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***“SUSTAINABLE DEVELOPMENT PLAN FOR
COMMERCIAL AGRICULTURE IN SURINAME BASED
ON THE ISRAELI KIBBUTZ SYSTEM”***

By

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A thesis submitted to the Anton de Kom University of Suriname, Faculty of Technology,
Suriname, in fulfillment of the requirements for the degree of
Master of Science in Sustainable Management of Natural Resources (MSc. in SMNR)

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This thesis is another opportunity for me to do a significant contribution to Suriname in the form of a research. It is the closing work of the Master's program of Sustainable Management of Natural Resources at the Anton de Kom University of Suriname. I started with the research in February 2020 and completed it in October 2020. I have never been associated with the agricultural sector, as I have specialized myself in civil engineering. The reason I still chose this topic is to make an attempt to systematically develop this sector in Suriname. The Kibbutz system has been very successful and has a systematic agricultural and business aspect to it, making it very interesting for Suriname. This country can earn a lot from the sector, but it is being ignored from the use of its full potential; of the lands, international partners and the farmers. I hope to see a change in the sector with a systematic approach like this one, as it can make a significant contribution to the economy of Suriname.

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PREVISH V. AUTAR

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List of abbreviations

ADeKUS	: Anton de Kom Universiteit van Suriname
ADRON	: Anne van Dijk Rijst Onderzoekscentrum Nickerie
CELOS	: Centre for Agricultural Research in Suriname
FAO	: Food and Agricultural Organization of United Nations
GIS	: Geographic Information System
ICCA	: International Congress and Convention Association
LVV	: (Ministry of) Agriculture, Animal Husbandry & Fisheries
MCA	: Multiple Criteria Analysis
PTC	: Polytechnic College Suriname
SDG	: Sustainable Development Goals
SLR	: Sea Level Rise
SWOT	: Strengths, Weaknesses, Opportunities & Threats

Executive summary

The United Nations stated that the global population will be around 11 billion people in 2100, putting pressure on food supplies even greater than it is currently. More pressure will be put on agricultural lands by the effects of climate change, such as SLR and droughts. This indicates that great attention must be paid to agriculture worldwide, including Suriname.

Structural solution or organization is missing in the agricultural sector of Suriname, causing a slow to rapid downfall of it. A solid plan for this sector should be developed, taking into account the country's economy, the effects of climate change and population growth (local and worldwide).

The aim of this study was to check the feasibility of implementing a sustainable development plan for the agricultural sector in Suriname, based on the Israeli kibbutz system. Furthermore, different implementation phases of such a system were discussed briefly for execution purposes.

Opinions of 101 agricultural students were considered using questionnaires. Most of them stated that there is aging, inefficiency and underutilization in the sector. According to them, modernization, government investments and more international markets are needed. These upcoming farmers have shown interest in Kibbutz systems, whereby the main conditions were better salary, assurance of housing and career oriented work. The only popular setback was its novelty, indicating doubts about its continuity.

Opinions of 10 experts were also taken into consideration from different departments of the agricultural sector. The general responses were about the same as those of the students, keeping in mind that both groups received different sets of questions.

The Kibbutz system was modified accordingly and translated into a development plan that is attractive and acceptable for present and future generations of Suriname. Different Sustainable Development Goals (SDG's) were also integrated within this plan, based on the obtained responses.

Keywords: Kibbutz, Commercial agriculture, Cooperatives, Sustainable development, Caribbean

1. INTRODUCTION

1.1 Problem description and thesis statement

Recent analysis by the Population Division of the UN Department of Economic and Social Affairs state that the worldwide population will be around 11 billion people in 2100. This degree of population growth will surely put a pressure on food supplies much greater than it is currently (United Nations, 2020). The global food consumption could put pressure on the agricultural sector as soon as 2050 (FAO, 2002). Due to this population growth, there will be an increase of buildings and other constructions. As a result, agricultural lands will be converted to shelter and housing areas. Even more agricultural lands will be lost due to the effects of climate change, such as sea level rise and salinization of lands (Gulden, 2020).

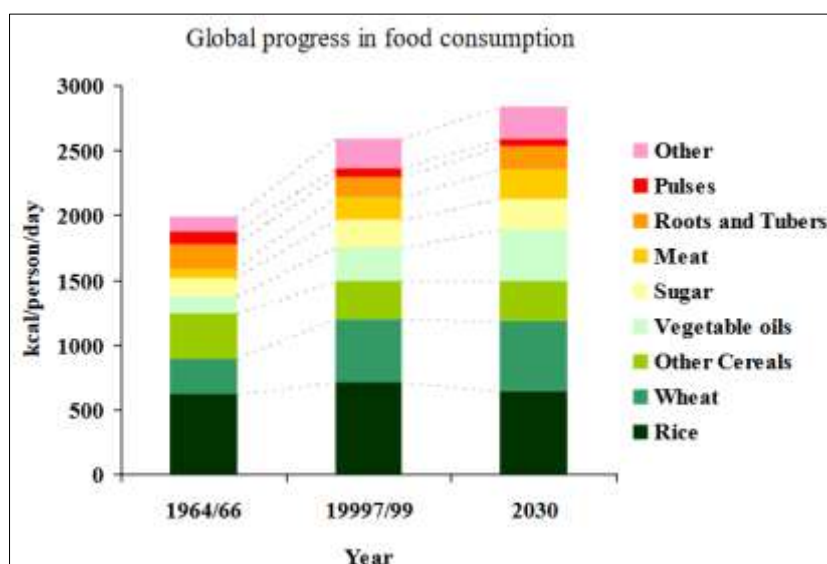


Figure 1 Global progress in Food consumption (FAO, 2002)

With due observance of the statements above, one can conclude that agriculture (or its management rather) is becoming very important in our daily life; more important than ever in the known history of humanity. This means the sector needs a lot of attention worldwide, including in Suriname. The focus must be on sustainable agriculture, integral approach and regulation where needed.

