

# MASTER'S THESIS

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A qualitative study on how global management can contribute to smart rural development: The case of sustainable aquaculture production by LAMTIB in Singapore.

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## Sammendrag

Denne masteroppgaven i global ledelse undersøker komplekse utfordringer med fattigdom og matsikkerhet i sammenheng med smarte byer og smarte landsbyer. Studien undersøker hvordan global ledelsesteori effektivt kan integrere moderne smart by-teknologi for å legge til rette for bedre matsikkerhet og bærekraftig vekst i smarte landsbyer. LAMTIB, en norsk stiftelse basert i Singapore, brukes som case-bedrift for å få praktisk innsikt. Innledningsvis diskuteres utfordringene med matsikkerhet og belastningen på naturressursene som forårsakes av dagens matproduksjonsmetoder. Deretter presenteres en potensiell løsning der akvakultur kan utnyttes ytterligere for å skape en mer bærekraftig matproduksjon. Akvakultur ble også valgt som tema fordi LAMTIB har et porteføljeselskap kalt Gaia Mariculture, som fokuserer på å skape bærekraftige matproduksjonssystemer med akvakultur.

Gjennom et eksplorativt forskningsdesign med kvalitativ metode, kombinerer oppgaven primærdata fra dybdeintervjuer samt interne og eksterne sekundærdata. Litteraturgjennomgangen ble brukt for å finne mangler i litteraturen, gi leseren en oversikt over allerede skrevet litteratur og etablere et grunnlag for å forstå smarte byer, smarte landsbyer og matsikkerhet i disse sammenhengene. Det teoretiske rammeverket forklarer global ledelse teori og hvordan den henger sammen med globalisering og andre globale trender. Teorikapitlet er deretter delt inn i to underavsnitt av global ledelsesteori med fokus på bærekraftig ledelse og tverrkulturell ledelse, som LAMTIB kan benytte seg av i framtiden.

Funnene fra analysen og diskusjonen av primær- og sekundærdataene, fører til flere anbefalinger for LAMTIB og hvordan de kan bruke global ledelsesteori for å nå sine mål. Disse anbefalingene og svarene på forskningsspørsmålene skisseres avslutningsvis med anbefalinger for videre forskning. Konklusjonen av forskningen understreker viktigheten av å fremme samarbeid med globale og lokale interessenter. Samt bruke ulike strategier for kulturell ledelse for å forstå ulike kulturer bedre, og danne partnerskap med samfunnsansvarlige selskaper. Oppgaven foreslår også å fremme investeringer i infrastruktur på landsbygda for å øke matsikkerheten i både rurale og urbane områder og fremme bærekraftig og inkluderende økonomisk vekst.

**Nøkkelord:** Akvakultur, Bærekraft, Matsikkerhet, Smarte landsbyer, Smarte byer

## Preface and Acknowledgements

This master's thesis marks the end of my studies at Handelshøyskolen at Nord University, Bodø. I want to take this opportunity to thank the people who have contributed or helped me during the writing process of this master's thesis in Global Management.

My gratitude to the Edu smart project and Masterfondet at Nord University for supporting me financially and making it possible for me to travel to Singapore to conduct in-depth interviews and observe and experience different smart city initiatives first-hand.

I want to thank Tom Preststulen for making the trip to Singapore possible. He taught me valuable insights about the world, seaweed, and smart villages. He also gave me access to many interesting people in Singapore and allowed me to gain interesting data for my thesis. I would also like to thank Alan Lee for allowing me to join different excursions to Malaysia and Indonesia. He also thought about how smart city technology can be implemented in rural villages and how to cultivate seaweed that can be a breakthrough product for food production and CO<sub>2</sub> Capture.

Throughout this semester, one person has been of immense help to me and whom I want to thank. My advisor Andreas Raspotnik has guided me through the task and given me assistance, constructive criticism, and support during this process. I also want to thank Evgenii Aleksandrov for providing me with guidance in the world of smart city literature.

Lastly, I am grateful for those who have offered me support and contributions by correcting and proofreading the contents of the thesis.

I genuinely hope that you, the reader, appreciate and enjoy reading this master thesis. Hopefully, it can motivate others to conduct a similar study in the future.

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*Trondheim 23<sup>rd</sup> of May 2023*

## **Abstract**

This master's thesis in Global Management examines the complex challenges of poverty and food security within the context of smart cities and smart villages. The study investigates how global management theory can effectively integrate modern smart city technology to facilitate sustainable growth in smart villages and improve food security. LAMTIB, a Norwegian foundation based in Singapore, is utilised as a case company to gain practical insights. The introduction of the thesis discusses the current challenge of food security and the strain on natural resources caused by current food production methods. The thesis then presents a potential solution where aquaculture could be further utilised to create more sustainable food production. The aquaculture focus was also chosen because LAMTIB has a portfolio company called Gaia Mariculture that focuses on creating sustainable food production systems in rural areas with sustainable aquaculture.

Through an exploratory research design with qualitative methods, the thesis combines primary data from in-depth interviews and internal and external secondary data. The literature review aims to find a gap in the literature, give the reader an overview of the already-written literature, and establish a foundation for understanding smart cities, smart villages, and food security in these contexts. The theoretical framework explains global management theory and how it is interlinked with globalisation and other global trends. The theory chapter is then divided into two subsections of global management theory focusing on sustainable management and cross-cultural management, which LAMTIB can apply.

The findings from the analysis and discussion of the primary and secondary data lead to several recommendations for the case company and how they can use global management theory to achieve their goals. These recommendations and answers to the research questions are outlined in conclusion with recommendations for further research. The thesis emphasises the importance of promoting collaboration with global and local stakeholders, using cultural management strategies to understand different cultures better and forming partnerships with socially responsible companies. It also suggests promoting investments in rural infrastructure to increase food security in rural and urban areas and promote sustainable and inclusive economic growth.

**Keywords:** Aquaculture, Food security, Smart cities, Smart villages, Sustainability

## Table of Contents

Sammendrag .....	i
Preface and Acknowledgements .....	ii
Abstract .....	iii
Table of Contents .....	iv
List of tables .....	vi
List of Figures .....	vi
List of appendixes .....	vi
Abbreviations .....	vii
1.0 Introduction .....	1
1.1 Background .....	1
1.2 Objective of the Thesis.....	6
1.3 Research Questions .....	9
1.4 Research Philosophy .....	10
1.5 Research Design.....	10
1.6 Outline of the Master Thesis .....	11
2.0 Literature Review .....	11
2.1 Smart Cities .....	12
2.2 Smart Villages .....	15
2.3 Food Security in Smart Cities / Villages.....	19
2.4 Literature Review Summary .....	21
2.5 Research Gap.....	21
3.0 Theoretical Framework .....	22
3.1 Sustainable Management.....	25
3.2 Cross-Cultural Management.....	28
3.2.1 Geert Hofstede's Cultural Dimensions .....	29
3.2.2 The Lewis Model.....	31
3.3 Summary of Theoretical Framework Chapter.....	32
4.0 Methodology .....	33
4.1 Data Collection.....	34
4.1.1 Primary Data.....	34
4.1.2 Secondary Data.....	34
4.1.3 In-depth Interviews.....	34

4.2 Data Analysis .....	35
4.2.1 Reliability .....	35
4.2.2 Validity & Generalisability .....	36
4.2.3 Overall Ethical Assessment.....	36
5.0 Results .....	37
5.1 Findings.....	37
5.2 Summary of the Findings .....	43
6.0 Discussions.....	44
6.1 Sustainable Management.....	46
6.2 Cross-cultural Management .....	49
6.3 Summary of the Discussion.....	53
7.0 Conclusion.....	54
7.1 Answering the Research Questions.....	54
7.2 Final Remarks and Recommendations for the Case Company .....	58
7.3 Recommendations for Further Research .....	59
8.0 Reference List.....	60
9.0 Appendixes.....	77
9.1 Appendix A – Sikt Approval.....	77
9.2 Appendix B – Interview Guide .....	78
9.3 Appendix C – Overview of the primary data gathering .....	85
9.4 Appendix D – Overview of why the Informants are relevant for the thesis. ....	85

## **List of tables**

**Table 3.1** – Explanation of Geert Hofstede's six dimensions of cultural differences

## **List of Figures**

**Figure 1.1** – Overview of the use of resources to produce different food sources

**Figure 2.1** – Conceptual model of how smart cities work with stakeholders

**Figure 2.2** – Benefits of living in a smart village and the importance of ICT

**Figure 2.3** – LEADER Approach by EU to create sustainable rural development

**Figure 3.1** – Different types of impact investing

**Figure 3.2** – Hofstede's cultural dimensions

**Figure 3.3** – Richard D Lewis cultural dimension model

**Figure 4.1** – The Research Process

## **List of appendixes**

**Appendix A** – Sikt approval

**Appendix B** – Interview guide

**Appendix C** – Overview of the primary data gathering

**Appendix D** – Overview of the Informants and their relevance to the thesis

## **Abbreviations**

**CSR:** Corporate Social Responsibility

**EU:** European Union

**GDP:** Gross Domestic Product

**GDPR:** General Data Protection Regulation

**GHG:** Greenhouse Gas

**HIC:** Hatchery In Container

**ICT:** Information and Communications Technology

**IMF:** International Monetary Fund

**IMTA:** Integrated Multi-Trophic Aquaculture

**LAG:** Local Action Group

**LAMTIB:** Leapfrogging Autonomous Micro-Technopolis in Boxes

**LEADER:** "Liaison Entre Actions de Développement de l'économie Rurale"

**MNC:** Multinational Corporation

**NGO:** Non-Governmental Organisations

**R&D:** Research and Development

**SDG:** Sustainable Development Goals

**SFA:** Singapore Food Agency

**UN:** United Nations

**WEF:** World Economic Forum

**WTO:** World Trade Organisation



## **Glossary of concepts**

**Aquaponics:** This is a sustainable method of food production that combines aquaculture (fish farming) with hydroponics (the cultivation of plants in water).

**Biosphere:** The portion of the Earth's surface and atmosphere where life exists. It includes all living organisms and their interactions with the physical environment.

**Food security:** Refers to the state of having reliable access to enough nutritious food. That includes physical access to food and the ability to afford it.

**Rural development:** Improving the economic situation and the life quality of humans living in rural areas.

**Seaweed:** Algae that grow naturally in the ocean but can also get cultivated in sea farms. Seaweed gets used in Asia as a food source for humans and animals. In addition, it can get used in various industrial and agricultural applications.

**Smart City:** There are some disagreements and several different definitions. However, a simplified definition is: A smart city is a city that uses advanced technology and data to improve the quality of life for its citizens. That can include efficient transportation systems, smart energy grids, waste management, and connected IoT devices that help people stay informed and connected.

**Smart villages:** There are some disagreements and several different definitions. However, a simplified definition is: Smart villages are rural communities that use technology and innovation to improve their quality of life, including renewable energy sources, mobile healthcare services, sustainable food production and access to information and education through digital technologies.

**SFA's Grown overseas strategy:** Singapore Food Agency's Grown overseas strategy is a government-funded program for Singapore to build strategic relations globally with the government and countries to create better food security and export urban food production solutions created in Singapore.

## **1.0 Introduction**

### **1.1 Background**

On the 15<sup>th</sup> of November 2022, the population rose to eight billion people (UN, 2022b). This population growth results from modern medicine, urbanisation, lower mortality, and increasing life expectancies. According to the United Nations (UN), the Earth will reach a population of around 10.4 billion in 2100 (UN, 2022c), which is a large number of people considering the planet's limited resources. However, large parts of this population live in a society with an economic system that increasingly uses the world's resources to create economic growth. For recorded history, this economic growth has increased with population growth, and the gross domestic product (GDP) per capita has also grown with the population (Peterson, 2017). The GDP growth has created a better standard of living for more people. However, this growth has also increased consumption, contributing to climate change by burning fossil fuels and producing new products (De Juan et al., 2022). Even though historically, more people are getting out of poverty due to this economic growth. However, approximately 2.2 billion people live without safe drinking water (WHO & UNICEF, 2019). There are also still 648 million people that live below the poverty line of \$2.15 per day, and the recent pandemic made the most significant setback in that stat for several decades (World Bank, 2022a).

The growing consumption and emission of CO<sub>2</sub> by humans, mainly in industrialised countries, creates an unpredictable future for people living in less developed countries and rural villages. According to the Institute for Economics and Peace, it gets estimated that 1.2 billion people will need to migrate from their home country by 2050 due to climate change and natural disasters (McAllister, 2023). This is because these countries are more prone and vulnerable to climate change. Their food security depends mainly on agriculture, where there are risks of extreme weather events, such as floods, droughts and changing rainfall patterns that can reduce crop productivity. According to the international fund for agricultural development, more than 70% of the most impoverished people in the world live in rural areas. Around 500 million smallholder farms are estimated to produce 80% of the food consumed and support the food security of almost 2 billion people in Asia and Sub-Saharan Africa (FAO, 2015).

According to the UN, one of the biggest future challenges is creating food security and a world free of hunger (UN, 2023). Right now, the world is producing enough food for ten billion people, but there are still 828 million people affected by hunger in 2021 (WHO, 2022). With

today's population growth and the desire for economic growth, there is a need to start looking at what can change in the context of food production and security. Food production is one of the biggest emitters, with 26% of Earth's greenhouse gas (GHG) emissions (Poore & Nemecek, 2018). That is a substantial number and problematic considering, according to Safdie (2023), that around 30% of food produced gets wasted or lost yearly. Moreover, global food waste has a substantial environmental impact and accounts for considerable GHG emissions and wasted natural resources. According to Scialabba et al. (2013), if food waste were a country, it would be the world's third biggest emitter of CO<sub>2</sub> in the world. So, a systematic change where humans use the shared natural resources more efficiently is needed to find new ways to feed people that can also be more environmentally friendly.

The World Economic Forum (WEF) explains that the world's current food system is intertwined with the global climate crisis and that there is a need to strengthen world food security sustainably. One of the solutions the WEF comes up with is that there is a need for more global cooperation to tackle this challenge. This shows that the current challenges facing the world and humanity require effective and competent global management. There is a need for visionary managers who can inspire and create change and achieve a sustainable future for all species. There is also an urgent need for global management that creates cross-cultural understanding and encourages a sense of environmental responsibility in all parts of the world. This is essential to ensure food security and a functioning biosphere for future human generations and all other species that depend on the biosphere for survival. The WEF article also explains that if the world fails to tackle these problems collectively through global partnerships to transform the food systems humans currently have, there is a growing risk of failing to deliver on the Sustainable Development Goals (SDG) and climate commitments by 2030 (WEF, 2022).

In accordance with the SDGs, all 193 member nations of the UN agreed in 2015 to work actively with 17 different SDGs and 169 targets (UN, 2015). The SDGs build on the earlier established Millennium Development Goals (MDGs) but are more comprehensive in scope, covering economic, social, and environmental dimensions of sustainable development (Kumar et al., 2016). Creating a comprehensive plan to build a global partnership for sustainable development dates back to the Earth Summit in Rio De Janeiro in 1992, where 178 countries adopted Agenda 21, which was a non-binding action plan for the 21st century created a plan for sustainable practices to ensure the well-being of present and future generations. That led to the creation of the UN Commission on Sustainable Development, a global partnership to try to improve the

life quality for humans and protect the Earth's environment (Jarvie, 2016). The modern SDGs aim to end poverty and hunger, protect the planet, and sustainably ensure everyone enjoys peace, equality and prosperity. They are based on the principle of leaving no one behind, recognising that achieving sustainable development requires addressing the needs of the most vulnerable and marginalised populations. That includes women, children, people with disabilities, and impoverished people. The implications of the SDGs for the world and the less fortunate are significant. The SDGs also provide a shared vision and a framework for action for governments, global managers, civil society, and the private sector to work together to address some of the world's most pressing challenges today.

There is still considerable progress that needs to be made if these targets and related milestones are to be met by 2030. However, these goals and the work towards them are essential for creating a more sustainable future for the ecosystems and giving all of Earth's species basic needs such as clean air, water and food. According to a report by IPBES (2019), several ecosystems are suffering, and species are declining globally at an unprecedented rate in human history due to GHG emissions. To set that into perspective, humans are only 0.01% of the global biomass of life, and there would have to be 70.000 billion humans to equal the Earth's collective biomass (Ritchie, 2019). However, although humans make up a small portion of the entire Earth's biomass, they are the ones who are now destroying the biomass for the remaining species through over-consumption and GHG emissions.

The current consumption has resulted in humans living in an overshoot situation since 1970 (McBain, 2017). That means that currently, more resources get used than Earth's biocapacity can reproduce, and humans are endangering the whole biomass on Earth because of their consumption (WWF, 2022). This situation paints a bleak picture of the future, and if today's development continues, humanity will collapse from its consumption and desire for further economic growth. There is only one planet known to sustain human life therefore, it is necessary to change how people live and consume. There is a need for a new industrial era in which economic prosperity coexists with environmental and social sustainability and where there is sustainable and reliable food security for all.

Food security with zero hunger is among the most critical SDGs because ensuring food security gives individuals access to sufficient, safe, and nutritious food for a healthy and productive life. Access to food is a human right, and the lack of access to food can create malnutrition, hunger,

and health problems. Additionally, food insecurity can result in broader consequences for society and the economy, such as increased healthcare costs and social unrest. In short, food security is essential for the well-being of individuals, communities, and nations globally. Food security is also crucial to sustainable development, reducing poverty, and promoting social and economic stability. As motioned in the introduction, 70% of the poorest people in the world live in rural areas, where most of them rely on traditional farming techniques, which can get seen as inefficient and very taxing on natural resources. There is also a growing fear of crop failure due to climate change, and according to Zilberman et al. (2018), there is a need to innovate and adapt to climate change to avoid starving in the future.

There is a growing concern about food security and climate change-influenced crop failure (World Bank, 2022b). One of the solutions can be the ocean, which covers about 70% of the Earth's surface and contributes to almost half of the global biological production. Despite the enormous size of the ocean, humans only get 2% of their calories and 15% of their protein from this source (European Commission et al., 2017). Aquaculture can be a part of the solution to increase sustainable food production. To give a simplified overview of how food production in aquaculture differs from other traditional protein sources regarding sustainability, Figure 1.1 shows the CO<sub>2</sub> emissions and how much resources such as water and feed are needed to produce these various food sources in Norway.






