interferes with their lifestyle including family and worship time.

3. *Total working days per year of plantation workers (days)*

Assessment methods used:

- Review company records to determine if formal working contracts are provided to all employees of the enterprise. Inspect the contracts to determine if the contract specifies the time-off policy for employees including public holidays and vacation days.
- Interview relevant stakeholders to determine if the time-off policy set by the enterprise meets the employment laws of the region and if the holiday and vacation days set by the enterprise are appropriate.

4. *Type of employment benefits provided by the plantation to the workers*

Assessment methods used:

- Review company records to determine if formal working contracts are provided to all employees of the enterprise. Inspect the contracts to determine if the contract specifies the benefits for employees including salary bonuses, health insurance and vacation time.
- Interview relevant stakeholders to determine if the employment benefits set by the enterprise meets the employment laws of the region and if the benefits are enforced by the enterprise.

5. *Compliance of the plantation with the regional labour laws*

Assessment methods used:

- Review company records to determine if formal working contracts are provided to all employees of the enterprise. Inspect the contracts to determine if the rules or policies outlined within the contract complies with the labour laws within the region.
- Interview company employees to determine if the company rules have been specified and explained to all employees.

6. *Provision of work equipment by the plantation for the workers*

Assessment methods used:

- Review company records to determine if the company keeps a record of the number and type equipment within its inventory. Inspect the records to determine if the company also records the number and type of equipment issued to all employees.
- Interview plantation workers to determine if the necessary work equipment are provided free of cost prior to the start of their employment. Interview plantation workers to also determine if the work equipment provided are adequate, safe to use and meet their working needs.

7. *Regional employment opportunities provided by the plantation*

Assessment methods used:

- Review company records to determine if the prioritization of locals for employment within the enterprise's local operations has been documented within a formal contract.
- For cases where non-regional employees were hired, interview management to determine the reasons why another candidate was selected instead of a local candidate.

7.2.3 Economic Indicators

1. *Annual Business Costs*

Assessment methods used:

- Review the business and accounting records to determine if the enterprise tracks and records its direct and indirect costs within a given period. This includes all the costs associated with the good and services produced by the enterprise.
- Interview relevant company staff members (e.g. accounts department) to check and clarify if all costs associated with the enterprise's operations have been tracked and recorded for the given time period.

2. *Price Determination of the Business Products*

Assessment methods used:

- Review the business and accounting records to inspect if the enterprise has determined the selling price of its goods and services after considering the break-even price of the products and services within a given market.
- Interview company staff members (e.g. sales and marketing departing) to clarify relevant financial issues.

3. *Company Business Plan*

Assessment methods used:

- Review the business records to inspect if the enterprise has an up-to-date business plan with all the necessary features (e.g. customer description, marketing strategy).
- Interview relevant company staff members (e.g. management department) to clarify issues such as:
  1. The viability and accuracy of the business plan
  2. The planning to generate revenue streams over time
  3. The necessary changes that must be made over time due to changes in consumer and market demands as well as business operations

4. *Market stability analysis of the business products*

Assessment methods used:

- Review the business records to inspect if the enterprise has implemented actions and mechanisms to ensure a diversified and consolidated income structure.
- Interview relevant company staff members (e.g. management department) to clarify issues such as:

  1. The number of buyers for the goods and products offered by the company
  2. The number of years the enterprise has an on-going relationship with each buyer
  3. The timely deliverance of the goods and products to each buyer
  4. The amount and stability of the revenue generated from each buyer

7.2.4 Governance Indicators

1. *Access rights of the enterprise to the resources within the region*

Assessment methods used:

- Review company records to determine if the company has a formal contract with the Indonesian government which outlines the company's access rights to the resources with the region.
- Interview relevant stakeholders to determine if any disputes have been raised regarding the company's use of the natural resources within the region.

2. *Engaging with the stakeholders connected with the plantation's operations*

Assessment methods used:

- Interview different stakeholder groups to determine the type of engagement strategies utilized by the plantation and asses if these strategies are efficient in engaging different stakeholder groups.

3. *Resolving potential conflicts with stakeholders*

Assessment methods used:

- Interview different stakeholder groups to determine the type of conflict resolution strategies utilized by the plantation and assess if these strategies are efficient in resolving conflicts between different stakeholder groups.

4. *Holistic audits by plantation management*

Assessment methods used:

- Review company records to determine if the company has up-to-date financial reports.
- Interview relevant stakeholders (e.g. plantation management) to determine if the financial reports are reviewed by an external body and if improvements are made over time to enhance the financial performance of the enterprise.

5. *Transparency regarding company reports and policies*

Assessment methods used:

- Review company records to determine if the company has up-to-date operational reports for their stakeholders.
- Interview plantation management to determine if the stakeholder reports (e.g. operational reports) are provided to relevant stakeholder in a timely and accurate manner.

6. *Awareness of workers regarding product quality standards*

Assessment methods used:

- Review company records to determine if the enterprise has a written plan regarding product quality control training provided to the workers. The records should also include the training dates as well as past training attended by the workers.
- Interview company staff members and plantation workers to determine if the enterprise has organised formal training sessions for employees regarding product quality and quality control measures.
- Assess whether the employees found the training to be effective and understood the necessary steps to take for better product quality management.

7.3 Results and Discussion

The results of the pilot testing process were discussed with each stakeholder group present (see Section 7.2) individually. This was to avoid the usual problems associated with different group dynamics in which dominant contributors (contributors with more power or influence) can inhibit or contradict individual views (Verhagen *et al.* 1998). The results of these individual discussions with each stakeholder group were collected and then discussed collectively at the Harvest Festival (discussed later in this chapter) with all the stakeholders that were present during the pilot testing process. Key points from each individual discussion were recorded in a reflection journal. These key points were used to stimulate and facilitate the final discussion (during Harvest Festival). The discussions were not audio recorded as most of the discussions with the stakeholders were carried out informally and on the plantation site. A final score was then collectively given by the stakeholders themselves regarding the sustainability performance of the plantation for each indicator during the Harvest Festival. A green score indicated satisfactory performance, a yellow score indicated moderate performance and a red score indicated that further improvements are required.

7.3.1 Sustainability Indicators Scores

Table 28 provides an overview of the 25 sustainability indicators tested on the plantation site as well as their respective score.

Table 28: Overview of the sustainability indicators tested on the plantation and their respective score

Indicators	Methods/Sources of verification	Decision (Score)	Reasons for score
Environmental Indicators			
Total area of natural vegetation converted for agricultural production (ha)	1. Site Visits 2. Government Contracts 3. Stakeholder Interviews	**Green**	1. Location of plantation is outside the protected forest reserve 2. No natural forests have been converted for plantation development 3. Plantation is developed on unused land
Pest Management Plan	1. Company Records 2. Stakeholder Interviews	**Green**	1. Company keeps a record of all pesticides used within its operations 2. Dosage requirements and timing of treatment applications are also recorded 3. All pesticides used have been approved by the respective Indonesian government departments
Type of recycling programs carried out	1. Company Records 2. Stakeholder Interviews	**Yellow**	1. Organic agricultural waste is recycled in the form of composting 2. Oil used by the machinery on the plantation is also recycled 3. Other wastes such as plastics are not currently recycled 4. Type and amount of recyclable wastes are not recorded
Number of approved waste disposal sites used by the plantation	1. Company Records 2. Stakeholder Interviews	**Yellow**	1. Non-recyclable wastes have not been identified or quantified 2. No designated or approved sites have been selected for waste disposal 3. Most of the waste generated is organic agricultural waste
Waste reduction target of the plantation	1. Company Records 2. Stakeholder Interviews	**Yellow**	1. No formal waste reduction plan has been implemented 2. Amount of waste generated is relatively low with most of the waste being organic agricultural waste 3. Formal waste reduction plans will be formulated gradually

pH of the soil on the plantation	1. Site Visits 2. Stakeholder Interviews 3. Use of field equipment (pH meter)	Green	1. Field test using a soil pH meter indicated that soil pH was between 6.6 -6.8 2. No crops on the plantation indicated stunted growth due to soil pH 3. Soil pH values were consistent with the volcanic soil type of the plantation
Water conservation target of the plantation	1. Company Records 2. Stakeholder Interviews	Red	1. No formal water reduction plan or water conservation target has been implemented 2. Only one water pump is currently used to extract underground water for plantation activities 3. Some Abaca plants are beginning to show signs of stunted growth due to lack of water
Water management training for farmers on the plantation	1. Company Records 2. Stakeholder Interviews	Red	1. Informal training regarding water saving activities are provided to plantation workers 2. Plantation workers have expressed that the trainings provided are insufficient
Social Indicators			
Monthly income of workers on the plantation	1. Company Records 2. Stakeholder Interviews	Green	1. Company provides formal contracts to all employees prior to the start of employment 2. Contract lists the basic pay of the employee including other pay such as holiday pay and overtime pay 3. Enterprise periodically transfers the pay earned by the employees directly into their bank accounts
Total working time per week of plantation workers	1. Company Records 2. Stakeholder Interviews	Green	1. Plantation workers have indicated that the working hours set by the enterprise do not interfere with their lifestyle 2. The break hours set by the enterprise is sufficient in comparison to the activities carried out
Total working days per year of plantation workers (days)	1. Company Records 2. Stakeholder Interviews	Green	1. Plantation workers have indicated that the time off policy set by the enterprise provides them with sufficient rest 2. The enterprise observes all public holidays within the region
Type of employment benefits provided by the plantation to the workers	1. Company Records 2. Stakeholder Interviews	Green	1. Plantation workers have expressed that the employment benefits provided by the enterprise are sufficient and are enforced
Compliance of the plantation with the regional labour laws	1. Company Records 2. Stakeholder Interviews	Green	1. Company also provides all employees with a set of the company rules 2. Company rules outline the rules that must be complied by employees of the enterprise 3. Company rules are explained to all workers in the presence of a representative from the company and the Department of Manpower
Provision of work equipment by the plantation for the workers	1. Company Records 2. Stakeholder Interviews	Green	1. Company records the number and type of equipment given to all employees 2. Plantation workers have indicated that the management provides the necessary work prior to the start of their employment
Regional employment opportunities provided by the plantation	1. Company Records 2. Stakeholder Interviews	Green	1. Plantation workers have indicated that locals are given priority for employment opportunities 2. Government contracts have indicated that the company will prioritize the locals for employment opportunities within the region
Economic Indicators			
Annual Business Costs	1. Company Records 2. Stakeholder Interviews	Green	1. Company records all costs associated with its operations including direct and indirect costs 2. Financial records are provided to the Indonesian governments for record keeping and tax purposes

Price Determination of the Business Products	1. Company Records 2. Stakeholder Interviews	**Green**	1. Market price of the products are reviewed regularly to determine the break-even price 2. Formal contracts are made between buyers and sellers to finalize the selling price of the products
Company Business Plan	1. Company Records 2. Stakeholder Interviews	**Yellow**	1. No formal business plan has been developed 2. Business strategy and plans of the enterprise are regularly discussed to determine the direction of the enterprise
Market stability analysis of the business products	1. Company Records 2. Stakeholder Interviews	**Green**	1. Company maintains formal contracts with all buyers of the product 2. Company regularly consults with existing buyers regarding the existing demands for the products 3. Company has back up plans if the supply demands for the products decreases
Governance Indicators			
Access rights of the enterprise to the resources within the region	1. Company Records 2. Stakeholder Interviews	**Green**	1. Government contracts have indicated the rights of the enterprise to the natural resources with the region 2. Government contracts have indicated the rights of the locals to the natural resources with the region 3. Plantation workers have indicated that no restrictions have been placed by the enterprise regarding the utilization of natural resources within the region
Engaging with the stakeholders connected with the plantation's operations	1. Stakeholder Interviews	**Green**	1. Plantation workers indicated that meetings with the plantation management are held daily to discuss work-related issues
Resolving potential conflicts with stakeholders	1. Stakeholder Interviews	**Green**	1. Plantation workers and local community members have indicated that disputes and grievances are discussed and resolved during gatherings such as the Harvest Festival
Holistic audits by plantation management	1. Company Records 2. Stakeholder Interviews	**Green**	1. Plantation management has indicated that yearly financial audits are carried out internally by the enterprise 2. Financial reports are submitted yearly to the Income Tax Department of Indonesia for review and monitoring purposes
Transparency regarding company reports and policies	1. Company Records 2. Stakeholder Interviews	**Red**	1. Plantation management has indicated that the operational reports (stakeholder reports) have not yet been prepared 2. The enterprise currently does not provided stakeholders with an account of its operational activities
Awareness of workers regarding product quality standards	1. Company Records 2. Stakeholder Interviews	**Yellow**	1. Plantation management and workers have indicated that the company does not currently have a formal training plan regarding product quality and control standards 2. On-the-job training is provided regarding product quality to all plantation workers 3. Plantation workers have expressed that formal training would allow them to effectively carry out quality control measures required by the enterprise

As indicated in Table 28, 17 sustainability indicators had a green score, 5 sustainability indicators had a yellow score and 3 sustainability indicators had a red score.

The evidence used to support the testing and scoring for each indicator is summarized in Table 28 explained in detail below.

Total area of natural vegetation converted for agricultural production (ha): As explained in the space recommendation contract (see Appendix 17), the location given to the enterprise for plantation development is outside of the protected forest reserve. As such, the permitted land area has no natural vegetation. Therefore, no natural forests have been converted for plantation development by the enterprise. Figure 16 indicates the land area given to the enterprise for plantation development.

Figure 16: Land area given to the enterprise for plantation development (photo credit: researcher)

As indicated in Figure 16, the land area that is given to the enterprise for plantation development has no natural vegetation. Furthermore, interviews with plantation workers and management staff indicated that the land currently being developed by the enterprise is unused land. Therefore, only weeding, land flattening and tilling activities are carried out prior to any planting activities. The pine trees on the land area are also not removed and are left intact as indicated in Figure 16. Therefore, the total area of natural vegetation converted for agricultural production by the enterprise is 0. As such, the indicator; *Total area of natural vegetation converted for agricultural production (ha)*, was given a green score.

Pest Management Plan: Interviews with management staff members indicated that the enterprise has a record of all pesticides currently being used within its operations along with the dosage requirements and timing of treatment application for each of the pesticide used. Figure 17 indicates the pest management record of the enterprise.

No	Jenis Kegiatan	Mesin/Implement/Fertilizer/Chemical		Nama pupuk & obat2an	Dosis per Ha	Waktu Pelaksanaan		Tanggal
1	Bajak 1	Traktor, discplough	-			31	Hari sebelum tanam	5-Jun
2	Pengendalian OPT Hama 1	Traktor, Boom Sprayer	Insektisida	Buldok	250 ML + 150 L AIR BERSIH	24	Hari sebelum tanam	6-Jul
3	Bajak 2	Traktor, discplough	-			20	Hari sebelum tanam	30-Jul
4	Pengendalian OPT Hama 2	Traktor, Boom Sprayer	Insektisida	Buldok	250 ML + 150 L AIR BERSIH	16	Hari sebelum tanam	19-Aug
5	Harrowing 1	Traktor, harrowing	-			13	Hari sebelum tanam	4-Sep
6	Pengendalian gulma 1	Traktor, Boom Sprayer	Herbisida	Gramoxone	4L +270 L AIR BERSIH	10	Hari sebelum tanam	17-Sep
7	Harrowing 2	Traktor, harrowing	-			7	Hari sebelum tanam	27-Sep
8	Pengendalian gulma 2	Traktor, Boom Sprayer	Herbisida	Gramoxone	4L +270 L AIR BERSIH	4	Hari sebelum tanam	4-Oct
9	Rotavating	Traktor, Rotavator	-			1	Hari sebelum tanam	8-Oct
10	Tanam dan aplikasi pupuk (Benih & NPK Pelangi)	Traktor, Planter	Benih & NPK Pelangi		250 KG	0	Hari	9-Oct
11	Pengendalian Gulma	Traktor, Boom Sprayer	Herbisida	Rumpas	500 ML + 150 L AIR BERSIH	15	Hari setelah tanam	24-Oct
12	Pengendalian OPT - Hama 1	Traktor, Boom Sprayer	Insektisida	Buldok	250 ML + 150 L AIR BERSIH	25	Hari setelah tanam	3-Nov
13	Pengendalian OPT - Jamur 1	Traktor, Boom Sprayer	Fungisida	Folicur	180 ML + 150 L AIR BERSIH	30	Hari setelah tanam	8-Nov
14	Pendangiran dan pembumbunan	Traktor, Cultivator	-			35	Hari setelah tanam	13-Nov
15	Pengendalian OPT - Jamur 2	Traktor, Boom Sprayer	Fungisida	Folicur	180 ML + 150 L AIR BERSIH	45	Hari setelah tanam	23-Nov
16	Pengendalian OPT - Hama 2	Traktor, Boom Sprayer	Insektisida	Buldok	250 ML + 150 L AIR BERSIH	60	Hari setelah tanam	8-Dec
17	Panen	Digger & Harvester				85	Hari setelah tanam	2-Jan

Figure 17: Pest management record of the enterprise (source: Plantation Management; PT Viola Fibre International)

Figure 18 indicates the pesticide preparation process carried out by the plantation workers.

Figure 18: Plantation workers mixing the pesticides into the water before spraying (photo credit: researcher)

As indicated in Figure 18, after checking the dosage requirements of each pesticide used, the plantation workers then mix the pesticide into the appropriate amount of water before spraying the pesticide onto the crops. This ensures that the right dosage is applied and prevents overdose, which can be detrimental to both human and environmental health. Interviews with both the management staff and plantation workers also indicated that both the environmental and agricultural department of Indonesia have approved all pesticides currently used within the enterprise's operations. As such, no illegal or highly hazardous pesticides have been used by the enterprise. Therefore, the indicator; *Pest Management Plan,* was given a green score.

Type of recycling programs carried out by the plantation: Interviews with plantation workers indicated that the recycling of organic agricultural waste is carried out in the form of composting. Further interviews with company management staff members indicated that contracts have been finalized with the relevant suppliers to recycle the oil that is used for the machinery on the plantation. However, interviews with company staff members did indicate that other types of recyclable wastes (e.g. plastic) on the plantation have not been identified or quantified. As such, the company also does not currently have a formal recycling program plan. Furthermore, the enterprise also has no record of the type and amount of recyclable waste produced by its operations. Therefore, the indicator; *Type of recycling programs carried out by the plantation,* was given a yellow score.

Number of approved waste disposal sites used by the plantation: Further interviews with company management staff and plantation workers also indicated that the non-recyclable wastes generated by the enterprise's operations have not been identified or quantified. These interviews also indicated that the enterprise does not currently have a designated or approved site for waste disposal. Interviews with plantation workers indicated that some of the wastes are sometimes disposed of via controlled burning. However, interviews with both the management staff and plantation workers have indicated that the company also does not currently have a formal plan regarding the appropriate methods or location for waste disposal as the amount of waste generated is still relatively low. Furthermore, most of the waste generated are organic waste and as such, composting is mostly carried out as a method of waste disposal. Therefore, the indicator; *Number of approved waste disposal sites used by the plantation,* was given a yellow score.

Waste reduction target of the plantation: Interviews with company management staff and plantation workers indicated that the company also does not currently have a formal waste reduction plan as the amount of waste generated currently is relatively low with most of the waste being organic waste. Further interviews with company staff members also indicated that the company has not made any plans to reduce the amount of waste generated over time. However, these interviews did indicate that the company will gradually formulate waste reductions plans in the future as the plantation begins to expand. Therefore, the indicator; *Waste reduction target of the plantation,* was given a yellow score.

pH of the soil on the plantation: Interviews with plantation workers indicated that currently no sites on the plantation indicated stunted crop growth due to soil pH. Furthermore, field tests using a soil pH meter indicated that the soil pH of each growing site (approximately 4 growing sites) on the plantation were between 6.6 – 6.8. Interviews with the plantation workers indicated that these values were consistent with the volcanic soil type of the area. Therefore, the indicator; *pH of the soil on the plantation,* was given a green score.

Water conservation target of the plantation: Interviews with management staff members and plantation workers indicated that the company does not currently have a formal water reduction plan as well as water conservation target to reduce water consumption over time. Figure 19 indicates a water pump on the plantation site that is used to extract underground water (bore water). Only a single water pump is currently being used to extract underground water.

Figure 19: Water pump used to extract underground water (bore water) (photo credit: researcher)

Figure 20 indicates the water recycling activities carried out by the plantation.

Figure 20: Rainwater collection tanks used on the plantation (photo credit: researcher)

Approximately 5 rainwater collection tanks (see Figure 20) have been set up at various sites on the plantation.

As indicated in Figure 19 and Figure 20, both underground water (bore water) and rainwater are used for plantation activities respectively. Figure 21 indicates Abaca plants showing signs of stunted growth due to dehydration.

Figure 21: Stunted growth of some abaca plants on the plantation (photo credit: researcher)

As indicated in Figure 21, some of the Abaca plants on the plantation have begun to show signs of stunted growth due to lack of water. Interviews with plantation workers have indicated that the groundwater extracted (Figure 19) as well as the water recycling activities (Figure 20) currently implemented by the enterprise are insufficient in meeting the water requirements of the plantation particularly during the dry season. As such, many of the Abaca plants on the plantation have started showing signs of stunted growth as indicated in Figure 21 while some of the trees have even died due to a lack of water. Therefore, the indicator; *Water conservation target of the plantation,* was given a red score.

Water management training for farmers on the plantation: Interviews with management staff members and plantation workers indicated that the company does not currently have a formal training plan for employees regarding water management. However, further interviews with management staff members and plantation workers did indicate that informal, on-the-job training is provided regarding water management to all plantation workers. Figure 22 indicates the rainwater collection tank set up by the plantation.

Figure 22: Rainwater collection tank set up by the enterprise (photo credit: researcher)

Interviews with plantation workers also indicated that they are given informal training regarding water saving activities by the enterprise such as setting up rainwater collection tanks as indicated in Figure 22, in order to better manage water use on the plantation. However, some plantation workers have expressed that these activities are insufficient to manage the water scarcity issues on the plantation. Some plantation workers have also expressed that further training and other water saving activities are necessary to better manage water use by the plantation. Therefore, the indicator; *Water management training for farmers on the plantation,* was given a red score.

Annual Business Costs: Interviews with management staff members indicated that the company records all costs associated with the enterprise's operations including both direct and indirect costs. Figure 23 indicates a section of the annual financial report of the enterprise. Financial transactions within the report (see Figure 23) have been omitted for confidentiality.

PT VIOLA FIBRES INTERNATIONAL					
SELECTED INFORMATION TO ANNUAL FINANCIAL REPORTS					
AS OF 31 DECEMBER 2018					
CURRENCY : IDR					
No.	**Description**			**Balance**	**Reff**
		IDR	**IDR**	**IDR**	
1	CASH ON HAND & IN BANKS				
	Cash				
	Bank OCBC NISP (IDR acc)				
	Bank OCBC NISP (Multicurrency IDR)				
	Bank OCBC NISP (Multicurrency USD)				
	BNI (IDR)				
2	RECEIVABLES				
	Employee receivables				
	Director receivables				
	Advance				
	Advance - Solar Panel - Saleh Ibrahim				
	Down Payment Purchase				
3	INVENTORY				
	Fertilizer Inventory				
	Seed Inventory				
	Insectisida Inventory				
	Herbisida Inventory				
	Fungisida Inventory				
	Peanut Inventory				
	Chili Inventory				
4	PREPAID TAXES				
5	PREPAID EXPENSES				
	Prepayment				
	Prepaid Office Rental				
6	OTHER CURRENT ASSETS				
	Immature - Abaca Plantations				
	- Immature - Abaca - Bonggol				
	- Immature - Abaca - Labor cost				

Figure 23: Annual financial report of the enterprise (source: Plantation Management; PT Viola Fibre International)

As indicated in Figure 23, the enterprise also records other financial issues associated with its operations including assets, inventory and well as taxes paid. Furthermore, interviews with relevant company staff members (e.g. accounting department) indicated that all costs and financial issues associated with the enterprise's operations are recorded for each financial year. The reports are reviewed and discussed with upper management before being sent to the relevant government departments in Indonesia for tax and record keeping purposes. Therefore, the indicator; *Annual Business Costs,* was given a green score.

Price Determination of the Business Products: Interviews with relevant company staff members (e.g. sales and marketing department) indicated that the company periodically reviews the market price of its products on accredited websites to determine the break-even point. The company will then utilize both the market price and break-even price to determine the selling price of its products within both the local and international markets. The company will then finalize the product price after negotiating with the buyer of the product. A formal contract which includes the selling price will be kept by both parties (buyer and seller) for record keeping purposes. Therefore, the indicator; *Price Determination of the Business Products,* was given a green score.

Company Business Plan: Interviews with relevant company staff members (e.g. management department) indicated that the company does not currently have a formal business plan. The business strategy of the enterprise is currently evolving to suit the needs of both the local and international markets. As such, the management teams from both regions (Indonesia and UK) periodically arrange group discussions to determine the direction and strategy of the enterprise to ensure that revenue streams can be generated and maintained over time. Currently, reports are written by the management teams from both regions during the group discussions regarding the progress of the enterprise and necessary changes that needs to be made to the company's business strategy. The reports also contain actionable tasks that each team member needs to undertake to achieve the enterprise's vision. Therefore, the indicator; *Company Business Plan,* was given a yellow score.

Market stability analysis of the business products: Interviews with relevant company staff members (e.g. management department) indicated that the company maintains a formal contract with all buyers. The enterprise also regularly consults with existing buyers regarding the demands for its goods and products as well as the appropriate selling price of these products. All changes including the delivery time for the goods will be finalized in a formal contract with the respective buyers. The enterprise also regularly reviews the market demands of its products on accredited websites including the local and international selling prices of its goods and products. The company also has back up plans in place if the supply demands for any of its products decreases. This helps ensure that it can maintain a wide number of revenue streams over time. Therefore, the indicator; *Market stability analysis of the business products*, was given a green score.

Monthly income of workers on the plantation and **Total working time per week of plantation workers:** The company also provides all employees with a formal contract prior to the start of their employment. As explained in the work agreement contract (see Appendix 9), the contract lists the basic monthly payments of the employees as well as other payments including holiday pay, bonuses as well as overtime pay. The contracts are signed by the employees after the details of the contract are explained to them in the presence of a representative from the company and the Department of Manpower. Interviews with the plantation workers have indicated that the enterprise periodically transfers the payments earned by them directly into their bank accounts at the end of the month. The interviews also indicated that the enterprise has not withheld payments from the employees and that no disputes have been raised regarding payments by the plantation workers. Furthermore, interviews with the plantation workers have indicated that the working hours set by the enterprise do not interfere with their lifestyle as they have sufficient time for family and social activities. The break hours set by the enterprise is sufficient in comparison to the tasks or activities that are expected to be carried. As the working hours set by the enterprise does not include Sunday, it does not interfere with the worship time of the employees. Therefore, the indicators; *Monthly income of workers on the plantation* and *Total working time per week of plantation workers* were both given a green score.

Total working days per year of plantation workers (days) and **Type of employment benefits provided by the plantation to the workers:** Interviews with the plantation workers have also indicated that the time-off policy set by the enterprise provides them with sufficient time-off from work. The vacation days set by the enterprise is sufficient in comparison to the tasks or activities that are expected to be carried out by the employees for the enterprise. As the enterprise observes all the public holidays of the region, it does not interfere with the lifestyle of the employees and provides them with sufficient time to spend with family, friends and for recreational activities. Further interviews with the plantation workers have indicated that the employment benefits are appropriate and are enforced by the enterprise. Therefore, the indicators; *Total working days per year of plantation workers (days)*and *Type of employment benefits provided by the plantation to the workers* were both given a green score.

Compliance of the plantation with the regional labour laws: The company also provides all employees with a set of the company rules (see Appendix 18), after the working contracts have been signed by them. The company rules outline the rules that must be complied by employees of the enterprise. These additional rules include work tolerances and actions that can be taken by the enterprise in the event that the employee commits violations. Interviews with plantation workers indicated that the company rules are explained to all workers in the presence of a representative from the company and the Department of Manpower. The employment contracts provided to the plantation workers also outlines the regional rules and policies that must be complied by the employees of the enterprise. These rules and policies include wage and overtime payments, salary bonuses, working hours, health insurance, as well as sick and holiday leave. Therefore, the indicator; *Compliance of the plantation with the regional labour laws*, was given a green score.

Provision of work equipment by the plantation for the workers: Interviews with management staff members indicated that the company also keeps an equipment record of the type and amount of work equipment within its inventory. Figure 24 indicates the equipment record of the enterprise.