Subsistence agriculture has been going on in Suriname for a long time. But there has never been a real transformation to actual or real commercial agriculture. If we look at the current situation of this sector in our country, it can be concluded that the development is extremely slow, equated to no progress. This indicates poor agricultural policies and the unattractiveness for younger generations, meaning there is an aging population (Demidof, 2020). There is no structural solution or organization of this sector in the country, causing a downfall of it.

The total food production of this country is less than the local demand. The result is that many consumer products are imported to cover this shortage (Ministry of LVV, 2010). As an importing and low income country with a strong dependency on its gold and oil, Suriname needs to produce its own food as there could be potential scarcity in the future or the prices will go up (or both) for the imports. This will lead to serious food shortages in the country.

Suriname's economy relies mainly on gold, bauxite, (unsustainable) forestry and fossil fuel, which are finite resources and subject to large price fluctuations. This mindset and culture needs to be changed.

Suriname has a lot of arable lands for food production. A structural plan for the agricultural production together with agribusiness must be developed as quickly as possible, taking into account the country's economy particularly and the effects of climate change and population growth (locally and worldwide). Emphasis must be placed on sustainability, modernization, end- products and attracting younger generations.

The following aspects need to be addressed for the progress of the agricultural sector (Kaplan Planners, 2016):

1. To substitute the import in order to not only secure the local market with supply of fresh products, but also improve its trade balance.
2. Development of agricultural industries to deliver end products with longer shelf life and value added products resulting in increased profits.
3. To focus on amplifying the export capacity of not only products in which Suriname has advantage, but also 'exotic' products for diversity.
4. Job opportunities for younger generation, taking into account gender equality by adapting modern technology in this sector.
5. Enhance and promote the agro-tourism and other agro services
6. Experimenting with new concepts that are successes in other countries, such as the Kibbutz system

1.2 Objective(s) of the study

The four (4) main objectives of this study are:

- To develop a sustainable development plan for commercial agriculture in Suriname, inspired by the Israeli “Kibbutz” system with modernization, Industry and rejuvenation as core parts of it.
- To achieve and/ or integrate the several Sustainable Development Goals (SDG’s) within this plan/ community as much as possible. Emphasis should be put on specific SDG’s relating agriculture and agribusiness.
- To analyze suitable areas/ places to implement the idea, taking into account climate change and population growth in Suriname.
- To set up a pseudo spatial plan, in order to get insights of the setbacks during execution of it.

1.3 Research questions

There are lots of questions to be answered regarding this study, so the questions are divided in one main question and several sub questions.

The main question is as follows:

As Suriname has great potential in agriculture, can the country implement a (n) (adapted) ‘Kibbutz’ best practices inspired plan, in order to develop its derelict agricultural sector towards a sustainable and commercial sector?

And the sub questions are:

- What are the pros & contras of this system?
- What kind of changes are needed in order to make this system acceptable for the people?
- How will the younger generations be attracted to this system?
- Where can such plans be executed?
- What are the setbacks in implementation of these agricultural villages?

1.4 Significance of this study

As stated earlier the economy of Suriname is highly dependent on mineral resources, which are finite resources. The mindset and culture of the country to fully reckon on these income sources are unsustainable and short- sighted. The country needs a stable and secure income source with a sustainable and attractive character.

The only reasonable option for Suriname is modern commercial agriculture, because of the advantages it has regarding soil quality, climate and the geographical location, to state a few. The problem is that there is no real commercial agriculture sector in Suriname. There is a need for structural solution, sustainability, modernization, rejuvenation and attractive job opportunities in this sector.

The idea is necessary for the transition from subsistence agriculture to a modern, industrialized, innovative commercial agricultural system, with knowledge as the basis of it. Furthermore, it is needed for agricultural contributions to the economy and food for Suriname. This study focusses on integrating modern agriculture and society, attracting youngsters and creating job opportunities while maintaining (or even improve) the stability of social structures, especially for these young generations of farmers who need a lot of sustention at the beginning of their careers.

1.5 Limitations and study area

This study is limited to data acquisition using questionnaires and interviews. The respondents are limited to only (enrolled) agricultural students and agricultural experts from different agricultural organizations in Suriname. Aerial photos have been taken from “Google Earth Pro 2017” for the placement of a pseudo Kibbutz system to assess implementation setbacks. This area is located in district Wanica, in the Tawajarie area. Figure 2 shows the physical placement of this area.