					
<b>CO<sub>2</sub> Emissions</b> (Measured in kg CO <sub>2</sub> / kg edible parts at slaughter)	-0,12 KG	2,9 KG	3,4 KG	5,9 KG	30 KG
<b>Consumption of Water</b> (Measured in liters/ Kg of edible parts at slaughter)	N/A	1.400 L	4.300 L	6.000 L	15.400 L
<b>Yield with 100 kg of feed</b> (Measured in % of how much is edible after slaughter)	N/A	57 KG	21 KG	17 KG	4-10 KG
<b>Yield</b> (Measured in % if how much are edible parts after slaughter)	100%	68%	46%	52%	41%

Figure 1.1 - Overview of the use of resources to produce different food sources. Data source: (Winther et al., 2009) & (Duarte et al., 2017)

As shown in Figure 1.1, humans currently use many of the world's resources to feed livestock for products and food. Moreover, according to this table, fish production and seaweed are more sustainable ways of producing food and give us the best utilisation of feed resources. For

example, seaweed only requires sunlight to grow, making it an efficient and low-maintenance aquaculture product that does not need fresh water, fertilisers, or pesticides. Seaweed also has the potential to capture carbon if processed correctly and can be used for various purposes such as human consumption, animal feed, and biofuel production. Seaweed is a fast-growing component of global food production. It can potentially contribute to reducing emissions from agriculture by improving the soil, substituting synthetic fertilisers, and lowering methane emissions (Duarte et al., 2017). Fish production can also be a more sustainable way of producing food than other food sources. Due to the traditional fishery in rural areas and the growing concern about overfishing, there is a need for new technology that will create more sustainable methods of producing fish that relies on something other than wild fish populations. However, it is important to note that not all forms of aquaculture are sustainable, and poorly managed aquaculture operations can negatively impact the environment, such as pollution and habitat destruction. Therefore, it is crucial to ensure that aquaculture is carried out responsibly and sustainably (Ozbay et al., 2014).

One potential solution to the complex challenges surrounding food production and security is the concept of smart cities and their possibility to create a sustainable food security (Amorim et al., 2019). The smart city is an urban concept, but its rural counterparts, called smart villages, are also a growing concept that builds on smart city technology and sustainable planning in rural areas. The concept of these innovative communities regarding food security is to utilise technology to create better food production in a more environmentally friendly way. For instance, smart cities can use information and communications technology (ICT) to improve the food supply chain and create new urban farming techniques that reduce waste and create better food security (APEC, 2019). On the other hand, smart rural villages can supply smart cities with food and produce more food considering fewer land constraints. Smart villages can also use smart city technology and new farming technology to better create sustainable food security for themselves (Davies & Garrett, 2018). In addition to the possibility of creating better food production and food security, smart cities and villages can create a better quality of life for their citizens. By adopting new technologies and clean energy sources that are more environmentally friendly, it is possible to reduce greenhouse gas emissions and create more liveable communities for all (Srivastava, 2022).

Based on Earth's current situation, stopping climate change may be impossible. However, there is still a window of opportunity to mitigate the most severe consequences that could result from

it (Arasu, 2022). According to a survey done by the WEF, more than 50% of adults say that climate change has had a severe impact on their lives, and 70% of them expected that climate change could affect their home country within the next ten years. This situation shows how more people have woken up to the fatal consequences the Earth and humanity could suffer if nothing gets done. With the SDGs, the UN wants to shift to sustainable development and create a better and more environmentally friendly future. Although the SDGs are a good and well-intentioned framework for global cooperation to solve some of the most pressing issues, it appears that the UN and its member states lack implementation capacity and a solution to solve some of these complex issues. The UN Secretary-General António Guterres said during an SDG progress report meeting in 2023 that the progress of the SDGs is not going as planned. Only 12% of the targets are currently on track, and the world community has stalled or gone into reverse on more than 30% of the SDGs in the last couple of years (Guterres, 2023). Therefore, understanding how humans can better cooperate globally to solve humanity's common problems is necessary. This is why this thesis will focus on creating better global cooperation with global management theory while creating a more sustainable Earth and food security.

## **1.2 Objective of the Thesis**

This master's thesis in Global Management is a qualitative case study that wants to discover how global management theory can get used to create a better and more sustainable future regarding food security. A potential solution is outlined above, where the creation of smart cities and smart villages can create more sustainable and environmentally friendly food production. Several in-depth interviews were conducted to understand this solution and how creating smart cities can help food security and sustainable growth. The interviews occurred in Singapore and the neighbouring countries Indonesia and Malaysia. In addition, some in-depth interviews took place in Norway. However, the main primary data gathering happened during the stay in Singapore, which is considered one of the most innovative cities in the world (McDonald, 2021).

The reason behind going to Singapore was to obtain data and understand its history, what they are currently doing and what can get taught from Singapore's experience as a smart city. The government of Singapore has also been actively creating different initiatives and policies to encourage sustainable growth and development. The country has successfully implemented sustainability measures and smart city technology. Several other countries are looking to them for advice and guidance (Mai, 2022). However, Singapore is a tiny city-state that has faced

several challenges, such as land and labour constraints, leading to a situation where the country is currently importing around 90% of its food supply and is dependent on other countries for food security. This is a vulnerable situation, so one of the initiatives Singapore is currently pursuing is its grown oversea strategy created by the Singapore Food Agency (SFA). This initiative aims to work more closely with global partners and neighbouring countries to secure Singapore's food security and export their urban food solutions developed in Singapore (SFA, n.d.). The data-gathering trip to Singapore generated practical insights into how smart city technology can create more sustainable food production. For example, Singapore currently produces around 10% of its food, with only 1% of the country being farmland. The country also uses rooftops to farm food and technical advances, such as vertical farms and aquaponics, to enhance its food security (MacKenzie, 2022). During the initial data gathering in Singapore, contact was established with a Norwegian foundation called Leapfrogging Autonomous Micro-Technopolis In Boxes (LAMTIB), which later became the case company for this thesis.

LAMTIB is a foundation based in Singapore and Oslo. The foundation focuses on sustainable innovation and technology. The goal is to push these technologies from smart cities to empower lives in less privileged and rural communities by creating smart villages. LAMTIB aims to create smart villages with smart city technology, such as cheap and reliable clean energy sources, to gain access to water, sanitation, and food security while giving these areas access to healthcare and education. Furthermore, the foundation wants to use climate-proof mobile containers with clean energy and ICT to create small-scale businesses that can use untapped human and natural resources and improve life quality. To make these ideas possible, LAMTIB has different industry partners that provide other smart cities technology services, such as solar power and saltwater desalination. Moreover, LAMTIB is working towards SDG 17, actively seeking partners to collaborate on the different SDGs (LAMTIB, 2020).

LAMTIB has a portfolio company called Gaia Mariculture which is engaged in aquaculture and sustainable food production that focuses mainly on seaweed production and blue swimmer crabs. Gaia Mariculture has made some aquaculture solutions in Singapore that can be implemented in rural areas, such as hatchery in container (HIC) for micro-sea farms and seaweed production, which increases environmentally friendly production through Integrated multi-trophic aquaculture (IMTA). This solution can also be considered a circular economy approach where one specie's waste is a valuable nutrient for another. This shift towards efficient high-tech farming can help to create environmentally friendly food security by providing



sustainable growth and income while consuming fewer natural resources. Gaia Maiaculture is an essential part of LAMTIB because the company can be a supplier of small-scale businesses and give rural villages the potential to sell products and give people work to get out of poverty (LAMTIB, 2020). LAMTIB was selected as a case company for this thesis because the foundation wants to create food security and smart villages by using current smart city technology to help the underprivileged out of poverty and actively work on several SDGs. LAMTIB has also done a pilot project in the Philippines in collaboration with Red Cross Philippines. The project aims to provide clean energy in the form of solar power and ICT systems for communications to rural off-grid communities in the country. The project got designed to improve connectivity, food security, education, healthcare, and small-scale business in the Philippines (UN, 2018). Figure 1.2 shows the operational framework of LAMTIB and how the company wants to operate and use clean energy and ICT technology to help these underprivileged communities to create small-scale businesses.

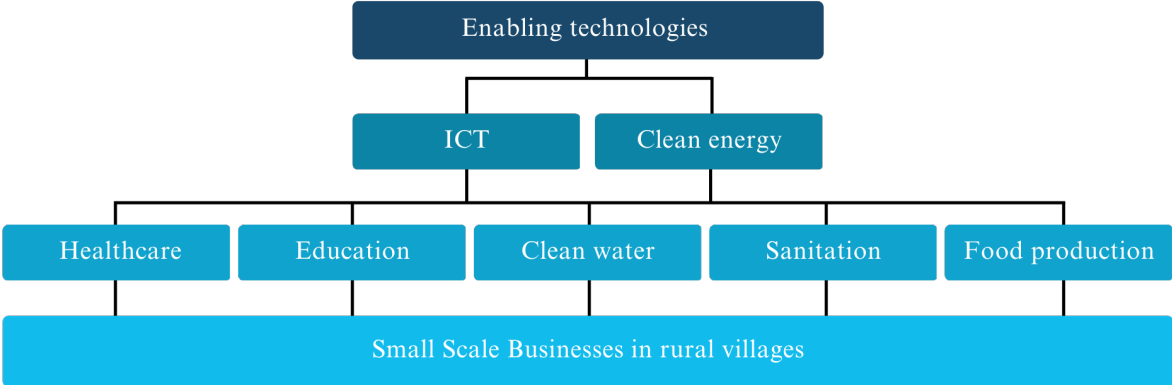


Figure 1.2 - Operational framework of LAMTIB Source: (LAMTIB, 2023)

During the data-gathering period in Singapore, different field trips got conducted to Malaysia and Indonesia with LAMTIB and Gaia Mariculture. The goal of the trips was to find production sites for seaweed and visit a potential smart village in rural Indonesia. These trips provided insight into the cultural differences and access to people for conducting in-depth interviews. The observations during the trips made it easier to understand the challenges and challenges facing LAMTIB when implementing smart city technology in rural areas to create smart villages. During these trips and conversations with people working at LAMTIB and Gaia Mariculture, a discussion arose regarding managing the company and stakeholders globally while implementing smart city initiatives in rural villages. For example, during the trip to a rural village in Indonesia, the researcher got a clear view of the cultural differences and how the rural village had a distinctive culture and way of life that was far different from industrialised countries such as Singapore. This observation revealed a research gap, which will

be explained more thoroughly in the literature review, where the current literature about smart cities, villages and food security is discussed.

Furthermore, this thesis is limited to food security in smart cities and rural villages and the smart city technologies connected to creating food security. As mentioned above, there should be better utilisation of the ocean because traditional agricultural production imposes a heavier burden on natural resources than aquaculture, as shown in Figure 1.1. The decision to focus the research on aquaculture also comes from the collaboration with Gaia Mariculture. This LAMTIB portfolio company is dedicated to developing aquaculture production systems for smart villages. Since this is a master's thesis in social science and not a formal or natural science, no financial or biological research will get made. It also should be mentioned that this master's thesis is limited to only using a single case company and not a comparative analysis of several case companies. This choice got made to understand better the challenges LAMTIB has ahead in terms of global management, sustainable development, and cross-cultural cooperation. Using a single case study also allows the researcher to create a better understanding and more in-depth analysis of the case (Gustafsson, 2017). This decision was made because of the broad strategy of LAMTIB, which wants to collaborate or create companies in several industries. This decision was made because only a few companies worldwide can be compared in a comparative analysis with LAMTIB. That is because the foundation's primary goal is not to create profit for its shareholders but to create global cooperation for a better future for underprivileged people in rural villages.

### **1.3 Research Questions**

Based on the brief analysis in the introduction and the research gap outline in the literature review in the next chapter, this thesis in global management aims to answer the following research question:

***How can global management be used to promote sustainable growth, enhance food security, and support implementing smart city initiatives in smart villages?***

The following sub-questions have been formulated to address this issue in more detail:

1. What are the current challenges and opportunities for using smart city technology to enhance food security?

2. What sustainable aquaculture solutions can enhance food security and reduce the negative impact of human activities on the environment?
3. How can global management theory be used to coordinate different actors and stakeholders to promote sustainable growth, enhance food security, and support smart city initiatives?

#### **1.4 Research Philosophy**

Research philosophy is crucial in determining the outcome of a study, as it guides the research design and data collection. (Saunders et al., 2019) emphasise the importance of understanding research philosophy when designing a research project. Different research philosophies, including positivism, interpretivism, pragmatism, postmodernism and critical realism, have unique perspectives on the goal and process of the research (Saunders et al., 2019). The chosen research philosophy should align with the study's problem definitions and the data studied. In addition, the research philosophy should also align with the problem definitions of the study and the type of data getting studied. This master thesis has an interpretivism research philosophy that believes the social world is subjective and constructed through people's interpretations and meanings. This philosophy emphasises the importance of understanding an individual's subjective experiences and perspectives and asserts that social reality gets created through interaction and communication. In projects where this research philosophy gets utilised, the researcher's role is not to test hypotheses but to engage in an interpretive process of understanding and uncovering the meanings and perspectives of the participants. In-depth interviews provide a rich data source for interpretivism research, allowing the researcher to understand the experiences and views of the participant's (Saunders et al., 2019).

#### **1.5 Research Design**

The research design is vital in establishing the approach for analysing and solving the overall research question and filling the research gap. It is, therefore, essential to choose a suitable research design. Research design can also be defined as the strategy that lays out the principles of the research methodology for a given study (Easterby-Smith et al., 2021). This master thesis will use an exploratory design with a qualitative method where the primary data will get gathered through in-depth interviews. The exploratory design was selected because this research design is most suitable when the researcher has limited knowledge about the study

field and aims to gather initial information and insights to answer the problem definition more clearly. The design allows the researcher to go more in-depth into the single case company and understand their problems and challenges concerning using global management theory. Moreover, exploratory research design allows the researcher to collect primary and secondary data (Gripsrud et al., 2016). When using this design, the researcher can review the existing literature and data on the topic to gain a broad understanding of the current state of knowledge and identify gaps that need to be filled. After this, the researcher interviewed relevant individuals with experience or expertise to gain a deeper understanding. A literature review and in-depth interviews provide a comprehensive, qualitative approach to exploring a research problem and generating ideas for further investigation.

### **1.6 Outline of the Master Thesis**

The outline of this master thesis will follow a systematic approach to help organise the research. The introduction chapter (Chapter One) will provide the reader with a background and actualisation of the problem, set the stage for the research question, and introduce the case company used in the thesis. The literature review chapter (Chapter Two) will examine existing literature to explain further the research gap outlined above in Subsection 1.2. The literature review will also be used to create an understanding of the already written literature about the topic. The theoretical framework chapter (Chapter Three) establishes the theoretical background for the study with the use of theory learned by the researcher during the master studies at Nord University. The methodology chapter (Chapter Four) outlines the research process and the data collection. The results chapter (Chapter Five) presents the empirical data and lays the foundation for the discussion chapter. The discussion chapter (Chapter Six) discusses the findings in relation to the theoretical framework and literature review. Finally, the conclusion chapter (Chapter Seven) summarises the main findings and implications, answers the study's research questions, and provides recommendations for the case company and future research. This structure helps ensure the research is rigorous and comprehensive while making the thesis well-organised.

## **2.0 Literature Review**

The literature review will highlight the key findings of already written literature and find opportunities for further research. This chapter is based on forty-five different sources that are reviewed to find out more about the topic and whether the research gap outlined in the scope of

the thesis in Subsection 1.2 is valid. In recent years the concept of smart cities has gained substantial attention from policymakers, city planners and citizens. The goal is mainly to find solutions that address the challenges of urbanisation, sustainability, and economic development in a city where the focus is on the citizen's quality of life. Several definitions of a smart city will be looked at during this chapter as well as the origin. However, smart cities are not limited to urban areas alone. The idea of smart villages has emerged to harness the benefits of smart city technologies in rural areas. In addition, the importance of food security in smart cities and rural areas has also gained significant attention. Therefore, this chapter will be divided into three parts that provide a literature review on these three key topics:

1. Smart cities
2. The concept of smart villages
3. Food security in smart cities and smart villages.

## **2.1 Smart Cities**

Urbanisation has existed globally for centuries but has increased rapidly in recent years. This has resulted in numerous benefits for those moving to cities, such as better education, healthcare, and job opportunities. At the same time, urbanisation also brings various challenges, including environmental damage, depletion of resources, and social inequality. However, the increasing urbanisation has created some issues and challenges, according to Yin et al. (2015). One of the most significant challenges is the impact on natural resources, particularly food and water. As cities expand, they often take over agricultural land and consume more water than can be replenished, leading to food insecurity and water scarcity, which can have severe social and economic implications.

One proposal to solve parts of this problem is to facilitate the creation of new habits and change the lifestyles of the people who consume the most and the daily lives of large groups. According to estimates from the UN, the first time in human history that the urban population overtook the rural population was in 2007 (Ritchie & Roser, 2018). Humans have historically been social animals and have lived in cities for a long time. Alexandria was the first city with over a million inhabitants in 100 BCE (O'Neill, 2022). However, there has been a rapid increase in urbanisation in later years, and by 2050 it is predicted that more than 70% of the world's population will live in cities (Ritchie & Roser, 2018). This trend is not necessarily negative because urbanisation can contribute to sustainable growth through suitable measures. So, therefore, the urban areas and cities must be appropriately managed and facilitate the creation

of sustainable growth and sustainable resource consumption. More than 80% of the Global GDP gets generated in cities and metropolitan areas. This number will likely increase because it is in the cities where most innovation and economic opportunities happen. So therefore, the urban areas and cities must be appropriately managed and facilitate the creation of sustainable growth and sustainable resource consumption (The World Bank, 2022).

As urbanisation and population growth continue to increase, the development of sustainable and resilient cities has become a crucial issue for the future of our planet. The concept of smart cities has emerged as a potential solution, utilising technology and data to improve the efficiency and liveability of urban areas. Smart city initiatives can also contribute to making cities reduce their ecological footprint and create more sustainable growth (Mora et al., 2017). Smart cities are a relatively new concept first mentioned by Gibson et al. (1992) in the book *The Technopolis Phenomenon: Smart Cities, Fast Systems, Global Networks*.

Even though the term "smart cities" has been written about for around 31 years, there has yet to be a consensus about the definition. According to Dameri (2013), there is no agreed-upon definition of a smart city; the problem is that cities define themselves as smart. The author also argues that smart cities are a new concept but widespread worldwide, with significant variations in different initiatives. This can also be seen in the research of Hollands (2008), where he criticises city planners and cities that label themselves as smart. The author also argues that policymakers and city planners do not want to be seen as unintelligent, so they often use the definition of smart city initiatives loosely. Esashika et al. (2020) have done a systematic review and a meta-synthesis analysis of smart cities literature from 1997 to 2020. After analysing nearly two decades of research on smart cities, they concluded that there has yet to be a joint agreement about the definition of a smart city. However, after an extensive review of the literature, the authors found a convergence that can explain the characteristics of a smart city, which are:

- Using advanced technology for communication and transportation.
- Making sure the city is environmentally friendly and sustainable.
- Having a population that is educated and able to adapt to new ideas.
- Using technology to improve cities and to involve citizens in decision-making.
- Having an economy that is based on knowledge and innovation. (Esashika et al., 2020)

Fernandez-Anez et al. (2018) have made a different approach by creating a conceptual model as outlined in Figure 2.1. During the analysis of smart cities, they felt they needed a tool for understanding the complexity of smart cities and the different stakeholder's role in creating and overcoming urban challenges. Their model shows how stakeholders and citizens are connected to global trends and smart city initiatives and divided into subsystems.