LAPORAN INVENTORY

TOOLS

JENIS BARANG	PART NUMBER	MASUK QTY	STOK GUDANG	KETERANGAN
kompresor		01	1	terpakai
travo las		01	1	terpakai
grenda		08		kosong
dongkrak 2 ton		01		terpakai
travo cas		01		terpakai
kawat las uk 2,6 mm		2 dus		kosong
kawat las rb uk 3,2 mm		1 dus		kosong
kawat stenlis		1 dus		kosong
kunci shok		01		dipakai
kunci ring pas uk 6		01		dipakai
pompa pet gemuk		01		dipakai

Figure 24: Equipment record of the enterprise (source: Plantation Management; PT Viola Fibre International)

As indicated in Figure 24, the company also records the number and type of equipment given to all employees. Interviews with the plantation workers have indicated that the management provides the necessary work equipment including safety equipment, free of cost prior to the start of their employment. The interviews also indicated that the equipment provided are adequate, safe to use and the company also reissues new equipment if the previous equipment has been damaged due to work related activities. Therefore, the indicator; *Provision of work equipment by the plantation for the workers*, was given a green score.

Regional employment opportunities provided by the plantation: As explained in the Meeting Record Contract (see Appendix 3), the enterprise will prioritize the locals for employment opportunities within the region. Interviews with plantation management staff have also indicated that locals are given priority for any employment opportunities within the enterprise's local operations. Therefore, the indicator; *Regional employment opportunities provided by the plantation*, was given a green score.

Access rights of the enterprise to the resources within the region: As explained within the Location Permit Contract (see Appendix 2), the rights of the enterprise to the natural resources within the designated location has been explicitly defined. This also includes the rights of the locals to the natural resources within the region including the enterprise's operating location. Interviews with the plantation workers (locals) also indicated that no restrictions have been placed on them by the enterprise regarding the utilization of natural resources within the region. Therefore, the indicator; *Access rights of the enterprise to the resources within the region*, was given a green score.

Engaging with the stakeholders connected with the plantation's operations and **Resolving potential conflicts with stakeholders**: Interviews with the plantation workers indicated that meetings with the plantation management are held daily (every morning) during which management and work-related issues can be discussed and resolved openly. If the issues cannot be resolved internally, a meeting will then be set up with the Department of Manpower to discuss and resolve any disputes together with the plantation management and affected plantation staff. Figure 25 indicates the gathering of the local community members including the plantation workers during the Harvest Festival which are held every 3 months before the crops are planted.

Figure 25: Plantation workers and local community members gathered at the plantation site for the Harvest Festival (photo credit: researcher) (note: photographs have been blurred to protect stakeholders' identities)

As indicated in Figure 25, plantation workers and local community members gather during the Harvest Festival to discuss disputes or grievances and to also resolve them as efficiently as possible for the mutual benefit of all parties involved. Therefore, the indicators; *Engaging with the stakeholders connected with the plantation's operations* and *Resolving potential conflicts with stakeholders* were given a green score.

Holistic audits by plantation management: Interviews with the plantation workers indicated that meetings with the plantation management are held daily (every morning) during which management and work-related issues can be discussed and resolved openly. If the issues cannot be resolved internally, a meeting will then be set up with the Department of Manpower to discuss and resolve any disputes together with the plantation management and affected plantation staff.

Figure 26 indicates the daily morning meetings attended by plantation workers prior to the start of their work activities.

Figure 26: Daily meetings attended by the plantation workers to discuss work-related issues and conflicts (photo credit: researcher) (note: photographs have been blurred to protect stakeholders' identities)

As indicated in Figure 26, daily morning meetings are attended by the plantation workers to discuss management and work-related issues. During this time, disputes and conflicts are raised and discussed openly with the plantation management in order to resolve the issue as efficiently as possible.

Interviews with the plantation management indicated that yearly financial audits are carried out internally by the enterprise. A copy of the financial reports are submitted yearly to the Income Tax Department of Indonesia for review and monitoring purposes. The enterprise regularly reviews its financial performance and discusses any discrepancies with the Income Tax Department in order to improve their financial performance over time and fulfil their tax obligations. Therefore, the indicator; *Holistic audits by plantation management*, was given a green score.

Transparency regarding company reports and policies: Interviews with the plantation management indicated that the operational reports (stakeholder reports) have not yet been prepared. The enterprise currently does not provided stakeholders with an account of its operational activities. However, the enterprise will prepare operational reports for their stakeholder in the future once the plantation's operational activities become more established and consistent. As the enterprise is still in the early stages of plantation establishment and crop development, accurate reports regarding its operational activities cannot currently be produced in a timely manner. Therefore, the indicator; *Transparency regarding company reports and policies*, was given a red score.

Awareness of workers regarding product quality standards: Interviews with plantation staff members and workers indicated that the company does not currently have a formal training plan for employees regarding product quality and quality control standards. However, further interviews with plantation staff members and workers did indicate that informal, on-the-job training is provided regarding product quality to all plantation workers. However, some employees have expressed that formal training would allow them to effectively carry out quality control measures required by the enterprise. Therefore, the indicator; *Awareness of workers regarding product quality standards*, was given a yellow score.

7.3.2 Removal/Modification of Sustainability Indicators

As indicated in Chapter Six, 33 sustainability indicators were selected by the stakeholders (see section 6.3). However, as indicated in Table 27 (see section 7.3), only 25 sustainability indicators are presented. This is because, during the pilot testing process, the stakeholders indicated that some of the indicators were not suitable and therefore should either be modified or removed entirely. Approximately 8 indicators were removed while 2 indicators were modified from the original set of 33 indicators that was previously identified.

The rationale for the modification or removal of the indicators are outlined below.

In terms of environmental indicators, the indicator; *Type of Integrated Pest Management (IPM) plan,* was changed to *Pest Management Plan* as the stakeholders felt that this modified form was much simpler and easier to understand. As such, the stakeholders could prepare reports on the type, quantity, timing and method of treatment applications used. The simplicity of this indicator also made it easier to record the type and number of chemicals used as well as prepare reports for different government departments regarding the pest management plan of the plantation. Therefore, this modified indicator was easier to understand as well as adopt and put into action.

The indicator; *Timing of treatment application by the plantation,* was combined into the indicator; *Pest Management Plan*. Therefore, within the *Pest Management Plan* indicator, the timing regarding different pesticide treatments were recorded. As such, the stakeholders felt that the previous indicator was redundant and should be removed. On this note, the indicator; *Infiltration rate of the soil on the plantation (mm/hr),* was also removed as the stakeholders felt that the structure of the land and the volcanic soil around the plantation allowed for good drainage. Furthermore, during the field observation and interview sessions, the issue of water stagnation or flooding was not brought up. Therefore, the stakeholders felt that this indicator was also unnecessary and should be removed.

The indicators; *pH of water bodies on the plantation, Nutrient content of water bodies on the plantation* and *Oxygen content of water bodies on the plantation,* were removed as there are no large bodies of water (rivers, lakes, ponds, etc) on or near the plantation. The water that is currently being used for plantation activities is either recycled rainwater or underground bore water. As such, the stakeholders felt that these three indicators were not applicable to this plantation and should be removed.

In terms of social indicators, the indicator; *Compliance of the plantation with the fair hiring regulations of the region;* was removed as the stakeholders felt that this indicator was similar to the indicator; *Compliance of the plantation with the regional labour laws*. The stakeholders felt that the fair hiring regulations of the region are covered under the regional labour laws. As such, this indicator; *Compliance of the plantation with the fair hiring regulations of the region*, was removed as the stakeholders felt that this indicator was redundant and over-complicated labour and hiring issues.

The indicator; *Number of regional employment opportunities provided by the plantation;* was changed to *Regional Employment Opportunities* as the stakeholders felt that the initial indicator was difficult to understand. The modified indicator was not only easier to understand but evidence for this indicator was also readily available. Reports regarding the number of workers hired by the plantation, the respective job roles of the workers, origin of the workers as well as the job status of the workers (permanent or temporary) were already prepared and recorded. As such, reports could also be prepared for different governments departments regarding the regional employment opportunities provided by the plantation. On this note, the indicator; *Percentage of regional workers employed by the plantation (%);* was removed as the stakeholders felt that this indicator was similar to the indicator; *Regional Employment Opportunities*. As such, the stakeholders felt that the indicator was redundant and should be also removed for simplicity.

Lastly, in terms of governance indicators, the indicator; *Effective participation of the stakeholders connected with the plantation operations;* was removed as the stakeholders felt that this indicator was similar to the indicator; *Engaging with the stakeholders connected with the plantation's operations*. The evidence collected for the initial indicator is very similar to the indicator; *Effective participation of the stakeholders connected with the plantation operations*. As such, the stakeholders felt that the indicator was redundant and should be removed for simplicity.

The economic indicators selected in Chapter Six were neither removed nor modified during the pilot testing process.

7.3.3 Challenges during the pilot testing stage

One of the biggest challenges during this process was organizing a suitable time with different stakeholders to carry out the pilot testing process. As different stakeholders had different levels of interest regarding the project as well as different schedules, scheduling a suitable time to test the sustainability indicators on the plantation with all the stakeholders present was rather challenging. As noted by Neef & Neubert (2011) 'time' is not only a precious commodity for scientists but for the stakeholders as well. As such, some stakeholders may not have the time to be involved in the research activities as they may be more concerned with meeting their basic needs compared to the stakeholders that are better off whom may have the time even for continuous involvement in the research (Cornwall & Jewkes 1995).

On this note, it must be noted that some stakeholders did lose interest in the project as indicated during the Delphi rounds. This was evident as the number of participants for each survey round did decrease over time (see Chapter Six). As such, only 3 stakeholder groups were present during the pilot testing process compared to the 26 stakeholder groups that were identified during the start of the project. The stakeholder groups present included: Plantation Workers, PT Viola Fibre International and Purico Group Ltd. Therefore, the stakeholder groups were mostly company staff members at different management levels. The plantation workers occupied the field/ground levels while PT Viola Fibre International and Purico Group Ltd occupied the intermediate and top management levels respectively. The extensive involvement of these three stakeholder groups in the research is unsurprising as collectively, these stakeholders are the client for the project. As noted by Rose, Spinks & Canhoto (2014), the client would be most interested in the outcome of the project as both the source of the problem and the desire to acquire an effective solution comes from the client facing the problem itself.

Furthermore, some stakeholder groups particularly the plantation workers did not seem initially interested in the effectiveness of the sustainability indicators. These stakeholders did not view sustainability as a critical issue and preferred to carry on with business as usual. Sustainability was still viewed as a foreign concept and not something to be concerned about particularly among this stakeholder group. Neef & Neubert (2011) indicated that the participation and interests of local stakeholders in the research project depends to a great extent on their own characteristics, their expectations from the project and their opportunity cost of time. As sustainability was still viewed as unessential among this stakeholder group, it made it difficult to engage with this group during the early stages of the pilot testing phase. This is consistent with the report by Glass *et al.* (2013) which indicated that during the early stages of testing a sustainability assessment toolkit, the participants (stakeholders) also demonstrated negative feelings towards the concept of sustainability often dismissing it as too difficult to apply in practice or so overly complicated that it has lost all meaning.

Even when discussions among the plantation workers could take place, the plantation workers were mostly concerned with social issues such as salary and employment for their friends and family members. Most of them were not interested in the other issues relating to the plantation such as environmental, economic and governance issues. However, stakeholder groups such as

PT Viola Fibre International and Purico Group Ltd were interested in other aspects of the plantation such as economic, governance and environmental issues in addition to the social issues. As noted by Lichtfouse *et al.* (2009), different stakeholders have different criteria to measure the sustainability of an agricultural system. As such, diverse social actors will often compete and interact to negotiate their priorities (criteria) between the environmental, economic and social aspect of the agricultural system (Pramudaya 2018). Furthermore, this challenge of engaging with the stakeholders has also been noted in the research by Schwilch *et al.* (2012) which indicated that the wishful thinking and unrealistic expectations of the researcher regarding stakeholder collaboration often poses a problem during the onset of stakeholder engagement.

Furthermore, it was also rather difficult to explain to the stakeholders that I was not an employee of the company and that the research was for academic purposes only. As such, the stakeholders particularly the plantation workers were initially hesitant in interacting with me and discussing their thoughts and opinions regarding the applicability and effectiveness of the indicators. This made it difficult to understand the effectiveness of the indicators in assessing the sustainability of the plantation system from the stakeholders' perspective during the onset of the testing stage. This is unsurprising as Neef & Neubert (2011) indicated that the local stakeholders tend to observe the behaviour of researchers, categorize their social position and use this classification in their interaction with the researcher. As such, the perception of the stakeholders will always have a strong bearing on the interaction between the researcher and the local stakeholders (Bruges & Smith 2008).

7.3.4 Solutions to the challenges encountered

One method to effectively engage with the local stakeholders particularly the plantation workers is by involving myself in the local monthly gatherings known as 'arisan'. 'Arisans' are held once a month, usually in a local restaurant or the home of one of the participating plantation workers. During this gathering, the plantation workers pool their salaries together and the sum is given to one of the participating plantation workers. Each month a different plantation worker is selected to receive the cash (sum of salaries). This form of microfinancing allows the recipient (plantation worker) to cover major personal costs such as purchasing a personal vehicle, home renovations, wedding/engagement expenses, as well as other living costs. These monthly gatherings are also treated as parties as food and drinks are served and the plantation workers also participate in karaoke. Therefore, the atmosphere during these gathering are more relaxed and less formal. I was fortunate enough to be able to participate in an 'arisan' which enable me to build further rapport with the plantation workers. As such, I was able to convince and encourage the plantation workers to collectively discuss about the indicators used and results collected during the pilot testing process.

Another method to effectively engage with the plantation workers is through the Harvest Festival. Before the planting season, a festival is held in which the local priest is called to conduct a prayer. This is done in hopes that the planting season will be successful, and a high yield will be acquired during the harvest season. After the prayer, food and drinks are served and everyone present will then join in the festivities. Therefore, similar to the 'arisans', the atmosphere during this festival is also more relaxed and less formal. I was also fortunate to be able to participate in the Harvest Festival and conduct the final group discussion with all the stakeholders involved during the pilot testing stage. Both these gatherings (Harvest Festival, Monthly Gathering) allowed me to interact with the participants in a less formal setting and also allowed the plantation workers to engage better with me in order to share their opinions regarding the sustainability indicators and the research as a whole. As stated previously, the type and intensity of the interaction between the researcher and the local stakeholders can be a decisive factor for the success of the engagement and the project as a whole (Neef & Neubert 2011).

7.3.5 Satisfaction of the stakeholders with the selected indicators

A major aim of the pilot testing stage was to understand the effectiveness of the selected sustainability indicators in assessing the sustainability of the Abaca plantation system from the perspective of the stakeholders. As indicated in the results section (see Section 7.3), approximately 8 indicators were removed while 2 indicators were modified from the original set of 33 indicators selected (see Chapter Six). The main reasons for the changes were because the stakeholders felt that the indicators were either redundant (i.e. not applicable to the current system) or difficult to understand and subsequently apply. As noted by Van Cauwenbergh *et al.* (2007), the use of redundant indicators can cause crucially important developments to escape attention or cause the information expressed by more relevant indicators to become difficult to understand. It must be noted that the value judgements of the stakeholders are crucial to the selection of effective sustainability indicators and subsequently, the development of an applicable sustainability assessment toolkit. This is because if the value judgements of the stakeholders are not adequately reflected within the toolkit, it may become irrelevant to the stakeholders as the knowledge that is produced from the toolkit may not be considered useful by them (de Olde *et al.* 2016).

Furthermore, it must also be noted that the effectiveness of the indicators and sustainability assessment toolkit as a whole also depends on its subsequent adoption by the end-users (stakeholders) (Binder *et al.* 2010). As such, the toolkit must be as simple as possible while addressing the complexity of the system (i.e. covering main dimensions of sustainability) (Binder *et al.* 2010). As such, the 25 indicators selected not only covered the main dimensions of sustainability but were also made as simple and as specific as possible and finally selected based on the collective feedback of the stakeholders present during the entire pilot testing process. When the stakeholders were questioned if they were satisfied with the overall indicators, many of them particularly the plantation workers expressed that the indicators were not only easy to understand but, the methods to test the indicators were simple to apply as well. Furthermore, other stakeholders particularly the plantation management (PT Viola Fibre International, Purico Group Ltd) indicated that they would like to use the indicators as a communication aid (guide) to discuss and incorporate future sustainability issues as well.

As such, most of the stakeholders could understand the relevancy and significance of the selected sustainability indicators. One of the main reasons for this understanding could be because of the context-specific nature of the indicators. As noted by de Olde *et al.* (2016), sustainability assessment toolkits need to reflect the various context and value judgements of the stakeholders. This is because such toolkits are more likely to provide outcomes that will likely fit into the context in which the stakeholders are operating and as such, can more likely stimulate them into taking action to improve the sustainability of the agricultural system (de Olde *et al.* 2016). As the indicators and methods used are context-specific based on the biophysical, socio-economic and unique edaphic of the abaca plantation system, it seems more likely that such indicators will likely be adopted and utilized by the stakeholders. The adoption and subsequent utilization of such indicators are essential to track the performance of agricultural systems and guide them towards a more sustainable outcome (The World Bank 1998; Freebairn & King 2003).

7.4 Chapter Conclusion

The main aim of this stage was to collaboratively pilot test the sustainability indicators with the stakeholders to understand the effectiveness of the indicators in assessing the sustainability of the Abaca plantation system. The stage also aimed to explain the challenges associated with a collaborative approach to pilot testing and provide solutions to those challenges.

During the pilot testing stage, it was understood that many of the stakeholders were still uninterested in sustainability and still felt that sustainability was someone else's responsibility. This was evident as only 3 stakeholder groups were present during the pilot testing process compared to the 26 stakeholder groups that were identified during the start of the project. Among the stakeholder groups present during the pilot testing process, it was particularly difficult to get the plantation workers interested in sustainability issues regarding plantation activities. The plantation workers did not view sustainability as a critical issue and therefore preferred to carry on with business as usual. Besides this, many of the stakeholders particularly the plantation workers were hesitant in interacting with me and discussing their thoughts and opinions regarding the applicability and effectiveness of the indicators.

As such, in order to overcome these issues, a less formal setting had to be used to 'break the ice' and improve interactions among different stakeholder groups. The monthly gatherings; 'arisans', and Harvest Festivals provided ideal situations to interact with different stakeholders particularly the plantation workers in a less formal setting. As the atmosphere in both settings were more relaxed, it allowed me to interact better with the participants and also allowed the plantation workers to engage with me more effectively to share their opinions and insight regarding the indicators and the research as a whole.

During the pilot testing process, 10 indicators were either modified or removed at the request of the stakeholders present during the pilot testing process. This process was carried out to ensure that the selected sustainability indicators were as simple and as context specific as possible in order to make it more applicable to the agricultural system. Through these challenges and methods of overcoming them, a list of 25 sustainability indicators covering the four dimensions of sustainability were selected and tested by the participants (stakeholders) to evaluate the overall sustainability of the Abaca plantation system. These indicators and their respective methods for testing were selected collaboratively by the stakeholders present for their simplicity, ease of understanding as well as applicability and relevance to the sustainability issues within the plantation system.

Chapter Eight

Reflections on the Action Research Process

8.1 Chapter Introduction

This thesis has presented and critically analysed both the implementation and outcomes of applying a bottom-up and participatory action research (PAR) approach towards sustainability assessments within plantation agricultural systems. As such, the previous chapters provided a clearer picture of the challenges and solutions regarding each stage of a PAR approach.

Chapter One highlighted the growing realization that in order to resolve the disagreements and confusions regarding the development and selection of sustainability indicators specific to plantation systems, more studies need to utilize approaches that are more participatory and bottom-up in order to engage with the full diversity of stakeholders associated with the plantation agricultural system. Chapter Two outlined the PAR methodology applied for this research with the methods used focussing on engaging with key stakeholders connected with this plantation system.

In Chapter Three, the results of the stakeholder identification and analysis process were presented. This process managed to identify a total of 26 stakeholder groups encompassing four broad sectors namely; government, business, local community and public. In Chapter Four, a list of 307 sustainability indicators for plantation systems covering the four major dimensions of sustainability were identified from the list of identified global literature. In Chapter Five, potential sustainability indicators for this plantation system were identified from the perspectives of the stakeholders. A total of 44 sustainability indicators encompassing the four major dimensions of sustainability were identified.

In Chapter Six, a structured and decision-oriented Delphi questionnaire was designed and used to select relevant indicators to assess the sustainability of this plantation system from the stakeholders' perspectives. Two Delphi rounds were carried out in which a preliminary list of 33 sustainability indicators were selected. The selected list of sustainability indicators encompassed the four major dimensions of sustainability. In Chapter Seven, the sustainability indicators selected by the stakeholders were then jointly pilot tested by me and the participants (stakeholders) on the Abaca plantation to assess the effectiveness of the selected indicators. The final list of 25 sustainability indicators selected by the stakeholders were not only simple and effective in assessing the sustainability of this system but, also encompassed the four major dimensions of sustainability.

Therefore, the contributions of these previous chapters matches the first three objectives of this research (see Chapter 1) and subsequently the first aim of this project which is to develop a suite of context-specific and stakeholder-centric sustainability indicators for plantation agricultural systems by applying a PAR approach. In this chapter, the reflections of the participants (stakeholders) on the lessons they have learnt as well as changes in their understanding of the problems investigated are presented to address the final objective of this research which is to collaboratively reflect on the findings and the entire research process together with the stakeholders. As a core aspect of PAR is about social change, the focus of this chapter is on understanding the reflections of the participants regarding the research in terms of:

i. The appropriateness of the research process
ii. The overall success of the research process
iii. The efficiency of the research process

The chapter also includes my reflection on the entire PAR process both as a researcher and facilitator of the research process to address the second aim of this project which is to draw lessons regarding the application of participatory approaches in plantation sustainability assessments. The insights gained from the reflection process can be used to improve other sustainability studies within plantation agricultural systems. This reflection chapter will also include the effects of the Covid-19 pandemic on this research project.

8.2 Effects of the Covid-19 Pandemic

A workshop was initially planned to be held in March 2020 in the Sutanraja Hotel Amurang in Indonesia. The strategic location of the hotel made it the ideal meeting spot for all stakeholders associated with this project to meet, discuss and reflect of the entire research process. However, with the onset of Covid-19, the workshop had to be cancelled as the government of Indonesia declared a state of emergency and banned all non-essential travel and large gatherings. The country was also placed under a national lockdown due to the rapid rise in the number of positive Covid-19 cases.

Given the urgency of the situation, I was also advised by many of the local stakeholders particularly the plantation management and government officials to leave the country or risk being stranded. As such, I had to board an emergency flight back to my home country (Malaysia) and wait until the situation improved. However, the situation did not improve with the Covid-19 outbreak turning into a global pandemic. As such, like the Indonesian government, the Malaysian government also declared a state of emergency and placed the country under a national lockdown throughout 2020.

However, throughout 2020, both the plantation management and I tried to organize online workshops with the other stakeholders via Microsoft Teams. However, many of the stakeholders declined the invite as the Covid-19 pandemic adversely impacted Indonesia's economy which in turn affected other aspects such as employment, job security and income. As many of the stakeholders were more concerned with meeting their basic needs and supporting their families, many of them did not have the time to spend on this research. Furthermore, some of the stakeholders especially the plantation workers do not have access to the internet given the remoteness of their location. Given these circumstances, an online workshop could not be set up despite numerous attempts.

As such, the information discussed and evaluated within this chapter are based on the notes that I recorded in a reflective journal throughout the research process.

8.3 Reflections on the PAR process

Evaluation is the test of the conceptualisation behind the theory-of-change of the methodology (Davies 1998). In practical terms, it is a means to understanding if the research process was useful in understanding and addressing the research questions. As such, the concept of ‘reflexivity’ was applied during this phase of the research. Reflexivity in its various guises occupies a central place in participatory action research (Koch & Harrington 1998). Although there are several definitions of reflexivity in literature, they all come down to the same critical reflection of the researcher’s own position and views and how this influences his/her interpretation of the research findings (Burr 1995).

This is important to ensure that the researcher can identify his/her feelings and pre-conceptions regarding the research and be able to put aside these feelings and pre-conditions (Ahern 1999). This is because a researcher’s position and background will affect what they choose to investigate, the angle of the investigation, methods judged most adequate for the research and even the findings considered most appropriate (Malterud 2001). As noted by Cutcliffe (2003), sharing experiences and insights fully makes researchers accountable to readers and therefore helps to make qualitative research findings more credible by accounting for the researcher’s values and biases.

The outcome of such reflexivity opens the possibility for the research product (reflective text) to incorporate a ‘many voiced’ account (i.e. participants’ voices) rather than a ‘lone voiced’ account (i.e. researcher’s voice only) as the latter is usually associated with narcissism and self-indulgence (Koch & Harrington 1998). As such, reflexivity is also important to the research to demonstrate the co-constitution in the making of the text (between participants and researcher) (Koch & Harrington 1998). According to Lincoln & Guba (1985), the use of a reflective journal can help the researcher capture his/her mind processes, thoughts and feelings about the research problem investigated. However, in this case the researcher must note changes in his/her thoughts and feelings during implementation of planned research activities (Lincoln & Guba 1985).

For this research, a reflective journal was utilized throughout the research project starting from project inception till completion. In this research, I played two key roles, one as facilitator of the PAR project and the second being a PhD researcher critically reflecting on the research project and the outcomes. In trying to distance myself from a research project in which I had a crucial role to play, I tried to look at the PAR approach as a technology/tool to make changes in addressing and understanding sustainability issues associated with the plantation agricultural system. It was believed that with the PAR approach, local stakeholders would collaborate, jointly learn together to understand, assess and monitor sustainability issues associated with the plantation agricultural system. In this chapter, I traced the steps used in the process of joint learning and then assessed whether the methods were appropriate for this investigation as well as what lessons can be learnt from this process.

The following subsections evaluate and discuss the reflections of this research based on the three previously mentioned themes:

i. Appropriateness
ii. Overall success (Effectiveness)
iii. Efficiency

8.3.1 Appropriateness

Appropriateness must be evaluated by comparing the research objectives with the research aim and asking if the research process was a good idea (Woodhill 1998). This section discusses the contributions of the research process in relation towards improving our understanding of sustainability assessments within plantation agricultural systems.

A fundamental part of a PAR process is the identification and analysis of the stakeholders' problems and actions to resolve them (Rose *et al.* 2014). On this note, this research process was in line with the core principles of the PAR methodology which is engaging and involving diverse and relevant stakeholder groups throughout the research process. As the research process was highly people/stakeholder centred, it allowed different stakeholder groups to express themselves and their needs in relation to the overall research purpose (Neufeldt & Janzen 2021). As such, the research context, themes and process started with and belonged to the participants and were based on their opinions, preferences and priorities (Abayneh *et al.* 2020).

On this note, the participants were also able to extend their understanding of the issues identified (i.e. sustainability issues) with the wider institutional context and reflecting on their own experiences as well. This process was facilitated by me with complimentary skills in participatory research. The research process ensured that the participants recognised the integration of issues within the wider scope of sustainability assessments for plantation agricultural systems. Furthermore, the participatory nature of this research ensured that all information generated throughout the research process were evaluated through feedback, collective discussions and testing. For example, the pilot testing stage enabled the participants to understand first-hand the benefits and limitations of the selected indicators thereby allowing them to remove any unnecessary indicators. As such, this research process provided the participants (stakeholders) with the means to measure progress and impact of the research. As this research process involved working with diverse stakeholder groups, it also allowed stakeholders at different levels to be engaged with. This included stakeholders at the village level to the government level. As such, the research process allowed different issues that covered the main sustainability dimensions to be raised by different participants.

Based on the points discussed above, the research process was appropriate for the investigation as it managed to secure the participation and engagement of different stakeholder groups to improve the overall understanding of sustainability within this plantation agricultural systems.

8.3.2 Effectiveness

From a project evaluation standpoint, effectiveness of the research is judged on the extent to which the stated objectives of the project were achieved in the production of planned outputs (Checkland 1989). This is usually the case when the research involves looking at the best technical means to deal with well-defined technical problems (Checkland 1989). However, research on sustainability particularly within plantation agricultural systems is more challenging as it involves more complicated issues. As such, an evaluation on the efficiency of the research process requires acknowledging that some of the planned outputs were limited due to the exploratory and participatory nature of the research approach.