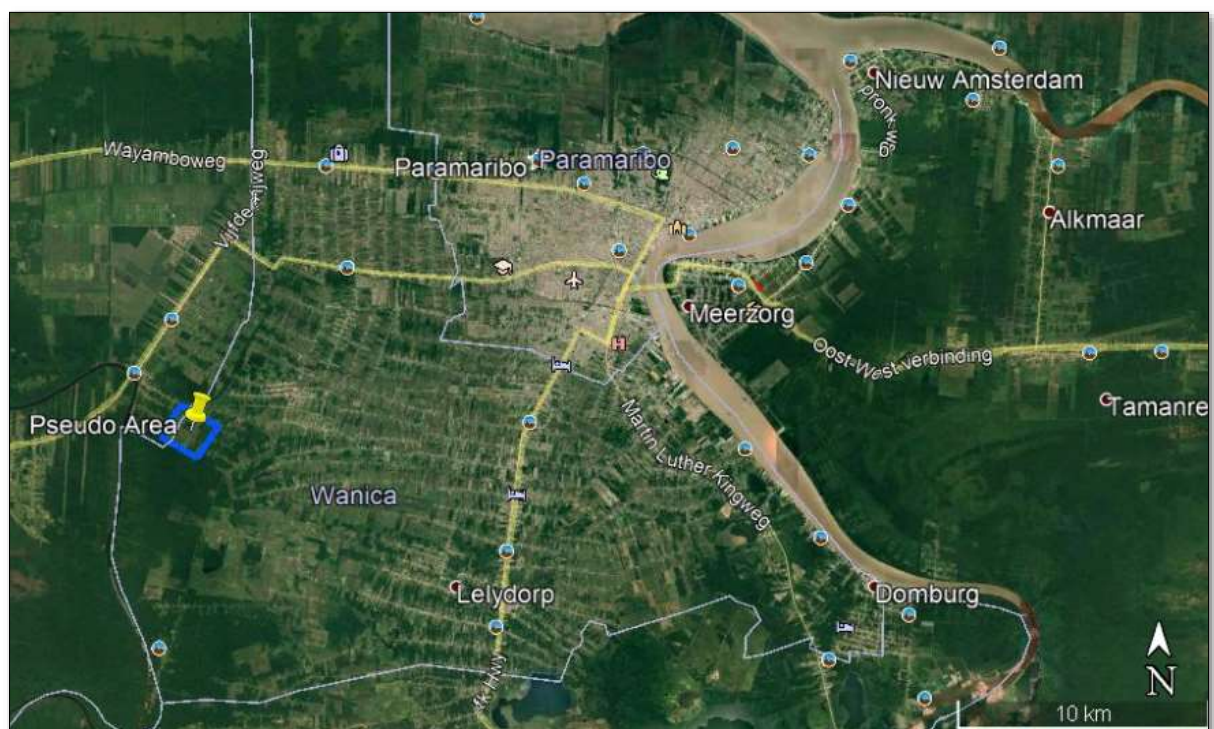


Figure 2 Study Area

1.6 Thesis Outline

This thesis starts with introducing a general overview of the problem in chapter one, which is further narrowed down to the specific problem description, research objectives, research questions, the study area & limitations of the thesis.

Literature review regarding agricultural policies in Suriname is presented in chapter two. Significant information about the Israeli settlements are stated in chapter three.

The methodology used to meet the objective and answer the research questions is described in chapter four.

The data results and the analysis are presented in chapter five. This is followed by the result based proposal discussed in chapter six; based on the findings, an adapted “Kibbutz inspired” spatial plan is created and proposed together with a proper organization and operational planning (SDG’s are the basis).

Chapter seven is about the discussions, based on the obtained results and proposed plans.

And finally the conclusions are presented in chapter eight with some suggestions for further research.

2. LITERATURE REVIEW

2.1 General information

The Surinamese economy is strongly dependent on its natural resources, such as gold, bauxite and oil. This sector has known heavy fluctuations on the international market, which causes a lot of serious setbacks for Suriname. However, this country has a lot of potential in the agricultural market but is underutilized. Suriname has a historic agricultural tradition, a great favorable climate, one of the biggest water resources, fertile soil and an average to good educated workforce. The geographical location of the country also works in its favor, as it has potential to become a hub to the Caribbean markets (Kaplan Planners, 2016; Government of Suriname, 2017; Ministry of LVV, 2010). Still, agriculture in Suriname does not fulfill its potential to the fullest. The direct agricultural share of the GDP has increased from 6.6% to 9.2% from 2005 to 2016. However, the increase is thanks to the share of forestry to the GDP and the agrarian trade balance still remains negative. In 2015 the import of goods was around USD 193 million and export was around USD 97 million. This trend is to be worried about, but even more worrying is the fact that Suriname exports consist of only rice and banana as main agricultural products (Government of Suriname, 2017).

The government has come up with a masterplan in order to develop and bring this sector to another level. The goal of the plan is to increase the share of agriculture in the national GDP by improving the agricultural sector. The vision is to become one of the largest food suppliers in the Caribbean and even looking forward to the European markets (Kaplan Planners, 2016).

2.2 Physical conditions for agriculture in Suriname

Certain physical conditions of Suriname should be taken into account for the determination of potential agricultural areas in the country. These aspects are needed in a multiple criteria analysis (MCA) for advantageous placements of such Kibbutz systems. They form a strong foundation for practical execution of agricultural programs like the Kibbutz system. The most important physical conditions are the type of climate (rainfall, humidity, wind, etc.), soil type and the available water resources. Below, these conditions are described briefly with their potential influences and availabilities for the agricultural sector.

2.2.1 Climate

The geographical location of Suriname is on the northern coast of South America and is heavily controlled by the Inter Tropical Convergence Zone (ITCZ), as it is located just north

of the equator. The ITCZ is the area where the north- east and south- east trade winds meet each other. The ITCZ travels north to south and vice versa, bringing yearly twice a heavy rainfall when it is overhead. The movement is between 15° north and 10° south (latitude) (Kaplan Planners, 2016).

The mean monthly rainfall in the northern part of Suriname (coastal area) is always higher than 60mm. The northwestern part may have rainfall lower than 60mm in the driest months (Coronie & Nickerie). The biggest portion (southern) of Suriname has the monsoon climate (Am- type of the Köppen classification). However, in the southwest area the tropical savanna climate dominates (Kaplan Planners, 2016).

Temperatures in Suriname are high (26°-31°C) during all seasons and the annual air temperature has a variation of maximum 3°. When divided into the coastal zone (min. 26° C) and the interior, the latter can have a fluctuation of 12°, while a maximum of 5° is registered in the former one on daily basis. The important factors that decide the temperature are cloud cover and evaporation. The mean temperature of soil at a depth of 2.5 meters in the forest areas is around 24° - 26°C (Kaplan Planners, 2016).