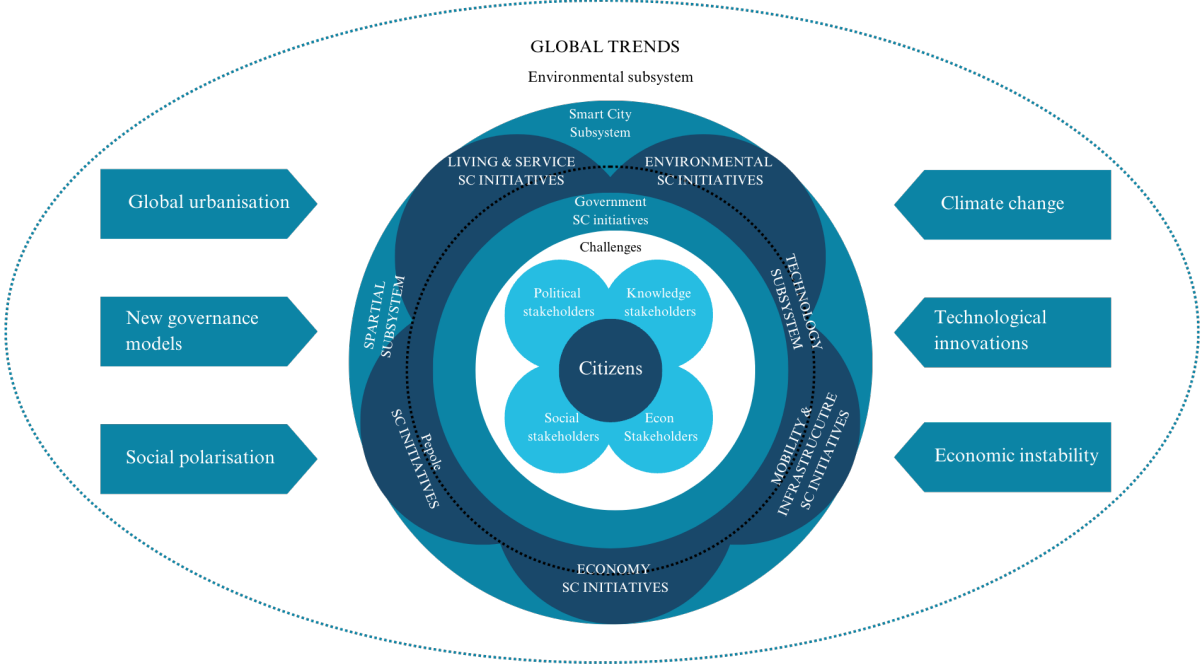


Figure 2.1 - Conceptual model of how smart cities work with stakeholders- Data source: (Fernandez-Anez et al., 2018)

There are several that criticise the concept of smart cities for example, Saxe (2019) writes that technology often breaks and has a not-so-long reliable life span. The author compares smart city initiatives to consumer technology, which is often designed to become outdated and glitchy after a few years. The author also argues that the focus should be on building reliable and "dumb cities" and questions whether humans will be better at solving urban problems with these smart digital initiatives that are most likely to break or become outdated. Silva et al. (2018) suggest that the concept of smart cities is still evolving and not mainstreamed throughout the globe due to technological, economic, and governing barriers. Kitchin (2015) criticises smart city's shortcomings and the research done by addressing some weaknesses, such as the lack of detailed information about their history and development, even though it is a new concept. Moreover, the author argues that the concept relies too much on standard examples and generalisations that may only apply to some situations and cities.

Davidenko et al. (2018) wrote that there is a need for better ties between smart cities and smart villages and that creating ties between them is vital for sustainable development. The paper

explains that smart villages cannot develop in isolation but must be implemented in the overall development strategy of the regions and countries and be better connected to smart cities. The paper also explains that social decisions, such as climate change and food security, will improve by creating better ties between smart cities and smart villages. In addition, better ties can create more employment and investment in rural areas that can help preserve the national culture and increase tourism.

## **2.2 Smart Villages**

Smart villages can potentially create better living conditions for many people living in rural areas. These rural developments can use smart city technology and be better tied to cities to create more sustainable development. However, urbanisation is a growing trend, and more and more people are moving to cities. One of the biggest concerns for rural populations in the recent trend of urbanisation is depopulation, where some of the habitats, primarily younger generations, move to bigger cities to pursue new challenges and better life quality. A report made by UNICEF (2018) determines that there is a multifaceted issue called urban advantage, where a child growing up in an urban area often has better access to basic needs such as water and sanitation and better outcomes because of access to services such as better education, health care and energy. However, in recent times during the pandemic, there was an increase in the trend of deurbanisation. This trend started when more people realised the possibility of working from home and realised that cities could also be associated with several challenges, such as higher living costs, congestion, pollution, and more considerable crime rates. However, that trend was a short-term response to the pandemic that will not change the global urbanisation underlying megatrend (UN-Habitat, 2022).

Even though the growing urbanisation trend, there are still many people that live in rural areas. Furthermore, considering the UN population estimates for 2050, 3.1 billion will still live in urban areas in the future (Ritchie & Roser, 2018). This means that many people living outside of urban areas still need to change their habits and how they live in the future. Therefore, these people should also be considered when planning for a sustainable future. Moreover, Mihai et al. (2020) state that sustainable rural development is necessary to achieve the SDGs. Rural development needs to take a new approach that covers the basic needs of rural populations with reliable public services to achieve these goals. People in rural areas must also diversify their economic activities, including other food sources besides agricultural production. The report



concludes that this new approach should include technical, socio-economic, and environmental conditions supporting rural economies and urban-rural linkages. This will help them become more resilient to economic shocks and the threat created by climate change. An article written by Heap & Hirmer (2020) also explains that smart villages often have been overseen by the popularity of smart cities but that smart villages are a highly relevant concept to the UN 2030 Agenda for Sustainable Development and the SDGs.

A potential solution to creating a new approach and sustainable rural development is utilising the new smart city technologies in rural parts of the world. This will possibly create a situation where more people can create a better future, more stable food security and a society with less consumption and emission of CO<sub>2</sub>. However, after reviewing the literature on smart villages, some of the same problems from smart cities are also seen in this literature. A systematic literature review with 79 different sources done by Gerli et al. (2022) provides a view of the definition often shaped by disciplinary backgrounds and geographical contexts that smart villages are often seen as the rural version of smart cities. This is also expressed by Zavratinik et al. (2018), who argue that smart development can be divided into rural and urban, but there are no clear definitions of either. However, the report also mentions that for smart villages to be successful, smart rural development needs to consider a particular location's unique characteristics and needs, such as its social, cultural, economic, and environmental aspects. The research done by Visvizi & Lytras (2018) shows that the debate and limitations around smart cities can also be related to the ongoing research and concept debate about smart villages.

In the book *Smart Villages in the EU and Beyond*, Visvizi et al. (2019) propose a smart rural village development methodology. The methodology builds on the idea of resilience and that rural villages can return to their original state after disturbances such as depopulation. With this methodology, they try to utilise the positive aspects of the history of rural areas to create a smart strategy for the future. A comprehensive understanding of rural areas, including their history, potential, and unique values, is necessary to design this strategy. While recognising the potential of rural areas, identifying their weaknesses and needs are the initial steps towards taking action. Such action can strengthen the outstanding features of different rural areas and address their deficiencies, benefiting their recovery using ICT and other smart city initiatives. The same book also argues about the importance of ICT technologies. If implemented correctly, some of the benefits of living in the city will also be accessible in rural areas, and smart villages will have the best of both worlds, as shown in Figure 2.2.

## Benefits of living in a smart village

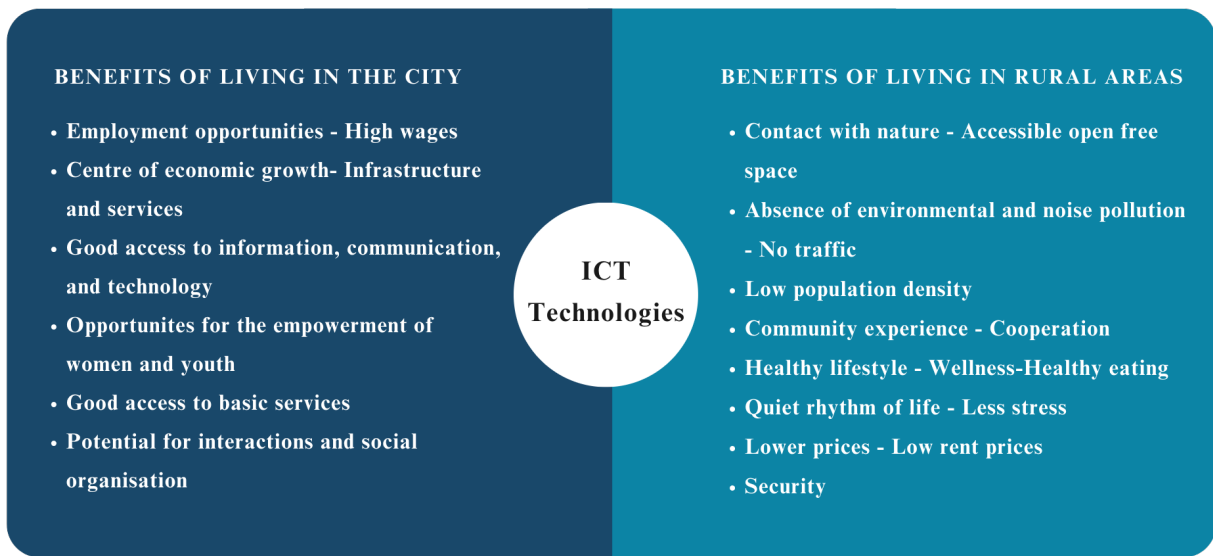


Figure 2.2 - Benefits of living in a smart village and the importance of ICT source: (Visvizi et al., 2019)

According to the European Parliament (2021), the European Union (EU) have no legal or decided-upon definitions of a smart village. However, Juan & Mceldowney (2021) define it as a local community that uses technology and innovation in their day-to-day life to create a better standard of life, improving the quality of public services and ensuring better handling of resources. Even though the EU does not have a definition of what a smart village is, they still have been an active player in rural development in the past. For example, with the Cork Declaration, the EU said as early as 1996 that rural areas and their inhabitants could be an essential asset for the EU. Furthermore, with the declaration, they said these areas could compete with their urban counterparts (European Commission, 1996).

In September 2016, 20 years after the first Cork declaration, over 300 stakeholders, representatives for the EU and member states, met again for another European conference. The Cork deceleration 2.0 created ten points to ensure sustainability and economically viable plans for rural areas, proving the EU's interest in creating good rural development for the future (European Commission, 2016). One year later, the EU created the EU Action for smart villages, which created several EU policy areas and funds to promote the concept of smart villages and sustainable rural development (Juan & Mceldowney, 2021). The EU also has a multi-level governance tool with the French name "liaison entre actions de développement de l'Économie rurale" (LEADER), shown in Figure 2.3. This is an approach the EU has used for more than 30 years and can be translated into a linkage between actions for developing the rural economy. It

is implemented by approximately 2800 local action groups (LAGs) and used to increase the community-led local development of rural areas in the EU (Paneva, 2021).

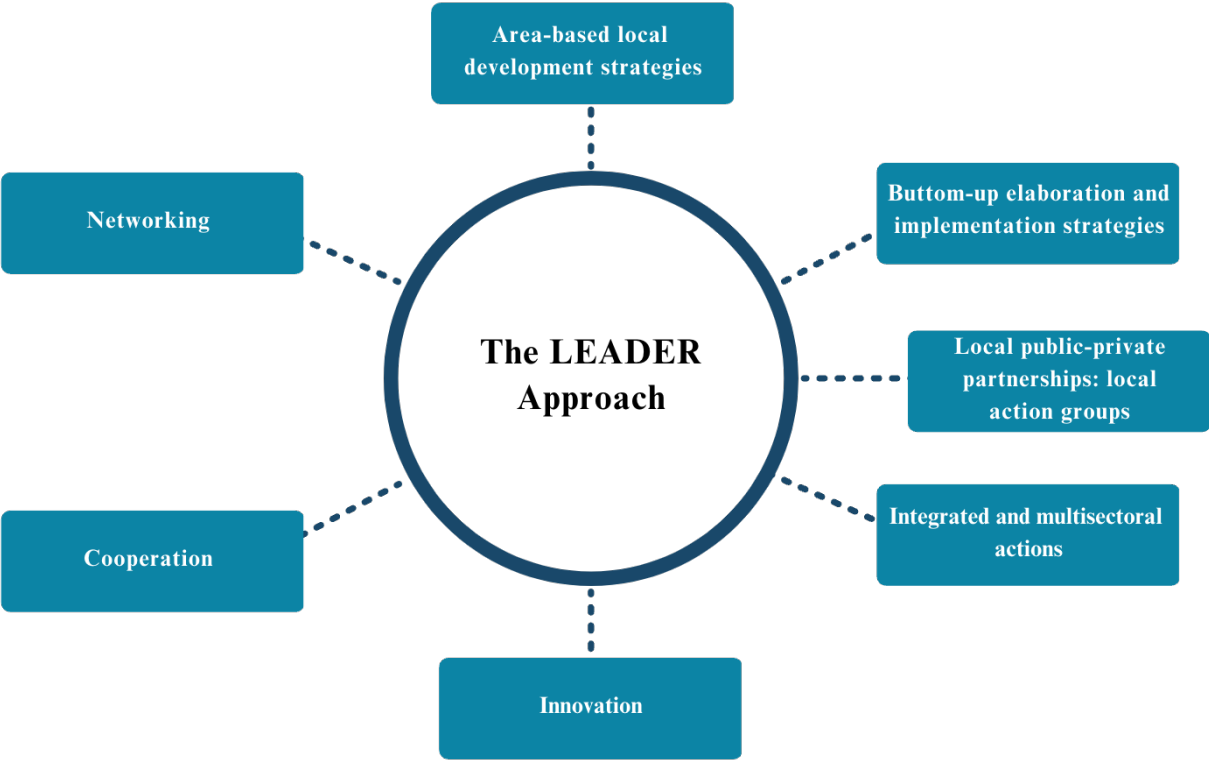


Figure 2.3 - LEADER Approach by EU to create sustainable rural development Source: (Visvizi et al., 2019)

However, the research created by Wieliczko et al. (2021) criticises the policy made by the EU towards rural areas stating that the policy created by the EU has challenges and limitations in the current policy framework to create a better and sustainable future for rural areas in the region. For example, funding and sustainable transition viability are some barriers that need to be considered, and the situation varies much based on location. Another criticism of smart villages is that it can be hard to implement all of these ICT technologies and intelligent digital solutions when 40% of rural homes globally do not have access to the internet (ITU, 2022).

The literature also mentions real-life examples of why the creation of smart villages is important. For example, Espino et al. (2021) paper shows how three smart villages in Southeast Asia during the pandemic still had sufficient food even though large parts of the world underwent extensive food supply chain disruption. The paper also explains that these areas already had smart villages agri-food solutions before the pandemic hit, and they just had to make some minor adjustments when the pandemic hit. This also shows the importance of food security for a smart city and a smart village.

### **2.3 Food Security in Smart Cities / Villages**

Food is an essential factor for every city and village, but also one of the biggest emitters of GHG in the world. An article written by Satterthwaite et al. (2010) highlights that food production will continue to be influenced by globalisation in the future. However, due to population growth and climate change, there is a need to rethink how cities and villages produce food and make it more sustainable. One of the main challenges for food security in cities is the growing urbanisation and consumption, and the upkeep of the food security of cities will become increasingly challenging in the future. Another problem that occurred recently and is in government official's and city planner's fresh memory is how the pandemic exposed the fragility and vulnerability of the global food system. That period was when it got more difficult in urban areas to access food than in rural areas or other countries (Acharya et al., 2021).

In the future, cities worldwide will face challenges because of climate change, according to a technical report made in collaboration between C40 Cities, the Global Covenant of Mayors, Acclimatize, and the Urban Climate Change Research Network. The report found that food security will be one of the six major problems in the future. They also found that food production drives climate change and is at risk of it (C40, 2018). The sustainable aspects are worrying, but according to Godfray et al. (2010), it will be a huge challenge to feed 9 billion people. Therefore, creating sustainable and equitable food security for all is important. Godfray et al. (2010) also propose several strategies that can help achieve the goal of feeding the world population in the future. One such strategy is sustainable intensification, which involves producing more food from the same land area while reducing environmental impacts. This can be achieved through various methods such as precision agriculture, zero or reduced tillage, contour farming, mulches, and cover crops. Another strategy proposed by the author is reducing food waste by improving the efficiency of food distribution systems. This can be done by investing in better storage facilities and transportation infrastructure and reducing post-harvest losses. Additionally, promoting dietary shifts towards more plant-based diets can help reduce pressure on natural resources while improving human health (Fehér et al., 2020).

The importance of investing in research and development (R&D) to improve the sustainability of food production is crucial. The book *Sustainable Production Technology in Food*, written by Lorenzo et al. (2021), provides a comprehensive overview of the modern and current technological status of sustainable food production. This includes developing new technologies that optimise resource use while minimising negative environmental impacts. For example, one

new technological advancement the book discusses is using algae in aquaculture to create more sustainable food production. However, the book also talks about several other sustainable production technologies for food and that there is a need for more research to create better food security.

There are several cities that are trying to act in this growing concern about food security in urban areas. For example, Milan Urban Food Policy Pact is a global agreement between 260 cities to promote sustainable food systems in urban areas by addressing issues such as hunger, obesity, and food waste. This pact recognises that citizens have an important role. By signing it, cities commit to collaborating and sharing knowledge and innovation to solve global food challenges (MUFPP, 2023). In addition, there are several approaches to creating good food security in cities for the future. For example, Singapore is trying to create new food production systems in a city that has been seen as a poster child for smart cities and has been ranked number one in smart city rankings several times (SNDGO, n.d.).

Mok et al. (2020) did a case study on how Singapore is trying to use technological innovations to create more sustainable food systems, where they found several other developments. The findings were that Singapore is currently developing technologies in three main areas to address food security: urban farming, processing technology, and alternative food sources. Aquaponics and vertical farming were mentioned in urban farming technologies. Singapore focuses on food waste valorisation, natural preservatives, and smart packaging in processing technology. Alternative food sources include insect farming, microalgae production, and seaweed production. Although it is not certain that Singapore has all the answers to saving food security in a city, several actors believe aquaponics is an innovative and sustainable production system. According to Santos (2016), aquaponics has the potential to play a significant role in advancing environmental and socio-economic sustainability in smart cities. That is because it enables the combination of aquaculture and hydroponic vegetable cultivation, leading to efficient utilisation of resources and space within urban areas.