Nevertheless, the outcomes from the research process resulted in the enhancement of different areas namely:

8.3.2.1 Social Capital

Social capital is an instantiated informal norm that promotes cooperation between individuals (Putnam 2001). It is closely related to human capital with many people drawing on the skills and knowledge of friends, community members and other stakeholders (Onyx & Bullen 2000). Research on sustainability particularly within plantation agricultural systems can be more challenging as it involves more complicated issues often relating to socio-political and cultural issues (Dale *et al.* 2013). Therefore, trust and relationships, i.e. social capital, become very important for research success. With the participatory nature of the research process, issues regarding sustainability within plantation agricultural systems could be identified, discussed and tested collaboratively. As a result, project activity resources were developed through:

i. Interaction and sharing of issues as the sociable and informal nature of the research process were appreciated as important aspects of the research process
ii. Building relationships between different stakeholder groups most notably between plantation workers and plantation management thereby enabling issues such as conflict resolution, training, salary and other working needs and requirements to be addressed clearly

It was felt that these achievements would not have been possible through a top-down sustainability assessment exercise, usually carried out by external consultants or firms.

8.3.2.2 Human Capital

Human capital often relates to the skills, experience or even knowledge possessed by an individual or population and is typically viewed in terms of the value to the organization (Dakhli & De Clercq 2004). As previously stated, the participatory nature of this research process allowed knowledge regarding the various sustainability issues within this plantation agricultural system to be understood. The gains from such understanding included but was not limited to:

i. Understanding the process of sustainability assessments.
ii. Understanding the applicability of different sustainability indicators.
iii. Understanding the overall performance of this plantation system and ways to improve it.

As such, the participatory nature of this research process helped stakeholders become aware of the various sustainability issues with their own plantation agricultural system (Mutimukuru

2010). It was felt that such awareness and understanding would not have been achieved from a sustainability assessment conducted by a hired firm.

Based on the points discussed above, the research process for this investigation was effective in terms of improving the understanding the different stakeholders collectively regarding sustainability assessments within plantation agricultural systems.

8.3.3 Efficiency

Efficiency is evaluated by asking if the research process was carried out in the best possible way (Woodhill 1998). This is a means of addressing if the resources were used efficiently to achieve the desired outputs (Woodhill 1998). In conventional research there is often a disconnect between academic research and practitioners on the ground. Academic research is therefore often criticised for their limited impacts in the real world (Herr & Anderson 2014).

Experience with this research indicates that participatory research can help bridge this gap. For example, the Delphi method helped to combine both the academic findings (systematic review) as well as the local knowledge gathered through focus groups and key informant interviews. This is essential as local knowledge itself was insufficient as some stakeholders including the plantation company and government departments responsible for sustainability assessments were unaware of what sustainability indicators could be suitable. As such, a bit of help from me (researcher) was useful in bridging this gap between local and academic knowledge (scientific knowledge). This matches with the participation literature where the limits to participatory approaches are acknowledged with calls for integrating both local and external scientific knowledge to make participatory approaches successful (Raza 2017).

As noted throughout this research and supported by Campbell & Salagrama (2000), the use of the participatory methods in this research process allowed me to access local and indigenous knowledge which were deemed invaluable to the overall success and progress of this research. For the local stakeholders, the methods used provided a more reliable and faster way to understand the wider perspective of the problems investigated and possible solutions. As such, on a functional level, it could be stated that the research process was efficient.

However, in a wider sense the question regarding efficiency requires a deeper reflection of the methodology:

i. In a practical sense, using more local key informants would have reduced delays during the initial phase of the project as trust, partnerships and relationships could have been developed faster.
ii. In terms of engagement, more training regarding stakeholder communication and engagement would have also been appropriate to help develop rapport with the participants faster.
iii. The exploratory nature of the research process meant taking a flexible view of the results and timeframe. This was at times rather difficult due to the need to prepare rigorous activity plans and reports as a matter of both research and bureaucratic routine. This in turn did result in some delays during the research process.

8.4 Lessons Learnt (Personal Reflection)

The main issue with regards to a PAR approach is in reconciling the knowledge generated which is primarily the experiential knowledge of the stakeholders, with the apparent expectations of a traditional academic thesis framework (Herr & Anderson 2014). The main goal of action research is to generate local knowledge that can be fed back into the research setting (Herr & Anderson 2014). However, an academic thesis requires public knowledge that is transferable (i.e. can be applied) to other settings and must be presented in such a way that readers can understand the potential for application in similar research (Herr & Anderson 2014).

The PAR process applied in this research has demonstrated that local knowledge regarding sustainability issues specific to plantation agricultural systems can not only be identified but also tested, applied and validated collaboratively with all the stakeholders involved. However, as noted throughout the research process, the success of each stage of this PAR process heavily depended on the stakeholders' interest in the project as well as my ability to interact and build enough rapport with the stakeholders involved. In order to do this, it is essential to build and maintain a good relationship with key/influential stakeholders for this research. In this case, the key stakeholders were the plantation management (PT Viola Fibre International and Purico

Group Ltd). My relationship with these key stakeholders allowed me to seek help from them in encouraging more stakeholders particularly government officials and plantation workers to be more involved in this research. It must be noted that without first having this relationship with these key stakeholders, gaining the support and interest of other stakeholders connected with this research would have been difficult and time consuming.

Besides this, the high level of influence of some stakeholders namely government officials (e.g. Heads of Department) and plantation management (e.g. plantation director) over the region, allowed them to engage with all stakeholders from different levels such as plantation workers, local community members, NGOs as well as other government officials from relevant departments. As these stakeholders were able to use their influence to engage with different stakeholder groups within the region, I was able to leverage their influence in order to develop better rapport with the other stakeholders as well. This helped in setting up interviews and meetings as well in acquiring relevant documents for this project such as the Indonesian Government Location Permit Contract and Meeting Record Contract. As the other stakeholders from the region were well acquainted and highly trusted these stakeholders (e.g. plantation director and Heads of Department), they were willing to participate and engage in the research project as well as provide the requested documents.

Besides this, the use of informal methods (e.g. field observations, festivals, gatherings) also worked better in terms of getting the stakeholders to engage collaboratively in the research. As noted in Chapter Six and Chapter Seven, formal methods of stakeholder engagement such as the use of Delphi questionnaires or formal meetings/interviews did not seem to work particularly well in gaining the interest and support of the local stakeholders to participate in the research. A possible reason for this could be because these methods placed the stakeholders in a more traditional/academic setting which may have frightened them or made the research seem less personalized and local, thereby discouraging them from participating. By using informal methods, I was able to interact and engage better with the local stakeholders as these methods placed the stakeholders in a more relaxed and 'fun' atmosphere in which they were more willing to discuss and explore issues relating to this research. As previously noted, the type and intensity of interaction between researchers' and local stakeholders can be a decisive factor for the success of a participatory research project (Neef & Neubert 2011).

However, it must also be noted that the success of this PAR process is also partly because the stakeholders for this research were already well acquainted with one another. As the social circles within the research area are well established, it not only made it easier to identify stakeholders for this research via the chosen methods (e.g. key informant interviews, snowballing), but it was also relatively easy for the stakeholders to collaboratively work with one another as they were already well acquainted. As such, it may have been difficult to utilize this approach and methods if the stakeholders were not part of a close community. Despite the challenges of this research, it must be noted that the knowledge generated by this research process could be validated and utilized by the participants thereby reinforcing the effectiveness of this methodology. Knowledge in this context does not only refers to the development of a context-specific and stakeholder consensus-based sustainability indicators, but also refers to the changes in the stakeholders' understanding regarding sustainability issues associated with the plantation system and subsequent willingness to contribute towards a more sustainable system.

As noted by Van Cauwenbergh *et al.*(2007), many sustainability indicators in agriculture have been developed, but very few are put to practice. This research shows that this 'adoption or uptake' problem can be overcome through PAR. For example, when the stakeholders of this research were questioned if they were satisfied with the overall indicators within the toolkit, many of them particularly the plantation workers expressed that the indicators were not only easy to understand but, the methods to test the indicators were simple to apply as well. Furthermore, other stakeholders particularly the plantation management indicated that they would like to use the toolkit as a communication aid (guide) to discuss and incorporate future sustainability issues as well.

Therefore, most of the stakeholders could understand the relevancy of the selected sustainability indicators and overall significance of the indicators. One of the main reasons for this understanding could be because of the context-specific nature of the indicators. As noted by de Olde *et al.* (2016), sustainability assessment toolkits need to reflect the various context and value judgements of the stakeholders. This is because such toolkits are more likely to provide outcomes that will likely fit into the context in which the stakeholders are operating and likely stimulate them into taking action to improve the sustainability of the agricultural system (de Olde *et al.* 2016). Another reason for this could be due to the transparent nature of the PAR process.

As supported by Kindon *et al.* (2007), the PAR process of this research helped the stakeholders and me (researcher) to work collaboratively to achieve a sustainable outcome. This is because the stakeholders could engage and learn together as well as address any sustainability issues that were of concern to them. As all information generated were provided to them equally and transparently, it allowed them to collaboratively select relevant indicators for the toolkit. It must be stressed that the transparent nature of the PAR process was essential in facilitating the participatory process of this research in order to produce the intended and desired outcomes. As the indicators and methods used are context-specific based on the biophysical, socio-economic and unique edaphic of the Abaca plantation system, it seems more likely that the toolkit will likely be adopted and utilized by the stakeholders.

This adoption and subsequent utilization of the toolkit must be highlighted. This is because most policies on sustainability assessments of plantation systems often utilize a top-down approach. As the top-down approach does not necessarily consider the input of local stakeholders as well as accurately reflect the sustainability issues specific to plantation agricultural systems, the indicators selected for this research would have likely been rejected by the local stakeholder had this research utilized a top-down approach. For example, the top-down approach would not have likely been able to identify the different sustainability issues specific to different government departments (e.g. Agriculture, Environment, Human Resources, etc). As different government different have different agendas (e.g. environmental protection, employment rights, crop yield, etc), without the bottom-up and participatory approach of this research, these issues might not have been identified. This would have made it difficult to produce specific yet diversified indicators as well as align the different agendas of different stakeholders (e.g. government departments) with a unified sustainable outcome.

Furthermore, Mitlin (2003) noted that lack of knowledge can put people at a disadvantage thereby increasing their vulnerability. Knowledge and power are closely linked and as this research process also focused on empowering the stakeholders, the participants were able to develop a level of competency, connection and confidence that would have not been possible without this methodology. As noted by Park (1999), participants of the PAR process typically develop three types of knowledge namely relational knowledge (the knowledge that they are not alone), representational knowledge (the knowledge required to resolve their issues) and reflective knowledge (knowledge gained from experience by engaging with the research process). The development of this shared knowledge must also be highlighted as it can be a potential driver in changing consumer perception regarding sustainable agricultural production. Therefore, the PAR process has the potential to empower consumers (local communities) to demand for the implementation of more specific and relevant sustainability measures in order to develop and maintain more sustainable plantation agricultural systems throughout the supply chain (i.e. from bottom to top level).

In general, the research process met the required quality criteria for assessing PAR as set by Pretty (1995). Furthermore, the research process continuously monitored and corrected expectations of the project while collaboratively developing realistic and actionable plans with the participants as well as ensuring that a diverse range of opinions and interests were incorporated and represented. However, it must be noted that the lack of follow-up and engagement of some of the participants was a shortcoming throughout this research process. Action research facilitation requires a combination of theoretical know-how and a continuous process of skill acquisition to develop greater competence. Although this would have greatly improved the outcomes of the research in terms of academic quality, due to the time limitations of this research, this was not entirely possible.

8.5 Chapter Conclusion

The main objective of this chapter was to evaluate the PAR research process in terms of its appropriateness, efficiency and effectiveness in addressing the research problem. Throughout the evaluation process, it was understood that despite the numerous challenges associated with this research process, the PAR approach could still bring about social change in terms of improving the understanding and knowledge of the participants regarding sustainability issues within plantation agricultural systems.

This research process enabled the participants to understand the diverse sustainability issues associated with the plantation agricultural system and integrate these issues with the wider context of sustainability. This ultimately resulted in the development of a context-specific and stakeholder consensus-based sustainability indicators for plantation agricultural systems. As such, with the evidence provided in this thesis it can be said that this research process (PAR) can contribute to the long-term discussion about sustainability assessments within plantation agricultural systems.

Chapter Nine
Conclusions

9.1 Chapter Introduction

Plantation systems continue to be amongst the fastest growing agricultural sub-sectors due to the increasing demand for plantation crops (e.g. palm oil, coffee, cocoa) worldwide (Gerber 2011). This has resulted in the rapid expansion of the plantation area particularly within tropical and sub-tropical countries in order to meet the increasing demands for these crops (Goldemberg *et al.* 2008). This in turn has raised numerous sustainability concerns from consumers due to the various environmental and social issues relating to this expansion (Fitzherbert *et al.* 2008; Wicke *et al* .2011; Hall *et al.* 2017). As such, plantation companies are beginning to recognise that the way they respond to these different sustainability issues can determine both their market competitiveness and overall survival (Sheth *et al.* 2011). In order for plantation businesses to track and monitor their sustainability performance, an appropriate sustainability assessment toolkit with relevant sustainability indicators is required.

This research project began based on a recognition that while a wide variety of sustainability assessment toolkits are available for agriculture in general, a limited number of these toolkits have actually been developed specifically for plantation agricultural systems. Therefore, the sustainability indicators used within these toolkits do not necessarily reflect the challenges specific to plantation agricultural systems. This research also recognized that a potential reason for this issue was due to the top-down approach regarding sustainability indicator selection as this approach often leads to a lack of consensus regarding the selection of a comprehensive and unambiguous set of sustainability indicators specific to plantation systems. Therefore, the aims of this research were to develop a suite of stakeholder consensus-based indicators for plantation agricultural systems, via a bottom up and Participatory Action Research (PAR) approach and draw lessons regarding the application of participatory approaches in plantation sustainability assessments.

The research sought to achieve these aims based on the application of a PAR in an Indonesian Abaca plantation. For this, the following research objectives were devised:

i. Identify and select relevant stakeholders connected with the plantation system in Indonesia.
ii. Identify possible sustainability indicators that can be used in assessing the sustainability of the Abaca plantation.
iii. Collaboratively select and pilot test the suitability of the indicators together with the stakeholders; and
iv. Collaboratively reflect on the findings and the entire research process together with the stakeholders.

This final chapter concludes this thesis by highlighting the key findings of this research and draw conclusions, before providing some final thoughts on the limitations of this study and future research.

9.2 Key Findings

As stated in the reflection chapter (Chapter Eight), despite the numerous setbacks and challenges associated with the PAR methodology, this approach was still successful in identifying the sustainability issues specific to plantation agricultural systems and subsequently developing a simple, effective, user-friendly and stakeholder consensus-based suite of sustainability indicators to assess this plantation system. As such, a list of 25 sustainability indicators covering the four dimensions of sustainability were selected and tested by the participants (stakeholders) to evaluate the overall sustainability of the Abaca plantation system. These indicators and their respective methods for testing were selected collaboratively by the stakeholders present for their simplicity, ease of understanding as well as applicability and relevance to the sustainability issues within this plantation system.

Furthermore, this PAR approach could also bring about social change in terms of improving the understanding and knowledge of the participants regarding sustainability issues within this plantation agricultural system. This is because the participatory nature of this research process ensured that all information generated throughout this process were evaluated through feedbacks such as collective discussions and testing. This provided the participants with the means to understand the progress and impact of the research. The gains from such understanding included knowledge regarding the process of sustainability assessments, applicability, efficiency and simplicity of the selected sustainability indicators well as an understanding of the overall sustainability performance of the plantation systems and ways to improve it. In short, this process helped to bridge the gap between local knowledge and academic knowledge to provide all stakeholders involved with a collective understanding regarding sustainability within this plantation agricultural system. Besides this, this PAR approach also helped to promote cooperation and strengthen relationships between different stakeholder groups. As this process emphasized on the sharing of sustainability issues connected with the Abaca plantation system, it allowed different stakeholders to interact with one another and draw on skills and knowledge from different stakeholders thereby helping to build stronger rapport with one another as well as widen their respective knowledge regarding sustainability within this plantation system.

However, in order to achieve these results, more informal methods of engaging stakeholders such as through gatherings and festivals must be used compared to formal methods in order to discuss about the findings more collaboratively. It is also essential to build and maintain a good relationship with key/influential stakeholders to help encourage other stakeholders to participate and collaborate in the research project. Furthermore, the character and personality of the researcher is highly crucial towards the success of this approach. The social skill of the researcher particularly in the level of rapport and trust built by the researcher with the stakeholders will ultimately determine the successfulness of this approach.

Nevertheless, as the sustainability indicators for this research were developed through the interactive and collaborative approach of this PAR methodology, these indicators are more likely to be adopted and utilized by the stakeholders. As such, both this PAR process and indicators developed have the potential to contribute to the improvement and long-term discussion about sustainability assessments within plantation agricultural systems.

9.3 Limitations of the Study

Despite the benefits of this approach, a key question has been raised regarding the limitations of this approach. This question is, 'how long will this social change last'. As noted throughout this research, continuous support and encouragement had to be given to the participants to encourage them to participate in the research process. As such, without someone (e.g. researcher, company management) to consistently encourage this change, there is a possibility that some of the participants may eventually revert to the concept of business as usual despite learning and experiencing from this research.

Besides this, although the PAR methodology could be applied to this research, it is still unclear whether this same approach can be applied towards sustainability assessments of other plantation systems in different regions. As previously mentioned, the success of this research was partly due to:

i. My relationship with key/influential stakeholders for this research
ii. The strong social circles within the research area
iii. The willingness and ability of the different participants (stakeholders) to work collaboratively with one another

As such, without these factors, whether or not this same approach can be applied to other plantation systems in different regions is questionable.

9.4 Suggestions for Further Studies

Future research that intends on utilizing a PAR approach for sustainability assessments of other plantation systems must utilize more bottom-up methods to successfully engage with diverse stakeholders and facilitate greater participation in the research process. As noted by Abayneh *et al.* (2020), the methods used in a PAR approach must be tailored to the region and community in which the research process is carried out. Furthermore, researchers that intend on utilizing this approach must also improve their social skills as well as flexibility and adaptability throughout the research process in order to build sufficient rapport with the participants and to also encourage long-lasting social change as well. For instance, using more informal ways of interacting and communicating with the participants can encourage greater participation as well as build stronger rapport.

It must also be noted that no previous studies have used a PAR approach to develop sustainability indicators for a plantation agricultural system. As such, future research regarding sustainability studies for different plantation systems can learn from the issues and challenges highlighted in this research as well as adopt the methods used and indicators identified for other sustainability assessment protocols. In this way, advocates of participatory action research can avoid making the same mistakes repeatedly thereby making the research process more efficient.

Therefore, the findings of this study can improve the understanding of sustainability issues specific to plantation agricultural systems and can also provide future researchers with essential insights in the development and implementation of more participatory and stakeholder centred initiatives regarding sustainability assessments within plantation agricultural systems.

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Appendix 1: Explanation guide provided during the stakeholder identification process

Dear Respondent,

The aim of this research is to develop a sustainability assessment protocol or toolkit for Abaca plantation agriculture. The research will apply a systems approach, drawing on sustainability science and socio-ecological systems theories, and employ bottom-up, participatory and multi-stakeholder processes in the development of the protocol. This methodology is expected to generate a sustainability assessment protocol, which is practical, user friendly and has greater legitimacy among the stakeholders concerned.

To facilitate our conversation, I have included below some pictures and diagrams relating to the Abaca production cycle and the sustainability dimensions of Abaca plantations.

Abaca

What is Abaca?

Figure 27: Abaca plants growing on a plantation

Abaca (*Musa textilis* Nee) is a plant that is native to both the Philippines and northern Indonesia. Abaca is a shade loving plant and grows vigorously under a canopy of trees. This plant also requires rainfall of even and almost continuous distribution, coupled with high relative humidity. It is the source of the biodegradable fibre known internationally as **Manila Hemp.**

What are the properties of Manila Hemp ?

Figure 28: The fibre (Manila Hemp) drying in the sun

The fibre; Manila Hemp, is naturally more **resistant to saltwater decomposition** compared to any other natural fibre. This biodegradable fibre also possesses **higher tensile strength** and **lower elongation** in both dry and wet states compared to synthetic fibres.

What are the uses of Manila Hemp ?

Figure 29: Tea bags made from Manila Hemp

Traditionally, Manila Hemp has been used as raw material for cordage. Today, it is considered as an excellent raw material in the processing of high quality paper such as **tea bags** and **currency notes**. Manila Hemp is also used in the upholstery production for luxury automobiles.

Abaca Production Cycle

Land Cultivation

When cultivating the land for Abaca production, total cultivation is not necessary as it can cause increased erosion and does not maintain a supply of organic materials as ground cover. As such, an almost zero tillage system (no-till system) is usually adopted when cultivating the land for Abaca production in order to keep soil disturbance to a minimum. In a no-till system, the soil is left intact and crop residue is left on the field. This means that the soil structure and the soil biota are conserved.

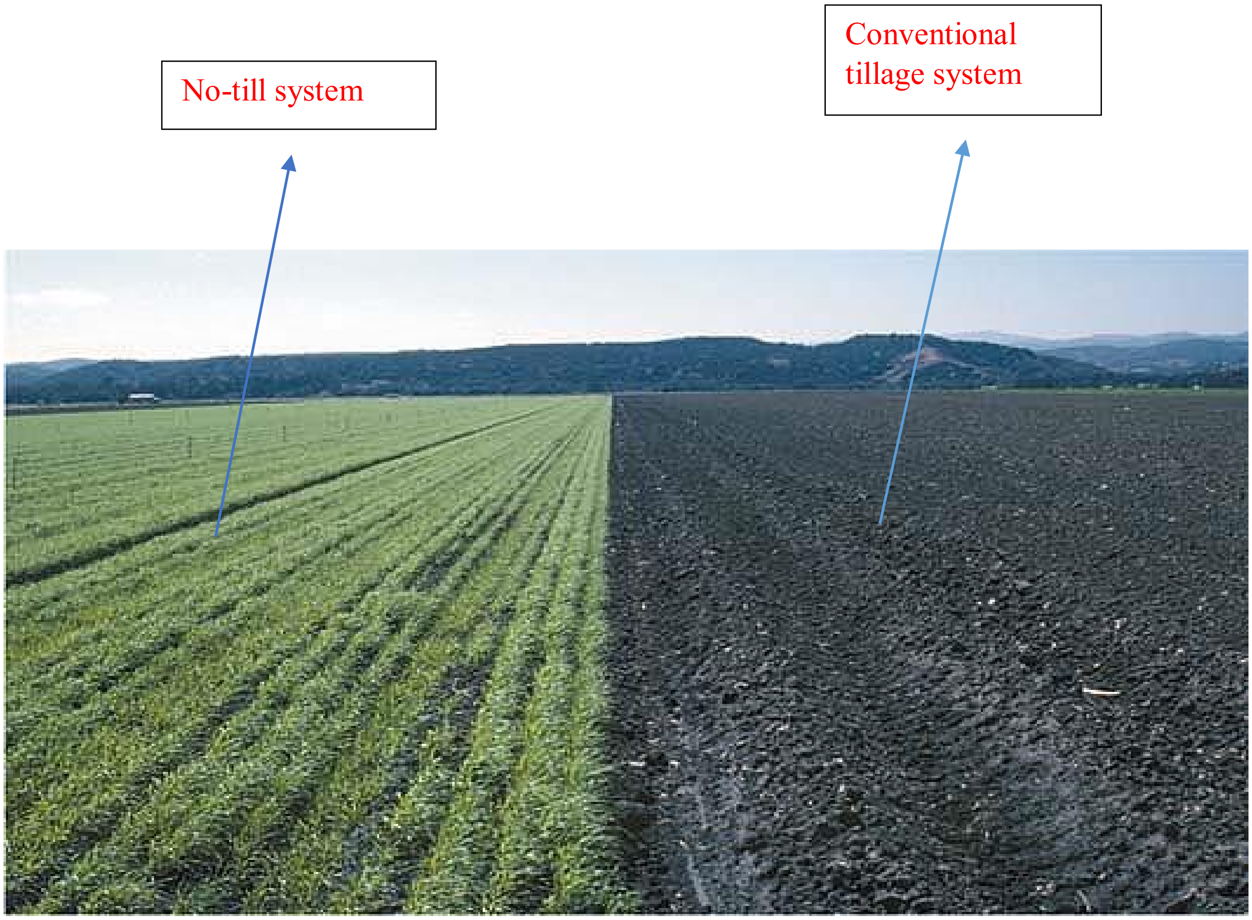

Figure 30: A comparison of a no-till and conventional tillage system side by side

Propagating the Abaca plant

Seeds

The cheapest way to propagate Abaca is by planting seeds from the ripe fruits. This method is rarely employed. The reason is because the seeds are of low viability and do not produce plants true to the parent plants.

The seeds are first planted in nursery gardens. Abaca seeds have a germination period of **12 to 30 days**. The plants remain in the nursery for about a year. The year old plants are then set out to the field to develop further and reach fibre-producing maturity. Seedlings plants take a year longer to reach fibre-producing maturity compared to plants propagated through vegetative reproduction. With seed planting, there is no assurance that any given number of plants will become good fibre producers.

Sucker-shoot

A more conventional way of propagating Abaca is through the sucker-shoot system. By utilizing young **sucker-shoots**, plantings that are true to the parent plants can be bred. The ‘suckers’ can be cut from the parent plant so that it includes a small portion of the rootstock without harming the parent plant. Although these plantings reach maturity faster compared to seedlings, it still takes time before the plants can be harvested as the planted units must still develop a root system.

Figure 31: The sucker-shoot system of the Abaca plant

Rootstock

Another common method of propagating Abaca is by using the rootstock from the parent plant. In this method, all or part of the rootstock of a vigorous and productive parent plant is dug up. The rootstock is then divided into sections, each of which contains one or more growing ‘eyes’ or a partially developed sucker-shoot.

More rootstock material can be provided for each new plant by this method than by any other. This method not only allows plantings that are true to the parent plants to be bred but these plantings are also able to mature more rapidly compared to those propagated in any other way. However, this method is more costly as an initial investment because it destroys all or part of producing plants.

Figure 32: The rootstock of the Abaca plant

Abaca Harvesting Process

Abaca is typically harvested three times a year after an initial growth period of **18 - 24 months**. The harvesting process is usually carried out between the **emergence of the flower bud and the ripening of the fruit**. This is because after the fruit has ripened, the stem of the plant will begin to deteriorate thereby causing the fibre to lose its quality. The harvesting process is as follows:

1. **Topping**

   During this stage, the leaf stalks of the Abaca plant are cut at the base of the petiole with a knife.

2. **Tumbling**

   During this stage, the stem of the plant is cut a few inches above the rootstock. The portion of the leaf sheath around the stem are also removed during this stage. This not only helps provide organic material for soil replenishment but also reduces the overall bulkiness and weight of the cut stems. Each mature stem contains from 10 to 20 useable leaf sheath from which high quality fibre may be obtained. The thicker the sheath, the more fibre it contains.

Figure 33: The tumbling stage of the Abaca harvesting process

3. **Tuxying**

   During this stage, 3 or 4 strips of fleshy material are removed from the central outer portion of each sheath. This portion contains the important structural fibres. This process is usually done by hand, on the ground using a large knife to start each section after which an expert flip of the hand loosens the long strip. Every strip is called a tuxy.

Figure 34: The tuxying stage of the Abaca harvesting process

4. **Stripping/cleaning**

   During this stage, the strips (tuxy) are cleaned to remove the pulp and produce the fibres. This stage must be carried out within **48 hours** after cutting the stem or the fibre quality will be reduced. The stage can be carried out manually or mechanically.

Figure 35: The stripping stage of the Abaca harvesting process

- **Manual:** In this method, a hard, wooden block is fastened to a log. A heavy knife blade is then suspended above the block. By using a foot-treadle, the blade is pulled down against the block with considerable pressure. A group of fibre strands is drawn by hand across the block under the blade, removing the pulpy material clinging to the strands.

Figure 36: The stripping stage of the Abaca harvesting process (Manual)

- **Machinery:** In this method**,** a motor driven wheel is placed behind a steel cleaning blade which can be held to a steel bar. By wrapping one end of a bunch of 'tuxy' around the wheel hub, mechanical power pulls-them across the bar under uniform pressure of the cleaning blade.

Figure 37: The stripping stage of the Abaca harvesting process (Machinery)

5. Drying

After the cleaning stage, the fibres are then hung on racks in the sun to bleach and dry them. This process can take from four hours to two days depending on the constancy and heat of the sun. Sun dried fibres have better lustre and appearance and also rank higher in terms of grading quality.