The coastal regions have a humidity of around 80- 90%, while the central and south Suriname have a relative air humidity of 70- 100%. However, during the wet season the values are recorded higher. Fluctuations of the humidity are big in the open areas. Records state numbers between 50% and 100% for humidity in those areas (Kaplan Planners, 2016).

Wind speed in Suriname has a mean around 1.3 on Beaufort scale. During dry seasons the maximum wind speed occur, recording around 1.6 Beaufort. The wind speed has 2 peaks in a year (February and September), while the minimum wind speed is 1.0 Beaufort and occurs only once a year (January) (Kaplan Planners, 2016).

Annual average rainfall in Suriname varies between 1500 to 3000 mm. Suriname knows a climate, which is divided into 4 seasons. However it is being observed for some changes in this due to the climate effects. Predictions show that the climate is leaning and moving towards a monsoon climate.

The current 4 seasons of Suriname are (Kaplan Planners, 2016):

- Long dry season: mid-August- early December
- Short rainy season: early December- early February
- Short dry season: early February- late April
- Long rainy season: late April- mid August

2.2.2 Soil

Inventory of soil suitability is a starting point for the development of agriculture in Suriname, despite new technologies such as manipulation of soil properties and hydroponics. The physical and chemical properties of the soil will determine the classification of the suitability for agricultural purposes. In table 1 below, some soil properties are given (Kaplan Planners, 2016):

Table 1: Categorization of Surinamese soil and their properties

Morphology	Soil Type	Fertility	Water Capacity	Drainage	Workability
Young coastal plain	<ul style="list-style-type: none"> • Sandy Ridges • Ripe clay • Incomplete ripe, brackish & saline clay • Incompletely ripened clay • Fluvial-marine soils • Polder 	<ul style="list-style-type: none"> • Overall very high 	<ul style="list-style-type: none"> • Overall very high • Low for sandy soils 	<ul style="list-style-type: none"> • Moderately slow overall • High for sandy soils 	<ul style="list-style-type: none"> • Very low • High for sandy soils
Old Coastal Plain	<ul style="list-style-type: none"> • Sandy ridges • Hard pan • Medium-Heavy textures plateau soils • Silty clays on plateau • Alluvial soils along rivers 	<ul style="list-style-type: none"> • Medium-Low overall • Very low for bleached sands and hard pan 	<ul style="list-style-type: none"> • High overall • Medium for alluvial soils • Low for sandy soil and hard pan 	<ul style="list-style-type: none"> • Moderately well drained • Deep flow blocked by hard pan/clay • Poorly drained in alluvial soils 	<ul style="list-style-type: none"> • High • Low for alluvial soils and silt clays

Terraces	<ul style="list-style-type: none"> • Light-Medium Textured Slope & Plateau soils • Foot slope and depression soils 	<ul style="list-style-type: none"> • Medium to low 	<ul style="list-style-type: none"> • High to medium sands • Low for sands 	<ul style="list-style-type: none"> • Moderately well drained 	<ul style="list-style-type: none"> • High
Zanderij Deck	<ul style="list-style-type: none"> • Light-Medium Textured Slope & Plateau soils • Light textured bleached soil 	<ul style="list-style-type: none"> • Medium (loam) to low (sands) to very low (bleached sands) 	<ul style="list-style-type: none"> • Very low 	<ul style="list-style-type: none"> • Moderately well drained • Imperfectly on lower slopes • Excessively (no pan) 	
Creeks Valleys of terrace and deck	<ul style="list-style-type: none"> • Creek valleys 	<ul style="list-style-type: none"> No assessment 	<ul style="list-style-type: none"> No assessment 	<ul style="list-style-type: none"> No assessment 	<ul style="list-style-type: none"> • High

About 4,273,095.00 hectares of land is suitable for agriculture. This is based on the data of the national GIS- model of year 2015. There is around 8.8 million hectares of land that has yet to be classified. The table and soil map (figure 3) give an extended indication of the areas and the suitability for specific agricultural product in Suriname (Government of Suriname, 2017).

Table 2: Total, in GIS- model classified ground according to suitability for agriculture in the year 2015

Description	Total hectares
Total land surface in Suriname	16,382,100.00
Yet to be classified in GIS- model	8,825,405.00
Classified in GIS- model	7,556,695.00
Not suitable for agriculture	3,283,600.00
Suitable for agriculture	4,273,095.00

2.2.3 Water resources

In Suriname, there are 4 main types of water resources available; rivers, swamps, groundwater and lake. However, the Brokopondo lake does not serve as a direct water resource for agriculture due to the fact that usage of mercury in gold mining processes pollutes the lake water. The lake spreads approx. 1600 km² in the Brokopondo district and was created for hydroelectric purposes (Kaplan Planners, 2016).

Rivers

There are seven main rivers in Suriname starting from the interior and flowing into the Atlantic Ocean. In table 3, the stated rivers and its characteristics are presented (Amatali & Sanipal, 1999). Figure 4 also shows the map of these seven main rivers (Gonini.org, 2020).