Even though smart cities and urbanisation make urban areas the advantageous desire for most people, Wolter (2022) wants to turn the urban versus rural debate into a debate about understanding mutual co-dependence. For example, urban areas often rely on rural areas for food production, resources, and water. At the same time, rural areas rely on urbanised areas for jobs, technology, and access to services such as health care and education. This view is also

shared by Heap & Hirmer (2020), that write about how smart cities need smart villages in several different aspects, such as food security and sustainable growth of enterprises in rural areas.

## **2.4 Literature Review Summary**

The literature review described in this chapter shows that there has been extensive research over several decades on the concepts of smart cities, smart villages, and food security in cities and villages. Definitions and characteristics of smart cities have been discussed and proposed, and some have developed a conceptual model to understand the complexity of smart cities. The EU and other policymakers have shown interest in promoting the concept of smart villages and sustainable rural development. Strategies for improving food security, such as sustainable intensification and reducing food waste, have been proposed, and several cities are promoting sustainable food systems through technological innovations. However, there are still challenges and limitations, such as the need for more research into new technologies and the issue of access to energy and knowledge in rural areas. There are also criticisms regarding the idea and the implementation of smart city initiatives in cities and villages and the technology's viability. Overall, the research has come a long way in exploring these concepts. However, more work must be done to fully address the challenges of urbanisation, sustainability, and economic development connected to smart city/village initiatives and food security.

## **2.5 Research Gap**

After examining forty-five different sources in the literature review above, it became apparent that there is a gap in the literature regarding utilising global management strategies and theories to facilitate the implementation of smart city technology in rural areas to create smart villages. For example, Heap & Hirmer (2020) mentioned that the concept of smart villages could play a role in reaching the UN SDGs, which entitles global cooperation and global management will be necessary. Unfortunately, the literature does not provide guidance on how to do this in practice or what should be done to create these partnerships. The closest reference to this mentioned in the literature is the EU's LEADER approach, as explained by Visvizi et al. (2019). However, that approach is different because of the local community perspective with LAGs, which mainly focuses on rural areas in the EU. The literature review with the article by Wolter (2022) also highlights smart cities and village's potential benefits in improving food security together and creating interdependence. However, further research is necessary to fully

understand how Global Management can promote sustainable growth and use smart city technology to create better food security. Given the importance of global cooperation and management in achieving some SDGs, this literature gap has to be addressed.

### **3.0 Theoretical Framework**

This chapter aims to lay down the theoretical foundation of this master's study. The chapter is based on secondary literature and previously established knowledge from the master's program in Global Management at Nord University. It will start with an explanation of what global management theory is and how globalisation has played a crucial role in the history and creation of global management. It will also be shown how globalisation is causing significant changes in global trends, thereby highlighting the importance of understanding global management in today's globalised world.

Global management, or international management, refers to implementing business strategies that enable a company to operate effectively and efficiently. That involves managing people, resources, and operations across different countries and cultures to achieve the organisation's goal, which is crucial for the case company. According to Cote (2020), there is a need for a broader depth of skills and knowledge when managing a global company than just a domestic company. For example, to take the right decisions, the management of a global company must understand the local market in various countries and be aware of the competition and competitive advantages. In addition, a manager at a global company must know the legal and economic conditions in different countries and have a global strategy that adapts to the business culture of the countries in which they operate. Global managers must also know about the language barrier and cultural differences. Effective intercultural communication is also essential for the management to understand and communicate with other stakeholders and employees (Anbari & Umpleby, 2018). This form of management has become increasingly important due to globalisation and the emergence of multinational corporations in recent decades. As a result, there is a significant need for global management to oversee and coordinate international operations, policies, and strategies of businesses, governments, and non-governmental organisations (NGOs), to achieve their goals and navigate effectively in a global market (Kedia & Mukherji, 1999).

Another essential part of global management is the capacity to cultivate a global mindset, which entails thinking and operating with a global perspective. This implies understanding and valuing different perspectives and cultural differences while being able to identify and take different opportunities across several markets. Global management also demands a solid management style capable of navigating complex and changing global environments. This is important because global managers must engage and inspire diverse teams across different locations and cultures. While communicating effectively is needed to get their teams working towards a common goal. Global management is also vital to tackle global challenges such as climate change, creating a more sustainable world. This can also be seen in how the UN Created the SDGs for a collaborative global approach for governments, businesses, and NGOs to work together to develop and implement global policies and strategies to address these issues together on a global scale.

Global management and globalisation are closely intertwined, and according to Hill (2021), globalisation impacts almost everything humans do. For example, most products are designed or produced in several countries, including food production. In addition, humans get news, culture, and entertainment from several different regions of the world. Global management and globalisation are closely related to each other because the rise of globalisation has significantly impacted how organisations, business and governments manage their operations and resources across borders and cultures. Historically, globalisation has been a trend for several centuries and can be traced back to the 2<sup>nd</sup> century BCE of the Han Dynasty in China. The Silk Road, an ancient trade route, allowed China to trade and exchange culture with several countries and cultures (Mousumi, n.d.). The Silk Road is an early example of how cultural exchange happened through trade and business and connecting people from around the world. However, in recent times, globalisation has accelerated rapidly and is mainly due to transport, technology, and communication advances. Another aspect that created this shift was the introduction of international collaboration organisations such as the World Trade Organisation (WTO), the International Monetary Fund (IMF), and the UN, which helped promote free trade, investments, and global development (Hill, 2021). The rise of the internet and other new communication technologies, such as E-mail and social media, has also created the possibility of connecting people and businesses across countries and cultures.

Globalisation has also created a global market with a global competition where multinational corporations (MNCs) must innovate and produce better services and products to fight for



customers. The negative side is that this trend has created economic inequality, where some countries have benefited more. Some countries have even been exploited for natural resources and cheap labour (Heimberger, 2020). Environmental degradation is also harmful because globalisation contributes to pollution, deforestation, and climate change, creating more cultural homogenisation. Even though there are both positive and negative sides to globalisation, it is challenging to avoid globalisation in today's modern and global world. For example, globalisation is also closely connected to the various global megatrends, such as technological breakthroughs, demographic and social change, climate change and resource scarcity and rapid urbanisation (PwC, 2022).

The effects of globalisation on the world are complex and multifactorial, with both positive and negative aspects. Some favourable aspects are increased economic growth and a better standard of living for more people due to knowledge and innovation sharing and cultural exchange (Guttal, 2007). On the other hand, according to Tamiotti et al. (2009), there is proof that globalisation and global trade have contributed to environmental megatrends such as climate change and resource scarcity. However, a contradictory aspect connected to globalisation is called the globalisation paradox. The paradox says the same force that has created globalisation and all the positive sides, such as free trade, global cooperation, and economic growth, have created new challenges and problems that threaten the world's current global system. The globalisation paradox is a concept that has been discussed and researched by scholars and policymakers but has recently received more attention due to the question of exploring how our global economic system is related to social and environmental concerns (Rodrik, 2011).

In order to find out more about how global management theory can help LAMTIB and close the research gap concerning how global management can promote sustainable growth and enhance food security in smart villages, it is necessary to go more in-depth on some parts of global management theory. The framework outlined in this chapter will also be used in the discussion later in the thesis related to the case company and to fill the research gap. This chapter is divided into two different sections within global management theory:

1. Sustainable Management
2. Cross-cultural Management

The motivation behind dividing the chapter into these two distinctions of global management is that sustainable and cross-cultural management is essential when managing a company

internationally with many different stakeholders and actors across borders and cultures. Moreover, companies like LAMTIB want to create sustainable smart villages where global partnerships are essential. So, understanding and exploring sustainable management and cross-cultural management theory is vital. Another motivation is that this theory makes it possible to understand global problems related to cultural concerns, corporate social responsibility (CSR), and sustainability in the case of LAMTIB.

### **3.1 Sustainable Management**

Sustainable management is an essential part of global management and an important part of the modern corporate strategy (Rafi, 2022). With the increasing concern around environmental damage and social responsibility, sustainable management and development have become vital when managing a global company or organisation. Global managers must consider their operation's environmental and social impacts globally and create sustainable strategies that balance economic, social, and environmental factors (Cuervo-Cazurra et al., 2022). This entails implementing sustainable practices, reducing the company's carbon footprint, and encouraging CSR across several markets. Sustainable management and global management are also connected in addressing global issues, such as climate change and sustainability, which requires collaboration between businesses, governments and NGOs.

The global and collaborative aspect of solving some of the world's most pressing issues to create more sustainable development can be traced back to the UN and the creation of the SDGs. However, the SDGs also have a history before the creation of the Millennium Development Goals, which can be traced back to Agenda 21 at the 1992 Earth Summit in Rio De Janeiro (Ghorbani, 2020). This summit occurred because of the report created by the Brundtland Commission in 1987 called *our common future*. The report criticised several global environmental problems, focusing on poverty in the South and unsustainable consumption and production patterns in the North. The report concluded that there needed to be a new strategy for a more sustainable production that unite development and the environment. Which is also described in one of the first definitions of sustainable development:

*"Development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs." - Brundtland Commission (1987)*

The report was then presented and debated at the UN General Assembly in 1989, which concluded to organise a UN Conference on Environment and Development. So, this definition and report led to the adoption and creation of a more sustainable development agenda which also served as the basis of the development of the MDGs and the SDGs (Ghorbani, 2020).

This history shows how sustainable management is interlinked with sustainable development and where global cooperation and management are among the most critical factors for fulfilling these goals. In recent years sustainability has become a more significant part of the overall global leadership theory (Liao, 2022). This results from corporations taking action to reduce their carbon footprint and promote sustainability. This shift may be because more humans get informed of the environmental challenges facing the planet due to GHG emissions, and corporations also realise their involvement in the crisis and discover the importance of adopting sustainable growth practices to save their reputation and the Earth. An article written by Liao (2022), which is a literature review on sustainable leadership, explains that for a global manager that values sustainability, there is a growing importance on balancing the company on three different goals, which are economy, society, and environment. As a result of these goals and a more significant focus on sustainability, companies have implemented sustainability practices such as CSR, one way future-oriented leaders can play a vital role in promoting sustainable practices within organisations and outward to the general population.

CSR have the possibility to create more sustainable growth, where managers can promote ethical behaviour, which can have a positive effect and enhance the reputation and brand value. Pérez & Rodríguez del Bosque (2015) state that various CSR strategies have increased customer loyalty. Big MNCs now choose to promote and integrate their CSR projects into their marketing (Robinson, 2020). This can be seen as greenwashing, where the company only tries to create a better public reputation with non-reliable environmental claims. However, in recent times, there have been more regulations about greenwashing. The EU is one of several legislators trying to develop a legal framework, such as the European Taxonomy, to prevent greenwashing, where companies use CSR and marketing to greenwash the company and brands (Arbinolo, 2023). However, implementing CSR practices globally can pose significant challenges, such as cultural differences, regulatory frameworks, and resource constraints (McWilliams et al., 2006).

In general terms, CSR is for managers and businesses to consider the impact of business activities on stakeholders, including employees, customers, communities, and the environment and can include many different activities and campaigns. For example, CSR can also be

connected to impact investing through socially responsible investments. Impact investing is essential to substantial growth and can contribute to sustainable development (Islam, 2021). It is an investment strategy that aims to benefit communities and has a positive social impact and financial gains (Chen, 2022). The goals of impact investing are also trying to create long-term value for all stakeholders more sustainably and socially. This shift of impact investing can also drive sustainable growth by providing capital for sustainable initiatives in rural communities, encouraging businesses to create more sustainable practices, and creating a broader culture of impact-driven investing. However, in a global context, impact investing can also pose some challenges, such as a lack of standardisation when it comes to impact investing, difficulty in measuring the impact the investment does, and a limited understanding of the market and social situations. There are also several different versions of impact investments where the degree of expected financial return and the approach to impact can vary. A matrix outlined in Figure 3.1 shows the different impact investing types and how to compare them to traditional profit-seeking investing (Gardes, 2017).

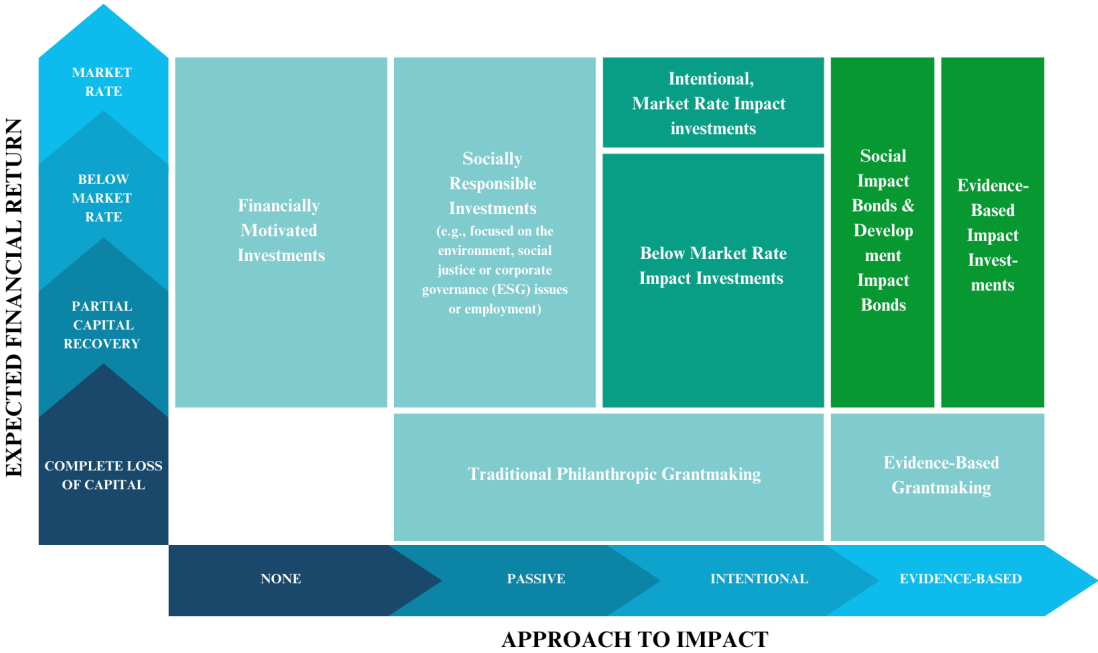


Figure 3.1 - Different types of impact investing Source: (The Bridgespan Group, 2018)

As shown in Figure 3.1, there are several different types of investing with an approach of impact. Not every impact investment needs to be a capital loss for the company or management team wanting to pursue more social investing. Financial gain is not the primary goal of such investments, but compared to traditional philanthropic endeavours, it is possible to have a financial gain. Creating positive incentives for investors with both CSR and not a total loss of capital gives the companies and managers the possibility to use some of their investment

budgets on impact investing that can be a driver for more sustainable development and create a more significant focus on environmental and social investing.

### **3.2 Cross-Cultural Management**

In today's globalised business world, it is vital to understand Cross-Cultural Management, which involves knowing the differences and similarities between cultures for effective leadership, collaboration, and communication. People from different backgrounds and cultures interact more frequently when doing business globally and across borders. This creates a situation where global managers need to understand and have knowledge of cultural dynamics for effective leadership and collaboration. Cross-Cultural Management provides an overview of the differences and similarities between cultures, enabling organisations and managers to develop strategies that foster effective communication, build trust, and enhance cooperation. Managing multicultural teams and organisations presents both challenges and opportunities for a manager. Therefore, it is vital to identify the cultural factors that influence business practices and how to manage cross-cultural differences effectively, both internally in the company and in external factors that can appear. Cross-cultural management theory emphasises the importance of understanding and managing cultural differences in international business, leading to more effective and inclusive solutions for rural development, food security and environmental sustainability.

According to the book *Understanding Cross-cultural Management*, there are a variety of different theories and research done in the world of cross-cultural management, such as Edward T Hall's high-context and low-context cultures theory and Geert Hofstede's work on cultural dimensions (Browaeyns & Price, 2015). Richard R Gesteland has also created a cross-cultural model with seven different dimensions. However, after thirty years of working globally, he thinks the world can be divided into Relationship focused vs Deal-focused Cultures (Gesteland, 2012). Another aspect that divides Gesteland from the rest is that he has two golden rules of international business, which are:

1. In international business, the visitor is expected to understand the local culture.
  2. The seller is expected to adapt to the buyer's needs when doing international business.
- (Gesteland, 2012)

However, this thesis will focus on the work of Geert Hofstede and Richard D Lewis. Hofstede's theory and the Lewis model can be used to understand cultural differences but in different terms

because they have different focuses and applications. For example, Hofstede's theory is more commonly used in business and management contexts, where the dataset is from the business world. In contrast, the Lewis model is often used in communication and negotiation training. Therefore, the dataset is more from cultural behaviours, making it simpler to understand the behavioural context of the culture, which can be crucial in cross-cultural communication. These theories will also be crucial for a global manager who wants to understand cultural aspects better when collaborating with global companies and local stakeholders.

### ***3.2.1 Geert Hofstede's Cultural Dimensions***

Geert Hofstede was a Dutch professor known for his cross-cultural management work and model. His research had a significant impact on the field of cross-cultural management. According to Hill (2021), Hofstede's research is one of the most used and cited cross-management research. The reason why Hofstede's research is the most cited study in the field and is by some seen as the standard for understanding cultural differences internationally is his scientific approach to understand how, when, and why cultures affect multinational companies. Hofstede created his theoretical framework for over a decade while working at IBM. He got the data for his model by creating large-scale exploratory surveys asking about 116.000 workers worldwide in 72 countries where IBM had offices and workers (Hofstede et al., 2010). There are several different definitions of culture. However, Geert Hofstede's definition of culture is as follows:

*"The programming of the human mind by which one group of people distinguishes itself from another group" - Hofstede (1980 p.24)*

This definition emphasises the role of culture in shaping people's behaviours, values, and beliefs. By recognising the influence of culture on people's mindsets, Hofstede's model provides valuable insights into how cultural differences can affect interactions and cooperation. Geert Hofstede's model consists of six dimensions shown in Table 3.1 that aim to guide managers and workers operating in culturally diverse corporations and to understand how to do business, communicate, and negotiate globally.