Figure 38: The drying stage of the Abaca harvesting process

After the drying stage, the fibres are piled in dry places that can be covered and have adequate ventilation. It is essential that the fibre storage areas are well ventilated as even after the drying process, the fibres still hold a certain percentage of moisture. Therefore, without ventilation, the fibres can change colour and lose quality. The stored fibres will then be packaged and transported to a point of sale.

Abaca Trading

In the Philippines, Abaca traders buy the Abaca fibres at the barangay. The Abaca fibres are then dried and re-bundled before being transported to the Grading and Baling Establishment (GBE).

Grading and Baling Establishment (GBE).

GBE personnel will then buy the Abaca fibres from the traders. The Abaca fibres will then be inspected, sorted and cleaned before being baled. The final classification, inspection and stamping of the fibre will be performed by a FIDA (Fibre Industry Development Authority) accredited classifier. The baled and graded fibre are then be store before being exported for sale.

Figure 39: The bundled Abaca fibres (Manila Hemp)

Sustainable Agriculture

Sustainable agriculture refers to the production of food, fibre or other plant and animal products using agricultural techniques that are economically viable, promotes environmental health as well as protects human and animal welfare. These techniques have site-specific applications that will, over the long term:

- Satisfy human food and fibre needs
- Enhance environmental quality and the natural resource base upon which the agricultural economy depends
- Make the most efficient use of non-renewable resources as well as on-farm resources and integrate, where appropriate, natural biological cycles and controls
- Sustain the economic viability of farm operations
- Enhance the quality of life for farmers and society as a whole

Accordingly, the sustainability of Abaca plantations may involve four dimensions: **Environmental**, **Economic**, **Social** and **Institutional (Governance)**.

This is shown in the picture below.

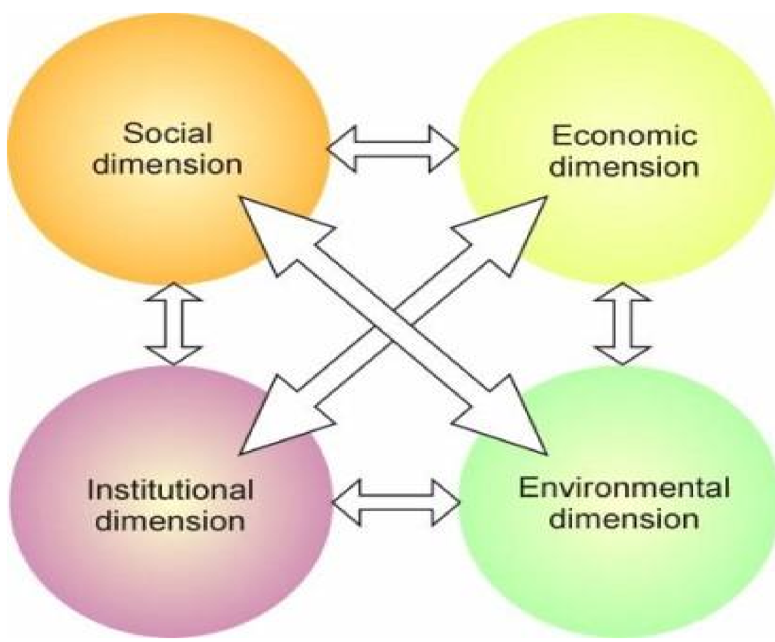

Figure 40: The four main dimensions of sustainability

Social Dimension

The social dimension of sustainable agriculture refers to the ability to ensure equity in the quality of life and human well-being conditions, regardless of class and gender. This dimension of sustainability is concerned with satisfying basic human needs as well as providing individuals with the **rights and freedom** to satisfy one's aspiration for a better life. This applies as long as the fulfillment of one's needs does not compromise the ability of others or future generations to do the same. Examples of themes of the social dimension include **decent livelihood**, **labour rights**, **human safety and health** and **fair-trading practices**.

Figure 41: A representation of the social dimension of sustainability

Economic Dimension

The economic dimension of sustainable agriculture refers to the efficient use of resources, the competitiveness and viability of the agricultural sector as well as its contributions to the viability of rural areas. This also includes the ability of the agricultural sector to generate durable growth, notably the ability to generate income and employment for the population livelihood. As such, this dimension of sustainability is concerned with the use of labour, natural resources and capital to produce goods and services to satisfy people's needs. Examples of some themes of the economic dimension include **product quality**, **production stability**, and **community investment (infrastructure development).**

Figure 42: A representation of the economic dimension of sustainability

Environmental Dimension

The environmental dimension of sustainable agriculture refers above all, to the management, protection and renewal of natural resources and heritage with the aim of ensuring that they are available for future generations. As such, this dimension of sustainability is concerned with maintaining life support systems essential for human survival by minimizing negative environmental impacts and cultivating positive impacts. Examples of some themes of the environmental dimension include **land**, **water**, **biodiversity** and **atmosphere**.

Figure 43: A representation of the environmental dimension of sustainability

Institutional Dimension

The institutional dimension of sustainable agriculture refers to the process of how decisions are made and implemented within the economic, social and environmental dimensions. Examples of some themes of the institutional dimension include **corporate ethics, accountability, rule of law** and **holistic management**.

Figure 44: A representation of the institutional dimension of sustainability

Appendix 2: Indonesian Government Location Permit Contract

BUPATI SOUTHEAST MINAHASA

SULAWESI UTARA PROVINCE

DECREE OF BUPATI SOUTHEAST MINAHASA

NO 39 YEAR 2018

CONCERNING

LOCATION LICENSE FOR BUSINESS TRANSFER OF ABACA BANANA FIBER CULTIVATION UNDER THE NAME OF PT. VIOLA FIBRES INTERNATIONAL LOCATED IN DESA SILIAN TIGA, SILIAN BARAT, SILIAN DUA, SILIAN TENGAH, SILIAN SATU, SILIAN UTARA, AND DESA SILIAN TIMUR

SILIAN RAYA SUB-DISTRICT

DISTRICT OF SOUTHEAST MINAHASA

SULAWESI UTARA PROVINCE

Considering:

a. that the applicant has obtained the permit from the Investment Coordinating Board of the Republic of Indonesia Number 1531/1 / IP / PMA / 2015 Dated June 18, 2015.

b. that the plan for cultivation of fibrous plant Abaca Banana of the applicant has been in accordance with Regional Regulation of Southeast Minahasa No. 3 of 2013 on District Spatial Plan of Southeast Minahasa Year 2013-2033.

c. that based on Land Technical Consideration of Southeast Minahasa Regency Number 03/2017 Date 15 November 2017.

d. that based on the considerations referred to in sections a, b and c above, it is necessary to set the Location Permit with the Decree of Bupati Southeast Minahasa.

Given:

1. Law Number 5 Year 1960 on Basic Regulation of Agrarian Principles (State Gazette of the Republic of Indonesia Number 2013);
2. Law Number 8 Year 2007 on the Establishment of Southeast Minahasa Regency in Sulawesi Utara Province (State Gazette of the Republic of Indonesia Year 2007 Number 11);

3. Law Number 18 Year 2004 concerning Plantations (State Gazette of the Republic of Indonesia of 2004 Number 85, Supplement to the State Gazette of the Republic of Indonesia Number 4411);
4. Law Number 25 Year 2007 regarding Investment (State Gazette of the Republic of Indonesia Year 2007 Number 67, Supplement to State Gazette of the Republic of Indonesia Number 4724);
5. Law Number 26 Year 2007 on Spatial Planning (State Gazette of the Republic of Indonesia 2007);
6. Law Number 32 Year 2009 on the Protection and Management of the Environment (State Gazette of the Republic of Indonesia Number 5059);
7. Law Number 12 Year 2011 regarding the Establishment of Laws and Regulations (State Gazette of the Republic of Indonesia Year 2011 Number 82, Supplement to State Gazette of the Republic of Indonesia Number 5234);
8. Law Number 18 Year 2012 regarding Food (State Gazette of the Republic of Indonesia of 2012 Number 227, Supplement to the State Gazette of Indonesia Number 5360);
9. Law Number 23 Year 2014 on Regional Government (State Gazette of the Republic of Indonesia Number 244, Supplement to the State Gazette of the Republic of Indonesia Number 5587), as amended several times and the latest by Law Number 9 Year 2015 on the Second Amendment to Law Number 23 Year 2014 on Regional Government (State Gazette of the Republic of Indonesia Year 2015 Number 58, Supplement to State Gazette of the Republic of Indonesia Number 5679);
10. Government Regulation Number 16 Year 2004 regarding the Stewardship of Land (State Gazette of the Republic of Indonesia Year 2004 Number 45, Supplement to State Gazette of the Republic of Indonesia Number 4385);
11. Government Regulation No. 13 of 2003 on Types and Tariffs of All Non-Tax State Revenues applicable to the National Land

Agency(State Gazette of the Republic of Indonesia Year 2010 Number 18, Supplement to the State Gazette of the Republic of Indonesia Number 5100);

12. Government Regulation No. 15/2010 concerning the Implementation of Spatial Planning (State Gazette of the Republic of Indonesia Number 21, Supplement to the State Gazette of the Republic of Indonesia Number 5103);
13. Government Regulation No. 27 of 2012 on Environmental Permits (State Gazette of the Republic of Indonesia of 2012 Number 48, Supplement to the State Gazette of the Republic of Indonesia Number 5285);
14. Regulation of the Minister of Agrarian Affairs and Spatial / Head of National Land Agency Number 5 Year 2015 on Location Permit
15. Regulation of Head of National Land Agency Number 2 Year 2011 concerning Guideline of Land Technical Consideration in Issuance of Location Permit, Location Determination and Permit of Land Use Change;
16. Regulation of the Minister of Agriculture No. 98 / Permentan / OT.140 / 9/2013 on Guidelines on Licensing of Plantation Enterprises.
17. Regulation of the Minister of Agriculture No. 39 / Permentan / OT.140 / 6/2010 concerning Guidelines on Licensing of Food Crops Business.
18. Southeast Minahasa District RegulationNumber 3 Year 2013on the Regional Spatial Plan of Southeast Minahasa District Year 2013-2033 (Regional Gazette of Southeast Minahasa Regency Year 2013 Number 71);
19. Southeast Minahasa District Regulation Number 11 Year 2014 regarding the Guidelines and Procedures for Licensing and Non-Licensing of Investment (Regional Gazette of Southeast Minahasa Regency Year 2014 Number 84);
20. Southeast Minahasa District Regulation Number 6 Year 2016

regarding Establishment and Composition of Regional Devices of Southeast Minahasa Regency (Regional Gazette of Southeast Minahasa Regency Year 2016 Number 98);

21. Southeast Minahasa District Regulation Number 11 Year 2016 regarding Amendment to Regional Regulation of Southeast Minahasa Regency Number 5 Year 2011 regarding Regional Tax(Regional Gazette of Southeast Minahasa Regency Year 2016 Number 103);
22. Southeast Minahasa District Regulation Number 12 Year 2016 Amendment to Regional Regulation of Southeast Minahasa Regency Number 6 Year 2011 on Public Service Levies (Regional Gazette of Southeast Minahasa Regency Year 2016 Number 104);
23. Southeast Minahasa District Regulation Number 13 Year 2016 Amendment to Regional Regulation of Southeast Minahasa Regency Number 7 Year 2011 regardingSpecific Licensing Levies (Regional Gazette of Southeast Minahasa Regency Year 2016 Number 105);
24. Southeast Minahasa District Regulation Number 14 Year 2016 Amendment to Regional Regulation of Southeast Minahasa Regency Number 8Year 2011 regardingSpecific Licensing Retribution (Regional Gazette of Southeast Minahasa Regency Year 2016 Number 106);

Regarding:

1. Regulation of the Minister of Home Affairs No. 24 of 2006 concerning Guidelines for the Implementation of One Stop Integrated Services;
2. Joint Regulation of the Minister of Home Affairs, Minister of Law and Human Rights, Minister of Trade, Minister of Manpower and Transmigration and Head of Investment Coordinating Board Number 69 Year 2009; Number M.HH-08.AH.01.01.2009; Number 60 / M.DAG / PER / 12/2009; Number 30 / MEN / XII / 2009; Number 10 of 2009 on the Acceleration of Licensing and

Non-Licensing Services to Start a Business;

3. Regulation of the Head of the Capital Investment Coordinating Board Number 11 Year 2009 concerning Procedures on the Implementation, Development and Reporting of One Stop Services in the Capital Services;
4. Regulation of the Head of the Investment Coordinating Board Number 14 Year 2009 concerning Electronic Information and Permit Service System (SPIPISE);
5. Regulation of Regent of South Southeast Minahasa Number 18 Year 2017 regarding Delegation of Authority of Signing and Issuance of Licensing and Non Licensing For and On behalf of Regent to Head of Department of Investment and Integrated Service One Door of Regency of Southeast Minahasa.

CONCLUDING

FIRST Providing Location Permit to PT. VIOLA FIBRES INTERNATIONAL which is located at Geding One Pacific Place Level 11, Jl. Jend. Sudirman, Kav 52-53, SCBD Kel. Senayan, Kec Kebayoran Baru, South Jakarta 12190 for land area± 6,913,134 M^2 (six million nine hundred thirteen thousand one hundred thirty-four) M^2located in Silian Tiga Village, Silian Barat, Silian Dua, Silian Tengah, SIlian Satu, Silian Utara, and Silian Timur Village SIlian Raya District of Southeast Minahasa Regency of Sulawesi Utara Province As stated in the attachment map of this decision letter.

SECOND All terms and conditions and stages of licensing must be complied with in accordance with applicable laws and regulations.

THIRD Rights and Obligations of License Holder:

1. Location Permit Holder is permitted to acquire / acquire land within the Location Permit area of the rights and interests of other parties on the basis of opportunity with the rights holder or with other parties having such interest by way of disposal of rights or sale, purchase of compensation, relocation / consolidation of land or by other ways in accordance with the applicable provisions.

2. After obtaining the Location Permit Letter, Location License Holder shall notify and conduct socialization at the requested location.
3. Before the land concerned is acquired by the Location Permit Holder, then all other parties' rights or interests in the land concerned are not reduced or their rights recognized, including the authorities which are legally owned by the holder of the land right to obtain the title of proof (certificate) , and the authority to use and utilize the land for personal or business purposes in accordance with the applicable spatial plan, as well as the authority to transfer to other parties.
4. Location Permit Holder is obligated to respect the interests of others on un-released land, not to close or reduce the accessibility of the community around the site, and to safeguard and protect the public interest.
5. Land acquisition shall be completed within 3 (three) years from the date of stipulation of this Decree and may be renewed for a period of 1 (one) year and the Location Permit Holder shall report periodically every 3 (three) months to the Head of Land Affairs Office of Southeast Minahasa Regency .
6. Location Permit Holder can only acquire land according to Map Permit Location.
7. Location Permit Holder obtaining land outside the location specified in the Location License, the acquisition of land rights can not be processed.
8. Location Permit Holder is obligated to use and utilize the land which has been acquired according to the designation.
9. The Location Permit Holder shall register the land already obtained in accordance with the designation.

FOURTH This Location Permit is not a grant of land rights and is granted to administer the subsequent licenses to the competent authority.

FIFTH If in the future there is a fixed / binding decision / decision on the use of other land located within the location permit area of PT. VIOLA FIBRES INTERNATIONAL then the decision to grant Location Permit will be reviewed.

SIXTH This decree shall come into force for 3 (three) years from the date of stipulation in the event that there shall be a mistake in its determination thereafter, shall be amended and corrected accordingly.

Set in the Ratahan

On January 30, 2018

Southeast Minahasa Regent

[SIGNED& STAMPED]

JAMES SUMENDAP

A copy of this decision shall be submitted to:

1. Minister of Agrarian Affairs and Spatial Planning / Head of National Land Agency in Jakarta;
2. Minister of Agriculture of the Republic of Indonesia in Jakarta;
3. Minister of Environment and Forestry of the Republic of Indonesia in Jakarta;
4. Governor of Sulawesi Utara;
5. Head of BAPPEDA of Sulawesi UtaraProvince;
6. Head of Plantation Office of Sulawesi UtaraProvince;
7. Head of Agriculture and Animal Husbandry of Sulawesi UtaraProvince;
8. Head of Regional Office of National Land Agency of Sulawesi UtaraProvince;
9. Head of Sulawesi UtaraProvincial Forestry Office;
10. Regional Secretary of Southeast Minahasa Regency;
11. Head of BAPPEDA of Southeast Minahasa Regency;
12. Head of Regional Finance Agency of Southeast Minahasa Regency;
13. Head of DPMPTSP of Southeast Minahasa Regency;
14. Head of Environmental Office of Southeast Minahasa Regency;
15. Head of Southeast Minahasa Regency Agricultural Office;
16. Head of Southeast Minahasa Regency PUPR Service;
17. Head of National Cooperative of UMKM Regency of Southeast Minahasa;
18. Head of Land Affairs Office of Southeast Minahasa Regency;
19. Camat of Silian Raya of Southeast Minahasa Regency;
20. Director of PT. VIOLA FIBERS INTERNATIONAL;

21. Archive.

Appendix 3: Indonesian Government Meeting Record Contract

MINUTES OF MEETING
REGIONAL SPACE COORDINATION AGENCY
SOUTHEAST MINAHASA
YEAR 2017
NUMBER 002/BA/BKPRD/MT/IX/2017

On this day, Tuesday, the nineteenth of September Year Two Thousand and Seventeen, held at the Meeting Room of the Regional Secretary of Southeast Minahasa Regency, a meeting of the Regional Spatial Coordinating Board of Southeast Minahasa Regency has been held together with the Parties of PT. Viola Fibres International in the framework of the Cultivation of Abaca Banana Fibrous Crop Plan in Silian Raya, with the requested area of 1600 hectares, attended by the Regional Apparatus and related Agencies (in accordance with the attendee's list) and listed in the annex which is an integral part of this Minutes.

Having noticed, heard and considered:

1. Speech of Regional Secretary of Southeast Minahasa Regency as Chairman of BKPRD of Southeast Minahasa Regency;
2. Submission of BAPEDA Head of Southeast Minahasa Regency related to the purpose and objectives of the Plan of the Cultivation of Abaca Banana Fibrous Crop by PT. Viola Fibres International;
3. Submission of the Parties PT. Viola Fibers International regarding the Plan of the Cultivation of Abaca Banana Fibrous Crop in Silian Raya in Southeast Minahasa Regency with an area plan of 1600 hectares;
4. Results of location review by members of BKPRD of Southeast Minahasa Regency at the above mentioned location on 13 September 2017;
5. The review and recommendation from each of the Regional Apparatus and related agencies as attached and an integral part of the minutes of this event;
6. Permit of Foreign Investment Principle Number 1531/1 / IP / PMA / 2015;
7. Recommendation from the Regent of Southeast Minahasa Number 327 / BMT / XII-2015 regarding Recommendation for the Cultivation of Fibrous Crop (Abaca Banana).

Herewith agree on the following matters:

1. Whereas based on Regional Regulation of Southeast Minahasa Regency Number 3 Year 2013 concerning Spatial Plan of Southeast Minahasa Regency Year 2013-2033, the Plan of the Cultivation of Abaca Banana Fibrous Crop Development can be conducted in Silian Raya of Southeast Minahasa Regency with an area of 1509 Hectares by observing and implementing all provisions current regulation.

2. In the implementation, the PT. Viola Fibres International is obliged to carry out studies and recommendations from the Regional Device and related agencies (attached) based on applicable laws and regulations.

   This report is made to be used properly.

Ratahan, September 19th 2017
REGIONAL SECRETARY
AS HEAD BKPRD

Ir. FARRY F LIWE MSc
Major Superintendent
NIP. 19580215 198907 1 001

REGIONAL SPACE COORDINATION AGENCY
SOUTHEAST MINAHASA
SUMMARY OF THE STUDIES AND RECOMMENDATIONS

NUMBER	INSTITUTION	STUDY	SIGNATURE
1	REGIONAL SECRETARY	1. In order to improve the investment climate in Southeast Minahasa , I as the Chairman of BKPRD of Southeast Minahasa basically approved the Abaca Banana Fibrous Crop cultivation development plan by PT. Viola Fibres International with regard to the following: a. Provisions of applicable legislation. b. Reviews and recommendations from regional apparatus and related agencies based on applicable laws and regulations. c. Company profile is completed d. Use of Local Labor should be prioritized. e. Coordination with the North Sulawesi Provincial Forestry Office for Forest boundary issues. 2. In terms of plans from PT. Viola Fibres International, the licensing process must be in accordance with the procedures and mechanisms based on applicable laws and regulations and each regional apparatus or related institution shall provide studies and recommendations in accordance with their field of duty.	
2	Assistant for Economic Affairs and Development SETDA Southeast Minahasa	1. as Vice Chairman of BKPRD of Southeast Minahasa in principle approved the plan for Abaca Banana Fibrous Crop cultivation development plan by PT. Viola Fibres International, with due regard to the following matters: a. reviews and recommendations from regional apparatus and related agencies based on applicable laws and regulations. b. Completed Company Profile must be included. c. Create a company activity report along with the positive and negative impacts of the activity. d. Pay attention to land status issues in these locations. e. Is there an MoU between the Company and the Government of Indonesia?	

		f. Environmental Setting Profile should be noticed. 2. The Company shall take into account the environmental impacts resulting from abaca banana cultivation plan and follow the procedures and mechanisms for environmental permit (AMDAL, UPL / UKL).	
3	Spatial Planning Coordination Board	Basically, we approve the plan of PT. Viola Fibres International by observing and implementing the following: a. The location must be in accordance with the RTRW law regulation of Southeast Minahasa regency. b. Coordination with UPTD Forestry Service of North Sulawesi Province in Southeast Minahasa regency regarding boundaries of Forest area.	
4	Department of Public Works and Spatial Planning of Southeast Minahasa Regency	We approve the development plan of abaca banana cultivation by PT. Viola Fibres International, located in Silian Raya, as long as the location is in accordance with its regulation based on RTRW Regulation of Southeast Minahasa .	
5	Research and Development Agency of Southeast Minahasa	1. The plan for cultivation of abaca banana crop must be in accordance with RTRW of Southeast Minahasa . 2. On the Regional Regulation of Southeast Minahasa no. 3 of 2013 on the Regional Spatial Plan of Southeast Minahasa 2013-2033 article 4, point b "The spatial planning policy of Southeast Minahasa consists of: construction and development of the region Agroindustry based on leading commodity; 3. Strategy of development and development of Agro-industry based on superior commodity area as referred to in Article 4 letter b, consist of: b. develop new Agro-industry efforts based on the results of studies that have potential and competitive opportunities at the regional and national levels. 4. Noting protected forest areas of Soputan Mountain.	

		5. The intended location is on Other Usage Areas (APL). 6. Abaca banana fiber cultivation plan in Silian Raya Sub can be continued because in accordance with RTRW Law of Southeast Minahasa. 7. The business activities are able to absorb local workforce and can improve the local economy.	
6	Environment Department of Southeast Minahasa	Basically, we approve the abaca banana cultivation activity plan as per the applicable legal procedures. In the event that the environmental permit of the Company is required to observe and implement the following: a. Make an Environmental Permit application along with the completeness of the file for the screening stage in order to prepare the environmental document / study. b. In the process of screening the Team from the Environment Department will study and determine what environmental assessments should be provided by the company through certified environmental experts / consultants. c. The Company prepares Experts / Environmental Consultants in the preparation of environmental documents / studies (AMDAL, UPL / UKL). d. Furthermore, the environmental documents will be discussed by a team from the Environment Agency who will issue environmental feasibility recommendations as the basis for the Regent in signing the Environmental Permit. e. Another thing to note in the handling of Environmental Permit is the suitability of the RTRW of Southeast Minahasa against the location plan.	
7	Agriculture Department of Southeast Minahasa	The Department of Agriculture in principle approved the plan of PT. Viola Fibres International with regard to the following: a. Provide training on abaca banana cultivation	

		procedures to local farmers. b. Facilitate the farmers in cultivating abaca bananas in SilianRaya .	
8	Investments and One Stop Integrated Service Department (PMPTSP), Southeast Minahasa	1. In order to improve the investment climate in southern minahasa , basically the PMPTSP service of Southeast Minahasa approved the plan to develop abaca banana cultivation by PT. Viola Fibres International with due regard to reviews and recommendations from regional apparatus and related agencies based on applicable laws and regulations. 2. To obtain location permits the company must have technical considerations of land and recommendations of BKPRD. 3. The Office shall facilitate licensing services in accordance with applicable regulations based on the authority delegated by the Regent of Southeast Minahasa to the Head of the PMPTSP Office.	
9	The Department of Manpower and Transmigration of Southeast Minahasa	Based on field review, we hereby recommend to PT. Viola Fibres International to develop Abaca Banana Cultivation by observing and implementing the provisions on: 1. Act. No.13 of 2013 on Manpower. 2. Act. No. 2 Year 2004 About Industrial Relations Settlement. 3. Act. No. 78 Year 2015 About Wages. 4. Report in writing every 6 months concerning the activities of the company and the workers.	
10	Department of Cooperatives and SMEs of Southeast Minahasa	Basically, the Office of SME Cooperative approved the plan of abaca banana cultivation by PT. Viola Fibres International with regard to the following: a. To plan the establishment of abaca fiber industry must pay attention to the suitability of RTRW	

		Southeast Minahasa . b. Abaca banana industry development plan should involve SME / SMEs for SilianRaya community	
11	Health Office of Southeast Minahasa	Health Department approved the plan of abaca banana cultivation by PT. Viola Fibres International with regard to the following: a. The Company is obliged to pay attention to hygiene and health in these activities. b. Pay attention to the safety of the workers.	
12	Land Office of Southeast Minahasa	Basically, we approve the plan of abaca banana cultivation by PT. Viola Fibres International with regard to the following: a. In the case of the handling of Location Permit based on Agrarian Regeneration No. 5 Year 2015 on Location Permit, then, for the plan of PT. Viola Fibres International in the development of Abaca Banana Cultivation must have a technical consideration of land as a condition in obtaining the Location Permit. b. Pay attention to the RTRW map of Southeast Minahasa and forestry map for the suitability of location so as not to contact with forest area. c. In accordance with the prevailing provisions, prior to the issuance of Location and Certificate of License, any investor is prohibited from engaging in activities on the land / land to be controlled.	
13	North Sulawesi Provincial Forestry Office	To obtain the location permit there must be a clear mapping of the coordinate point to see the boundaries with the forest area considering the location is adjacent to the forest area. The team will go directly to the field together with the Team from the National Land Agency of Southeast Minahasa conducting the survey as well as the installation of the area patter that will be controlled / as the company's location permit	

		request.	
14	Chief of Police Sector of Touluaan, Police Sector Southeast Minahasa	Basically, we approve the intent of PT. Viola Fibres International in the abaca banana cultivation development plan in Silian Raya regency with attention to security issues at the site. To reduce friction with the local community, the recruited workforce is a community originating from Silian Raya Regency.	
15	TombatuMilitary Command, Southeast Minahasa	We agree on the intent of PT. Viola Fibres International in the abaca banana cultivation development plan in Silian Raya regency with attention to security issues at the site. To reduce friction with the local community, the recruited workforce is the community of KecamatanSilian Raya.	
16	Legal Division of Regional Secretariat of Southeast Minahasa	We approve the plan of PT. Viola Fibres International to develop abaca banana cultivation in Regency of Silian Raya with attention to the following: a. Permit handling must comply with applicable laws and regulations. b. Location according to its designation based on RT/RW Regulation of Southeast Minahasa c. Handling of Location Permit must follow the stages of procedures and mechanisms based on applicable laws and regulations.	
17	Section of Government and Regional Secretariat of Southeast Minahasa	We approve the plan of PT. Viola Fibers International to develop the cultivation abaca in Silian Raya by taking into account the limits of Southeast Minahasa to not intersect with another , (Southeast Minahasa).	
18	Regency Head of Silian Raya	We approve the plan of PT. Viola Fibres International to develop abaca banana cultivation in Silian Raya with attentions to matter as follows: a. The company must coordinate with the Village	

		Government / Old Law in terms of security at the location considering the location is located in 7 villages in Silian Raya. b. Labor recruitment is prioritized for Silian Raya Regency community	