Table 3: Characteristics of the seven main rivers in Suriname

River	Basin Area (km ²)	Discharge (m ³ /s)			Water level range (in cm)	Salinity point (Salinity in mg/ L)
		Annual average	Extreme low	Extreme high		
Corantijn	67,700	1,597	100	15,000	350	75 km. upstream (200)
Nickerie	10,100	174	10	1,800	421	N.A.
Coppename	21,700	565	25	4,200	424	172 km. upstream (200)
Saramacca	9,400	257	10	2,000	312	Km. 185 at Groningen (200)
Suriname	16,500	442	20	4,000	404	Km. 88 at Paranam (300)
Commewijne	6,600	169	5	1,200	309	N.A.
Marowijne	68,700	1,791	100	15,000	310	Km. 58 at Albina (300)

POTENTIËLE AGRARISCHE ZONES VAN NOORD - SURINAME

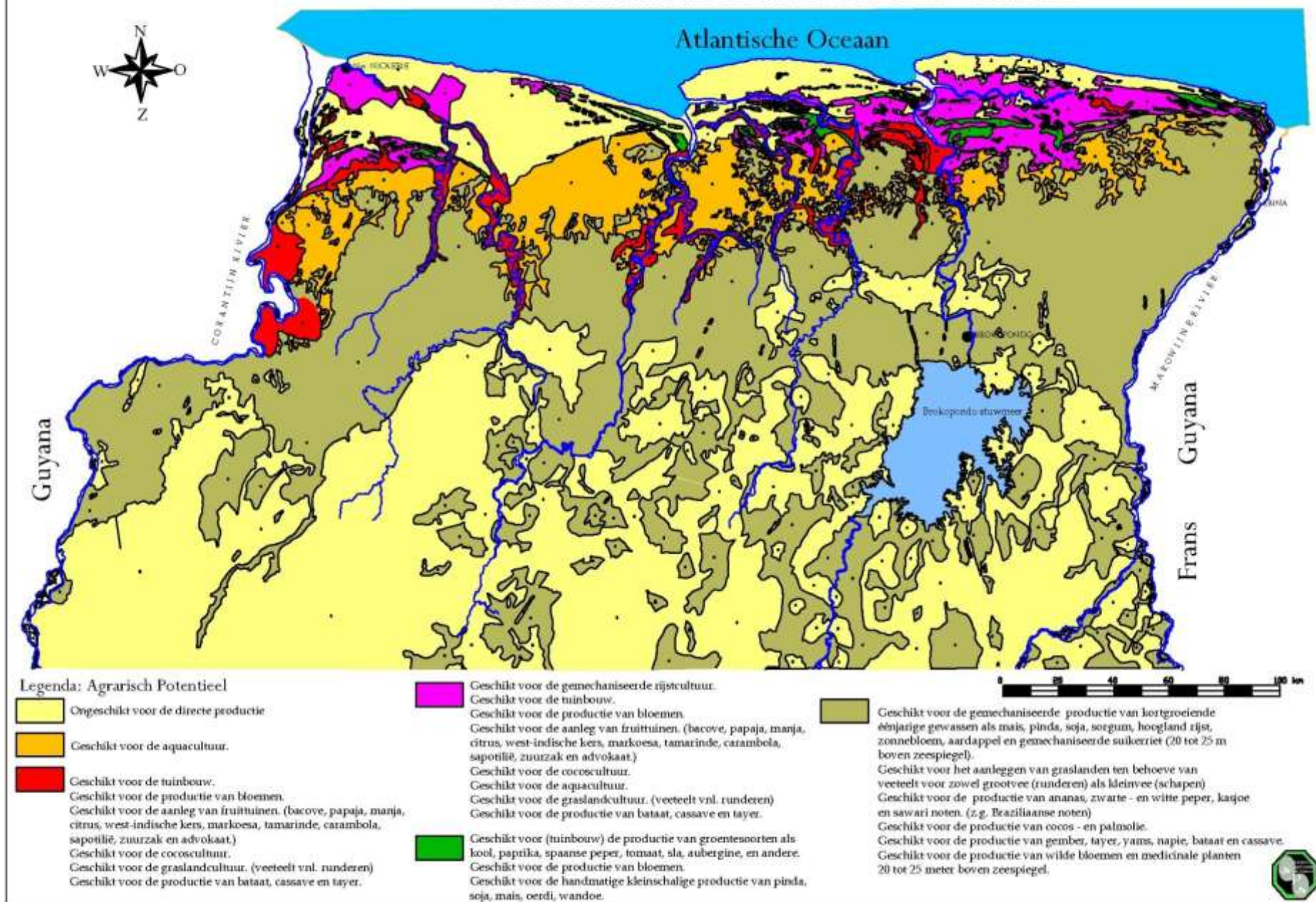


Figure 3 Potential Agricultural zones of North- Suriname (Government of Suriname, 2017)