Table 3.1 - Explanation of Geert Hofstede's Six Dimensions of cultural differences. Source: (G. H. Hofstede et al., 2010)

DIMENSION	COUNTRY RANKING
<b>POWER DISTANCE</b> This dimension says something about how the attitude of the culture to authorities. This is about the extent to which less powerful members of a society accept and expect power to be distributed unequally.	<b>PDI</b> Low: USA High: Malaysia
<b>INDIVIDUALISM</b> This dimension is about collectivism vs individualism and says something about how a culture value independence. Furthermore, they value the degree to which citizens in that culture prioritise individual goals and personal autonomy versus group goals and collective goals.	<b>INV</b> Individualistic: USA Collectivistic: Singapore
<b>MASCULINITY</b> This dimension is about how much a culture values assertiveness, competitiveness, and material success, a masculine cultural trait. Versus nurturing, cooperation, and quality of life, which is, by Hofstede's model, a more feminine culture.	<b>MAS</b> Masculinity: Japan Femininity: Norway
<b>UNCERTAINTY AVOIDANCE</b> This dimension is about how the people in the culture feel threatened or uncertain of unknown situations. This is also connected to the degree to which a society tolerates ambiguity and uncertainty and the extent to which the people in that culture seek predictability and order.	<b>UAI</b> Low: Singapore High: Japan
<b>LONG-TERM ORIENTATION</b> This cultural dimension says something about the culture's focus on the future. It is also connected to how much a culture emphasises long-term planning, perseverance, and pragmatism versus short-term-orientated cultures where immediate gratification and tradition made in the past are more of the focus.	<b>LTO</b> Long term: China Short term: USA
<b>INDULGENCE</b> To what degree a culture allows or suppresses the gratification of basic human desires related to enjoying life and doesn't think about social norms. For example, a restrained culture suppresses gratification to align with social standards, while indulgent cultures value human needs and desire more.	<b>IND</b> Restrained: China Indulgent: Sweden

Below is Figure 3.2, showing the cultural differences in Singapore, Malaysia, Indonesia, and Norway based on Geert Hofstede's six dimensions. This is to put the theory in the context of the problem definition and get an overview of the different cultural dimensions the researcher got exposed to during the data gathering of this thesis.

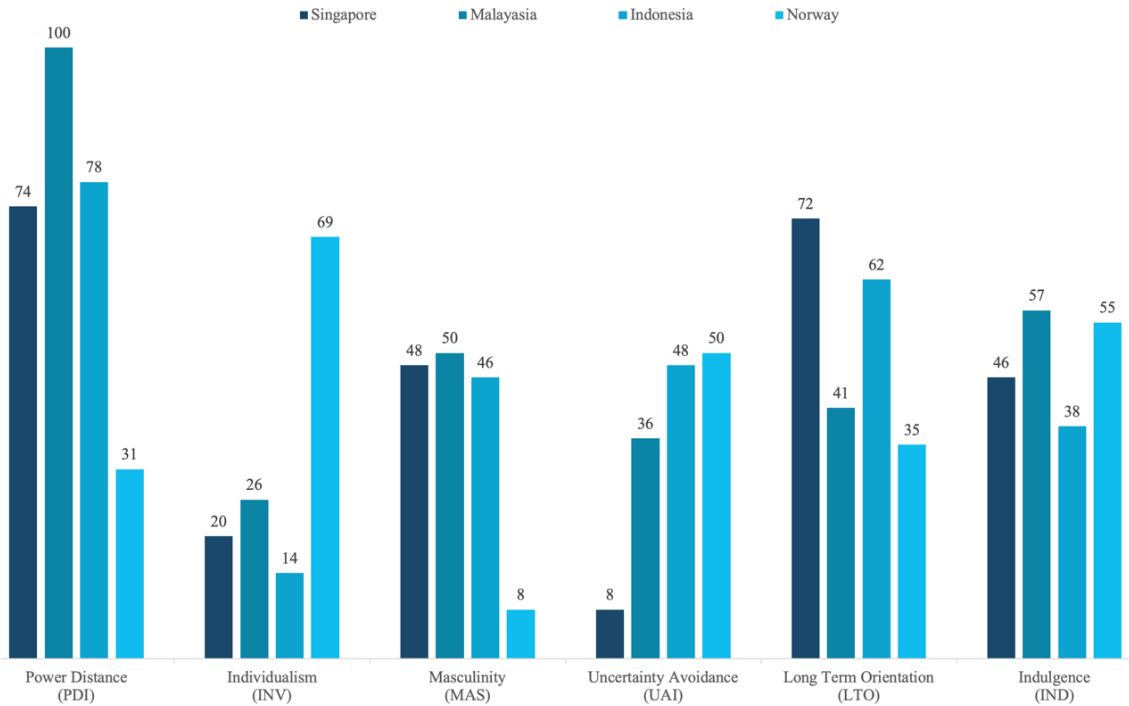


Figure 3.2 - Geert Hofstede's cultural dimensions. Comparison of Singapore, Malaysia, Indonesia and Norway. Data Source: (Hofstede Insights, 2023)

### 3.2.2 *The Lewis Model*

Richard D Lewis is an English linguist and communication consultant mostly known for his cross-cultural model, "The Lewis Model". The model was introduced in his book *When cultures collide* in 1996 (Lubin, 2013). This model takes on another approach than Geert Hofstede's, which is more about understanding people's behaviours and how to interact and communicate with different people across cultures. Lewis mentions the work of Hofstede and Edward T. Hall as one of the inspirations for his model. However, Lewis's model is not based on any datasets or empirical findings but more on his observations and interactions with different cultures during his work as a communication consultant and his analysis of historical and contemporary cultural trends (Lewis, 2005). That makes this model more of a conceptual framework than a data-driven model. However, it is still a popular model that makes navigating the world of different cultures easier. The Lewis model presents a cultural typology categorising culture into linear-active, multi-active, and reactive. The model shown in Figure 3.3 is often used in cross-cultural communication and negotiation training. It can help managers and businesses understand how to communicate effectively with people from different cultural backgrounds.

The three different categories in the model are:

1. **Multi-active:** This category of cultures focuses on people and relationship building. Within these cultures, individuals value emotional connections and personal interactions. Communication is also indirect, based on gestures, non-verbal cues and reading between the lines. Diplomacy is highly valued, emphasising maintaining harmony and avoiding confrontation. This category of cultures values empathy and relationship building.

2. **Linear-active:** In this category, emphasis is placed on tasks, efficiency, and productivity. Planning and organising are highly valued, and individuals prioritise achieving goals and objectives. Communication is direct and concise, with attention to facts and logical reasoning. These cultures value being well-prepared, punctual, and efficient in problem-solving.

3. **Reactive:** This category of cultures emphasises listeners and their needs. Respect, harmony and saving face are prioritised. People in this culture tend to be responsive in communication, adapting to the other party and considering their opinions. Patience and politeness are highly valued, and confrontation is often avoided. This culture emphasises maintaining relationships and preserving social harmony (Lewis, 2005).



## Cultural Types: The Lewis model

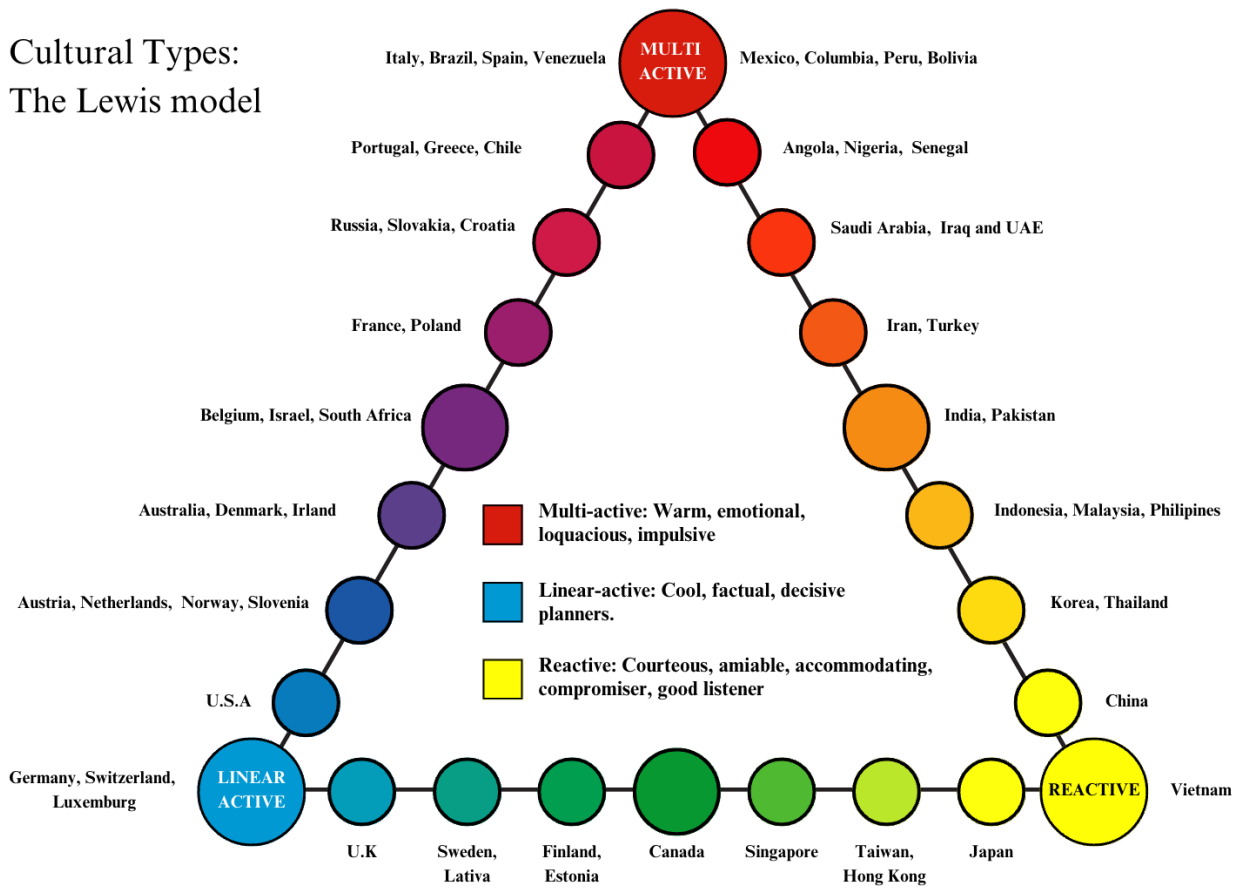


Figure 3.3 - Richard D Lewis cultural dimension model. Adapted / Source: (Lewis, 2005)

### 3.3 Summary of Theoretical Framework Chapter

This chapter aims to create the overall theoretical framework for this thesis and identify how the case company can use global management theory to bridge the gap between food security in smart cities and the creation of smart villages. The chapter starts with an introduction to global management and its importance in creating a collaboration for a more sustainable world. The chapter's introduction also explains globalisation and how it is interlinked with global management and global trends. Following the introduction, the chapter is divided into two distinct subsections focusing on essential parts of global management theory: sustainable management and cross-cultural management. This division of global management theory was made to get a deeper understanding of the theory and try to find theories that had practical applications to the case company and could help with the research gap. During the sustainable management chapter, the history of sustainable management and development got outlined, and the importance of CSR and impact investing in a global manager's work to balance the economic, social and environmental factors got emphasised. In the cross-cultural management subsection, Richard Gesteland's two golden rules of international business and theories, such as

Hofstede's six dimensions of cultural differences and Richard D. Lewis's cultural dimension model, were outlined. Finally, the framework outlined in this chapter will be used in the discussion chapter, where this theory will be discussed with the findings of the primary data gathering.

### 4.0 Methodology

This chapter intends to describe the methodology applied to answer the problem definitions in this master thesis. The data collection process, analysis, and interpretation are critical components of empirical research such as this one. As a result, selecting the proper methodology is vital to get the most relevant and correct data for the research project. This chapter builds on the research philosophy and research design mentioned in Subsections 1.5 and 1.6 in the introduction. In addition, this chapter aims to explain how the data was collected and will include a critical examination of the data to avoid sources of error while maintaining good privacy and research ethics. In Figure 4.1, the research process of this master thesis is outlined.

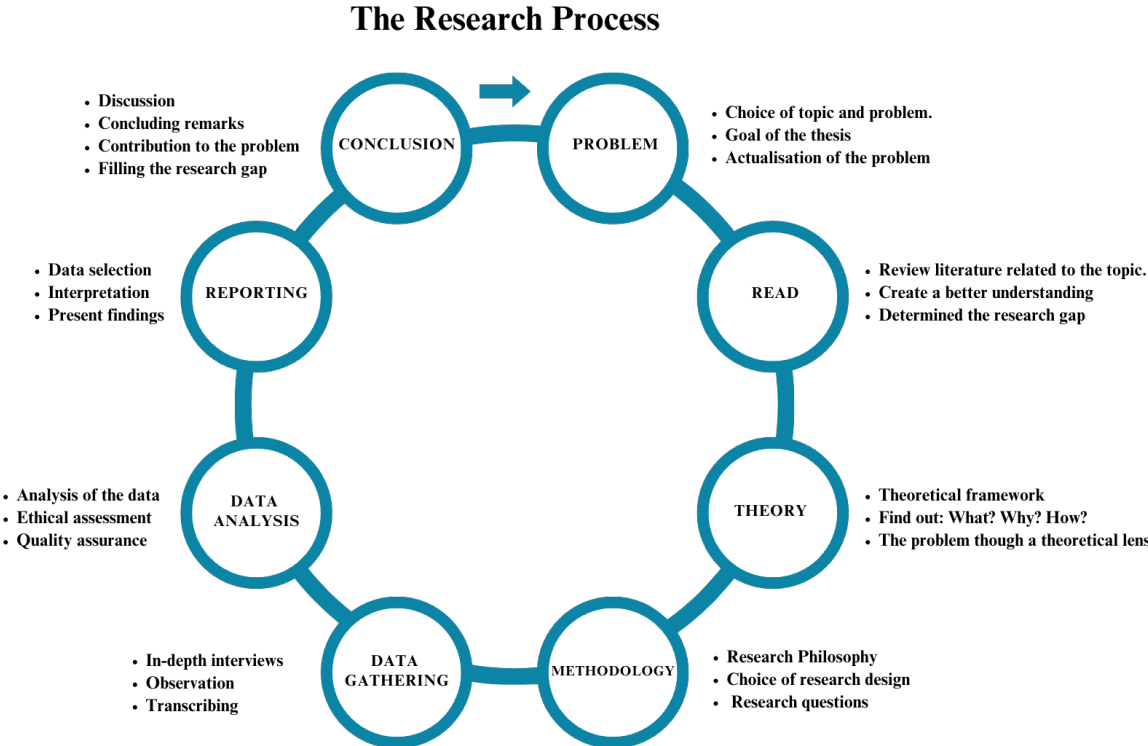


Figure 4.1 - The research process model inspired by (Gripsrud et al., 2016, p.39) & (Sheppard, 2019)

## **4.1 Data Collection**

The data collection in this thesis was carried out in Singapore, Malaysia, Indonesia, and Norway. During the data-gathering process, the researcher got knowledge and insight from experts, already written literature, and people knowledgeable in the field. According to Gripsrud et al. (2016), data and data retrieval can be distributed into two different data sets: primary and secondary data.

### ***4.1.1 Primary Data***

Primary data is crucial for addressing the literature review gap and answering this thesis's research questions. There are two main approaches for collecting primary data, qualitative and quantitative, which differ in how the data is analysed. The qualitative approach focuses on in-depth understanding through text and language, while the quantitative approach uses numbers and statistics to estimate and explain theories and test hypotheses (Gripsrud et al., 2016). This thesis will use in-depth interviews as its primary data. Before the primary data gathering, it was necessary to apply for Skit. More information about the application and the case number of the Sikt approval (*see* Appendix A).

### ***4.1.2 Secondary Data***

This category of data can also be primarily divided into two sets of data:

- **Internal data:** This data was received from LAMTIB and Gaia Mariculture. The data includes business plan information, investor presentations and proof of concept manuals. This information was made available by the founder of LAMTIB and a person working in the management of Gaia Mariculture.
- **External data:** This data is from various external sources. It is also from this data that the literature review was done. The data used as external secondary data came from public sources, academic literature, websites, books, reports and publications. This data was actively used before and during the writing of the master thesis to get better knowledge and an overview of the topic.

### ***4.1.3 In-depth Interviews***

The primary data was gathered through in-depth interviews using an unstructured and open-ended interview guide (*can be found in* Appendix B). The goal of the in-depth interviews was to gather data that can be used to identify patterns, themes, or insights that can then be used to

find out more about the topic and answer the problem definition. The choice of using this qualitative method for obtaining primary data has both advantages and disadvantages. An example of a disadvantage is that this data-gathering method is more time-consuming and requires the researcher to create a good and well-structured interview guide. It is also necessary that the researcher finds suitable and credible interview objects for the topic and that the respondents see that the researcher is credible and worth their time. This type of data gathering also makes it more difficult to generalise the data.

On the other hand, this type of data gathering allows the researcher to ask follow-up questions and collect stories and information that may not have been gathered if the researcher only asked generic questions, thereby not allowing the participants to provide rich, detailed information about their experiences and perspectives. The follow-up questions can also help clarify points or further explore the issue. Based on these factors, this data gathering method allows the researcher to go more in-depth and learn more about the topic, resulting in the advantages outweighing the disadvantages. A table of the technical overview of how the in-depth interviews were carried out (*can be seen in Appendix C*). The table consists of data about the Informants, the tools used during the interviews, and the time spent on each interview. To maintain the anonymity of the Informants, all personal information has been anonymised, and each Informant has been given an Informant initial. Also, the voice recording and E-mails containing sensitive information were deleted to comply with Nord University's and the general data protection regulation (GDPR) rules (Nord University, n.d.-b)

## **4.2 Data Analysis**

### ***4.2.1 Reliability***

When acquiring applicable primary data, it is essential to assess the data to determine its reliability. Reliability, in this case, refers to the consistency of the research results if the same study would be conducted at another time. In other words, it measures how consistently a researcher obtains the same results when asking identical questions to the interviewees or Informants. However, a qualitative research approach has its drawbacks concerning reliability. That is because biases may emerge when interviewing knowledgeable professionals within their field, and it is possible to get biased and non-objective answers. Additionally, people's opinions and attitudes can change over time. To minimise these subjective interpretations, a well-defined

interview guide with precise questions was developed to reduce misunderstandings (DeJonckheere & Vaughn, 2019).

#### ***4.2.2 Validity & Generalisability***

Data credibility can get divided into two categories: internal and external validity. Internal validity refers to how well the acquired data and findings align with reality. Since this data collection was conducted through semi-structured in-depth interviews, which allowed interviewees to offer their opinions, internal credibility can be considered high. External credibility relates to the generalisability of the study's findings. The use of a qualitative method for data collection makes generalisation more challenging. This is a critique of qualitative data methods where the main argument is the need for more statistical generalisability. According to Yin (2013), some view it as limited and less valuable than quantitative research. Nevertheless, the thesis's goal is not to achieve generalisable results. Instead, the data collection's external credibility can be evaluated using an analytical generalisation. This approach contrasts with statistical generalisation by comparing the obtained data with an existing theory, which helps bolster external credibility (Polit & Beck, 2010).