SOUTHEAST MINAHASA DISTRICT GOVERNMENT

DISTRICT SPATIAL PLANNING COORDINATION BOARD

SECRETARY OF REGIONAL DISTRICT SOUTHEAST MINAHASA	ASSISTANCE ECONOMY AND DEVELOPMENT OF SECRETARIAT AREA IN SOUTHEAST MINAHASA DISTRICT	HEAD OF DISTRICT SPATIAL PLANNING AGENCY SOUTHEAST MINAHASA DISTRICT
HEAD OF RESEARCH AND DEVELOPMENT AGENCY SOUTHEAST MINAHASA DISTRICT	HEAD OF GENERAL PUBLIC WORK AND SPACE RECOMMENDATION SOUTHEAST MINAHASA DISTRICT	HEAD OF DEPARTMENT OF THE ENVIRONMENT SOUTHEAST MINAHASA DISTRICT
HEAD OF DAMAGE OF INVESTMENT AND ONE STOP INTEGRATED CENTER SERVICE SOUTHEAST MINAHASA DISTRICT	HEAD OF AGRICULTURE DEPARTMENT SOUTHEAST MINAHASA DISTRICT	HEAD OF DEPARTMENT OF LABOR AND TRANSMIGRATION SOUTHEAST MINAHASA DISTRICT
HEAD OF DEPARTMENT OF COOPERATIVE SME SOUTHEAST MINAHASA DISTRICT	HEAD OF HEALTH DEPARTMENT SOUTHEAST MINAHASA DISTRICT	HEAD OF LAND OFFICE SOUTHEAST MINAHASA DISTRICT
HEAD OF UPD DEPARTMENT OF FORESTRY SOUTHEAST MINAHASA DISTRICT	POLICE HEAD OF TOULUAAN SECTOR POLICE SECTOR SOUTHEAST MINAHASA	COMANDO DISTRICT MILITARY TOMBATU

THE LEGAL HEAD OF LEGAL SECRETARIAT SOUTHEAST MINAHASA DISTRICT	SECTION OF GOVERNMENT AND REGIONAL SECRETARIAT SOUTHEAST MINAHASA DISTRICT	SUB-DISTRICT HEAD OF SILIAN RAYA

SPATIAL PLANNING OF DISTRICT SPATIAL PLANNING BOARD OF SOUTHEAST MINAHASA DISTRICT WORKING GROUP YEAR 2017

HEAD OF GOVERNMENT AND THE SECRETARIAT OF REGIONAL AUTONOMY SOUTHEAST MINAHASA DISTRICT	TOULUAN SECTOR POLICE SOUTH MINAHASA SECTOR POLICE	DISTRICT MILITARY COMAND TOMBATU
HEAD OF ECONOMIC, FIELD AND INFRASTRUCTURE REGIONAL PLANNING AGENCY SOUTHEAST MINAHASA DISTRICT	HEAD OF FIELD OF COMPLAINT DATA POLICY AND REPORTING INVESTMENTS AND ONE STOP INTEGRATED SERVICE DEPARTMENT (PMPTSP), SOUTHEAST MINAHASA DISTRICT	HEAD OF FIELD OF TRADE COOPERATION OF SMEs SOUTHEAST MINAHASA DISTRICT
HEAD OF DEPARTMENT OF AGRICULTURE PLANTATION SOUTHEAST MINAHASA DISTRICT	HEAD OF FIELD OF COMPLAINT DATA POLICY AND REPORTING INVESTMENTS AND ONE STOP INTEGRATED SERVICE DEPARTMENT (PMPTSP), SOUTHEAST MINAHASA DISTRICT	SECTION HEAD OF SPATIAL PLANNING SME COOPERATIVE DEPARTMENT SOUTHEAST MINAHASA DISTRICT
ELEMENTS OF PLANNING AGENCY SOUTHEAST MINAHASA DISTRICT	ELEMENTS OF HEALTH DEPARTMENT SOUTHEAST MINAHASA DISTRICT	ELEMENTS OF LEGAL SECTIONS SOUTHEAST MINAHASA DISTRICT
LAND OFFICE ELEMENTS SOUTHEAST MINAHASA DISTRICT	ELEMENTS OF RESEARCH AND DEVELOPMENT AGENCY SOUTHEAST MINAHASA DISTRICT	

SPACE UTILIZATION AND CONTROL WORK GROUP OF SPATIAL PLANNING COORDINATION BOARD OF SOUTHEAST MINAHASA YEAR 2017

HEAD OF LEGAL SECRETARIAT SECTION SOUTHEAST MINAHASA DISTRICT	HEAD OFFICE AGRICULTURE SOUTHEAST MINAHASA DISTRICT	TOULUAAN SECTOR POLICE SOUTH MINAHASA POLICE SECTOR
MILITARY DISTRICT THEAD OF TOMBATU	HEAD OF FIELD OF COMPLAINT DATA POLICY AND REPORTING INVESTMENTS AND ONE STOP INTEGRATED SERVICE DEPARTMENT (PMPTSP), SOUTHEAST MINAHASA DISTRICT	HEAD OF FIELD OF COPYRIGHT AND SPACE PLANNING DEPARTMENT OF PUBLIC WORKS AND SPATIAL PLANNING SOUTHEAST MINAHASA DISTRICT
HEAD OF FIELD OF EMPLOYMENT AND EMR EMPLOYEES AND TRANSMIGRATIONS DEPARTMENT SOUTHEAST MINAHASA DISTRICT	SPATIAL PLANNING SECTION CHIEF PUBLIC WORKS AND SPATIAL PLANNING SERVICE SOUTHEAST MINAHASA DISTRICT	ELEMENTS OF ENVIRONMENTAL DEVELOPMENT SOUTHEAST MINAHASA DISTRICT
ELEMENTS OF AGRICULTURE DEPARTMENT SOUTHEAST MINAHASA DISTRICT	ELEMENTS OF HEALTH DEPARTMENT SOUTHEAST MINAHASA DISTRICT	ELEMENTS OF GOVERNMENT AND OTDA SETDA SECTION SOUTHEAST MINAHASA DISTRICT
ELEMENTS OF RESEARCH AND DEVELOPMENT AGENCY SOUTHEAST MINAHASA DISTRICT	ELEMENTS OF SME COOPERATION SOUTHEAST MINAHASA DISTRICT	

Appendix 4: Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) flowchart

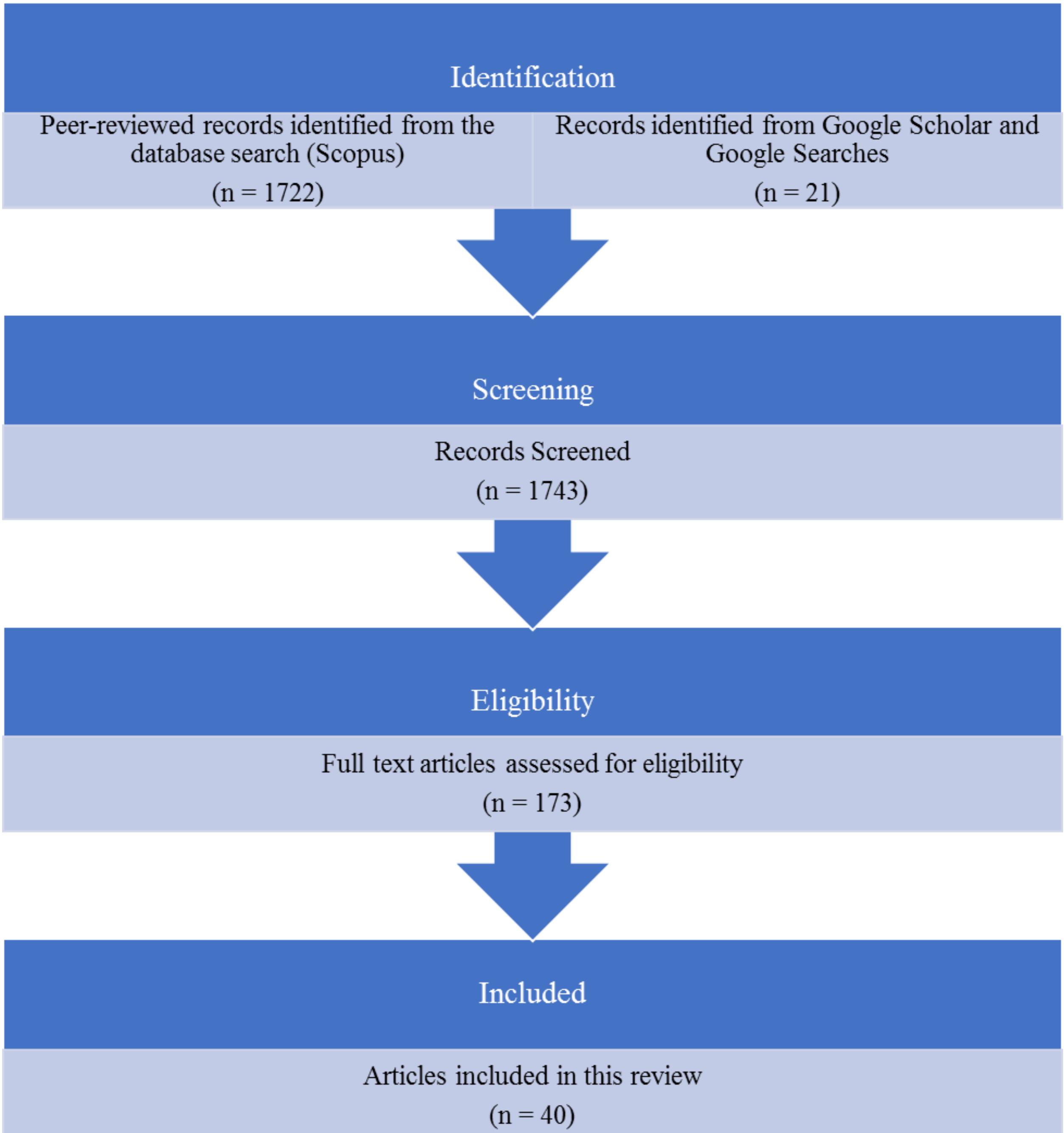

Figure 45: Preferred reporting items for systematic reviews and meta-analysis flowchart (Liberati *et al.* 2009)

Appendix 5: Keyword combination used in database searches

Table 29: Keyword searches used in database searches

No	Search Term	Number of hits
1	Sustainab* AND Assessment AND Plantation	502
2	Sustainab* AND Evaluation AND Plantation	222
3	Sustainab* AND Indicators AND Plantation	237
4	Sustainab* AND Assessment AND Palm Oil	209
5	Sustainab* AND Evaluation AND Palm Oil	100
6	Sustainab* AND Indicators AND Palm Oil	76
7	Sustainab* AND Assessment AND Coffee	108
8	Sustainab* AND Evaluation AND Coffee	85
9	Sustainab* AND Indicators AND Coffee	71
10	Sustainab* AND Assessment AND Cocoa	38
11	Sustainab* AND Evaluation AND Cocoa	24
12	Sustainab* AND Indicators AND Cocoa	24
13	Sustainab* AND Assessment AND Sisal	9
14	Sustainab* AND Evaluation AND Sisal	15
15	Sustainab* AND Indicators AND Sisal	2

Appendix 6: Full list of the sustainability indicators for plantation agriculture identified in the systematic review

Table 30: Full list of sustainability indicators identified in the systematic review

Environmental Indicators
1. GHG Reduction Target
2. Air Pollution Reduction Target
3. GHG Emissions and Carbon Sequestration
4. GHG Mitigation Practices
5. Air Pollution Prevention Practices
6. Ammonia Emissions
7. Global Warming Potential
8. GHG Balance
9. Overall CO2 emissions from farming activities
10. Above and below carbon stocks
11. Percentage of area affected by residue burning
12. Potential of photochemical ozone creation
13. Water Conservation Target
14. Water Footprint
15. Water Management
16. Clean Water Target
17. Quality of Discharge Water
18. Ground and Surface water withdrawals
19. Groundwater Table
20. Ratio of potentially polluted rivers
21. Ratio of potentially polluted water abstraction sources
22. Ratio of potentially polluted water catchments
23. Visual Water Pollution
24. Percentage of area under irrigation by type of irrigation
25. Potential eutrophication
26. Potential acidification
27. Wastewater Discharge Control Practices
28. Riparian Buffer Strips
29. Effluent processing
30. Wastewater Quality
31. Concentration of Water Pollutants
32. Chlorophyll
33. Conductivity
34. Dissolved Oxygen
35. Freshwater ecotoxicity

36. Groundwater Ubiquity Score
37. Marine ecotoxicity
38. Nitrate
39. Phosphate
40. Thermotolerant coliforms
41. Turbidity
42. Water pH
43. Soil Improvement Practices
44. Integrated system
45. Organic matter management
46. Deep and Surface Drainage
47. Residue Management
48. Air Capacity
49. Available N
50. Available water holding capacity
51. Average P
52. Average K
53. Bray P
54. CN Ratio
55. Drainage Class
56. Exchangeable Na
57. Gross K Balance
58. Gross P Balance
59. Inorganic P
60. Macroporosity
61. Organic P
62. Particle Density
63. Penetration Resistance
64. Phosphate
65. Phosphorus Balance
66. Potentially mineralizable nitrogen
67. Soil Aggregate Stability
68. Soil Enzyme Activity
69. Soil Electrical Conductivity
70. Soil fertility quality index
71. Soil metabolic quotient
72. Soil phosphorus saturation
73. Soil water content
74. Sum bases
75. Soil Total Organic Carbon
76. Soil Total Porosity

77. Soil Total K
78. Litter Decomposition Rate
79. Soil Cover
80. Area potentially eroded due to farming practices
81. Cover Crops
82. Erosion in slopping fields
83. Maintenance of terrace
84. Soil resource protection
85. Windbreaks
86. Winter Cover
87. Farm machinery operation
88. Land Conservation and Rehabilitation Plan
89. Land Conservation and Rehabilitation Practices
90. Land Equity Ratio
91. Net Loss or Gain of Productive Land
92. Aggregated biodiversity
93. Agrobiodiversity
94. Average number of species found in habitat
95. Canopy Cover
96. Coarse Woody Debris
97. Crop Genetic Diversity
98. Ecosystem Connectivity
99. Enhance and conservation of genetic heritage
100. Habitat of natural predator system
101. Index Value
102. Invasive species into landscape
103. Locally Adapted Variety and Breeds
104. Percentage of total farm area that in non-cropped
105. Proximity to old woodland
106. Shrub cover
107. Species Conservation Practices
108. Species Conservation Target
109. Stand Age
110. Tree Density
111. Amount and distribution of organic matter present
112. Percentage of area covered by border trees
113. Ecological buffer zones
114. Ecosystem Enhancing Practices
115. Location of production areas
116. Occurrence of threatened species
117. Protection area to plantation area

118.	Number of pesticide applications per season
119.	Pesticide Risk
120.	Waste Disposal
121.	Waste Management
122.	Waste Reduction Practices
123.	Waste Reduction Target
124.	Energy Balance
125.	Energy Consumption
126.	Energy Dependence
127.	Energy Intensity
128.	Energy Return on Investment
129.	Energy Input
130.	Energy Use Efficiency
131.	Net Energy
132.	Ratio of renewable to non-renewable energy
133.	Renewable Energy Use Target
134.	Dependence on non-renewable energy sources
135.	Deferred Voluntary Re-Use
136.	Cumulative Energy Demand for Fossil Fuel
137.	Farm Autonomy
138.	Contribution to the environmental value of the area
139.	Size and location of plots
140.	Type of farming system
141.	Immediate internal destination
142.	Immediate Removal
143.	Total Removal
Economic Indicator	
1.	Contribution to regional agricultural production value (%)
2.	GDP Contribution
3.	Operating Costs
4.	Total Income
5.	Benefits to Costs
6.	Debt to Asset Ratio
7.	Discounted Benefit Cost Rate
8.	Discounted Pay Back Time
9.	Long Term Profitability
10.	Return on Investment
11.	Return on Equity
12.	Value of Turnover
13.	Value of Sales
14.	Biological asset value divided by number of shares

15. Gross agricultural value
16. Holding size
17. No of ha of trees planted
18. Payback period of investments
19. Percentage of dead trees
20. Plantation area affected by disease
21. Plot number per farm
22. Stock to sales ratio
23. Total discounted costs
24. Total investment costs
25. Total value of produce per hectare
26. Regional product sales
27. Revenue from tourism
28. Tree Damage
29. Rate of product output per unit time
30. Yield Volatility
31. Total production
32. Productive process efficiency
33. Agricultural machinery
34. No of competitors in market for similar product
35. Conformance to quality specifications
36. Product Quality
37. Quality Performance
38. Dependence on leading supplier
39. Evenness of volumes harvested
40. Guarantee of production levels
41. Harvest volume-stand growth ratio
42. Number of actual and alternative buyers
43. Price Volatility
44. Procurement Channel
45. Product Diversification
46. Stability of market
47. Stability of supplier relationship
48. Yield Consistency Index
49. Security of supply
50. Economic specialization rate
51. Economic viability
52. Economic transferability
53. Financial autonomy
54. Business Plan
55. Public Subsidies

56. Repartition of revenue among the farm population
57. Sensitivity to subsidies and allowances
58. Total amount of subsidies
59. Delays
60. Origin of workers
Social Indicator
1. Deduction of wages due to disciplinary measures
2. Employment Relations
3. Family Labour Input
4. Hired Labour Input
5. Number of people in village without job
6. Payment Basis
7. Probable farm sustainability
8. Rate of full time employment
9. Return to own labour
10. Seasonal labour
11. Services/Multi-activities
12. Share of workers with enforceable contracts
13. Short Trade
14. Type of jobs
15. Compensation payments
16. Income and total value of benefits reported by workers
17. Number of employees
18. Unemployment rate in the region
19. Contribution to pension scheme
20. Collective Work
21. Additional income for smallholders
22. Quality of life
23. Prioritization of communities to business and employment opportunities
24. Access to adequate first aid equipment
25. Hygiene and Safety
26. Rights to maternity leave and to receive payments
27. Equal participation in training
28. Amount of money invested locally
29. Number of infrastructures provided locally
30. Type and value of community projects
31. Stakeholder satisfaction with community projects
32. Provision of wood products and livelihood improvements
33. Age of farmers
34. Characteristics of house
35. Family Size

36. Level of education
37. Number of community members having own plantation
38. Number of people migrating to communities near operations in search of work
39. Possession of household assets
40. Isolation
41. Pluriacticvity
42. Dependence on farm income (%)
43. Migration rate (%)
44. Ex-emigrants returned to engage in farming
45. Beyond retirement Age
46. Accessibility of space
47. Land Equivalent Ratio
48. Number of disagreements over land due to purchase by plantation operation
49. Number of people receiving compensation for land purchased by plantation
50. Free, Prior and Informed Consent
51. Labour Intensity
52. Number of conflicts
53. Number of grievances
54. Effective resolution and management of conflicts
55. Rate of agricultural products
56. Value of goods
57. Contribution to world food balance
58. Current food security status
59. Measures taken to increase food security
60. Possible threats to decreased food availability
61. Recreational and Cultural Elements Inside
62. Enhancement of building and landscape heritage
63. Certification
64. Displacement of people
65. Freedom of trade union organization
66. Farm membership of farmer association
67. Number of projects undertaken jointly by associations
68. Facilitation of local communities participation
69. Knowledge, respect, and fairness of plantation ownership
70. Perception of availability of water and its quality
71. Perception of changes in living and working conditions
72. Perception of communication and organization
73. Perception of impact of plantation operation
74. Perception of quality of plantation operation
75. Farmers sense of contribution to communication
76. Framers sense of attachment to land

77. Perception of local population
78. Farmers sense of self realization
79. Quality Awareness
80. Quality Implementation
81. Social Involvement
82. Producer Opinion and Participation
83. Accessible programs to teach rural populations about the importance of sustainable forest management
84. Risk for population if project is abandoned
85. Cultural events related to farming
86. Farm appreciation of SMOP specific cultural heritage
87. Farmers undertaking harvest as a family reunion
88. Appreciation of historical significance
89. Number of products from denominated origin
90. Index value
Governance Indicator
1. Legitimacy
2. Existence of national or local guidelines regarding sustainable residue extraction levels
3. Civic Responsibility
4. Conflict Resolution
5. Due Diligence
6. Grievance Procedures
7. Holistic Audits
8. Mission Driven
9. Mission Explicitness
10. Tenure Rights
11. Responsibility
12. Engagement Barriers
13. Stakeholder Identification
14. Economic incentives for env protection

Appendix 7: Semi-structured interview guide

Outcomes

1. What type of services are expected or provided by this plantation? Examples: Regulating services, Provisioning services, Cultural services

Regulating Services

1. What regulating services are expected or provided by this plantation? Examples: Carbon sequestration (Mitigate Global Warming), Climate Regulation

Provisioning Services

1. What provisioning services are required of this plantation? Examples: Quantity of Abaca fibre required, Quality of the Abaca fibre required, Quality and Quantity of intercrops required

2. What business plan does Purico have to ensure productivity? Examples: Guarantee of production levels, Stability of market, Risk Management, Long term profitability, Production Diversification

Supporting Services

1. What supporting services are expected or provided by this plantation? Examples: Nutrient cycling, Production of atmospheric oxygen, soil conservation

Cultural Services

1. What cultural services are expected or provided by this plantation? Examples: Recreation, Ecotourism, Spiritual enrichment
2. How will each of these services change in the future?
3. Are there issues of concern with any of these services?

Resource Units

Plantation Crops

1. What crops are currently available within this plantation? Examples: Abaca, Chilli

2. What crops will be available in the future?

3. Are there any issues with the crops within the plantation in terms of its long-term viability in producing the expected outcomes? Examples: Monoculture, Diversity

Production Management

1. What practices need to be in place to manage crop production? Examples: Production cycle, Stability of production, Product quality, Procurement channel, Input materials
2. Why do you think these practices are important for production management?
3. How do we ensure that the crops continue to be produced in a way that meets the expectations of the users from time to time? Examples: Evidence, Method to measure
4. Which organisations govern these practices?
5. What level of governance do these organisations have?
6. How do these organisations govern these practices? Examples: Monitoring, Enforcement, Fines
7. Are the any other issues regarding production management in terms of its long-term viability in producing the expected outcomes?

Soil

1. What type of soil is present within the plantation?
2. What is the current state of this soil type? Examples: Productivity, Fertility, Drainage, Quality
3. How will the state of the soils change in the future?
4. Are there any issues with the soil on this plantation in terms of its long-term viability in producing the expected outcomes?

Soil Management

1. What practices need to be in place to manage the soil? Examples: Improving application of organic fertilizer, Improving soil drainage, Intercropping, Cover crops, Diversion ditches

2. How do we ensure that the soil is managed in a way that meets the expectations of the users from time to time? Examples: Evidence, Method to measure
3. Why do you think these practices are important for soil management?

4. Which organisations govern these practices?

5. What level of governance do these organisations have?
6. How do these organisations govern these practices?
7. Are the any other issues regarding soil management in terms of its long-term viability in producing the expected outcomes?

Water

1. What water bodies are present within the plantation boundary?
2. What water bodies are present outside of the plantation boundary? Examples: Lakes, Rivers
3. What is the current state of these water bodies? Examples: Unpolluted, Polluted
4. What was the state of these water bodies?
5. Which water source is currently being used for plantation activities?
6. Which water source will be used in the future for plantation activities?
7. How will the plantation activities affect these water bodies in the future?
8. Are there any issues with the water bodies within the plantation in terms of its long-term viability in producing the expected outcomes? Examples: Pollution, Water Scarcity

Water Management

1. What practices need to be in place to manage water sources? Examples: Controlled application of organic fertilizer, Non-use of highly hazardous chemicals, Water harvesting, Minimization of irrigation water
2. Why do you think these practices are important for water management?
3. How do we ensure that the water is managed in a way that meets the expectations of the users from time to time? Examples: Evidence, Method to measure
4. Which organisations govern these practices?
5. What level of governance do these organisations have?
6. How do these organisations govern these practices? Examples: Monitoring, Enforcement, Fines
7. Are the any other issues regarding water management in terms of its long-term viability in producing the expected outcomes?

Agro-biodiversity

1. What type flora and fauna species are currently present within the plantation? Examples: Indigenous plant and animal species (Wild boar)
2. What type of flora and fauna species was present within the plantation?
3. How are the flora and fauna species on the plantation likely to change in the future?
4. Are there any issues with the agro-biodiversity within the plantation in terms of its long-term viability in producing the expected outcomes?

Biodiversity Management

1. What practices need to be in place to manage biodiversity? Examples: Creation and maintenance of habitat networks or wildlife habitat, ecologically based approaches in tillage, Use of locally adapted variety or breeds, Source material (Abaca) from different sources
2. How do we ensure that the biodiversity of the plantation and is managed in a way that meets the expectations of the users from time to time? Examples: Evidence, Method to measure
3. Why do you think these practices are important for maintaining biodiversity?
4. Which organisations govern these practices?
5. What level of governance do these organisations have?
6. How do these organisations govern these practices?
7. Are the any other issues regarding biodiversity management in terms of its long-term viability in producing the expected outcomes? Examples: Monitoring, Enforcement, Fines

Resource System (Abaca Plantation)

Sector

1. What sector does this plantation belong to?
2. What is the current state of this sector?
3. What was the state of this sector before?
4. Are there any issues of concern with this sector in terms of its long-term viability in producing the expected outcomes?

System boundary

1. What is the current boundary of this plantation? Examples: Clarity of boundary
2. What will the boundary of this plantation be in the future?
3. Are there any issues of concern with the boundary of this plantation in terms of its long-term viability in producing the expected outcomes? Examples: Encroachment, Conflict

Size of resource system

1. What is the current size of the plantation?
2. What was the size of the plantation?
3. What will the size of the plantation be in the future?
4. Are there any issues with the size of the plantation in terms of its long-term viability in producing the expected outcomes? Examples: Management issues, Labour force required

Human constructed facilities

1. What are the facilities currently available within this plantation? Examples: Office Buildings, Storehouses, Equipment Shed
2. What facilities were available within this plantation?
3. What facilities will be available within this plantation in the future?
4. Are there any issues with these facilities within the plantation in terms of its long-term viability in producing the expected outcomes? Examples: Construction phase (Environnemental Impact, Social Impact)

Location

1. Where is this plantation currently located? Examples: Province, District, Sub-district
2. Which village does the plantation encompass?
3. Are there issues with this location in terms of its long-term viability in producing the expected outcomes? Examples: Complaints, Harassment

Resource Users

Number of relevant users

1. Who are the current users of the plantation? Examples: Local Community, Corporate buyers, Purico
2. What do these users use the plantation for? Examples: Services or benefits gained (Employment, Food, Fibre)
3. How will the users of the plantation change in the future? Examples: Foreign labourers, New buyers of the abaca product
4. What will these users use the plantation for?
5. Are there any issues of concern with these users in terms of the long-term viability in producing the expected outcomes? Examples: Conflict within community

Socioeconomic attributes

1. What are the current socioeconomic attributes of the users? Examples: Occupation, Income, Education, Gender Gap (Job Opportunities)
2. How are these attributes likely to change in the future? Examples: Increase in income, Higher employment rates, Access to better education
3. Are there any issues of concern with these attributes in terms of the long-term viability in producing the expected outcomes? Examples: Crime rate, Violence

Importance of resource

1. What do the users currently value the plantation for? Examples: Source of livelihood, Source of food, Religious or spiritual reason
2. How will their values of the plantation change in the future? Examples: Source of additional income (entrepreneur)
3. Are there any issues of concern regarding the values or importance of the plantation in terms of the long-term viability in producing the expected outcomes?

Governance System

Organisations

1. What organisations govern this plantation? Examples: Ministry of Agriculture, Purico, Labour Division, Farming Division, Community Leader
2. What is the level of governance of these organisations? Examples: District, Province, National, International, Local
3. How do these organisations govern this plantation? Examples: Rules, Laws, Formal, Informal, Enforcement, Monitoring
4. Which plantation activities do these organisations govern? Examples: Environmental, Social (Employment), Fiscal commitments (Tax)
5. What is the current state of these governance framework?
6. What was the state of these governance framework?
7. Are there any issues of concern with these governance framework in terms of the long-term viability in producing the expected outcomes?

Action-Interactions

User Management

1. What practices are in place to manage the users? Examples: Workers, Government Offices, NGO, Business owners
2. Why do you think these practices are important for user management?
3. How do we ensure that the users are managed in a way that meets expectations? Examples: Evidence, Method to measure
4. Which organisations govern these practices?
5. What level of governance do these organisations have?
6. How do these organisations govern these practices? Examples: Monitoring, Enforcement, Fines
7. Are the any other issues regarding user management in terms of the long-term viability in producing the expected outcomes?

Learning

1. What practices need to be in place to monitor and improve the different dimensions of this plantation? Examples: Sustainability Dimension: Environmental, Social, Economic, Governance
2. Why do you think these practices are important learning processes in order to improve each sustainability dimension within the plantation from time to time?