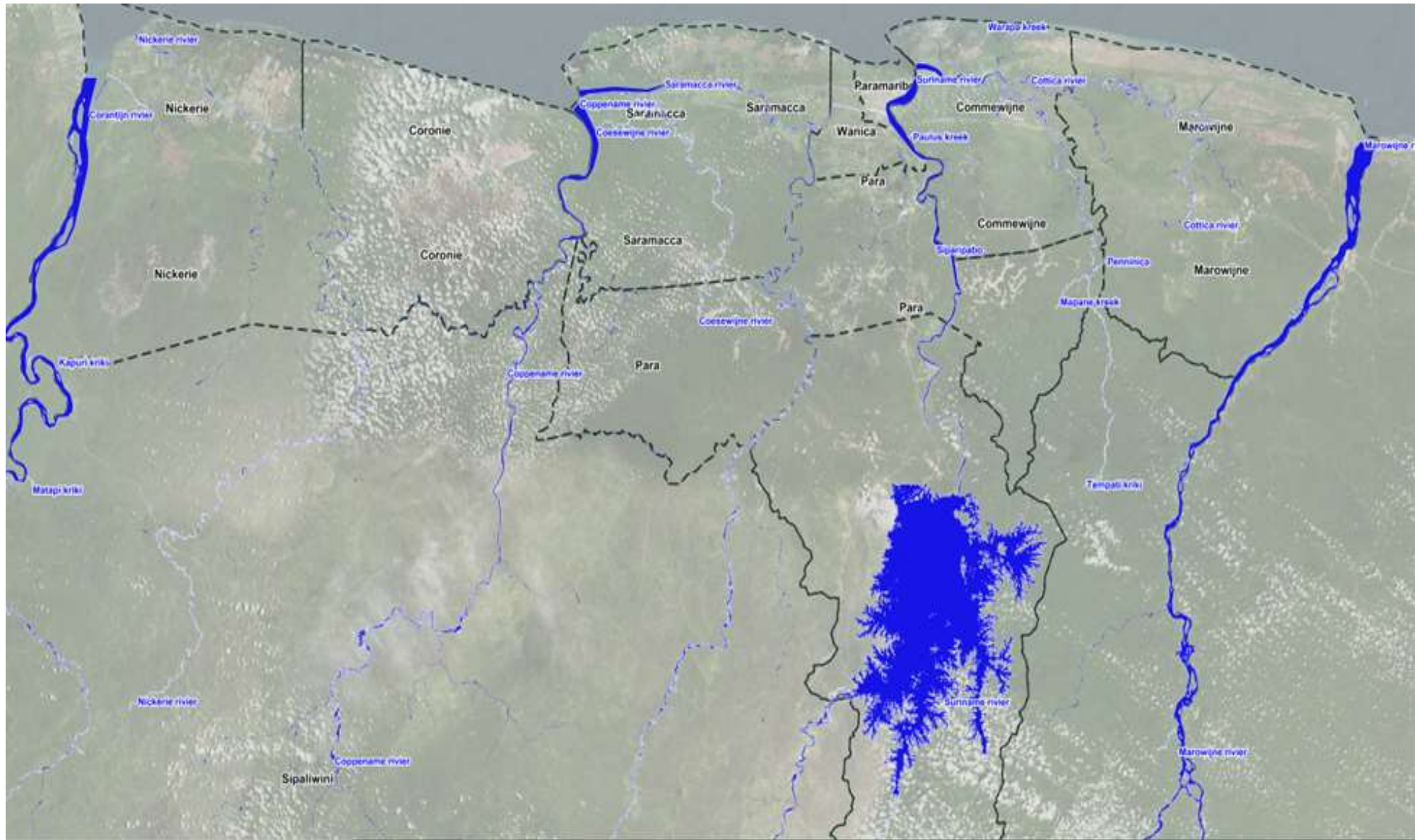


Figure 4 Map of the seven main rivers in Suriname (Gonini.org, 2020)

Swamps

There are 4 large swamps that are used for irrigation purposes. The table below shows the district and discharge of these swamps (Kaplan Planners, 2016).

Table 4 Discharge of the large swamps in Suriname

District	Swamp	Discharge (m ³ / s)	
		Minimum	Maximum
Nickerie	Nanni	9.5	16.8
Coronie	Coronie	N.A.	N.A.
Para/ Saramacca	Coesewijne	8.0	22.1
Commewijne	Surnau	N.A.	N.A.

Groundwater

The Surinamese aquifers are built up of unconsolidated sediments consisting of kaolinite clay, sand and gravel. The aquifers are in the coastal area and groundwater resources are scarce thus leaving the option for only domestic needs. Based on groundwater age and flow, the basin is divided in two parts (Kaplan Planners, 2016):

- Young Coastal Plain: main aquifers are the A- sand and Coesewijne. The groundwater ages vary from 10,000 to 20,000 years, but these 2 aquifers are not recharged at present
- Old coastal plain and Savannah: the underground water flow is around 6m/ day, while the groundwater age is around 2,000 years. Estimations say that the annual recharge of the savannah area is around 480 mm and in the old coastal plain around 200 mm

The availability of groundwater is generally realized by the Coesewijne and A- Sand aquifers. However, various amounts of freshwater are available from the Zanderij aquifer to the southern parts of the coastal areas. While in the eastern areas significant amount of water is available from local aquifers, the southern part of Suriname has scarce- moderate brackish to saline groundwater (Kaplan Planners, 2016).

2.3 Agricultural development plans in Suriname

2.3.1 Current agricultural Policy

A two track policy is being used in the present agricultural policy for the further development of this sector. Both, the population agriculture and the medium- and large- scale agriculture will receive attention regarding the enhancement of its resilience. All the stakeholders will have an active participation in the developmental process of the sector. Spatial planning,

management, training and research are some of the preconditions that will get the attention. The use of international knowledge, experience and modern technologies should be sharpened also (Government of Suriname, 2017).

Agricultural policy of Suriname is set in such a manner that it aims to make contributions to the seven strategic goals of the agricultural sector, which are listed below. Firstly, strategic and operational issues were identified for the Ministry of Agriculture, Animal husbandry and Fisheries (LVV). This was done on the basis of an analysis of the environmental and spatial situations. Afterwards, these issues were translated into strategic and operational goals and processed in a framework of goals or targets to achieve. At last, policy strategies were formulated which came forth from the framework of goals or targets that are aimed to achieve (Ministry of LVV, 2010).

Population Agriculture

The main focus of the latest policy plan is the further development of the population agriculture. There are many agricultural products that cannot be grown on a large scale under the local growing conditions, but they thrive in the production chain of the population agriculture (pepper, cassava, sweet potatoes, etc.). Furthermore, this is also suitable for relatively new application techniques such as greenhouses, hydroponics and organic agriculture. The policy aims at the independent control of various services by different groups and organizations, such as family businesses, self-employed workers, women organizations, etc. The various services include production facilities, supply of small equipment, supply part-time workers during peaks, inputs, processing and many more (Government of Suriname, 2017).