#### ***4.2.3 Overall Ethical Assessment***

When conducting in-depth interviews in a research project, it is crucial to ensure that the interviewees get adequate privacy protection. Interviewing as a data collection method often involves fostering closer relationships with Informants, so adhering to GDPR rules and anonymising all personal information is vital to maintain data protection and cohering to privacy laws. To prevent misinterpretation or omission, the researcher requested permission to record conversations, justifying this to reproduce the information accurately. Interviewees also got informed that only the person conducting the interviews would handle the data and delete the recordings after processing. The in-depth interviews got recorded using the Dictaphone app, which Nord University recommended for collecting personal and sensitive data (Nord University, n.d.-b). The Dictaphone app, made by the University of Oslo, encrypts audio files and transmits them to an external server. Taking these precautions ensures that the thesis author complies with Norwegian privacy requirements and GDPR guidelines for a master thesis (Nord University, n.d.-a).

## 5.0 Results

This chapter presents the results of the primary data gathering from in-depth interviews in Singapore, Malaysia, Indonesia and Norway. A table with an overview of the research participants and how their knowledge and insights are essential for this research is made (*see* Appendix D). The table is without personal information to maintain the participant's anonymity and comply with the GDPR rules. However, the table summarises the characteristics of the participants and gives some background info.

### 5.1 Findings

Singapore is recognised as one of the leading smart cities globally. Using Singapore as an example, there is a possibility to see how global management and smart city technology can be potential solutions for creating better food security in smart cities and smart villages. In Singapore, it is also possible to see how history and the citizen's global mindset have influenced the city's development. Informant G explained that Singapore is one of the most globalised cities in the world, where the city-state is a global finance hub in Asia, connecting Asia to Western markets. The country also has one of the biggest ports in the world, and Singapore has been a global shipping port since British colonialism, and the East India Company enabled a free port in the country in 1819. However, being a small nation without natural resources can pose some challenges to creating a diverse and robust economy.

*"Singapore's situations stand out from any other country by being the world's only island-city state. The country is only 726 km<sup>2</sup>, with no natural resources, and during the planning, both the needs as a city and a country need to be taken into account."*

– **Informant G**

During the interviews in Singapore, it was explained that Singapore is Asia's most sustainable city and also among the most sustainable cities in the world. According to Informant G, this was achieved because the government has prioritised innovation and technology when planning the city. The worldwide recognition as a smart city is a result of several years of R&D, where they have levered technology and digitalisation to improve the quality of life for their citizens. Informant G also mentioned that Singapore imports over 90% of the food supply from over 170 countries. Hence, there is a significant interest in being friends with their global trading partners and neighbours. However, neighbouring countries like Indonesia and Malaysia have a substantially lower percentage of food imports because of lower labour costs and more farming

land. Informant G also expressed a growing concern in Singapore that the country is too dependent on other countries for the city's food security. According to Informant F, Malaysia currently produces 40% of the food consumed in Singapore. Moreover, the government in Singapore is, according to Informant G, actively working on different programs, such as "30 by 30", with the goal that Singapore will produce 30% of its food supply by 2030. They are also actively seeking innovations and technology regarding food production and the possibility of creating companies that can produce food overseas due to land constraints in Singapore.

*"In Singapore, the capital and operational expenditures for producing food are too high, and the producers cannot compete with importers. The government is therefore pushing for more R&D, aquaponics and vertical farms due to land limitations." – Informant C*

A considerable problem for several big cities related to food security is the increasing cost of land and labour. For example, Informant C explained that other megacities such as Tokyo and Hong Kong also have similar problems where producing considerable amounts of food in the city is not economically viable. Another picture of Singapore as a food producer was drawn when interviewing a traditional fish farmer in Singapore. Informant D explained that the fish farm had to innovate to stay alive constantly, and most of his competitors have stopped traditional fish farming in Singapore because of the importer's costs and price competition. The Informant also talked negatively about the government and said that these new and costly aquaculture projects have yet to succeed.

*"Many traditional farmers in the industry have voiced concerns that the Singapore Food Agency is only using resources for the sake of press releases, but not practical real value things that can grow the food production" – Informant D*

Informant C also mentioned that growing local food with aquaculture in Singapore has yet to scale as planned by the Singaporean government. So, they are now looking for global partners to grow their food overseas through the SFA's grown overseas strategy. According to Informant C, there is a growing possibility for neighbouring countries and global partners to work more closely with Singapore to create better food security for the country and learn from Singapore's food production systems. However, partnerships like that do not come by themselves, and according to Informant G, there is a need for managers with a global mindset to align strategies and coordinate efforts of multiple stakeholders across borders for these initiatives to succeed.

Informant E explained that there are possibilities for Singapore and other big cities worldwide to invest in smart rural development and create smart villages. According to Informant E, this will create better food security, more inclusive economic growth, and job opportunities for people in rural areas. The Informant talked about how there is a vast amount of human capital and natural resources unused in rural areas globally today. These people are often overseen but are motivated to create a better life quality for themselves and their families. However, there is a need for more resources and knowledge to create sustainable food production and make small-scale businesses to create better living conditions in these areas. The Informant explained that giving these rural developments, different ICT technologies and education about sustainable agriculture and aquaculture techniques can be helpful.

According to Informant H, one of the crucial elements is building strong partnerships between all stakeholders, such as local communities, government, NGOs, and businesses. The Informant emphasised that this is important because it will help ensure that the project is adapted and tailored to the needs of each community and that the resources are used efficiently. The Informant also explained that the villages need investments in education and training programs. One of the biggest obstacles companies and NGOs face when helping these villages is a lack of financial and human resources. During the interviews, Informant H also explained that leadership that connects actors and cooperation between global and local stakeholders are critical factors. The Informant argued that governments or international organisations such as the world bank and IMF should fund these development projects and help them become self-sufficient. The Informant also explained that private companies could provide this funding and resources as part of their CSR or impact investing campaigns.

*"If governments and the UN want to create food security for more people and accomplish SDG 2, there is a need for global collaboration and partnerships with local actors" – Informant H*

Informant E also mentioned that implementing successful rural development requires stakeholders to participate and collaborate on goals and objectives actively. The Informant talked about the global participation of the SDGs and that almost everybody knows the importance of these goals. However, the Informant talked about how the global community's progress should be faster, and the incentives for solving the goals should be higher and give



better global recognition. The Informant also talked about how these goals are significant and can be almost too large to the point that they can be demotivating. However, the Informant emphasised that even if these goals may not be achieved by 2030, there is a need to do more as soon as possible to create a better future for the next generation.

Understanding cultural differences when doing business and collaborating with global stakeholders is crucial. Informant E mentioned that when doing business and trying to communicate well, there is a need to understand the culture. This is vital for negotiating with rural communities and through the whole value chain when talking and negotiating with different global partners such as governments, NGOs and other businesses.

*"It is important to work with the local communities and involve them in the decision process from the start. This can open more doors and ensure the community's cultural values and traditions are respected, and they feel part of the decision-making."*

– **Informant E**

During the interviews, it became clear from Informant E that each village is unique and has a distinct culture that needs to be taken care of. Another critical factor in creating a better situation for a rural village is to have local communities on board. There is a considerable implication if there is resistance from local communities or governments. The local communities and governments can be critical, so they need to see the project's value and not be sceptical of the company's intentions. Informant E mentioned that to overcome these difficulties, it is necessary to build good partnerships with the local stakeholders and communicate and be transparent about their goals and objectives. Also, the company should be willing to adapt to the unique local community's operations and resources.

There is a growing concern about food security and how rural areas can grow sustainably. According to Informant E, various challenges face rural communities worldwide, such as poverty, limited access to resources, education, healthcare, and environmental degradation. There is also a growing concern that rural areas are in a weak position because they are the most vulnerable to climate change and have the adverse effects of urbanisation. The Informant explained that problems are often interconnected, and addressing them needs a holistic approach because almost every community has unique needs and resources. This is also why

LAMTIB is trying to help these rural villages, but they need collaborators and help from other partners to implement the vision.

*"There is a need for a multidisciplinary approach to create solutions in multiple disciplines connected to sustainable growth, such as food production, health, education, and community mobilisation. That is why partnerships and SDG 17 are so important."*

**- Informant E**

However, according to Informant E, there are also many possibilities for these rural areas. The Informant mentioned that some areas have unused human capital and natural resources. It was also explained that there is considerable potential for implementing smart city technology in rural areas to create better sustainable growth. The Informant talked about how more inclusive economic growth can be achieved by connecting different companies CSR strategies, impact investing and NGOs to invest in rural areas. Which would promote economic development, create job opportunities for people in the villages and enhance the overall well-being of those people.

Informant A, who works in the aquaculture sector, sees massive potential in teaching people in rural areas to farm fish and other sustainable aquaculture technologies, such as farming seaweed. These technologies can help rural development grow economically, urban areas get access to better food security, and the wildlife population of fish that have been overfished can thrive naturally.

*"Aquaculture fits perfectly into the larger picture of sustainable food production and sustainable cities and villages". – Informant A*

Informant A explained that to create a more sustainable future, more innovation is needed in the food sector, both in urban and rural areas. However, some technological solutions are already there in agriculture and aquaculture. The Informant talked about the importance of sustainable aquaculture and its potential importance in enhancing food security in a more environmentally friendly process, such as recirculating aquaculture systems and IMTA. The Informant explained that the farmers could minimise using resources like water and feed, reducing the waste and pollution generated by food production. According to the Informant, this will also help ensure the long-term viability of the production and aquaculture as a source of income in rural areas and food in urban areas.

*"The world has a growing need for food, and we are running out of space on land, so we need to start growing and harvesting more from the sea" – Informant B*

Informant B mentioned that investing and creating more aquaculture solutions might be wise because the world needs more food. However, the Informant explained that there is a growing concern worldwide, especially in rural areas considering overfishing. Therefore, there is a need for more regulation, sharing of knowledge and aquaculture to preserve these wildlife seafood populations. The Informant explained that several solutions are more sustainable and can be implemented in smart cities and rural villages. For example, aquaponics and HIC are suitable both in smart cities with land constraints and in smart villages. Seaweed also has a significant potential for sustainable food production in rural villages with access to marine areas because of its sustainability and because the product uses no freshwater or fertiliser and only needs the sun as energy. The Informant also explained that seaweed could be a potential product that helps Norway be more self-sufficient. It was said there is also a growing concern in Norway regarding food security. Informant B said that the Norwegian aquaculture sector, which may be seen as more mature than Singapore, uses approximately 1.8 million tons of fish feed per year. 92% of the feed is imported from other countries, such as soya from Brazil. This situation has also made the Norwegian government more concerned, and they want to be more self-sufficient and not depend on a few large suppliers. The government and aquaculture have also realised that this feed is not environmentally friendly and are now looking for more sustainable feed types. This proves that there is also a growing demand for sustainable aquaculture and feed, such as seaweed, in the western part of the world.

Informant F expressed that globalisation and the creation of various free trade agreements have led to countries becoming more dependent on the global food chain to create food security. According to Informant G, this may also be one of the reasons why countries such as Singapore depend on the global food supply chain to feed their citizens. The Informant explained that Singapore has an open trading economy, which means that Singapore's imports are tariff-free. The Informant said that this makes sense given that Singapore is one of the world's largest shipping ports and the city is highly globalised, but it is also a concern for the future. The cultural differences inside Singapore as a global hub got explained by the fact that Singapore is a city-state where people from different ethnical backgrounds coexist. However, the three main ethnic groups in Singapore are Chinese, Malay, and Indian. So even though Singapore is a

global and modern city with much Western influence, it is still possible to see these cultures and traditions in daily life and society.

Furthermore, Informant A talked about despite the small geographical distance between Singapore, Malaysia, and Indonesia, there are cultural differences because of cultural practices, historical background, religion, and cultural identity. The Informant also highlighted a growing concern about Westernisation in the context of globalisation, urbanisation and creating smart villages. The Informant explained that urban areas are vulnerable to Westernisation because of the influx of new ideas, technologies, and cultures, including Western influences. Informant A emphasised that media, entertainment, and the overall pop culture from the West play a significant role in this process, leading to a more homogenous global society that gradually undermines cultural diversity. The Informant also draws attention to the impact of MNCs and global food chains, promoting Westernisation in the culinary culture. The Informant also talked about how this needs to be considered by both businesses and governments when giving rural areas more connection to urban areas, because there is a need to preserve cultural differences in a globalised world.

## **5.2 Summary of the Findings**

This chapter presents the results of the primary data gathering. During the interviews, it became clear how Singapore, as a small city-state without any natural resources and land constraints, is trying to achieve their goal of producing 30% of its own food by 2030. The results chapter shows how global cooperation and participation are needed to reach the SDGs and other goals, such as food security for a city considered one of the smartest in the world. The Informants also explained that there is a need for global cooperation and trade to obtain food security in the future. This chapter also emphasises a need for sustainable rural development and that smart villages using smart city technology and new aquaculture techniques such as HIC, aquaponics, and seaweed farming can be potential solutions for creating better and more sustainable food security in several countries. The result chapter also shows how the Informants talked about the need to respect cultural values and traditions when creating partnerships and negotiating with different stakeholders and how important it is to involve the local stakeholders in the decision-making to create more inclusive economic growth.

## 6.0 Discussions

In this chapter, the results will be discussed related to the theory chapter and the literature review. The main objective is to investigate how global management can be used to create food security and sustainable growth in smart villages. The chapter starts with a discussion on global management theory and globalisation and will then be structured into the same two sections made earlier in the theory chapter. The discussion will also address some criticism of the theory.

During the data gathering, it became evident that international collaboration for reaching different goals, such as the SDGs and creating food security, is essential. It also became apparent how globalised this world is when a country considered one of the smartest in the world relies on 170 different countries to ensure 90% of its food security. Even though the literature and Informants regard Singapore as one of the world's smartest, the city still depends on the global food supply chain and cooperation between countries and companies on a global level. However, being too reliant on global partners and the global food supply chain can be a problem for Singapore in the future because, according to Skonieczny (2010), globalisation is full of different contestations and criticisms. For example, Kim et al. (2020) criticise globalisation and predict a deglobalisation trend in the coming years. A future where countries get more protective and unwilling to trade will significantly impact the food security of countries such as Singapore. However, according to Van der Marel (2020), globalisation is still growing but changing to a more stable growth phase. This is mainly because globalisation has grown immensely in recent years due to humans being more connected with technologies such as the internet, the creation of MNCs and urbanisation. Moreover, Dadush (2022) explains that the deglobalisation question is often discussed during a crisis or challenging times when political tension and protectionism are higher, and countries pull more to sovereignty. So, there are several different views on globalisation and how it will be. However, this uncertainty could be a wake-up call for Singapore and other large cities or countries not self-sufficient in essential resources such as food.

The main research question of this thesis assumes that there is a need to understand how global management can be used to create sustainable growth and enhance food security in rural villages. The result chapter shows a need for global cooperation and management to coordinate collaboration and create a strategy that fits in a global context and accounts for different markets, cultures, and mindsets. The result shows how the global food supply chain is interlinked with global markets. Furthermore, global management and cooperation between

nations and governments are crucial for having a secure food supply. In the future, when even more people are moving to urban areas due to the global trend of urbanisation, there will most likely be a growing concern about food security. This is because there will be more people on the planet to feed and because of land constraints and higher costs in cities. This proves the importance of global management and creating good partnerships. In Singapore's case, it should be mentioned that the country is one of three city-states in the world and the only island city-state, so Singapore's case is unique. However, as Informant C explained, similar trends can also be seen in other big megacities, such as Tokyo and Hong Kong. So, there are several examples of cities that may have to rely on other countries and the global food supply for food security in the future.

Growing concern about food security puts countries and their governments under pressure to create a more reliable and secure food supply. For example, the results show that Singapore and the SFA have developed various government-backed initiatives. This shows that Singapore is more open to collaboration and finding new solutions. This willingness to use research and a global mindset has led to Singapore becoming one of the smartest cities in the world, according to Informant G. So, their history of R&D and creating solutions for their problems related to other smart city initiatives has worked so far. However, they still have a long way to go regarding food security, and they are taking this problem seriously by creating initiatives like the SFA's grow overseas initiative. This initiative aims to create nutritious and healthy food with global partners and countries. The initiative can also open the door for Singapore and other smart cities to invest in rural areas. LAMTIB can also use this opportunity with the creation of smart villages. That is because the grown overseas strategy also implies that Singapore wants to export their food production technology, which can be good if implemented correctly in rural areas. However, this implies that rural areas need more infrastructure and education to use new smart city technologies. This also shows how global partnerships and cooperation may be the way to solve some of these problems. One of the solutions mentioned in this thesis about creating better food security and sustainable development is creating smart villages with smart city technology.

The main objective of LAMTIB is to partner with various companies and stakeholders to create more sustainable and inclusive economic growth. In addition, they want to create job opportunities and small-scale businesses in rural areas, so these villages can become self-sufficient and sell their products on the world market. However, this master's thesis may not

cover all potential solutions to these complex challenges. For example, Singapore is one of the leading countries in cultured meat production, which is also one of the solutions they are researching to get closer to their goal of better food security (SFA, 2021).

Informant E explained that for creating smart villages which utilise smart city technology for producing food, there is a need for a holistic approach where complex challenges require multifaceted solutions. For example, each village is unique, and there is also a need for collaboration with NGOs and community groups that can provide local knowledge and expertise. There is also a need to address this challenge through collaboration with global and local stakeholders. A globalisation report by the UN (2017) stressed the importance of establishing global agreements and urged UN member states to enable sustainable and inclusive globalisation. The report also highlighted key trends, including the rapid advancement of new technologies, urbanisation, and the impact of globalisation on climate change.

## **6.1 Sustainable Management**

During the interviews, almost every Informant discussed sustainability and the importance of creating a more sustainable way of living. This may be because of a more broad and increased focus on climate change and how food production is not environmentally friendly (Filho et al., 2022). This can also be seen with the growing trend of sustainable management and how it has become more important in recent years. For example, a report by EY Global (2021) shows that sustainability has become an imperative part of modern corporate strategy, where as much as 90 % of global institutional investors will reconsider investing in a company if they do not have any sustainability plans or strategy. This view can also be confirmed by Winston (2021), which shows that sustainable business became mainstream in 2021 because the younger generation is more concerned about climate change and the environment. This global interest could be a potential trend for big corporations to cooperate and solve significant sustainability and climate change challenges. This is a positive development in a world where some global crises, such as the pandemic, have put the SDGs in danger. A report by the UN (2022a) about the progress of the SDGs, shows how the pandemic and armed conflicts are threatening the human species. The report asks for an urgent scale-up of cooperation to find solutions to humanity's pressing issues. This urgency may also be because the estimated cost of meeting the various SDGs rose to \$176 trillion last year (Jessop, 2022).