3. How do we ensure that the monitoring and learning processes are managed in a way that meets expectations? Examples: Evidence, Method to measure
4. Which organisations govern these practices?
5. What level of governance do these organisations have?
6. How do these organisations govern these practices? Examples: Monitoring, Enforcement
7. Are the any other issues regarding user management?

Appendix 8: Explanation guide provided during the Delphi process

Sustainability Indicators and Methods

Here are some common **sustainability indicators** as well as **methods** that are often used to **asses** and **measure** sustainability in agriculture. These indicators and methods are often specific to particular sustainability issues and are divided into the four sustainability dimensions as explained previously.

Environmental Dimension

Sustainability Issue: Water Pollution

Indicator: **Water Pollution Prevention Practices**

Method: **Check for best practices to reduce water pollution**

Figure 46: Controlling fertilizer use (Method)

Sustainability Issue: Air Pollution (Greenhouse gas emissions)

Indicator: **Greenhouse gas mitigation practices**

Method: **Check for best practices to reduce GHG emissions**

Figure 47: Servicing farm machinery (tractors) regularly (Method)

Social Dimension

Sustainability Issue: Lack of equipment, tools or facilities

Indicator: **Safety of workplace and facilities**

Method: **On-site inspection of site to determine if enterprise maintains safe facilities**

Figure 48: Safety inspection of equipment and facilities (Method)

Sustainability Issue: Salary/Wages issues

Indicator: **Wage Level**

Method: **Review documents (salary slips) to determine if the enterprise is paying the appropriate living wage**

Figure 49: Document review to determine wage level paid by the enterprise (Method)

Economic Dimension

Sustainability Issue: Production stability issues

Indicator: **Guarantee of production levels**

Method: **Review business records to determine if the enterprise has mechanisms in place to prevent any production disruptions**

Figure 50: Reviewing the enterprises business plans (Method)

Sustainability Issue: Product quality issues

Indicator: **Quality Assurance (QA)**

Method: **Review the quality control report to determine if the required standards are addressed and followed**

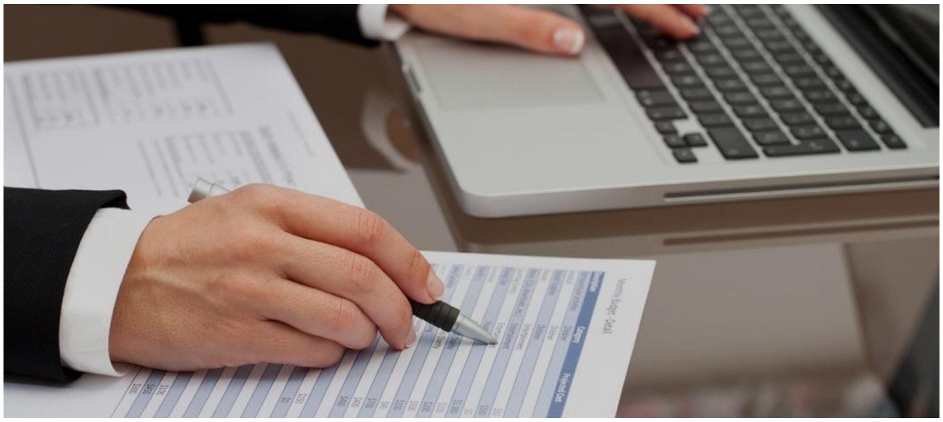

Figure 51: Reviewing the enterprises quality assurance report (Method)

Institutional Dimension

Sustainability Issue: Work related issues

Indicator: **Stakeholder Engagement**

Method: **Interview employees/workers/staff to determine if enterprise engages with employees**

Figure 52: Interviewing employees to determine level of stakeholder engagement (Method)

Sustainability Issue: Overall operational issues of the enterprise

Indicator: **Holistic Audits**

Method: **Review reports to governance body from external or internal auditors**

Figure 53: Reviewing documents (audit reports) regarding the enterprises operations (Method)

Appendix 9: Plantation Worker Contract

WORK AGREEMENT
NO: 0010/PKKTVFI-S/V/2018

On this day, (date), May, 2018, an agreement is made between:

I. The **Directors of PT VIOLA FIBRES INTERNATIONAL**, in this case is represented by Ir. M. Saleh Ibrahim, as General Manager, has its office at Jalan WisataSoputanKecamatanSilian Raya, KabupatenMinahasa Tenggara – Sulawesi Utara – Indonesia; hereinafter referred to in this Work Agreement to as **FIRST PARTY**.
II. ____, having his/her address in _____________, hereinafter referred to in this Working Agreement as **EMPLOYEE.**

Hereby explain that both parties have agreed to make a work agreement with the following conditions:

ARTICLE 1
STATEMENTS

- **EMPLOYEE** expressed willingness to work PT. Viola Fibres International and subject to the Corporate Management Party,
- **EMPLOYEE** declare to be submissive and obedient to the rules, regulations, and working system applicable to the company

ARTICLE 2
SCOPE OF WORK

- **EMPLOYEE** Working Area is governed by the Management Party
- **EMPLOYEE** is not permitted to do other work during working hours other than those stated in the first point above, except for approval / orders from the Management

ARTICLE 3
WORKING HOURS

The Company's normal working days are	: Monday – Saturday
Working hours at	: 07:00 – 16:00 WITA
Break hour	: 11:00 – 12:00 WITA or for 1 (one) hour with time adjusted to job demands.

ARTICLE 4
WAGE AND OVERTIME

- During this agreement, **EMPLOYEE** will receive income and other facilities from the Company in accordance with the position / occupation as follows:
- A fixed monthly salary of Rp. 2. 600,000 (two million six hundred thousand rupiahs) which includes food wages.
- **EMPLOYEE's** monthly salary will be reviewed from time to time in accordance with the employee's work performance and adjusted to the calculation of the cost of living in the region.
- Payment of wages will be paid every month no later than the 3rd (third) of the current month.
- THR (Holiday Day Allowance) of 1 (one) month salary will be given once a year before the Feast and will serve at least 1 (one) year.For permanent employee whose working period is less than 1 (one) year, THR payments will be calculated proportionally according to their working period.
- The **Company** is fully aware that employee is the most important company assets. One of the tangible manifestations of the Company's attention to its employee is to protect its employee by participating in the Health and Employment BPJS Program. Especially for BPJS Health, the **Company** will bear 4% of the basic wage and employee as much as 1%.
- **EMPLOYEE** is required to go to work overtime if there is a job to be completed or urgent.
- As a reward for overtime work, employee will get incentives according to company regulations.
- The provision of incentives will be combined with the payment of wages that will be received by the **EMPLOYEE**.

ARTICLE 5
SICK LEAVE AND LEAVE WORK PERMITS

A. SICK LEAVE

1. Employee who are unable to enter work for 1 (one) day, because illness must notify the Company by phone / mail.
2. Employee who cannot do work due to illness for more than 1 (one) day must submit a sick certificate from the doctor to the company.
3. The Physician Certificate mentioned in the preceding article must be submitted to the Company before the illness break begins.
4. If the employee does not heed the conditions as stated in the above points, then the employee is considered absent and this will affect the employee's conduct.
5. Employee who do not enter work within 4 (five) continuous working days without accompanying written information with valid evidence, the employee is declared to have resigned at his own request as stipulated in the Regulations and will be processed according to procedures

B. LEAVE WORK PERMIT

Employee is allowed to leave work with full salary in the following matters:

1.	Marriage of Employee	3 days
2.	Child birth of Employee	2 days

3.	Passing of Employee’s Husband/Wife/Child/Parent/In-Law	5 days
4.	Passing of Employee’s sibling	2 days
5.	Marriage of Employee’s child	2 days
6.	Marriage of Employee’s sibling	
7.	Circumcision/Baptism of Employee’s child	1 day
8.	Menstrual leave	2 days

ARTICLE 6
EMPLOYEE OBLIGATIONS

1. Employee must carry out their duties and obligations as well as possible and with full dedication, awareness and responsibility in accordance with the regulations that apply to the Company and in accordance with the instructions given
2. Working honestly, orderly, carefully and passionately for the benefit of the Company.
3. Use and maintain the Company's property as well as possible.
4. Dress neatly and politely; behave and behave politely, and respect-respect among fellow employee and to superiors and society.
5. Hold firm secrets from the company and not convey to other parties who are not entitled.

ARTICLE 7
PROHIBITIONS AND SANCTIONS

Employees are prohibited from doing things that are contrary to Law No. 13 of 2003 concerning EMPLOYMENT article 158, which can result in Termination of Employment. The matters referred to are that Employees are prohibited from:

a) commit fraud, theft or embezzlement of goods and / or money belonging to the company;
b) provide false or counterfeit information to the detriment of the enterprise;
c) drinking, intoxication, using and / or distributing narcotics, psychotropic, and other addictive substances in the work environment;
d) commit immoral acts or gambling in the work environment;
e) attack, persecute, threaten or intimidate co-workers or employers in the work environment;
f) persuade co-workers or employers to commit acts that are contrary to the laws and regulations;
g) carelessly or intentionally damaging or letting in the event of a hazard of a company's property which causes a loss to the enterprise;
h) carelessly or deliberately letting a co-worker or employer in a state of danger at work;
i) dismantle or divulge company secrets that should be kept secret except for the interest of the state; or
j) to conduct other actions within the company that are subject to imprisonment of 5 (five) years or more.

ARTICLE 8
WORK TERMINATION

Employers may terminate their employment relation to Employee pursuant to Law No. 13 of 2003 concerning Manpower, with the following stages:

a. Violation of ARTICLE 7 shall be granted:
- Warning Letter (SP) 1, in the form of Reprimand and Reduction of basic salary of 5%
- Warning Letter (SP) 2, in the form of Hard Strikes and Reduction of basic salary of 10%
- Warning Letter (SP) 3, as well as **Termination of Employment (PHK).**

Or can be **directly terminated (PHK)** without a warning letter according to the violation committed.

ARTICLE 9
THE PERIOD OF THE WORK AGREEMENT

- This working agreement is valid for an unspecified period,
- This Collective Labor Agreement may expire if there is an agreement between the two parties.
- This joint employment agreement may terminate if the Company that the Employee is no longer able to perform the assigned duties as limited by the age factor.
- The Work Agreement can be terminated by the First Party if the Employee commits violations as stated in Article 4 and Article 7.
- At any time this employment relationship may be terminated if the Employee violates the company's rules, regulations and working system.

ARTICLE 10
FORCE MAJEUR

This Work Agreement will be automatically canceled if there are circumstances or coercive situations, such as: natural disasters, rebellions, wars, riots, and Government Regulations or anything that results in this employment agreement being impossible.

ARTICLE 11
SETTLEMENT OF DISPUTES

- If there is a dispute between the two parties, it will be resolved by deliberation to reach consensus.

- If by taking the way the agreement is not reached, then both parties agree to settle the problem is done through legal procedure applicable in the Republic of Indonesia

Silian, February 9th 2018

PT. VIOLA FIBRE INTERNATIONAL

Approved and accepted by:

Ir. M. Saleh Ibrahim.
General Manager

Employee

Appendix 10: Field Observations (Photographs Used)

Figure 54: Plantation workers spraying herbicides on the crops (P1) (photo credit: researcher)

Figure 55: Cover crop (peanuts) planted next to the main crop (Abaca) (P2) (photo credit: researcher)

Figure 56: Rainwater collection wells set up by the plantation (Abaca) (P3) (photo credit: researcher)

Figure 57: Soiling tilling practices carried out by the plantation (P4) (photo credit: researcher)

Figure 58: Other crops (chilies) growing on the plantation (P5)(photo credit: researcher)

Appendix 11: Full list of sustainability indicators identified for this research

Table 31: Full list of sustainability indicators identified in this research

Environmental Indicators
1. GHG Reduction Target
2. Air Pollution Reduction Target
3. GHG Emissions and Carbon Sequestration
4. GHG Mitigation Practices
5. Air Pollution Prevention Practices
6. Ammonia Emissions
7. Global Warming Potential
8. GHG Balance
9. Overall CO2 emissions from farming activities
10. Above and below carbon stocks
11.Percentage of area affected by residue burning
12. Potential of photochemical ozone creation
13.Water Conservation Target
14.Water Footprint
15.Water Management
16.Clean Water Target
17. Quality of Discharge Water
18. Ground and Surface water withdrawals
19. Groundwater Table
20. Ratio of potentially polluted rivers
21. Ratio of potentially polluted water abstraction sources
22. Ratio of potentially polluted water catchments
23.Visual Water Pollution
24. Percentage of area under irrigation by type of irrigation
25. Potential eutrophication
26. Potential acidification
27. Wastewater Discharge Control Practices
28. Riparian Buffer Strips
29. Effluent processing
30. Wastewater Quality
31. Concentration of Water Pollutants
32. Chlorophyll
33. Conductivity

34. Dissolved Oxygen
35. Freshwater ecotoxicity
36. Groundwater Ubiquity Score
37. Marine ecotoxicity
38. Nitrate
39. Phosphate
40. Thermotolerant coliforms
41. Turbidity
42. Water pH
43. Soil Improvement Practices
44. Integrated system
45. Organic matter management
46. Deep and Surface Drainage
47. Residue Management
48. Air Capacity
49. Available N
50. Available water holding capacity
51. Average P
52. Average K
53. Bray P
54. CN Ratio
55. Drainage Class
56. Exchangeable Na
57. Gross K Balance
58. Gross P Balance
59. Inorganic P
60. Macroporosity
61. Organic P
62. Particle Density
63. Penetration Resistance
64. Phosphate
65. Phosphorus Balance
66. Potentially mineralizable nitrogen
67. Soil Aggregate Stability
68. Soil Enzyme Activity
69. Soil Electrical Conductivity
70. Soil fertility quality index
71. Soil metabolic quotient
72. Soil phosphorus saturation

73. Soil water content
74. Sum bases
75. Soil Total Organic Carbon
76. Soil Total Porosity
77. Soil Total K
78. Litter Decomposition Rate
79. Soil Cover
80. Area potentially eroded due to farming practices
81. Cover Crops
82. Erosion in slopping fields
83. Maintenance of terrace
84. Soil resource protection
85. Windbreaks
86. Winter Cover
87. Farm machinery operation
88. Land Conservation and Rehabilitation Plan
89. Land Conservation and Rehabilitation Practices
90. Land Equity Ratio
91. Net Loss or Gain of Productive Land
92. Aggregated biodiversity
93. Agrobiodiversity
94. Average number of species found in habitat
95. Canopy Cover
96. Coarse Woody Debris
97. Crop Genetic Diversity
98. Ecosystem Connectivity
99. Enhance and conservation of genetic heritage
100. Habitat of natural predator system
101. Index Value
102. Invasive species into landscape
103. Locally Adapted Variety and Breeds
104. Percentage of total farm area that in non-cropped
105. Proximity to old woodland
106. Shrub cover
107. Species Conservation Practices
108. Species Conservation Target
109. Stand Age
110. Tree Density
111. Amount and distribution of organic matter present

112. Percentage of area covered by border trees
113. Ecological buffer zones
114. Ecosystem Enhancing Practices
115. Location of production areas
116. Occurrence of threatened species
117. Protection area to plantation area
118. Number of pesticide applications per season
119. Pesticide Risk
120. Waste Disposal
121. Waste Management
122. Waste Reduction Practices
123. Waste Reduction Target
124. Energy Balance
125. Energy Consumption
126. Energy Dependence
127. Energy Intensity
128. Energy Return on Investment
129. Energy Input
130. Energy Use Efficiency
131. Net Energy
132. Ratio of renewable to non-renewable energy
133. Renewable Energy Use Target
134. Dependence on non-renewable energy sources
135. Deferred Voluntary Re-Use
136. Cumulative Energy Demand for Fossil Fuel
137. Farm Autonomy
138. Contribution to the environmental value of the area
139. Size and location of plots
140. Type of farming system
141. Immediate internal destination
142. Immediate Removal
143. Total Removal
144. Number of herbicide applications per year
145. Number of pesticide applications per year
146. Amount of fertilizer used per growing area
147. Amount of pesticide applied per growing area
148. Number of different cover crop varieties
149. Type of fertilizer used per growing area
150. Timing of treatment applications

151. pecies conservation practices
152. Number of water conservation practices
153. Number of GHG mitigation practices
154. Type of waste management programs
155. Type of recycling programs carried out
156. Waste reduction target of the plantation
157. Type of tillage practices carried out
158. Diversity of crops
159. Percentage of pesticides used that are nationally registered
160. Presence of soil erosion
Economic Indicators
1. Contribution to regional agricultural production value (%)
2. GDP Contribution
3. Operating Costs
4. Total Income
5. Benefits to Costs
6. Debt to Asset Ratio
7. Discounted Benefit Cost Rate
8. Discounted Pay Back Time
9. Long Term Profitability
10. Return on Investment
11. Return on Equity
12. Value of Turnover
13. Value of Sales
14. Biological asset value divided by number of shares
15. Gross agricultural value
16. Holding size
17. No of ha of trees planted
18. Payback period of investments
19. Percentage of dead trees
20. Plantation area affected by disease
21. Plot number per farm
22. Stock to sales ratio
23. Total discounted costs
24. Total investment costs
25. Total value of produce per hectare
26. Regional product sales
27. Revenue from tourism
28. Tree Damage

29. Rate of product output per unit time
30. Yield Volatility
31. Total production
32. Productive process efficiency
33. Agricultural machinery
34. No of competitors in market for similar product
35. Conformance to quality specifications
36. Product Quality
37. Quality Performance
38. Dependence on leading supplier
39. Evenness of volumes harvested
40. Guarantee of production levels
41. Harvest volume-stand growth ratio
42. Number of actual and alternative buyers
43. Price Volatility
44. Procurement Channel
45. Product Diversification
46. Stability of market
47. Stability of supplier relationship
48. Yield Consistency Index
49. Security of supply
50. Economic specialization rate
51. Economic viability
52. Economic transferability
53. Financial autonomy
54. Business Plan
55. Public Subsidies
56. Repartition of revenue among the farm population
57. Sensitivity to subsidies and allowances
58. Total amount of subsidies
59. Delays
60. Origin of workers
61. Business tax reports
62. Annual yield of each business product
63. Business product diversification
64. No of procurement channels to source inputs
65. Market stability analysis
67. Price determination of the business products
68. Percentage of input from each supplier

Social Indicators
1. Deduction of wages due to disciplinary measures
2. Employment Relations
3. Family Labour Input
4. Hired Labour Input
5. Number of people in village without job
6. Payment Basis
7. Probable farm sustainability
8. Rate of full-time employment
9. Return to own labour
10. Seasonal labour
11. Services/Multi-activities
12. Share of workers with enforceable contracts
13. Short Trade
14. Type of jobs
15. Compensation payments
16. Income and total value of benefits reported by workers
17. Number of employees
18. Unemployment rate in the region
19. Contribution to pension scheme
20. Collective Work
21. Additional income for smallholders
22. Quality of life
23. Prioritization of communities to business and employment opportunities
24. Access to adequate first aid equipment
25. Hygiene and Safety
26. Rights to maternity leave and to receive payments
27. Equal participation in training
28. Amount of money invested locally
29. Number of infrastructures provided locally
30. Type and value of community projects
31. Stakeholder satisfaction with community projects
32. Provision of wood products and livelihood improvements
33. Age of farmers
34. Characteristics of house
35. Family Size
36. Level of education
37. Number of community members having own plantation
38. Number of people migrating to communities near operations in search of work

39. Possession of household assets
40. Isolation
41. Pluriacticvity
42. Dependence on farm income (%)
43. Migration rate (%)
44. Ex-emigrants returned to engage in farming
45. Beyond retirement Age
46. Accessibility of space
47. Land Equivalent Ratio
48. Number of disagreements over land due to purchase by plantation operation
49. Number of people receiving compensation for land purchased by plantation
50. Free, Prior and Informed Consent
51. Labour Intensity
52. Number of conflicts
53. Number of grievances
54. Effective resolution and management of conflicts
55. Rate of agricultural products
56. Value of goods
57. Contribution to world food balance
58. Current food security status
59. Measures taken to increase food security
60. Possible threats to decreased food availability
61. Recreational and Cultural Elements Inside
62. Enhancement of building and landscape heritage
63. Certification
64. Displacement of people
65. Freedom of trade union organization
66. Farm membership of farmer association
67. Number of projects undertaken jointly by associations
68. Facilitation of local communities' participation
69. Knowledge, respect, and fairness of plantation ownership
70. Perception of availability of water and its quality
71. Perception of changes in living and working conditions
72. Perception of communication and organization
73. Perception of impact of plantation operation
74. Perception of quality of plantation operation
75. Farmers sense of contribution to communication
76. Framers sense of attachment to land
77. Perception of local population

78. Farmers sense of self realization
79. Quality Awareness
80. Quality Implementation
81. Social Involvement
82. Producer Opinion and Participation
83. Accessible programs to teach rural populations about the importance of sustainable forest management
84. Risk for population if project is abandoned
85. Cultural events related to farming
86. Farm appreciation of SMOP specific cultural heritage
87. Farmers undertaking harvest as a family reunion
88. Appreciation of historical significance
89. Number of products from denominated origin
90. Index value
91. Monthly income of workers
92. Type of employment benefits provided
93. Fair wages and allowances
94. Total working time per week
95. Total working days per year
96. Provision of employment contracts
97. Provision of a pension scheme
98. Provision of work equipment
99. Compliance with regional labour laws
100. Number of regional employment opportunities
101. Equal participation in training and skill development
102. Type of training and development courses organized
103. Compliance with regional fair hiring regulations
104. Number of investments made for community development
Governance Indicators
1. Legitimacy
2. Existence of national or local guidelines regarding sustainable residue extraction levels
3. Civic Responsibility
4. Conflict Resolution
5. Due Diligence
6. Grievance Procedures
7. Holistic Audits
8. Mission Driven
9. Mission Explicitness
10. Tenure Rights
11. Responsibility

12. Engagement Barriers
13. Stakeholder Identification
14. Economic incentives for env protection
15. Access rights of the plantation
16. Holistic audits
17. Conflict resolution
18. Grievance procedures for workers
19. Compliance with regional business laws
20. Quality control report

Appendix 12: Full list of sustainability indicators used in the Delphi questionnaires

Table 32: Full list of sustainability indicators used in the Delphi questionnaires

Environmental Indicators
1.GHG Reduction Target of the plantation
2. Number of GHG Mitigation Practices implemented by the plantation
3. Percentage of growing area affected by residue burning (%)
4. Percentage of growing area that is non-cropped (%)
5. Total area of natural vegetation converted for agricultural production (ha)
6. Quantity of fertilizer used per growing area (kg/ha)
7. Percentage of renewable energy use within plantation (%)
8. Number of pesticide applications per year
9. Amount of pesticide applied per growing area (kg/ha)
10. Number of pest resistant crops used by the plantation
11. Percentage of pesticides used that are nationally registered (%)
12. Use of pesticide rotation
13. Type of integrated pest management plans (IPM)
14. Type of recycling programs carried out by the plantation
15. Number of approved waste disposal sites used by the plantation
16. Type of waste management programs carried out by the plantation
17. Non-use of open air burning of waste
18. Waste reduction target of plantation
19. Amount of fertilizer used by type per growing area (kg/ha)
20. Number of different crop varieties on the plantation
21. Number of herbicide applications per year
22. Type of soil drainage system used by the plantations
23. Soil management training for farmers on the plantation
24. Yearly percentage of vegetative soil cover on the plantation (%)
25. Type of tillage practices carried out by the plantation
26. Timing of treatment applications by the plantation
27. pH of the soil on the plantation
28. Infiltration rate of the soil on the plantation (mm/hr)
29. Water logging of soils on the plantation
30. Depth of top soil on the plantation
31. Presence of soil erosion on the plantation
32. Presence of desertification on the plantation
33. Diversity of soil biota on the plantation

34. Number of water conservation practices carried out per year
35. Number of approved location for wastewater discharge
36. Water conservation target of the plantation
37. Water management training for farmers on the plantation
38. Quantity of water used for irrigation per year (m3/year)
39. Depth of water table on the plantation
40. pH of water bodies on the plantation
41. Turbidity of water bodies on the plantation
42. Nutrient content of water bodies on the plantation
43. Oxygen content of water bodies on the plantation
44. Diversity of protected species on the plantation
45. Species conservation target on the plantation
46. Species conservation practices carried out by the plantation
47. Presence of wildlife pathways on the plantation
48. Wildlife protection policy of the plantation
49. Percentage of locally adapted crops produced on the plantation (%)
50. Diversity of crops on the plantation
Economic Indicators
1. Debt to total asset ratio of the business
2. Internal rate of return of the business
3. Annual business revenue
4. Annual business cost
5. Net income of the business
6. Return on investment of the business
7. Price determination of the business products
8. Company business plan
9. Annual yield of each business product (tonnes)
10. Business product diversification
11. No of procurement channels of the business to source different inputs
12. Percentage of input from each supplier
13. Number of actual and alternative buyers of the business products
14. Market stability analysis of the business products
15. Evidence of business tax reports
Social Indicators
1. Monthly income of workers on the plantation
2. Total working time per week of plantation workers (hrs)
3. Total working days per year of plantation workers (days)
4. Provision of employment contracts to the workers by the plantation
5. Provision of a pension scheme to the workers by the plantation

6. Type of employment benefits provided by the plantation to the workers
7. Compliance of the plantation with regional labour laws
8. Availability of medical care facilities to the plantation workers
9. Access of plantation workers to safe drinking water
10. Emergency procedures set up by the plantation for the workers
11. Provision of workplace safety training by the plantation for the workers
12. Provision of sanitation facilities by the plantation for the workers
13. Provision of work equipment by the plantation for the workers
14. Provision of recreational facilities on work site by the plantation for the workers
15. Equal participation of plantation workers in training and skill development
16. Fair wages and allowance provided to plantation workers
17. Compliance of the plantation with the fair hiring regulations of the region
18. Type of training and development courses organized annually by the plantation for the workers
19. Number of workers that have attended training and development organized by the plantation
20. Number of workers showing understanding regarding training and development organized by the plantation
21. Number of regional employment opportunities provided by the plantation
22. Percentage of regional workers employed by the plantation (%)
23. Number of investments made by the plantation for community development
24. Annual number of worker accidents on the plantation
Governance Indicators
1. Access rights of the plantation to the resources within the region
2. Mission statement of the business
3. Compliance of the business with the mission statement
4. Identification of stakeholder connected with the plantation's operations
5.Engaging with the stakeholders connected with the plantation's operations
6. Effective participation of the stakeholders connected with the plantation's operations
7. Grievance procedures for plantation workers
8. Resolving conflicts with potential stakeholders
9. Evidence of holistic audits by government departments
10. Transparency regarding company reports and policies
11. Compliance of the business with the business operational laws of the region
12. Quality control reports for business products
13. Production quality practices carried out by business operations
14. Awareness of workers regarding product and production quality standards

Appendix 13: Questionnaire used during Delphi Round 1

QUESTIONNAIRE

Now that you have read the information sheet, could you please answer the questions as listed in this questionnaire. You can refer to the information sheet at any time during this survey and you can also ask me to clarify any questions that you are unsure of.

Please refrain from discussing the questions and answers among yourselves as individual answers are expected from each respondent. There are no right or wrong answers with this questionnaire. This questionnaire is only designed to **understand the extent of your agreement or disagreement with the selected indicators.**

This is a highly structured questionnaire which is likely to take approximately **30 minutes of your time.**

This questionnaire is divided into 4 sections. These are:

- Section A: Environmental Sustainability Indicators
- Section B: Social Sustainability Indicators
- Section C: Economic Sustainability Indicators
- Section D: Governance Sustainability Indicators

In each section, there is only one set of questions. This is:

- Set 1

Please respond to all sections.

<u>In Set 1 of each section:</u>

Please give your opinion about the extent to which the suggested indicators are relevant to assessing the sustainability of the abaca plantation in Indonesia. Please select one option from the list of options given below:

vii. Very Irrelevant
viii. Irrelevant
ix. Neutral
x. Relevant
xi. Very Relevant
xii. Not Applicable (N/A)

Section A: Environmental Sustainability Indicators

Question A.1: How relevant do you find the following indicators ?