Large scale Agriculture

The only large scale agricultural products are rice and banana. Important aspects such as, marketing, export, processing, production and land use are properly planned here. Shareholders have relatively better networks that can respond correctly when problems arise and thus solve them or have solutions for them. It is possible for Suriname to realize a situation whereby the production and development of international market will go together. This means that the production will be based on the demand of the international markets. Despite these favorable characteristics, this category of the agricultural sector is plagued by high labor cost compared to labor productivity, high input costs and high transportation costs. There is underutilization of value added aspects of these products. For example, poor physical infrastructure

(drains, overflows, overgrown channels, etc.) leads to under-utilization, increasing the costs (Government of Suriname, 2017).

Furthermore, it is stated that development growth will focus on a number of main products with favorable potential for export growth and replacement of imports. There are some new and unknown products (for export) that are interesting for foreign investors and are included in a new product cluster, namely (Government of Suriname, 2017):

1. Palm oil and processing; this product has been grown successfully in the past
2. Cocoa and processing; plan is to plant around 3000 ha. at Phedra and Victoria and 1000 people will be able to find a job here
3. Biomass for fiber industry and energy
4. Aquaculture; active and on larger scale
5. Lemon and other local fruits with processing industries
6. New citrus varieties
7. New varieties of cooking banana
8. Mechanized corn and peanut cultivation; near the savannah areas

Agricultural development in the interior

Within the agricultural sector of Suriname, the agriculture in the interior holds a special place. For this part of the country, a separate policy is being developed. The main goal is to assist the current farmers to develop agriculture towards adapted production systems, such that it helps to produce its own food supply and to generate income out of it. The accent is on the fact that the damage to land and forest must be minimum and the system should be sustainable.

Apart from focusing on (quality) revenues, attention must also be paid to maintaining the soil fertility, water quality and the balance of the biodiversity. Trainings and workshops will be offered, whereby the focus will be on learning the whole of interactions within natural ecosystems, such as understanding the forest areas and how to apply those imitations on the lands, in order to have the same theme as the surrounding areas (Ministry of LVV, 2010).

In order to keep producing on the same piece of land, it is very important to pay significant attention to soil management and soil improvement. This aspect is very important, as there will be no need to cut down new forest areas for agricultural lands. The aim is to produce vegetables on the same land all year around and not only at the beginning of the rain seasons.

For the development of the new agricultural methods, the following principles are suggested (Ministry of LVV, 2010):

- ❖ Management and improvement of the soil over the years

- ❖ Strengthening the nutrient cycle of the soil-crop system
- ❖ Use of nitrogen binding plants to add nitrogen
- ❖ Biological crop protection, based on prevention rather than combatting (plagues)
- ❖ Avoid using synthetic substances to prevent infections, for crop protection, etc.

Important interventions which have to be made are (Ministry of LVV, 2010):

- ❖ Coaching and training in cultivation methods for vegetables, fruits, cassava and highland rice
- ❖ Coaching and training in soil conversion techniques and compost creation
- ❖ Management and organizational courses and trainings
- ❖ Training Centers with demo annex for sustainable agriculture
- ❖ Set up marketing structure/ strategy
- ❖ Strong partnerships with NGO's, which are operating actively in the interior

The government will be an important institute responsible to mitigate the challenges and threats regarding agricultural investments, such as uncertainty, lack of agro- institutes, high labor costs, etc. The sector will be better equipped to develop farms, processing facilities and market channels, if supported and assisted by the government (Kaplan Planners, 2016).

2.3.2 SWOT analyses of the local agricultural sector

In order to set out the goals, this SWOT- analysis method has been used by the Ministry of Agriculture, Animal husbandry and Fisheries (LVV). The strengths, weaknesses, opportunities and threats of the agricultural sector are given in this method. By using this method, it becomes easier to set out the strategic goals and policies regarding the sector. The strengths can be used to overcome the weaknesses and the opportunities can be used to lower the impact of and eventually overcome the threats.

It is noteworthy that the SWOT- analysis below is not the exact copy from LVV. They have more of a SWOT of the Ministry internally. So, the points made in the SWOT are carefully analyzed and derived using data and information from multiple reports (Ministry of LVV, 2010; Government of Suriname, 2017; Kaplan Planners, 2016).

Table 5 SWOT analysis of agricultural sector in Suriname

Strengths	Weaknesses
<ol style="list-style-type: none"> 1. Climate and soil conditions are in favor for agriculture in Suriname. 2. Water resources for agricultural purposes are one of the best in the world. 3. There is a strong history of agriculture present in Suriname. 4. There is know-how for traditional agriculture in the country. 5. Remarkable waterways for transportation of agricultural goods locally. 6. Existing network at the international market, thanks to large scale farming. 	<ol style="list-style-type: none"> 1. Focus stays on population farming, thus relatively small export rates. 2. The government does not have prodigious focus on the large scale agriculture. 3. Investment and focus for international standards for export products is low. 4. The investment in the sector is relatively low. 5. Outdated techniques in execution, which leads to labor- intensive work. 6. Very weak institutes for agricultural development. 7. Low interest in making agricultural end products (for export). 8. No diversification in agricultural products.
Opportunities	Threats
<ol style="list-style-type: none"> 1. The worldwide focus is shifting gradually towards agriculture, meaning a potential market and income source for Suriname. 2. The geographical location of Suriname has great potential for trades with different markets, such as CARICOM and European markets. 3. There are qualitative/ trained people and organizations available that have scope and potential to develop further and provide trainings to the existing and upcoming farmers. 	<ol style="list-style-type: none"> 1. Agricultural land loss due to climate change and sea level rise and relatively no attention on this subject 2. The character of harvesting the mineral resources (such as gold mining) creates loss of potential agricultural land due to no waste management 3. Rising number of various concession issues in the interior 4. Rate of rejuvenation of farmers is low, indicating a decreasing interest in the sector