LAMTIB is a foundation that, according to Informant E, wants to create partnerships to solve some of the pressing issues in the world while creating more inclusive economic growth. They want to create a multidisciplinary approach to solutions connected to smart villages and inclusive economic growth where food production is essential. However, if they do so, they need collaborators who see the importance of developing sustainable growth initiatives and creating a better future for more people. As mentioned in the theory chapter, CSR is a growing trend in the corporate world, and more businesses and global managers look to CSR to create a better brand image and do marketing and social campaigns that are good for the local community or the overall society. This trend can have a potentially massive impact on LAMTIB since the trend opens up several possible business and partner opportunities for the company.

However, it is crucial to be cautious about new partners because the intentions of a CSR campaign can also be to greenwash the brand. Some examples of greenwashing episodes can, for example, be the Volkswagens scandal called "Dieselgate". In this case, the car manufacturer installed software to cheat in emission tests to make the cars seem more environmentally friendly during the tests (Plungis, 2015). There is also a growing trend with energy companies to rebrand themselves for a more renewable future. However, companies such as Equinor, TotalEnergies, and QatarEnergy are still mainly producing fossil fuels which have gained controversy. Smith (2022) says this is the epitome of greenwashing. Others, like Atomos (2021), say that rebranding can change the company's strategy in the long term considering the energy transition to renewables and new investments in the field. Apart from being MNCs that mainly produce fossil fuels, a common denominator about these companies is that they are all state-owned. This proves that regulation and a legal framework that penalises those who engage in greenwashing, such as the European taxonomy mentioned earlier in the theory chapter, is a step in the right direction. This would also make it easier for companies like LAMTIB to find companies who want to make a positive impact with their CSR strategy and not just trick people into creating a better and more environmental brand.

As shown in the result and the literature review, smart city initiatives and technology can be utilised to create a better and more sustainable future for the underprivileged and people living in rural villages. This possibility can also occur with SFA's grown oversea strategy, where the Singaporean government wants to export its urban technology to create better production facilities. This shows a willingness to export smart city technology to create smart villages. However, some actions still need to be accomplished for this to be facilitated. In LAMTIB's



case, there is a need for better communication between different stakeholders about the financial potential of the unused human capital and natural resources in these rural villages. It is crucial to demonstrate to potential investors the opportunities to establish small-scale businesses, which contribute to rural development, reduce poverty, and attract a broader range of investors who can recognise the potential. Based on the impact investing matrix outlined in Figure 3.1, LAMTIB is well positioned. The business model of LAMTIB allows them to go broadly and utilise all parts of this matrix, from seeking traditional philanthropic and evidence-based grants and investments with expected financial returns, such as "Socially Responsible Investments" and "Evidence-based impact investments". To progress towards the goal of LAMTIB, they need partnerships and increased investment, as explained by Informant E. By incorporating and making use of impact investing into the strategy, LAMTIB can demonstrate its commitment to sustainable development and attract like-minded partners and investors who share their values. Impact investing is an effective tool for promoting sustainable practices (OECD, 2019). Impact investing can also direct capital to companies and projects that align with LAMTIB's mission. Creating these strategic partnerships and investments can be wise to drive sustainable development and work collectively towards a more sustainable future.

The growing trend of CSR and investing for the benefit of society will potentially help LAMTIB to create more collaborations with various stakeholders and companies. However, there is also a possibility for traditional, financially motivated investments by creating small-scale businesses. This is important because if LAMTIB is going to have global success, they need partnerships and investments. During the interviews, Informant H mentioned that various companies and NGOs face challenges when trying to improve living conditions in rural areas. It was expressed that there is a need for more financial and human resources. This highlights the growing need for more investments and resources to enable these areas to grow. Another perspective discussed by Informant H was the potential involvement of global actors such as the IMF or the World Bank to help these villages. This support could make it possible to build infrastructure and give these villages access to clean energy and water, which as a result, can make these smart villages work sustainably off the grid during the worst climate shocks and be self-sufficient in the future.

This comes down to an aspect mentioned several times in this thesis about creating better cooperation and partnerships to solve pressing challenges. There is a growing trend of caring about the environment, and more corporations want to do their part. However, there are still

setbacks in achieving the SDGs, and it seems like these goals will not be fulfilled by 2030. Currently, the world is going backwards on some SDGs due to bad economic times from post-pandemic shocks, such as inflation and the ongoing wars that have worsened the situations for vulnerable people in the world (UN Secretary General, 2022). In addition, many countries, particularly those in the Global South, need additional resources and capacity effectively to pursue the SDGs (Blicharska et al., 2021). The SDGs represent a global commitment to building a sustainable future for all. Despite the challenges involved in their implementation, the transformative potential of the SDGs should not be overlooked. The goals have the power to potentially improve the lives of millions, especially those who are less fortunate and most vulnerable. The SDGs can reduce poverty, address food insecurity, promote sustainable economic growth, ensure environmental sustainability, and promote social inclusion. However, achieving the SDGs requires a combination of political will, investments in infrastructure, education, healthcare, social protection programs and collective action.

## **6.2 Cross-cultural Management**

There is a growing importance of cross-cultural theory and management as businesses expand across borders and humans from different backgrounds and cultures interact more frequently. Therefore, understanding cross-cultural dynamics is essential for creating collaboration and effective global management. Cross-cultural management theory can help businesses and managers to develop strategies that provide an understanding of cultural differences and similarities that can be used to promote effective communication, build trust and enhance cooperation. For example, understanding cultural differences is essential in the case of LAMTIB. For them, it is crucial to understand the different cultures when operating in a culturally diverse context. Understanding cultural differences will also help the company understand how to implement different strategies and create better inclusivity. According to Informant E, this is important because each village has unique characteristics. By promoting cultural awareness and sensitivity, LAMTIB can facilitate smooth communication and cooperation and foster a mutually beneficial relationship between rural and urban communities. LAMTIB could also support efforts to preserve the unique village cultures, ensuring that they retain their distinct identities and are not excessively influenced by Westernisation, as observed by Informant A's description of Singapore. By promoting cultural preservation, LAMTIB can help rural villages maintain their rich heritage and adapt to changes while retaining their unique identities.

Another cultural challenge LAMTIB must overcome is related to food production and tradition. Some potential rural villages most likely have their traditions and way of producing food, which can be challenging to change. This can also be seen in Singapore, where Informant D, a traditional farmer in Singapore, expressed pessimistic opinions towards the government and its desire to find new aquaculture solutions. However, the Informant was not directly negative because of the innovations but because the authority spent money on unproven techniques instead of helping those who still farm food traditionally in the country. The Informant also explained how several of his competitors had to give up and how the Informant kept going by using different innovative solutions.

In creating these collaborations with various global and local stakeholders, LAMTIB should keep Gesteland's two-golden rules for international business in mind. The first rule says that the visitor is expected to understand the local culture. This rule emphasises the need for LAMTIB to understand the local culture, customs, and practices. This also includes knowledge about how the villages produce, distribute, and consume food. By understanding and following Richard Gesteland's first rule, LAMTIB can better tailor its initiatives to each community's unique needs and circumstances. Additionally, LAMTIB should be prepared to adapt its approach to the specific needs of each community, which is Gesteland's second rule of international business. For example, some rural villages may have limited infrastructure or access to resources, which could impact the feasibility of implementing smart city initiatives and food production. In another case, the villages may have more resources and somewhat access to electricity or other infrastructure, which shows that the foundation may need to adapt its approach to focus on alternative solutions more appropriate for the local context. This is also a promising approach for resource management and fits well with what Informant E said during the interview that all villages are unique. Furthermore, by being culturally sensitive and adaptive, LAMTIB can build trust and collaboration with the rural communities it seeks to help and increase the likelihood of success for its food security initiatives. These two rules can also be used for LAMTIB when partnering and collaborating with other businesses and organisations globally.

When LAMTIB starts establishing different partnerships and setting up smart villages, it is wise for them to understand the counterpart's culture. Geert Hofstede's model is one of the most widely recognised cross-cultural management models. Using this model can help LAMTIB get an overview of the different cultures and understand what to expect and negotiate based on this

knowledge. In Table 3.1, the six dimensions of Geert Hofstede's model are outlined with example countries and a short description of each dimension. For example, as seen in Figure 3.2, there are differences between the country's cultures where the data for this master thesis was collected. An advantage for LAMTIB when using this management theory is to be aware of and understand their culture so they also understand how others perceive it. An example of this can be seen in the same figure, where Singapore has a "Low Uncertainty Avoidance", which indicates feeling uncomfortable with uncertain and unknown situations and the highest "Long-Term Orientation", which indicates focus and planning for the future. It is essential to understand such differences because it can help to understand different choices and how to deal with the other party in negotiations and communication.

Even though the popularity of Geert Hofstede's theory, it is not spared from criticism. For instance, Fougère & Moulettes (2007) criticise the theory on several aspects, such as the data Geert Hofstede used in his theory. Their criticism is that the model only uses one company in the survey and data gathering. Considering that the data gathering took place in the 80s at IBM, it also should be mentioned that the business culture of IBM could have influenced the result. Furthermore, the people surveyed are mostly businesspeople in IT and marketing and not random samples from the culture in each country, which could have given a broader picture of the culture. They also criticise the theory because the questions in this survey got asked from the perspective of a Western businessman, which could have created some Western biases. Others, such as Ly (2013), criticise some parts of the model as being too generalised and that a country has a more considerable cultural difference than what can be found in one MNC. Nonetheless, it is reasonable to say that the perspective of Geert Hofstede's model can provide helpful information about the different aspects of various cultures. It is also useful for LAMTIB to know that these dimensions do not fully reflect reality but provide some directional indications of how cultures differ.

Another cultural management theory useful for LAMTIB is Richard D. Lewis's cultural model, also known as the Lewis Model. The model is outlined in Figure 3.3 and shows how different countries with distinct cultures can be divided into three different broad categories. The model divides cultures into linear-active, multi-active and reactive categories. The model can provide LAMTIB with an overview of the diverse cultural behaviours and differences they may encounter. Compared to Hofstede's model, this can help LAMTIB recognise that different countries may prioritise and value different aspects of interactions and collaboration.

Understanding whether a culture is more task-oriented, relationship-oriented, or hierarchical, LAMTIB can adapt its strategies and engagement methods according to the model. For example, when partnering or working with a company from a linear-active country, such as USA or Germany, LAMTIB can prioritise efficiency, punctuality, and direct communication. On the other hand, while working with a company or people from a country that is regarded as a multi-active country, such as Mexico and Venezuela, LAMTIB can focus on building personal connections and fostering social interactions. Likewise, in dealings with reactive cultures such as China and Vietnam, LAMTIB should respect hierarchy, observe social norms, and employ indirect communication styles.

The Lewis model has also received criticism, such that it does not have the same scientific backing as Hofstede's model, where it is hard to determine the empirical evidence because Richard D. Lewis uses his own observations (Niemi, 2019). Another criticism of the model can also be seen as this model overgeneralises and oversimplifies cultural diversity by grouping the countries into only three broad categories. This also makes the model fail to capture the nuances and variations in different cultures and may create more prominent stereotypes or biases. Furthermore, when dividing the countries into categories, the model also assumes a level of cultural homogeneity within a country and ignores internal cultural differences. It should also be mentioned that this model is developed with observations and experiences from the Western world, so a Eurocentric bias cannot be excluded. Although this model has shortcomings, it can provide some general insights and serve as a starting point for understanding cultural differences. However, it is essential to approach it cautiously, acknowledging its limitations and complementing the model with other cultural frameworks, such as Hofstede's cultural model, to gain a more comprehensive understanding of the specific cultural contexts LAMTIB will be working with.

Using these cultural models not only helps LAMTIB navigate cross-cultural challenges but can also be used to help the organisation understand its own cultural biases and perspectives. By recognising their cultural biases, LAMTIB can adapt their approach and communicate more effectively with global and local stakeholders with diverse cultural backgrounds. Furthermore, by showing cultural awareness, LAMTIB can foster stronger relationships, build trust and create a collaborative environment where all stakeholders feel valued and respected, which is essential to creating good partnerships. Moreover, understanding cultural dimensions and adapting strategies can enhance LAMTIB's negotiation skills. By recognising cultural

preferences, LAMTIB can tailor its proposals, compromises, and problem-solving approaches to resonate with its partner's or stakeholder's cultural values and expectations. This increases the likelihood of reaching mutually beneficial agreements and maintaining long-term partnerships. However, it is essential to emphasise that it is difficult to exclude a cultural bias when these theories are influenced by and created in the Western part of the world. So, it is essential for LAMTIB and others who use these models to know that these categorisations and dimensions dividing cultures into different boxes should not be used to stereotype or oversimplify any culture. This is because most cultures are complex and diverse, and individuals and corporate cultures can have various traits that are not common in that culture.

Although these models should be used carefully, they still provide a good overview. Hofstede's dimensions and Lewis's pyramid aim to define and categorise cultural differences to facilitate cross-cultural understanding. Hofstede's model provides a more detailed and nuanced analysis of cultural traits, while Lewis's pyramid offers a more straightforward, more practical approach to categorising cultures. Despite these differences, the two theories complement each other by providing different perspectives on cultural variations. For example, Hofstede's dimensions can help explain the underlying reasons behind the behaviour of individuals in a particular culture, whereas Lewis's pyramid can guide practical approaches to communication and collaboration with people from that culture. This shows that Geert Hofstede's and Richard D. Lewis's cultural models offer LAMTIB valuable tools for understanding and adapting to cultural differences when collaborating with local and global stakeholders. Using these models, LAMTIB can more easily navigate diverse cultural landscapes, create meaningful connections and foster successful partnerships with stakeholders worldwide. As shown in these models, cultural sensitivity and adaptability will also be crucial in effectively implementing LAMTIB's initiatives and contributing to positive social impact and sustainable development. Using Hofstede's six dimensions and Lewis's pyramid can provide LAMTIB with a comprehensive framework for navigating cross-cultural challenges in today's globalised world. As a result, they can leverage these theories, improve their global management strategies, and foster more effective communication and collaboration across cultures.

### **6.3 Summary of the Discussion**

The discussion focuses on the role of global management in promoting food security and sustainable growth in smart villages. The chapter highlights the importance of global cooperation in achieving the SDGs and ensuring better food security. The discussion addresses

globalisation and the global food supply chain that have affected food security, for example in Singapore, which now relies on global partners for its food security. The chapter then explores the significance of global cooperation and management in addressing future challenges and achieving sustainable growth. The research confirms that global management is vital for sustainable growth and food security in rural villages and emphasises the need to develop strategies that consider the various partners, markets, villages, and cultures. The chapter also discusses Singapore's initiatives, such as the grow oversea strategy and using smart city technology in smart village projects. In addition, it highlights the growing emphasis on sustainability in corporate strategies and the role of CSR and impact investing. The discussion also emphasises the importance of cross-cultural management in global contexts and the need to preserve the culture in villages and give them practical education.

## **7.0 Conclusion**

In this concluding chapter, the main objective of this master thesis will be summarised, and the research questions will be answered. This thesis intends to contribute to global management research by exploring how global management can be used to create food security and sustainable growth in smart villages using smart city technology. This chapter will also present the final remarks for this thesis, highlighting the essential findings and giving recommendations for future research.

### **7.1 Answering the Research Questions.**

The research question outlined in Subsection 1.3 will be answered in this section using the data obtained in the thesis and insight from the discussion.

#### **1. What are the current challenges and opportunities for using smart city technology to enhance food security?**

Numerous challenges are associated with using smart city technology to create better food security. One of the main problems is the considerable investment required for researching different technologies and their implementation. Developing and adopting advanced technology for food production can be risky and costly, and many countries and cities do not have the resources. This cost can also be linked to land constraints and high city labour costs, which is one of the reasons why it is challenging to do traditional food production in cities.

Another challenge is the need for more public awareness among urban residents regarding the importance of sustainable food security and reduced dependency on food imports from the global food supply chain. This lack of understanding can hinder adopting and supporting initiatives to improve food security through smart city technologies. The low awareness can also lead to insufficient education about the complexities of the food production system. Gaining consumer support is also challenging due to the higher cost associated with urban food production. The costs are often higher due to advanced technology, small productions and infrastructure needed to produce food in urban areas. This results in more expensive products for consumers than similar products already available through the global food supply chain. The globalisation of today's world is also a challenge for promoting smart city technology to increase local and sustainable food production. With easy access to a wide range of products from global food supply chains, consumers may prefer cheaper and imported alternatives instead of the more expensive city-produced foods. So, the global market may make it more challenging to convince consumers that investing in smart city technology which produces sustainable food, is the better choice.

Despite the various challenges, there are also opportunities to use smart city technologies to improve food security. Some of the opportunities include vertical farming, aquaponics, and curated meat. Smart city technology can also, with the use of real-time data and analytics, monitor and manage resources to optimise production and minimise waste. However, within the scope of this thesis, the focus has been primarily on the potential solution presented by the case company LAMTIB. The complex challenges of food production and food security were addressed by transferring smart city initiatives to create smart villages to produce more sustainable food. The initiative aims to create more inclusive economic growth, create jobs and a cheaper way to produce food due to larger land areas and a cheaper labour force. In addition, the creation of smart villages makes it possible to supply food to neighbouring smart cities and contribute to their food security. This can create a more mutually beneficial relationship between smart villages and smart cities, where sustainable food production and distribution are optimised. Doing so can create a more stable and sustainable food source for citizens in both environments. This can also be an opportunity for smart city technology to create a better life quality for more people by creating inclusive, environmentally friendly economic growth. The implementation of smart city technology in the context of smart villages not only addresses food security challenges but can also help transition to clean energy sources that reduce GHG emissions to create a better and liveable community for all.



## **2. What sustainable aquaculture solutions can enhance food security and reduce the negative impact of human activities on the environment?**

In this thesis, different sustainable aquaculture solutions have been identified, and their potential to increase food security while minimising negative environmental impacts has been highlighted. Aquaponics, a system that combines fish production with plant cultivation, is one of these solutions. In aquaponics, the waste produced by fish serves as a nutrient source for plants creating a mutual relationship between the species. This practice maximises resource utilisation, improves water quality, and promotes ecosystem balance. Another sustainable aquaculture solution described was IMTA, which involves cultivating several species in one system. In IMTA, the waste generated by one species becomes a valuable source of nutrients for another species. This system effectively reduces the build-up of nutrients, which improves water quality. Moreover, these sustainable aquaculture solutions, such as aquaponics and IMTA, can facilitate the implementation of circular economy principles where waste from one process becomes a valuable resource for another, creating a more sustainable and resource-efficient food system. In addition, this thesis also mentions HIC, an aquaculture technique that involves using modular and portable containers containing technology such as recirculating aquaculture systems. These container-based hatcheries offer scalability, replicability, and rapid deployment, that can be used in areas with limited space. Seaweed farming is also highlighted as a promising aquaculture practice in this thesis. Seaweed can capture CO<sub>2</sub> and requires no fresh water, fertiliser or added energy other than sunlight. Seaweed is already an established part of the diet in Asia and, as shown in this thesis, can have other possible use cases, which makes it an aquaculture practice that can enhance food security and reduce the negative impact of human activities on the environment.