Please tick one box per indicator

	Very Irrelevant	Irrelevant	Neutral	Relevant	Very Relevant	Not Applicable
GHG Reduction Target of the plantation						
Number of GHG Mitigation Practices implemented by plantation						
Percentage of growing area affected by residue burning (%)						
Percentage of growing area that is non-cropped (%)						
Total area of natural vegetation converted for agricultural production (ha)						
Quantity of fertilizer used per growing area (kg/ha)						
Percentage of renewable energy use within plantation (%)						
Number of pesticide applications per year						
Amount of pesticide applied per growing area (kg/ha)						
Number of pest resistant crops used by the plantation						
Percentage of pesticides used that are nationally registered (%)						
Use of pesticide rotation						
Type of integrated pest management plans (IPM)						
Type of recycling programs carried out by the plantation						

Question A.1: Continued

Please tick one box per indicator

	Very Irrelevant	Irrelevant	Neutral	Relevant	Very Relevant	Not Applicable
Water logging of soils on the plantation						
Depth of top soil on the plantation						
Presence of soil erosion on the plantation						
Presence of desertification on the plantation						
Diversity of soil biota on the plantation						
Number of water conservation practices carried out per year						
Number of approved location for wastewater discharge						
Water conservation target of the plantation						
Water management training for farmers on the plantation						
Quantity of water used for irrigation per year (m3/year)						
Depth of water table on the plantation						
pH of water bodies on the plantation						
Turbidity of water bodies on the plantation						
Nutrient content of water bodies on the plantation						

Question A.1: Continued

Please tick one box per indicator

	Very Irrelevant	Irrelevant	Neutral	Relevant	Very Relevant	Not Applicable
Oxygen content of water bodies on the plantation						
Diversity of protected species on the plantation						
Species conservation target on the plantation						
Species conservation practices carried out by the plantation						
Presence of wildlife pathways on the plantation						
Wildlife protection policy of the plantation						
Diversity of crops on the plantation						
Percentage of locally adapted crops produced on the plantation (%)						

Section A ends here. Please move on to Section B

Section B: Social Sustainability Indicators

Question B.1: How relevant do you find the following indicators ?

Please tick one box per indicator

	Very Irrelevant	Irrelevant	Neutral	Relevant	Very Relevant	Not Applicable
Monthly income of workers on the plantation						
Total working time per week of plantation workers (hrs)						
Total working days per year of plantation workers (days)						
Provision of employment contracts to the workers by the plantation						
Provision of a pension scheme to the workers by the plantation						
Type of employment benefits provided by the plantation to the workers						
Compliance of the plantation with regional labor laws						
Availability of medical care facilities to the plantation workers						
Access of plantation workers to safe drinking water						
Annual number of worker accidents on the plantation						
Emergency procedures set up by the plantation for the workers						
Provision of workplace safety training by the plantation for the workers						
Provision of sanitation facilities by the plantation for the workers						
Provision of work equipment by the plantation for the workers						

Question B.1: Continued

Please tick one box per indicator

	Very Irrelevant	Irrelevant	Neutral	Relevant	Very Relevant	Not Applicable
Provision of recreational facilities on work site by the plantation for the workers						
Equal participation of plantation workers in training and skill development						
Fair wages and allowance provided to plantation workers						
Compliance of the plantation with the fair hiring regulations of the region						
Type of training and development courses organized annually by the plantation for the workers						
Number of workers that have attended training and development organized by the plantation						
Number of workers showing understanding regarding training and development organized by the plantation						
Number of regional employment opportunities provided by the plantation						
Percentage of regional workers employed by the plantation (%)						
Number of investments made by the plantation for community development						

<u>Section B ends here. Please move on to Section C</u>

Section C: Economic Sustainability Indicators

Question C.1: How relevant do you find the following indicators ?

Please tick one box per indicator

	Very Irrelevant	Irrelevant	Neutral	Relevant	Very Relevant	Not Applicable
Debt to total asset ratio of the business						
Internal rate of return of the business						
Annual business revenue						
Annual business cost						
Net income of the business						
Return on investment of the business						
Price determination of the business products						
Company business plan						
Annual yield of each business product (tonnes)						
Business product diversification						
No of procurement channels of the business to source different inputs						
Percentage of input from each supplier						
Number of actual and alternative buyers of the business products						
Market stability analysis of the business products						
Evidence of business tax reports						

Section C ends here. Please move on to Section D

Section D: Governance Sustainability Indicators

Question D.1: How relevant do you find the following indicators ?

Please tick one box per indicator

	Very Irrelevant	Irrelevant	Neutral	Relevant	Very Relevant	Not Applicable
Access rights of the plantation to the resources within the region						
Mission statement of the business						
Compliance of the business with the mission statement						
Identification of stakeholder connected with the plantation's operations						
Engaging with the stakeholders connected with the plantation's operations						
Effective participation of the stakeholders connected with the plantation's operations						
Grievance procedures for plantation workers						
Resolving conflicts with potential stakeholders						
Evidence of holistic audits by government departments						
Transparency regarding company reports and policies						
Compliance of the business with the business operational laws of the region						
Quality control reports for business products						
Production quality practices carried out by business operations						
Awareness of workers regarding product and production quality						

standards						

<u>End of questionnaire. Thank you for your time and response</u>

Appendix 14: Information sheet used during Delphi Round 1

INFORMATION SHEET

Dear Respondent,

Thank you for agreeing to partake in a survey for this research project. Your participation will be completely confidential, and you will remain anonymous throughout this process. The data gathered within this survey will not be subject to any public disclosure and is only for use as part of this PhD research project.

This PhD project aims to develop a sustainability assessment protocol or toolkit for abaca plantation agriculture. Although research regarding sustainability in agriculture has been carried out for different types of plantation agriculture, there is a lack of research specifically regarding sustainability in abaca plantation agriculture. As such, there is currently no sustainability assessment toolkit available for abaca plantation agriculture.

Sustainability assessment tools are particularly relevant to Indonesia as Indonesian stakeholders such as government organisations, non-governmental organisations (NGOs), business organisations and the wider public expect agricultural plantations within Indonesia to comply with an expected level of sustainability standard to ensure adherence to the environmental, economic, social and governance laws of Indonesia.

However, as 'sustainability' itself is a constantly evolving science, its definition depends on local conditions and stakeholders. This in turn poses two important questions:

- What constitutes a sustainable abaca plantation within Indonesia ?
- What needs to be measured to ensure that an abaca plantation in Indonesia operates sustainably ?

As such, our purpose here is to develop a simple, user-friendly and effective sustainability assessment toolkit for abaca plantation agriculture that is appropriate for the Indonesian context.

As an important stakeholder in Indonesia, we would like to know what indicators you think could be used to assess the sustainability of an abaca plantation in Indonesia. In this research, we have started with a series of qualitative interviews, literature reviews and document reviews.

These exercises have enabled us to identify a list of **103 sustainability indicators** for plantation agriculture. We thank you for your cooperation and support in this research so far.

In this phase of the survey process, we would like to know the extent of your agreement or disagreement with these 103 indicators. After this phase, we will analyseall of your responses and feed the results back to you in Phase 2. The second questionnaire in Phase 2 will have a reduced number of indicators and will include a summary of the group response. You will be given the opportunity to change your response from the first questionnaire after examining the group response in the second questionnaire in Phase 2.

The identity of all participants (stakeholders) in this research will **<u>remain confidential at all times.</u>**

This information sheet is divided into 4 sections. These are:

- Section A: Environmental Sustainability Indicators
- Section B: Social Sustainability Indicators
- Section C: Economic Sustainability Indicators
- Section D: Governance Sustainability Indicators

Please take a moment to read about the different sustainability indicators within each section in the following pages of this information sheet.

<u>Once you have finished reading this information sheet, a questionnaire will then be given to you for you to fill in.</u>

<u>**Section A: Environmental Sustainability Indicators**</u>

Guidance Note:

Environmental sustainability refers to the management and protection of natural resources to ensure that they are available and remain productive to future generations. This can be achieved by reducing negative environmental impacts (e.g. pollution) and increasing positive impacts (e.g. recycling).

Environmental sustainability can be divided into 8 main themes. These include:

- **Greenhouse Gas (GHG) Emissions**
- **Pest Management**
- **Waste Management**
- **Soil Management**
- **Soil Quality**
- **Water Management**
- **Water Quality**
- **Ecosystem Diversity**

Based on these 8 themes, 50 environmental sustainability indicators have been identified. The themes and the respective indicators within each theme are explained below.

A.1. Greenhouse Gas (GHG) Emissions:

Greenhouse gases (GHGs) such as carbon dioxide (CO_2) are produced from the combustion of fossil fuels (oil, natural gas, coal) and wood products. The release of excessive GHGs into the atmosphere can increase the surface temperature of the Earth thereby resulting in global warming. Global warming can disrupt weather and rainfall patterns which in turn can affect agricultural productivity.

Indicators of GHG Emissions:

a. GHG Reduction Target of the plantation

This indicator refers to having a written plan that sets measurable and binding goals for the plantation to reduce GHG emissions.

b. Number of GHG Mitigation Practices implemented by plantation

This indicator intends on capturing the type of practices that have been implemented by the plantation to reduce GHG emissions.

c. Percentage of growing area affected by residue burning (%)

This indicator intends on capturing the percentage of the growing area that is cleared via open burning by the plantation.

d. Percentage of growing area that is non-cropped (%)

This indicator intends on capturing the percentage of the growing area in which the natural vegetation is left undisturbed by the plantation.

e. Total area of natural vegetation converted for agricultural production (ha)

This indicator intends on capturing the size of the growing area converted from natural vegetation by the plantation.

f. Quantity of fertilizer used per growing area (kg/ha)

This indicator intends on capturing the amount of fertilizer used by the plantation on the growing area.

g. Percentage of renewable energy use within the plantation (%)

This indicator intends on capturing the percentage of renewable energy used within the plantation.

A.2. Pest Management:

Agricultural pests (mice, locust, aphids) often threaten the health of the nation's vital agricultural areas. Some of the adverse impacts include farm infestation and crop diseases which in turn can reduce agricultural productivity and crop yield.

Indicators of Pest Management:

a. <u>Number of pesticide applications per year</u>

This indicator intends on capturing the number of pesticide applications per year carried out by the plantation.

b. <u>Amount of pesticide applied per growing area (kg/ha)</u>

This indicator intends on capturing the amount of pesticides used on the growing area by the plantation.

c. <u>Number of pest resistant crops used by the plantation</u>

This indicator intends on capturing the number of pest resistant crops that are being used by the plantation.

d. <u>Percentage of pesticides used that are nationally registered (%)</u>

This indicator intends on capturing the percentage of pesticides used by the plantation that are nationally approved for use by the Indonesian government.

e. <u>Use of Pesticide Rotation</u>

This indicator intends on capturing the different types of pesticides applied per growing season by the plantation.

f. <u>Type of integrated pest management (IPM) plans</u>

This indicator intends on capturing the type of practices that have been implemented by the plantation to manage pests.

A.3. Waste Management:

The generation of waste and in particular hazardous waste (excess pesticides and fertilizers) from agricultural practices, creates disposal problems that can cause health risks (drinking water contamination) as well as environmental pollution (soil and water contamination). Therefore, proper waste management and disposal practices are necessary to prevent ecosystem contamination.

Indicators of Waste Management:

a. <u>Type of recycling programs carried out by the plantation</u>

This indicator intends of capturing the type of recycling programs carried out by the plantation.

b. <u>Number of approved waste disposal sites used by the plantation</u>

This indicator intends on capturing the number of sites approved for waste disposals that are being used by the plantation.

c. <u>Type of waste management programs carried out by the plantation</u>

This indicator intends on capturing the type of waste management activities carried out by the plantation.

d. <u>Non-use of open-air burning of waste</u>

This indicator intends on capturing the number of waste burning activities carried out by the plantation.

e. <u>Waste reduction target of plantation</u>

This indicator refers to having a written plan that sets measurable and binding goals for the plantation to reduce waste production.

A.4. Soil Management:

Fertile soils provide a range of services including water purification and carbon storage. However, poor agricultural practices including unsustainable land allocation and inappropriate farming practices can reduce soil quality thereby affecting agricultural productivity. Therefore, proper soil management is essential for both agricultural production and to improve crop yields.

Indicators of Soil Management:

a. Amount of fertilizer used by type per growing area (kg/ha)

This indicator intends on capturing the amount of fertilizer used by type on the growing area by the plantation.

b. Number of different crop varieties on the plantation

This indicator intends on capturing the number of crop varieties grown on the plantation.

c. Number of herbicide applications per year

This indicator intends on capturing the number of herbicide applications carried out per year by the plantation.

d. Type of soil drainage system used by the plantation

This indicator intends on capturing the type of soil drainage systems put in place by the plantation.

e. Soil management training for farmers on the plantation

This indicator intends on capturing the number soil management training programs available for farmers on the plantation.

f. Yearly percentage of vegetative soil cover (%) on the plantation

This indicator intends on capturing the number of days; expressed as yearly percentage, during which crops are present on the plantation.

g. Type of tillage practices carried out by the plantation

This indicator intends on capturing the type of soil tillage practices carried out by the plantation.

h. Timing of treatment applications by the plantation

This indicator intends on capturing type of soil treatment practices carried out at different times of the year by the plantation.

A.5. Soil Quality:

Soil quality, which includes the biological, chemical and physical properties of soil are important aspects for both soil health and productivity. Therefore, soil quality should be monitored over time to ensure that the soil's capacity to provide various functions such as supplying nutrients to crops do not diminish.

Indicators of Soil Quality:

a. <u>pH of the soil on the plantation</u>

This indicator intends on measuring the pH of the soil on the plantation to ensure that the soil pH falls within the appropriate range

b. <u>Infiltration rate of the soil on the plantation (mm/hour)</u>

This indicator intends on measuring the rate at which water enters the soil on the plantation

c. <u>Water logging of soils on the plantation</u>

This indicator intends on visually inspecting the growing area for the presence of water logged soils on the plantation

d. <u>Depth of top soil on the plantation</u>

This indicator intends on measuring the depth of the top soil on the plantation to measure crop root penetration

e. <u>Presence of soil erosion on the plantation</u>

This indicator intends on visually inspecting the growing area of the plantation for signs of soil erosion

f. <u>Presence of desertification on the plantation</u>

This indicator intends on visually inspecting the growing area of the plantation for signs of desertification; dry/cracked soils

g. <u>Diversity of soil biota on the plantation</u>

This indicator intends on identifying the type of organisms present in the soil on the plantation

A.6. Water Management:

Inappropriate agricultural water practices (e.g. excessive use of water) can adversely affect areas already facing water scarcity. Therefore, proper water management is required to ensure sustainable water use for agricultural practices.

Indicators of Water Management:

a. Number of water conservation practices carried out per year

This indicator intends on capturing the number water conservation practices carried out per year by the plantation

b. Number of approved location for wastewater discharge

This indicator intends on capturing the number of locations approved for wastewater discharge used by the plantation

c. Water conservation target of the plantation

This indicator refers to having a written plan that sets measurable and binding goals for the plantation in achieving a decrease in water use

d. Water management training for farmers on the plantation

This indicator intends on capturing the number of water management training programs available for farmers on the plantation

e. Quantity of water used for irrigation per year (m^3/year)

This indicator intends on capturing the amount of water used to irrigate the growing area on the plantation per year

f. Depth of water table on the plantation

This indicator intends on determining the depth of the water table within the growing area of the plantation

A.7. Water Quality:

Substances discharged into water bodies without adequate treatment can result in water pollution. Therefore, without proper water quality monitoring practices, water pollutant levels can increase over time and eventually compromise the health of ecosystems.

Indicators of Water Quality:

a. <u>pH of water bodies on the plantation</u>

This indicator intends on measuring the pH of water bodies (lakes, rivers) on the plantation

b. <u>Turbidity of water bodies on the plantation</u>

This indicator intends on visually inspecting the clarity of water bodies (lakes, rivers) on the plantation

c. <u>Nutrient content of water bodies on the plantation</u>

This indicator intends on measuring the nutrient content of water bodies (lakes, rivers) on the plantation such as nitrites, ammonium and nitrates via test kits

d. <u>Oxygen content of water bodies on the plantation</u>

This indicator intends on measuring the oxygen content of water bodies (lakes, rivers) on the plantation

A.8. Ecosystem Diversity:

The protection of ecosystem biodiversity is essential as healthy ecosystems can provide vital services such as pollination, pest management and nutrient cycle regulation, which are essential for agricultural productivity.

Indicators of Ecosystem Diversity:

a. <u>Diversity of protected species on the plantation</u>

This indicator intends on identifying the number of protected species (e.g monkeys, birds) present within the growing area of the plantation

b. Species conservation target on the plantation

This indicator refers to having a written plan that sets measurable and binding goals for the plantation regarding the conservation of protected species on the plantation

c. Species conservation practices carried out by the plantation

This indicator intends on identifying the number of practices in place to conserve the protected species on the plantation

d. Presence of wildlife pathways on the plantation

This indicator intends on identifying the existence of wildlife pathways on the growing area of the plantation, which allows for the movement of animal species within the plantation

e. Wildlife protection policy of the plantation

This indicator refers to having a written plan that sets measurable and binding goals for the plantation regarding the protection of wildlife within the plantation boundary and its surroundings

f. Diversity of crops on the plantation

This indicator intends on identifying the types of crops present on the growing area of the plantation.

g. Percentage of locally adapted crops produced on the plantation (%)

This indicator intends on capturing the percentage of crops produced by the plantation that are locally adapted varieties (breeds)

Section B: Social Sustainability Indicators

Guidance Note:

Social sustainability is defined as the ability to ensure equity in human well-being and the quality of life regardless of class or gender. The social aspect of sustainability can be sorted into three broad categories namely, employees, customers and the surrounding community. Individuals in these categories are all directly or indirectly affected by the actions of a plantation. Therefore, consideration regarding the effects of a plantation is essential to ensure socially sustainable operations.

Social sustainability can be divided into 5 main themes. These include:

- **Employment Relations**
- **Workplace Safety and Health**
- **Social Equity**
- **Capacity Development**
- **Local Economy**

Based on these 5 themes, 24 social sustainability indicators have been identified. The themes and the respective indicators within each theme are explained below.

B.1. Employment Relations:

Businesses that provide regular employment must comply with both the national and regional labour laws of the country of operation.

Indicators of Employment Relations:

a. Monthly income of workers on the plantation

This indicator intends on identifying the monthly income of both skilled and unskilled labour on the plantation.

b. Total working time per week of plantation workers (hrs)

This indicator intends on identifying the total working time in hours per week of both skilled and unskilled labour on the plantation.

c. Total working days per year of plantation workers (days)

This indicator intends on identifying the total working days per year of both skilled and unskilled labour on the plantation.

d. Provision of employment contracts to the workers by the plantation

This indicator intends on identifying if employees are provided with legally binding contracts by the plantation, which are accessible to them at all times.

e. Provision of a pension scheme to the workers by the plantation

This indicator intends on identifying if employees are provided with a pension scheme by the plantation

f. Type of employment benefits provided by the plantation to the workers

The indicator intends on capturing the type of employment benefits that are available to employees (skilled and unskilled labour) on the plantation

g. Compliance of the plantation with regional labor laws

This indicator intends on identifying if the terms of employment provided by the plantation comply with the regional labor laws and regulations of the country of operation.

B.2. Workplace Safety and Health:

Workplace safety and health refers to the business ensuring that the workplace is safe, has met all appropriate regulations and satisfies basic human needs such as adequate sanitary facilities, clean water as well as necessary and safe work equipment.

Indicators of Workplace Safety and Health:

a. Availability of medical care facilities to plantation workers

This indicator intends on identifying the type of medical care facilities that are available to the employees on the plantation.

b. Access of plantation workers to safe drinking water

This indicator intends on identifying if the plantation workers have access to safe drinking water on the plantation.

c. Annual number of worker accidents on the plantation

This indicator intends on identifying the number of accidents on the plantation reported per year.

d. Emergency procedures set up by the plantation for the workers

This indicator intends on identifying if the plantation has set up emergency procedures and evacuation plans for the plantation workers in the event of a natural disaster.

e. Provision of workplace safety training by the plantation for the workers

This indicator intends on identifying if employees are provided with the necessary training regarding plantation operation and equipment handling prior to the start of their employment.

f. Provision of sanitation facilities by the plantation for the workers

This indicator intends on identifying if the sanitation facilities that are provided by the plantation are able to meet the needs of the workers.

g. Provision of work equipment by the plantation for the workers

This indicator intends on identifying if the work equipment that are provided by the plantation are able to meet the needs of the workers.

h. Provision of recreational facilities on work site by the plantation for the workers

This indicator intends on identifying the type of facilities (rest area, cafeteria) that are provided for the employees by the plantation.

B.3. Social Equity:

In a business context, implementing social equity means that any discrimination of individuals or groups on the basis of whatever characteristics must be avoided. This requirement applies to hiring, promotion, job assignment, termination, compensation, working conditions, harassment as well as direct or indirect forms of discrimination.

Indicators of Social Equity:

a. <u>Equal participation of plantation workers in training and skill development</u>

This indicator intends on identifying if training and skill development are provided to all plantation workers regardless of age, gender, ethnicity or other characteristics.

b. <u>Fair wages and allowances provided to plantation workers</u>

This indicator intends on identifying if employees are provided with the same wages and allowances for the same quantity and type of work regardless of age, gender, ethnicity or other characteristics

c. <u>Compliance of the plantation with the fair hiring regulations of the region</u>

This indicator intends on identifying if the plantation complies with the fair hiring regulations of the region

B.4. Capacity Development:

Capacity development refers to the training and education provided by businesses in which all personnel (employees, workers) have the opportunity to acquire the skills and knowledge necessary to undertake current and future tasks required by the business.

Indicators of Capacity Development:

a. <u>Type of training and development courses organized annually by the plantation for the workers</u>

This indicator intends on capturing the type of training and development courses that are organized by the plantation for the employees annually.

b. Number of workers that have attended training and development organized by the plantation

This indicator intends on identifying if the plantation keeps records of the number of training attended by employees. This indicator also intends on identifying which employees have attended the training courses organized by the plantation.

c. Number of workers showing understanding regarding training and development organized by the plantation

This indicator intends on identifying if the workers on the plantation understand the training and development programs organized by the plantation. This indicator also intends on identifying if the workers can utilize the training given to them by the plantation.

B.5. Local Economy:

Local economy refers to the contributions that the business makes to local economic development. Local economic development can foster employment, infrastructural development as well as a high quality of life. Beyond economic growth, it is about providing opportunities for all to obtain decent work at the local level.

Indicators of Local Economy:

a. Number of regional employment opportunities provided by the plantation

This indicator intends on identifying the number of employment opportunities provided by the plantation for the locals within the region

b. Percentage of regional workers employed by the plantation (%)

This indicator intends on identifying the percentage of workers employed by the plantation that are from the local region

c. Number of investments made by the plantation for community development

This indicator intends on identifying the number of investments the business has made for community development

Section C: Economic Sustainability Indicators

Guidance Note:

Economic sustainability within the agricultural sector refers to the ability of the business to generate durable growth, particularly the ability to generate income as well as employment for the local population. Diversification of income sources and efficient use of resources are also important factors of this dimension.

Economic sustainability can be divided into 4 main themes. These include:

- **Profitability**
- **Company Investment Strategy**
- **Production Stability**
- **Value Creation**

Based on these 4 themes, 15 economic sustainability indicators have been identified. The themes and the respective indicators within each theme are explained below.

C.1. Profitability:

Financial profitability is essential to ensure the long term growth of the plantation's operations over its life cycle. The plantation must have the capacity to generate a positive net income through its business activities to ensure a profitable business operation from year to year.

Indicators of Profitability:

a. Debt to total asset ratio of the business

This indicator intends on identifying the business's total liability (assets financed by creditors) relative to its total assets in order to determine its financial leverage.

b. Internal rate of return of the business

This indicator intends on identifying the profitability of potential investments of the business. The higher the internal rate of return, the more desirable and profitable the business.

c. Annual business revenue

This indicator intends on identifying the total income generated from business operations per year prior to the deduction of any expenses.

d. Annual business cost

This indicator intends on identifying the total cost of running the business per year. Some of these costs include, operational costs, production costs and sales costs.

e. Net income of the business

This indicator intends on capturing the earnings of the business after deducting all expenses (taxes, sales expense, operational expense). A large positive net income indicates a large profit and vice versa.

f. Return on investment of the business

This indicator intends on measuring the potential gain or loss on an investment relative to the amount of money invested into the business

g. Price determination of the business products

This indicator intends on identifying if the business has considered the break-even point to negotiate the selling price of the business products with the buyers.

C.2. Company Investment Strategy:

Investments in terms of financial resources and knowledge are critical to ensure both economic growth and social development. As such, part of the strategic direction of a business is to decide on how and where to invest different types of resources to achieve optimum and sustained growth.

Indicators of Company Investment Strategy:

a. Company business plan

This indicator intends on identifying if the business has a business plan or an up-to-date document that specifies the revenue streams, growth plans and operational action plans of the business for the future.

C.3. Production Stability:

A business needs to ensure that its production line is sufficiently resilient to withstand environmental, social and economic shocks. A business needs to have mechanisms in place to ensure that it is capable of meeting its commitments, which includes both production and quality standards.

Indicators of Production Stability:

a. Annual yield of each business product (tonnes)

This indicator intends on capturing the annual yield (amount in tonnes) of each product produced by the business for income generation

b. Business product diversification

This indicator intends on identifying the number of different products produced by the business for income generation.

c. No of procurement channels of the business to source different inputs

This indicator intends on identifying the number of procurement channels through which the business can source different inputs for its operation

d. Percentage of input from each supplier

This indicator intends on identifying the percentage of input from different suppliers for the required business products (materials) that the business depends on

e. Number of actual and alternative buyers of the business products

This indicator intends on identifying the number of actual and alternative buyers of the business products in case of unexpected loss of the selected (actual) buyers

f. Market stability analysis of the business products

This indicator intends on identifying if the business carries out market stability analysis to determine the market demands and price shifts regarding the products produced.

C.4. Value Creation:

Businesses can support the creation of value in a local economy through its fiscal contributions (taxes). By paying its correspondent taxes in the appropriate location, the business can contribute to the development of the local economy.

Indicators of Value Creation:

a. Evidence of business tax reports

This indicator intends on identifying if the business fulfils its fiscal commitments by reviewing and paying its local taxes.

Section D: Governance Sustainability

Guidance Note:

Governance in this context means that corporations and organisations must be held accountable for the management of their supply chains and stakeholder relations. Unless good governance is considered, sustainability within the other dimensions will also remain unreachable.

Governance sustainability can be divided into 4 main themes. These include:

- **Resource Appropriation Criteria**
- **Responsibility to Business Practices**
- **Accountability Standards**
- **Product Quality Standards and Awareness**

Based on these 4 themes, 14 governance sustainability indicators have been identified. The themes and the respective indicators within each theme are explained below.

D.1. Resource Appropriation Criteria:

Business operations do not reduce the existing rights of communities to resources (land, water)

Indicators of Resource Appropriation Criteria:

a. Access rights of the plantation to the resources within the region

This indicator intends on identifying the number of resources that the business have access rights to within the region. This indicator also intends on identifying the criteria by which the business has to abide by when using the approved resources.

D.2. Responsibility to Business Practices:

Senior management/owners of the business regularly and explicitly evaluate the business's performance against its mission or code of conduct.

Indicators of Responsibility to Business Practices:

a. <u>Mission statement of the business</u>

This indicator intends of identifying if the business has made its commitment to all areas of sustainability clear to all stakeholders by publishing a mission statement or other similar declaration that is binding for management.

b. <u>Compliance of the business with the mission statement</u>

This indicator intends on identifying the practices that have been carried out by the business to ensure its commitment towards sustainability as stated in the mission statement

c. <u>Identification of stakeholders connected with the plantation's operations</u>

This indicator intends on identifying the practices carried out by the enterprise in identifying different stakeholder groups connected with its plantation operations

d. <u>Engaging with the stakeholders connected with the plantation's operations</u>

This indicator intends on identifying the practices carried out by the enterprise to engage with the identified stakeholders and acquire input from these stakeholders

e. <u>Effective participation of the stakeholders connected with the plantation's operations</u>

This indicator intends on identifying the decisions and practices carried out by the enterprise based on the input and feedback given by the stakeholders

f. <u>Grievance procedures for the plantation workers</u>

This indicator intends on identifying the practices carried out by the enterprise to ensure that grievance procedures are explained to all stakeholders and that the procedures are familiar to and respected by the stakeholders.

g. <u>Resolving conflicts with potential stakeholders</u>

This indicator intends on identifying the practices carried out by the enterprise to ensure that conflicts or disputes with different stakeholder groups are resolved quickly and effectively in a manner that mutually benefits all parties involved.

D.3. Accountability Standards:

The enterprise assumes full responsibility for its business operations and regularly reports about its sustainability performance to all relevant stakeholders.

Indicators of Accountability Standards:

a. <u>Evidence of holistic audits by government departments</u>

This indicator intends on identifying the type of audits (financial, safety) carried out by different government organizations to ensure that the business complies with the proper reporting procedures.

b. <u>Transparency regarding company reports and policies</u>

This indicator intends on identifying if the business has explicit and open policies to deal with requests for information. This indicator also intends on capturing if the business can show how it allows access to various company information to relevant stakeholders.

c. <u>Compliance of the business with the business operational laws of the region</u>

This indicator intends on identifying if the business practices (code of conduct) of the enterprise complies with the business operational laws of the region.

D.4. Product Quality Standards and Awareness:

"Product quality standard" refers to the set of rules defined to guarantee both product quality and product safety. These standards ensure that the product meets certain criteria such as appearance, composition, source, sanitation and are suitable for distribution or sale.

Indicators of Product Quality Standards and Awareness:

a. <u>Quality control report for business products</u>

This indicator intends on identifying if the business has in place reporting procedures regarding both its product and production quality.

b. Production quality practices carried out by business operations

This indicator intends on identifying the practices carried out by the business to ensure that it complies with both product and production quality standards.

c. Awareness of workers regarding product and production quality standards

This indicator intends on identifying if the employees within the business are aware of the product and production quality standards and practices of the business. Employees that are aware of the product and production quality standards of the business can help improve the overall quality of the business.

Appendix 15: Questionnaire used during Delphi Round 2

QUESTIONNAIRE

Now that you have read the information sheet, could you please answer the questions as listed in this questionnaire. You can refer to the information sheet at any time during this survey and you can also ask me to clarify any questions that you are unsure of.

In the first survey round, we asked you to give your opinion about the extent of your agreement or disagreement with the **103 indicators**. We have analysed your response from the first survey round along with the response from the other group members. We thank you for your cooperation in this research thus far.

In this second survey round, your response along with the group response from the first survey round are listed in this questionnaire. In this round, you are given the opportunity to change your response (if you choose to) from the first survey round after examining both the group response and your own response from the first survey round.

Please note that your individual response to each of the indicators from the first survey round are only made available to you and not to the other group members.

After examining the response from the first survey round, we find that many of you preferred to select the 'neutral' option when asked about the extent of your agreement or disagreement with the selected indicators. As such, we were unable to limit the number of indicators in this questionnaire for this survey round as we were not conclusively able to identify which indicators were relevant or irrelevant. The purpose of these surveys are select relevant indicators that can be used to develop a sustainability assessment toolkit for abaca plantation agriculture.

Plantation companies and agribusiness require a simple and effective sustainability assessment toolkit to manage their agricultural operations in a sustainable manner. Therefore, it is not practical to design and develop a toolkit with all 103 indicators as these companies would not likely adopt and utilize such a complicated and tedious toolkit.

Therefore, in this second survey round, we humbly ask that you be more selective about your choice of indicator preferences. This will help us identify and select a reasonable number of relevant indicators to be used as part of the sustainability assessment toolkit.

Please refrain from discussing the questions and answers among yourselves as individual answers are expected from each respondent. There are **no right or wrong answers** with this questionnaire. This questionnaire is only designed to **understand the extent of your agreement or disagreement with the selected indicators.**

However, please do consider the practicality of the indicators when selecting them in each section.

The identity of all participants in this research will remain confidential at all times.

This is a highly structured questionnaire which is likely to take approximately **40 minutes of your time.**

This questionnaire is divided into 4 sections. These are:

- Section A: Environmental Sustainability Indicators
- Section B: Social Sustainability Indicators
- Section C: Economic Sustainability Indicators
- Section D: Governance Sustainability Indicators

In each section, there is only one set of questions. This is:

- Set 1

Please respond to all sections.

<u>In Set 1 of each section:</u>

Please give your opinion about the extent to which the suggested indicators are relevant to assessing the sustainability of the abaca plantation in Indonesia. Please select one option from the range of options given below with (**1) being Highly Irrelevant** and (**7) being Highly Relevant**:

Highly Irrelevant

Highly Relevant

1	2	3	4	5	6	7

Section A: Environmental Sustainability Indicators

Question A.1: How relevant do you find the following indicators ?

Please tick one box per indicator

No	Indicators	Previous Response		Your New Response In the previous round we used a (1-5) scale but in this round we are using a (1-7) scale						
		1 = lowest relevance 5 = highest relevance		1 = lowest relevance 7 = highest relevance						
		Your Response	Group Response	Please circle one response below						
Greenhouse Gas (GHG) Emissions										
1	GHG Reduction Target of the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Number of GHG Mitigation Practices implemented by plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Percentage of growing area on plantation affected by residue burning (%)	N/A	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Percentage of growing area on plantation that is non-cropped (%)	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Total area of natural vegetation converted by plantation for production (ha)	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Quantity of fertilizer used per growing area by the plantation (kg/ha)	N/A	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Percentage of renewable energy use within the plantation (%)	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Pest Management										
1	Number of pesticide applications carried out by the plantation per year	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Amount of pesticides applied per growing area by the plantation (kg/ha)	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Number of pest resistant crops used by the plantation	N/A	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Percentage of pesticides used by the plantation that are nationally registered (%)	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Use of pesticide rotation by the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Integrated pest management plans implemented by plantation	5	4 dan 5	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Waste Management										
1	Type of recycling programs carried out by the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Number of approved waste disposal sites used by the plantation	N/A	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

3	Type of waste management programs carried out by the plantation	3	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Non-use of open-air burning of waste by the plantation	N/A	5	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Waste reduction target of the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Soil Management										
1	Amount of fertilizer used by type per growing area by the plantation (kg/ha)	2	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Number of different crop varieties on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Number of herbicide applications carried out per year by the plantation	5	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Type of soil drainage system used by the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Soil management training for farmers on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Yearly percentage of vegetative soil cover (%) on the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Type of tillage practices carried out by the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8	Timing of treatment applications by the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Soil Quality										
1	pH of the soil on the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Infiltration rate of the soil on the plantation (mm/hour)	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Water logging of soils on the plantation	2	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Depth of top soil on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Presence of soil erosion on the plantation	3	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Presence of desertification on the plantation	N/A	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Diversity of soil biota on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Water Management										
1	Number of water conservation practices carried out per year by the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Number of approved location for wastewater discharged from the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Water conservation target of the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Water management training for farmers on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Quantity of water used for irrigation per year by the plantation (m^3/year)	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Depth of water table on the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Water Quality										
1	pH of water bodies on the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Turbidity of water bodies on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Nutrient content of water bodies on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Oxygen content of water bodies on the plantation	3	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Ecosystem Diversity										
1	Diversity of protected species on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Species conservation target by the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Species conservation practices carried out by the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Presence of wildlife pathways on the plantation	5	5	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Wildlife protection policy of the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Diversity of crops on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Percentage of locally adapted crops produced on the plantation (%)	5	3 dan 4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

<u>Section A ends here. Please move on to Section B</u>

Section B: Social Sustainability Indicators

Question B.1: How relevant do you find the following indicators ?

Please tick one box per indicator

No	Indicators	Previous Response		Your New Response In the previous round we used a (1-5) scale but in this round we are using a (1-7) scale						
		1 = lowest relevance 5 = highest relevance		1 = lowest relevance 7 = highest relevance						
		Your Response	Group Response	Please circle one response below						
Employment Relations										
1	Monthly income of workers on the plantation	1	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Total working time per week of plantation workers (hrs)	1	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Total working days per year of the plantation workers (days)	1	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Provision of employment contracts to the workers by the plantation	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Provision of a pension scheme to the workers by the plantation	4	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Type of employment benefits provided by the plantation to the workers	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Compliance of the plantation with regional labour laws	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Workplace Safety and Health										
1	Availability of medical care facilities to plantation workers	N/A	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Access of plantation workers to safe drinking water	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

3	Annual number of worker accidents on the plantation	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Emergency procedures set up by the plantation for the workers	5	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Provision of workplace safety training by the plantation for the workers	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Provision of sanitation facilities by the plantation for the workers	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Provision of work equipment by the plantation for the workers	5	5	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8	Provision of recreational facilities on work site by the plantation for the workers	3	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Social Equity										
1	Equal participation of plantation workers in training and skill development	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Fair wages and allowances provided to plantation workers	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Compliance of the plantation with the fair hiring regulations of the region	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Capacity Development										
1	Type of training and development courses organized	3	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

	annually by the plantation for the workers									
2	Number of workers that have attended training and development organized by the plantation	3	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Number of workers showing understanding regarding training and development organized by the plantation	3	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Local Economy										
1	Number of regional employment opportunities provided by the plantation	3	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Percentage of regional workers employed by the plantation (%)	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Number of investments made by the plantation for community development	4	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Section B ends here. Please move on to Section C

Section C: Economic Sustainability Indicators

Question C.1: How relevant do you find the following indicators ?

Please tick one box per indicator

No	Indicators	Previous Response		Your New Response In the previous round we used a (1-5) scale but in this round we are using a (1-7) scale						
		1 = lowest relevance 5 = highest relevance		1 = lowest relevance 7 = highest relevance						
		Your Response	Group Response	Please circle one response below						
Profitability										
1	Debt to total assets ratio of the business	5	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Internal rate of return of the business	5	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Annual business revenue	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Annual business cost	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Net income of the business	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Return on investment of the business	5	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Price determination of the business products	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Company Investment Strategy										
1	Company business plan	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Production Stability										
1	Annual yield of each business product (tonnes)	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Business product diversification	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	No of procurement channels of the business to source different inputs	4	3	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Percentage of input from each supplier	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Number of actual and alternative buyers of the business products	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Market stability analysis of the business products	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Value Creation										
1	Evidence of business tax reports	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Section C ends here. Please move on to Section D

Section D: Governance Sustainability Indicators

Question D.1: How relevant do you find the following indicators ?

Please tick one box per indicator

No	Indicators	Previous Response		Your New Response In the previous round we used a (1-5) scale but in this round we are using a (1-7) scale						
		1 = lowest relevance 5 = highest relevance		1 = lowest relevance 7 = highest relevance						
		Your Response	Group Response	Please circle one response below						
Resource Appropriation Criteria										
1	Access rights of the plantation to the resources within the region	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Responsibility to Business Practices										
1	Mission statement of the business	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Compliance of the business with the mission statement	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Identification of stakeholders connected with the plantation's operations	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	Engaging with the stakeholders connected with the plantation's operations	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	Effective participation of the stakeholders connected with the plantation's operations	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	Grievance procedures for the plantation workers	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	Resolving conflicts with potential stakeholders	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Accountability Standards										
1	Evidence of holistic audits by government departments	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Transparency regarding company reports and policies	4	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

3	Compliance of the business with the business operational laws of the region	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Product Quality Standards and Awareness										
1	Quality control report for the business products	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Production quality practices carried out by the business operations	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	Awareness of workers regarding product and production quality standards	5	4	**1**	**2**	**3**	**4**	**5**	**6**	**7**

End of questionnaire. Thank you for your time and response

Appendix 16: Descriptive analysis regarding relevancy scores of indicators from Delphi Round 1 and Round 2

Table 33: Descriptive analysis regarding relevancy scores of indicators from Delphi Round 1 and Round 2

	Round 1				**Round 2**			
Total Indicators	**Mean**	**Standard Deviation**	**Min Value**	**Max Value**	**Mean**	**Standard Deviation**	**Min Value**	**Max Value**
Environmental Indicators								
1. GHG Reduction Target of the plantation	4.17	1.043	2	5	5.09	1.758	2	7
2. Number of GHG Mitigation Practices implemented by plantation	4.11	0.963	2	5	4.91	1.640	2	7
3. Percentage of growing area affected by residue burning (%)	3.72	1.179	2	5	3.64	2.378	1	7
4. Percentage of growing area that is non-cropped (%)	3.78	1.003	2	5	4.64	1.748	2	7
5. Total area of natural vegetation converted for agricultural production (ha)	4.00	0.686	3	5	5.18	1.537	3	7
6. Type of fertilizer used per growing area (kg/ha)	3.72	0.895	2	5	4.00	1.897	1	6
7. Percentage of renewable energy use within plantation (%)	3.89	1.132	2	5	4.64	1.748	1	7
8. Number of pesticide applications per year	3.28	0.752	2	4	4.45	1.864	1	7
9. Amount of pesticide applied per growing area (kg/ha)	3.50	0.786	2	4	3.64	1.859	1	6
10. Number of pest resistant crops used by the plantation	3.83	1.249	2	5	4.45	2.067	1	7

11. Percentage of pesticides used that are nationally registered (%)	3.72	0.752	2	5	4.27	1.654	1	7
12. Use pesticide rotation	3.50	0.786	2	5	4.64	2.014	1	7
13. Type of integrated pest management (IPM)	4.17	0.786	3	5	5.55	1.293	3	7
14. Type of recycling programs carried out by the plantation	4.44	0.856	3	5	5.09	1.300	3	7
15. Number of approved waste disposal sites used by the plantation	4.22	1.396	1	5	5.55	0.934	4	7
16. Type of waste management programs carried out by the plantation	4.22	1.215	1	5	4.82	1.328	2	7
17. Non-uses of open air burning of waste	4.28	1.018	2	5	5.09	1.814	1	7
18. Waste reduction target of plantation	4.17	0.857	3	5	5.36	1.120	4	7
19. Amount of fertilizer used per growing area (kg/ha)	3.44	0.856	2	5	4.27	2.005	1	7
20. Number of different cover crop varieties on the plantation	3.78	0.732	2	5	4.91	1.375	3	7
21. Number of herbicide applications per year	3.28	0.826	2	5	4.18	1.601	2	7
22. Type of soil drainage system used by the plantation	3.67	0.907	2	5	3.64	1.963	1	6
23. Soil management training for farmers on the plantation	4.39	0.916	3	5	4.64	1.748	1	7
24. Yearly percentage of vegetative soil cover on the plantation (%)	3.89	1.079	2	5	4.91	1.300	3	7
25. Type of tillage practices carried out by the plantation	4.00	0.686	3	5	5.18	2.000	3	7
26. Timing of treatment applications by the plantation	4.00	0.594	3	5	5.36	1.206	4	7
27. Ph of the soil on the plantation	3.89	0.583	3	5	5.45	1.572	2	7
28. Infiltration rate of the soil on the	3.78	0.548	3	5	5.00	1.265	3	7

plantation (mm/hr)								
29. Water logging of soils on the plantation	3.50	1.618	1	5	3.55	2.067	1	7
30. Depth of top soil on the plantation	3.67	0.907	2	5	4.36	1.502	2	7
31. Presence of soil erosion on the plantation	3.11	1.132	1	5	4.45	1.968	1	7
32. Presence of desertification on the plantation	3.28	1.364	1	5	3.73	2.370	1	7
33. Diversity of soil biota on the plantation	3.78	0.808	2	5	4.00	2.049	1	7
34. Number of water conservation practices carried out per year	3.61	0.979	2	5	4.45	1.809	1	7
35. Number of approved locations for wastewater discharge	4.11	1.278	1	5	4.73	1.489	2	7
36. Water conservation target of the plantation	3.94	0.998	2	5	5.36	1.120	4	7
37. Water management training for farmers on the plantation	4.11	1.231	2	5	5.64	0.809	5	7
38. Quantity of water used for irrigation per year (m3/year)	3.72	0.958	2	5	4.82	1.722	1	7
39. Depth of water table on the plantation	3.78	0.808	2	5	5.09	1.640	2	7
40. Ph of water bodies on the plantation	3.72	0.575	3	5	5.36	1.286	3	7
41. Turbidity of water bodies on the plantation	3.89	0.900	2	5	4.73	1.737	2	7
42. Nutrient content of water bodies on the plantation	3.56	0.922	2	5	5.00	1.414	3	7
43. Oxygen content of water bodies on the plantation	3.56	0.784	2	5	5.00	1.342	3	7
44. Diversity of protected species on the plantation	3.94	1.110	1	5	4.73	1.737	1	7
45. Species conservation target on the	4.28	1.179	2	5	4.27	1.849	2	7

plantation								
46. Species conservation practices carried out by the plantation	4.11	1.183	2	5	4.36	1.690	2	7
47. Presence of wildlife pathways on the plantation	4.72	1.127	2	5	4.64	1.690	2	7
48. Wildlife protection policy of the plantation	4.06	1.110	2	5	4.27	1.902	1	7
49. Diversity of crops on the plantation	4.17	0.618	3	5	4.91	1.868	1	7
50. Percentage of locally adapted crops produced on the plantation (%)	3.83	0.786	3	5	4.73	1.794	2	7
Economic Indicators								
1. Debt to total asset ratio of the business	3.22	0.878	1	5	4.36	2.014	1	7
2. Internal rate of return of the business	3.39	0.979	1	5	4.55	2.162	1	7
3. Annual business revenue	3.83	0.857	2	5	4.73	2.240	1	7
4. Annual business cost	3.61	0.778	2	5	5.55	1.508	3	7
5. Net income of the business	3.78	0.943	2	5	5.00	1.949	1	7
6. Return on investment of the business	3.72	0.895	2	5	4.73	2.328	1	7
7. Price determination of the business products	3.67	0.767	2	5	5.45	1.368	4	7
8. Company business plan	4.22	0.647	3	5	5.64	1.567	3	7
9. Annual yield of each business product (tonnes)	3.83	1.150	1	5	5.00	2.000	1	7
10. Business product diversification	3.78	0.943	1	5	4.91	1.300	3	7
11. No of procurement channels of the business to source different inputs	3.61	0.778	3	5	4.91	1.221	3	7
12. Percentage of input from each supplier	3.61	0.608	2	4	4.82	1.471	2	7
13. Number of actual and alternative buyers of the business products	3.67	0.907	1	5	5.09	1.758	2	7
14. Market stability analysis of the	4.11	0.900	2	5	5.18	1.471	3	7

business products								
15. Evidence of business tax reports	4.00	1.029	1	5	5.36	1.690	2	7
Social Indicators								
1. Monthly income of workers on the plantation	3.56	1.199	1	5	5.36	1.629	2	7
2. Total working time per week of plantation workers (hrs)	3.56	1.042	1	5	5.27	1.489	3	7
3. Total working days per year of plantation workers (days)	3.61	0.979	1	5	5.18	1.471	3	7
4. Provision of employment contracts to the workers by the plantation	3.50	1.098	1	5	5.09	1.700	2	7
5. Provision of a pension scheme to the workers by the plantation	4.11	1.183	1	5	4.36	2.335	1	7
6. Type of employment benefits provided by the plantation to the workers	4.06	0.873	2	5	5.45	1.572	3	7
7. Compliance of the plantation with regional labour laws	3.89	0.832	2	5	5.73	1.489	3	7
8. Availability of medical care facilities to the plantation workers	4.61	1.092	3	5	4.27	1.737	2	7
9. Access of plantation workers to safe drinking water	4.39	1.037	2	5	4.91	1.446	2	7
10. Annual number of worker accidents on the plantation	3.67	1.455	1	5	4.45	1.695	2	7
11. Emergency procedures set up by the plantation for the workers	4.33	1.029	3	5	4.82	1.662	2	7
12. Provision of workplace safety training by the plantation for the workers	4.44	0.984	3	5	4.64	1.502	3	7
13. Provision of sanitation facilities by the plantation for the workers	4.33	1.085	2	5	4.91	1.578	2	7
14. Provision of work equipment by the	4.39	1.037	2	5	5.64	1.206	4	7

plantation for the workers								
15. Provision of recreational facilities on work site by the plantation for the workers	4.17	1.383	2	5	3.73	1.489	1	5
16. Equal participation of plantation workers in training and skill development	4.06	0.539	3	5	4.73	1.348	3	7
17. Fair wages and allowances provided to plantation workers	4.11	0.900	3	5	4.91	1.446	3	7
18. Compliance of the plantation with the fair hiring regulations of the region	4.06	0.639	3	5	5.00	1.549	2	7
19. Type of training and development courses organized annually by the plantation for the workers	3.83	0.786	2	5	4.64	1.859	1	7
20. Number of workers that have attended training and development organized by the plantation	3.78	0.732	3	5	4.18	1.722	2	7
21. Number of workers showing understanding regarding training and development organized by the plantation	3.94	0.725	3	5	4.64	1.502	2	7
22. Number of regional employment opportunities provided by the plantation	4.17	0.786	3	5	5.00	1.342	3	7
23. Percentage of regional workers employed by the plantation (%)	4.50	0.857	3	5	5.73	1.104	4	7
24. Number of investments made by the plantation for community development	3.89	1.023	3	5	4.64	1.433	3	7
Governance Indicators								
1. Access rights of the plantation to the resources within the region	2.33	1.188	2	5	5.36	1.120	4	7
2. Mission statement of the business	2.72	1.018	3	5	4.27	1.794	2	7
3. Compliance of the business with the mission statement	2.72	1.127	2	5	4.36	2.111	2	7

4. Identification of the stakeholder connected with the plantation's operations	2.67	1.138	2	5	4.45	1.968	1	7
5. Engaging with the stakeholders connected with the plantation's operations	2.67	1.138	3	5	5.09	1.446	3	7
6. Effective participation of the stakeholders connected with the plantation's operations	2.83	1.150	2	5	5.00	1.483	3	7
7. Grievance procedures for plantation workers	2.83	1.098	1	5	4.91	1.814	1	7
8. Resolving conflicts with potential stakeholders	2.56	1.247	2	5	5.64	1.502	3	7
9. Evidence of holistic audits by government departments	2.17	1.249	3	5	5.18	1.601	3	7
10. Transparency regarding company reports and policies	2.67	1.138	3	5	5.27	1.555	2	7
11. Compliance of the business with the business operational laws of the region	2.89	1.079	2	5	5.00	1.732	2	7
12. Quality control reports for business products	2.50	1.150	2	5	4.64	1.804	2	7
13. Production quality practices carried out by business operations	2.78	1.114	2	5	4.82	1.537	2	7
14. Awareness of workers regarding product and production quality standards	2.50	1.200	1	5	5.27	1.272	4	7

Appendix 17: Space Recommendation Contract

SPACE RECOMMENDATIONS

REGIONAL SPACE COORDINATION AGENCY

SOUTHEAST MINAHASA DISTRICT

Reciting : Application letter from PT. Viola Fibers International Number 006 / ADM-JKT / VIII / 2017 dated August 29, 2017 regarding: Application for Disturbance Permit (HO), Building Construction Permit (IMB), Trading Business License (SIUP), Environmental Permit and **Location Permit**.

Weighing :

a. that the location of the plan for the development of cultivation of Abaca Banana fibrous crop shall be in accordance with the spatial layout in Southeast Minahasa Regency;
b. that for the suitability of the spatial designation for the development plan of Abaca Banana fibrous crop by PT. Viola Fibres International in Kecamatan Silian Raya, it has been discussed in the Regional Spatial Planning Coordination forum and has been agreed upon by observing and conducting the study of each Regional Device and related institutions;
c. based on the considerations referred to in sections a and b above, it is necessary to stipulate the spatial recommendations of the Regional Spatial Planning Coordinating Board.

Considering :

1. Law Number 26 Year 2007 on Spatial Planning (State Gazette of the Republic of Indonesia Year 2007 Number 68, Supplement to the State Gazette of the Republic of Indonesia Number 4725);
2. Law Number 26 of 2008 concerning National Spatial Planning (State Gazette of the Republic of Indonesia of 2008 Number 48, Supplement to the State Gazette of the Republic of Indonesia Number 4833);
3. Government Regulation Number 15 of 2010 concerning the Implementation of Spatial Planning (State Gazette of the Republic of Indonesia Number 21 of 2010, Supplement to the State Gazette of the Republic of Indonesia Number 5103);
4. Southeast Minahasa District Regulation Number 3 Year 2013 on Regional Spatial Plan of Southeast Minahasa District Year 2013-2033 (Regional Gazette of Southeast Minahasa Regency Year 2013 Number 71)

Noticing :

1. Permit of Foreign Investment Principle Number 1531/1 / IP / PMA / 2015;
2. Minutes of the Meeting of the Regional Spatial Planning Coordinating Board of Southeast Minahasa Number 002 / BA / BKPRD / MT / IX / 2017;
3. Recommendation of Regent of Southeast Minahasa Number 327 / BMT / XII-2015 regarding Land Recommendation for Cultivation of Fibrous Plant (Abaca Banana)

RESOLVING:

Enacting :

FIRST : Provide Spatial Recommendation to:

		Company name : PT. Viola Fibers International Company's address : Jl. Jend. Sudirman Kav. 52-53, SCBD Jakarta Selatan 12190 Type of business : Cultivation of Fibrous Plant (Abaca Banana) Location :Silian Raya Area of Location : 1509 Hectares (outside protected area)
SECOND	:	The recommended location is 1509 hectares outside the protected area and is in an area consistent with its designation under prevailing laws and regulations.
THIRD	:	The company must observe and carry out any technical review of the regional apparatus and relevant agencies based on applicable laws and regulations summarized in the Minutes of Regional Coordination Meeting of Southeast Minahasa Regency Coordinating Board No. 002 / BA / BKPRD / MT / IX / 2017 which is an integral part of this recommendation.
FOURTH	:	The company is required to have Location Permit, Environmental Permit, and other permits and non-licenses under applicable laws and regulations prior to carrying out the above-mentioned activities.
FIFTH	:	If the company violates the provisions as regulated in the prevailing laws and regulations, this recommendation shall be revoked and declared no longer valid.
SIXTH	:	This recommendation shall come into force on the date stipulated in the event that should there be an error in the future there shall be an appropriate amendment.

Set in Ratahan
On the Date of September 19th 2017
REGIONAL SECRETARY
AS HEAD OF REGIONAL SPACE COORDINATION AGENCY
SOUTHEAST MINAHASA DISTRICT

Ir. FARRY F. LIWE, MSc
Major Superintendent
NIP. 19580215 198907 1 001

Copy of the letter was delivered to:

1. Regent of Southeast Minahasa
2. Deputy Regent of Southeast Minahasa

3. Director of PT. Viola Fibres International
4. Archive

Appendix 18: Company Rules

COMPANY RULES

1. Working hours that apply to employees:
   - Working hours : 06:00 – 14:00 WITA
   - Break hour : 10:00 – 11:00 WITA
2. All employees are required to attend the time of entry and return or under certain conditions such as permission.
3. Tolerance for delay is 5 minutes after the hour of entry, if more than that then the wage will be deducted by 15%. Likewise with the time to go home from work, if leaving the office less than the hour of departure, the specified amount will be deducted by 15%.
4. Every employee who leaves office during working hours without the permission of the company, the proportional wage of his/her working hours will be recalculated.
5. If an employee does not enter work due to illness more than 1 day, he / she must send a certificate from the doctor.
6. Every employee whose permit is not entered (with the permission of the company), then the wages to be paid is a daily wage without lunch money.
7. Every employee who does not enter work without prior notice will not be paid in full and considered absent
8. Every employee who will carry out overtime work in accordance with the orders of the employer is required to make an overtime warrant.
9. Leaving the place of duty for personal use should only be done during break hour.
10. Employees who get an assignment for operational purposes must request a letter of assignment, negligence in implementing this provision may be subject to disciplinary action.
11. All permission forms submitted by each employee will be considered for their purposes, the company reserves the right not to grant the proposed permission if it is deemed improper for its purposes or reason.
12. Employees who leave the assignment without applying for permission and without being approved will be considered absent with the result that employee work attendance allowances will not be taken into account, the attendance allowance and basic salary will be deducted.
13. Every employee who often does not work for reasons of illness, the company will submit an alternative resignation for the health of the employee concerned and for the smooth operation of the work and the company.
14. The company will take a disciplined attitude in the form of verbal, written, and termination of employment to employees who commit violations such as:
    a. Carry out both direct and indirect actions that may lead to actions that contain criminal elements, such as fighting, torture, theft, embezzlement, threats, incitement, sabotage, or drinking and drug abuse.
    b. Divulge of company secrets.

c. Negligent in every job instructed
d. Undermine company inventory
e. Conduct actions that clearly violate the company's provisions regarding discipline and rules and the company's code of ethics, the company will provide administrative sanctions as follows:
    - verbal warning
    - written warning
    - demotion.
    - work termination.
f. For the first Warning Letter will be imposed sanction of wage cuts of 5% and for the second warning will be imposed sanctions deduction of 10%

PT. VIOLA FIBRE INTERNATIONAL

Knowing,

Ir. M. Saleh Ibrahim.
General Manager

Southeast Minahasa Manpower Office