## **3. How can global management theory be used to coordinate different actors and stakeholders to promote sustainable growth, enhance food security, and support smart city initiatives?**

The findings of this thesis underline that there is a need for better coordination of global cooperation across different actors and sectors to address the challenges related to poverty and hunger. There is a need for a more holistic approach where the global management theory can be used for collaboration between different actors and stakeholders to create sustainable growth and food security. Encouraging collaboration and information sharing across sectors globally,

such as food production, energy, technology and education, provides a more collaborative and coordinated approach that works together to address some of the complex challenges. This collaboration provides an opportunity to leverage the resources of different partners, making it easier for stakeholders to develop comprehensive solutions that maximise the efficiency and impact of smart city initiatives.

A crucial aspect of global cooperation is cross-cultural management and the creation of solid partnerships with both global and local stakeholders. Building relationships on mutual trust and understanding helps to overcome cultural differences and develop meaningful cooperation. These partnerships also make it possible to increase knowledge sharing between urban and rural areas. Stakeholders can exchange valuable insights and experiences by facilitating cooperation, partnerships and sharing best practices. This can also be seen in the SFA's grown oversea strategy, where they want to work with various countries and stakeholders to create better food security for Singapore. They also want to export their food production systems, which shows their willingness to share knowledge. Knowledge sharing is also crucial because it becomes easier to identify effective strategies and food production systems that can be reproduced and adapted to unique cities and villages.

Smart city technology can also have an important role in coordinating global cooperation. These technologies give stakeholders a better overview of the initiatives due to active real-time data monitoring. This makes it easier to make evidence-based decisions and evaluate the investment or social program while providing the opportunity to adjust if necessary. This is a more dynamic approach, and it allows the stakeholders to ensure that the resources are allocated efficiently, leading to an overall better outcome and sustainable progress. Another fundamental aspect of global cooperation is community engagement and empowerment. Community-driven initiatives encourage a sense of ownership and increase the likelihood of successful implementation and long-term sustainability. That is also why it is important to involve local communities in the decision-making process and provide them with relevant knowledge and expertise. This allows stakeholders to better adapt the initiative to the specific needs and objectives of the village or city. Financial mechanisms also play an essential role in ensuring global development efforts. To mobilise resources for sustainable growth in rural areas, it is essential to establish financial mechanisms such as impact investments, public-private partnerships and grants. These mechanisms can attract more financial resources and promote socially responsible investments prioritising long-term sustainability and inclusive economic

development. By embracing these strategies, stakeholders can work better together to achieve inclusive and sustainable development that ensures a better future for all.

## **7.2 Final Remarks and Recommendations for the Case Company**

LAMTIB is strategically positioned to promote sustainable and inclusive growth and is aligned with the current global trends and the growing concern about food security and climate change. To make the most of this position, LAMTIB must continue to forge collaborations with global and local stakeholders, including governments, NGOs, and private sector partners, to share knowledge and resources to create a more holistic approach. In addition, LAMTIB can benefit from using global management theory to improve its cross-cultural management practices. Using theoretical frameworks, such as Geert Hofstede's six dimensions and Richard Lewis's cultural model LAMTIB can develop a deeper understanding of the different cultural contexts in which the foundation operates. This will also give LAMTIB the possibility to get an overview of the different cultures. Gaining a better cross-cultural understanding makes it easier for LAMTIB to develop strategies that consider local values and give them a sense of ownership leading to more effective and inclusive solutions. Cross-cultural management can also help LAMTIB be better prepared during negotiations and understand the partner's cultural differences.

This thesis also highlights the growing trend of sustainable management and the urgent concern that the implantation of the SDGs may not be achieved within the given timeframe. This has led to a greater urgency which can be seen in the growing trend of CSR, and more companies want to be involved in solving some of these complex problems. This trend of caring about the environment and doing something good for society can also be seen in impact investing and investing with a purpose. For LAMTIB, using these trends and finding socially responsible partners to collaborate with is vital. LAMTIB should also highlight the possibility of using the untapped human capital and natural resources currently in rural villages. LAMTIB can communicate this information to investors and potential partners so there is a more substantial possibility of creating inclusive economic growth. This can also create more investment in infrastructure in rural areas. Another aspect that can convince investors and partners is that LAMTIB can leverage real-time data from these smart city initiatives allowing LAMTIB and its partners to make informed decisions and optimise resource allocation. This real-time data also assures the partners and impact investors that their resources are used properly and have an impact. LAMTIB should also prioritise sustainable and inclusive economic growth to

enhance food security. Their idea of helping rural villages create small-scale businesses and supporting local entrepreneurship plays a crucial role. However, it is also essential that these businesses and entrepreneurs have access to training and resources through the network of partners. This will create a mutually beneficial collaboration where it is easier to create an environment where both parties can grow.

By incorporating these recommendations, LAMTIB can effectively apply global management theory to achieve its goals and positively impact smart villages and cities. In conclusion, creating sustainable and equitable food security for all is a complex challenge that requires multifaceted solutions. The recommendations proposed in this thesis were formed by global magnet theory, where cross-cultural management and sustainable management were used. These recommendations provide a starting point for creating cooperation between rural and urban areas while enhancing food security and creating more sustainable growth that meets the needs without compromising the opportunities for future generations.

### **7.3 Recommendations for Further Research**

Based on the findings of this thesis and the conclusion, there are several opportunities for further research. The recommendations for further research can, for example, be a comparative analysis of smart cities and villages to identify effective strategies for integrating smart city technology in rural areas and improving food security. Another interesting research could have been to explore the potential of blockchain technology in the context of smart cities and villages. For example, this research could investigate how blockchain can enhance transparency, traceability, and trust within the food supply chain or impact investing and transactions. The research can uncover insights and propose strategies for leveraging blockchain to address the challenges associated with resource management, proof and evidence of impact investments, and food waste in smart cities and villages. The last recommendation is an analysis of how circular economy strategies in developing countries can be implemented. Such research would focus on understanding the adoption and impact of circular economy principles in these countries by examining the economic, environmental, and social benefits of implementing a circular economy. The research can also provide insights into how circular economy strategies can be effectively implemented, considering the specific context of developing nations.

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## 9.0 Appendixes

### 9.1 Appendix A – Sikt Approval

During the initial planning of the data gathering, it is required to send an application to Sikt, previously known as the Norwegian Centre for Research Data (NSD). This is to provide guidelines and to ensure the safe and secure handling of personal data when conducting an empirical study such as this one. This project with reference number "940070" was applied for on the 28<sup>th</sup> of January 2023 and approved on the 29<sup>th</sup> of January 2023 by automatic assessment. The interviews in this research project started on the 11<sup>th</sup> of February, 2023. During the data gathering, the data management template from Sikt got used to create an overview of the data gathering process.



[Notification form](#) / [Master thesis in Global Management](#) / Assessment

## Assessment of processing of personal data

Reference number	Assessment type	Date
940070	Automatic	29.01.2023

**Project title**  
Master thesis in Global Management

**Data controller (institution responsible for the project)**  
Nord Universitet / Handelshøgskolen / Marked, organisasjon og ledelse

**Project leader**  
Andreas Raspotnik

**Student**  
Eijar Øie Skjørholm

**Project period**  
01.02.2023 - 31.05.2023

**Categories of personal data**  
General

**Legal basis**  
Consent (General Data Protection Regulation art. 6 nr. 1 a)

The processing of personal data is lawful, so long as it is carried out as stated in the notification form. The legal basis is valid until 31.05.2023.

[Notification Form](#)

### Basis for automatic assessment

The notification form has received an automatic assessment. This means that the assessment has been automatically generated based on the information registered in the notification form. Only processing of personal data with low risk for data subjects receive an automatic assessment. Key criteria are:

- Data subjects are over the age of 15
- Processing does not include special categories of personal data;
  - Racial or ethnic origin
  - Political, religious or philosophical beliefs
  - Trade union membership
  - Genetic data
  - Biometric data to uniquely identify an individual
  - Health data
  - Sex life or sexual orientation
- Processing does not include personal data about criminal convictions and offences
- Personal data shall not be processed outside the EU/EEA, and no one located outside the EU/EEA shall have access to the personal data
- Data subjects will receive information in advance about the processing of their personal data.

### Information provided to data subjects (samples) must include

- The identity and contact details of the data controller
- Contact details of the data protection officer (if relevant)
- The purpose for processing personal data
- The scientific purpose of the project
- The legal basis for processing personal data
- What type of personal data will be processed and how it will be collected, or from where it will be obtained
- Who will have access to the personal data (categories of recipients)
- How long the personal data will be processed

<https://mekskjema.sikt.no/63c7c2dc-587c-4941-99f6-62cfd79783f6/vurdering>

1/2

## 9.2 Appendix B – Interview Guide

The researcher did choose to use a semi-structured interview guide for the data-gathering method. This interview guide is, therefore, a basic outline only. In addition, the researcher did not ask each respondent the same question because all questions are not relevant for some. However, the researcher used follow-up questions based on the responses to gain more in-depth and valuable information.

### Interview Guide

#### **Purpose of the interview** *(Mentioned before the interview)*

This interview aims to gather primary data for a master's thesis in Global Management. By participating in this interview, the information can be used to find possible solutions to create better food security in urban and rural areas. The interview will also work to obtain information connected to the research gap in the thesis about how global management can be used for this purpose and create sustainable growth in rural areas. The interviews will be conducted with several people who have knowledge about smart cities, smart villages and people who know about sustainable food production.

#### **Ethics** *(Mentioned before the interview)*

To follow the school's ethical and GDPR guidelines, the interviews are confidential, your identity is anonymous, and what you mention in this interview cannot be traced back to you. However, I want to record the audio to reproduce the conversation correctly. Is this okay for you? (The audio recordings will be deleted after the transcribing)

If you want, you can withdraw from the interview at any time, and you have the possibility of not answering specific questions.

Before we start, do you have any questions about the purpose of this interview or any of the ethical aspects of the conversation?

#### **Background information:**

- Can you give a short introduction of yourself?

#### **All Questions in the semi-structured interview:**

*(Different questions to different people):*

- Can you tell me any relevant government initiatives in Singapore related to sustainable aquaculture and food security?
- What has the Singapore government done to be recognised as one of the world's most innovative cities?
- How can smart city technology in Singapore today be implemented in other places, such as rural villages?
- Can you explain the current state of aquaculture in Singapore and its role in meeting the city's food demands?
- How has the government worked towards creating policies and initiatives in Singapore to address the growing concern about food security?
- What policies and initiatives have been implemented by the Singapore government to promote food security and sustainable growth in the city?
- What challenges do traditional farmers face in maintaining food security?
  - How do you think these challenges can be addressed?
- How do you think Singapore's mindset and history have influenced the city's development as a smart city?
- What are the biggest challenges faced by Singapore in creating growth and food security?
- How does Singapore's dependence on other countries for food impact its food security and relationship with other countries?
- What possibilities exist for Singapore and other big cities worldwide to invest in smart rural developments to create better food security for themselves?



- Do you see any negative effects of globalisation, and how is it affecting the culture in Singapore?
- What are some potential developments or opportunities for sustainable aquaculture in smart cities in Singapore, and what do you think can be transferred to rural areas?
  - What are the main challenges to overcome for these opportunities to be transferred to rural areas?
- Do you think there should be a better collaboration on innovation to address these challenges?
  - How should these collaborations be incentivised?
- Does sustainable aquaculture fit into the larger picture of sustainable food production and sustainable cities?
- What are some of the main challenges facing the global aquaculture industry regarding sustainability and integration with smart cities?
- Can you share any examples of innovative or successful sustainable aquaculture projects you know of in Singapore?
- What do you think are sustainable aquaculture's economic benefits and drawbacks in smart cities?
- How can sustainable aquaculture in smart cities be made more economically viable for farmers and investors?
- How do you think governments and smart cities can support the growth and expansion of sustainable aquaculture?
- Can you talk about the potential for growth and expansion of the aquaculture sector, both domestically and globally?

- What key technologies and infrastructure are needed to support sustainable aquaculture in smart cities?
- What are the main challenges traditional farmers face in adopting new technology?
- How can collaborations between farmers, researchers, and governments help achieve food security and sustainable growth in rural areas?
- What lessons from Singapore's approach do you think can be applied to rural areas when creating smart villages?
- Can you provide an overview of LAMTIB's operations and its role in promoting food security and sustainable growth in rural areas?
- What are the critical factors for successful local food production in rural areas?
- How do smart city initiatives and technologies contribute to food security and sustainable growth in rural areas?
- What challenges are facing rural communities worldwide, and what approach should be taken to address these problems?
- What possibilities exist for implementing smart city technology in rural areas?
- How do you think rural areas can be used to create better food security in urban areas?
- What are the main areas of research and development needed to support sustainable aquaculture in smart cities?
- How can government, industry, and academic partners collaborate to advance sustainable aquaculture in smart cities?

- How are local communities and industries involved in developing and implementing aquaculture solutions in the city?
- How do you ensure that your operations and practices do not negatively impact the environment or local communities?
- How would you define food security and sustainable growth in the context of rural development?
- What are the most pressing challenges to achieving food security and sustainable growth in rural areas?
- Can you describe Singapore's experience with sustainable aquaculture in the context of smart cities?
- What are some of Singapore's challenges in implementing sustainable aquaculture in smart cities?
- Can you tell me about the current state of sustainable aquaculture in Norway?
- What are some challenges and barriers to implementing sustainable aquaculture in Norway?
- Is there a plan to create aquaculture systems in smart cities in Norway?
- Can you talk about the potential for growth and expansion of the aquaculture sector in Singapore?
- How does marine biology research contribute to developing food security and sustainable growth in rural areas?
- Can you share examples of marine-based solutions that have the potential to create sustainable growth in rural areas?

- What are the environmental considerations that need to be taken into account when implementing marine-based solutions in rural areas?
- How do you think cross-country collaborations and knowledge sharing improve the implementation of smart city initiatives in rural development?
- What are the critical success factors for implementing marine-based solutions in rural areas, and how can they be managed effectively?
- What are the critical factors for protecting and sustainably managing marine resources?
- How can aquaculture fit into the larger picture of sustainable food production and sustainable cities and villages?
- How can aquaculture techniques minimise the use of resources like water and feed, reducing the waste and pollution generated by food production?
- Can sharing knowledge about aquaculture techniques help save the wildlife population from overfishing?
- What are the potential solutions to create better food security and the possibility of creating small-scale businesses in rural developments?
- What do you think will be the future of aquaculture?
- What do you think about the UN's Sustainable Development Goals?
- Do you think Agenda 2030 is going to be achieved?
  - What do you think needs to be done now to achieve these goals?

- What are the most important factors when building partnerships between all stakeholders when creating smart cities / smart villages?
- What leadership qualities do you think are necessary to connect actors and cooperation between global and local stakeholders?
- How can the global community work together to achieve the SDGs for creating a better future for the next generation?
- What do you think about CSR and the growing trend of impact investing?
- How important is understanding cultural differences when doing business and collaborating with stakeholders globally?
- What cultural differences exist between the different ethnic groups in Singapore, and how do these cultures and traditions impact daily life and society?
- How do you think businesses and governments can connect rural areas more to urban areas while preserving their cultural differences?
- What are the implications of resistance from local communities or governments to a rural development project, and how can these difficulties be overcome?
- What role do partnerships with local stakeholders play in ensuring successful cross-cultural collaboration, and how can these partnerships be built and maintained?
- How should companies adapt to the local community's unique situations, and what are the benefits of doing so?
- What are the challenges in managing cultural differences in rural contexts?
- How can companies communicate their goals and objectives transparently to local stakeholders?

- What do you think are the benefits of doing so in a culturally diverse context?

### Closing remarks:

- What do you think are the main takeaways from this interview?
- Is there something you think is necessary or relevant that I have not asked about?

### 9.3 Appendix C – Overview of the primary data gathering.

Informant	Where the data comes from	Tools used to obtain the data	Time consumption
A	A person in the management of Gaia Mariculture	In person in-depth interview, GDPR approved dictaphone. Computer with the interview guide.	Five hours over several days
B	Marine biologist from Norway	In person in-depth interview, GDPR approved dictaphone. Computer with the interview guide.	Two hours
C	Marine Biologist and ex-government from Singapore	In person in-depth interview, GDPR approved dictaphone. Computer with the interview guide.	One hour
D	Traditional farmer in Singapore	In person in-depth interview, GDPR approved dictaphone. Computer with the interview guide.	One hour
E	Person in the management of LAMTIB	In person in-depth interview, GDPR approved dictaphone. Computer with the interview guide.	Four hours over several days
F	Local food production expert in Malaysia	In person in-depth interview, GDPR approved dictaphone. Computer with the interview guide.	One hour
G	Person working for the Singapore Government	In-depth interview over Zoom, GDPR approved dictaphone. Computer with the interview guide.	One Hour
H	Smart city researcher from Norway	In person in-depth interview, GDPR approved dictaphone. Computer with the interview guide.	Two hours

### 9.4 Appendix D – Overview of why the Informants are relevant for the thesis.

Informant	Where the data comes from	Why their insight is important for this thesis
A	A person in the management of Gaia Mariculture	Have insight into aquaculture food production in Asia that can be integrated into smart cities/villages. Core competence in Seaweed and hatchery systems.
B	Marine biologist from Norway	A Researcher that have done research about aquaculture and the possibility for seaweed as a food product also in the western world.
C	Marine Biologist and ex-government from Singapore	This respondent was important to gain insight into how smart city initiatives for aquaculture works
D	Traditional farmer in Singapore	Interesting to hear the traditional farmer perspective on how to create food security in the future in a smart city.
E	Person in the management of LAMTIB	This respondent has great knowledge about smart cities and smart villages. The person has also a lot of different ideas about how LAMTIB can take smart city technology to help rural development.
F	Local food production expert in Malaysia	Contributed with great insight into how food production is done in more rural areas. This person had some insights into aquaculture and agriculture but in a more traditional way.
G	Person working for the Singapore Government	This respondent gave insight into how Singapore works with creating food security for the future.
H	Smart city researcher from Norway	Insight into how smart cities/villages in Norway have planned for food security in the future.