<p>4. The sector has a great potential to generate huge income for the country and create a lot of employment for the citizens.</p>	<p>5. Peoples tendency of shifting to the urban areas due to centralization of social accommodations</p> <p>6. Underutilization of human- and natural resources due to mixed up regulations of the sector</p> <p>7. The sector is unattractive for young people, due to outdated techniques and no intervention from the government regarding this subject</p>
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2.3.3 Goals

Strategic Goals

As stated before, the seven strategic goals for the agriculture, incorporated in the agricultural policy of Suriname, are (Ministry of LVV, 2010):

1. Food guarantee and its execution for the total Surinamese population
2. Guarantee of the agricultural health and food security
3. Development of sustainable agricultural sector
4. Development of the agricultural sector in order to become food producer and supplier for the Caribbean region
5. Increase the contribution to the national economy
6. Creating spatial conditions for the sustainable development of the agricultural sector
7. Management of the risks and preconditions in the execution of the agricultural policy

The goals stated above are linked to each other in such a way that they strengthen each other. In order to have a stable foundation to execute goals 1 to 5, it is important to realize goals 6 and 7.

The mutual relationships of the strategic goals are as follows (Ministry of LVV, 2010):

- ❖ Sustainable development of the agricultural sector, management of spatial conditions, preconditions and risks do strengthen the food security
- ❖ In order to enhance agricultural health and food security, there should be a sustainable development of the agricultural sector while managing the spatial conditions, preconditions and risks

- ❖ In order to achieve sustainable agriculture, it is very important to have a decent management system for the spatial conditions, preconditions and the risks
- ❖ The first step towards becoming the food producer and supplier of the Caribbean is to have food guarantee and security for local citizens, sustainable development of the agriculture and management of the risks and spatial conditions
- ❖ Contribution to the national economy can happen if there is food security and guarantee for the locals, if there is a sustainable sector and most importantly, to become the food supplier for the Caribbean region while the management team continues its work

Critical Success factors (CSF's)

In order to fulfill the strategic goals, the CSF's are important ultimate goals, strategic issues, results and achievements which need to be tackled. The results of these interim goals will eventually lead to the fulfillment of the strategic goals. There is a big quantity of CSF's to be realized (Ministry of LVV, 2010):

- Develop a sustainable agricultural plan, using strategic thoughts and activities
- Attract external capital investments, in order to enhance the scale of agricultural activities and the production
- Enhance the income and development of the farmers, workers and entrepreneurs
- Create sustainable employment with long term guarantee
- Further development of the assessment of products towards the highest level of international standards and the decentralization of assessment facilities
- Establish an institute and regulations organ, which will be responsible for the sustainable development of agriculture
- Optimize the intern and extern communication between the intern and extern stakeholders, respectively
- Intensify the information distribution regarding the agricultural health and food security towards the society
- Certify the stakeholders in food security
- Enhance the sustainable exploitation of agricultural land
- Introduce sanctions against offenders who go against the rules and regulations regarding agricultural policies
- Enhance the export production of agricultural products
- Develop a regional transportation network of agricultural products meant for export

- Perform a trade- and foreign policy, which focusses on the increase of export outlets of Surinamese products not only on the Caribbean markets, but also other potential markets
- Enhancement of trade- and export quota on international markets regarding Surinamese products
- Enhance the production of products with an added value, referring to end products
- Diversification of agricultural sector with new (not traditional) products
- Intensify research regarding development of agricultural sector and realization of policy goals
- Formally establishing the destination areas for agricultural activities (including aqua culture)
- Risk management in the implementation of the agricultural policies

In order to support the CSF's, there is a number of essential conditions which has to be taken into account. Some of these supporting conditions are (Ministry of LVV, 2010):

- Attracting the necessary framework for policy making
- Establish policy- and knowledge center for agriculture
- Enhance the investment behavior for and in this sector
- Research of spatial planning and environmental effects regarding destination areas for agriculture
- Strengthening research and planning institute of the ministry of LVV
- Conduct feasibility studies regarding development of products intended for the Caribbean markets

The secondary goals for the agricultural policy to achieve are (Ministry of LVV, 2010):

- Reduction and prevention of poverty
- Development of the rural areas
- Produce a development- oriented spatial planning of Suriname

By looking at how the SWOT system works, it can be said that the goals are formulated very loosely. As stated before, the focus of the government has always been on maintaining the current scale by accommodating population farming and the available farmers. There has never been a proper plan in execution to develop and expand agriculture. Neither has the government ever attempted to make fundamental changes in the national policy regarding agriculture. This can be seen in the strategic goals, which in its total focusses on maintaining

the available quantity while trying to improve quality and productivity only. Furthermore, there has never been active initiatives and stimulation on different levels from the government in this sector. The focus has been to shift from the traditional structures towards fundamental changes and innovations on different levels in order to thrive. However, the national master plan of 2016 has some promising goals, but still it has no detailed execution nor the stakeholders' involvements in the planning process (doomed to fail).

2.4 Agricultural cooperatives in Suriname

By definition, an agricultural cooperative is a system whereby farmers pool their resources for certain activities to get better results. There are two main types of cooperatives in agriculture; the supply cooperatives (provide their members with inputs for production) and marketing cooperatives (industrial processing and marketing of farm products). Farmers also are positive about credit cooperatives, because they act mainly as the financial body for the farmers (Ortmann & King, 2007).

It can be concluded from the previous paragraphs of this chapter, that the role of the government has always been very significant in the agricultural sector of Suriname. They are the institute that develop the national policy plans for this sector. Even in the cooperative systems in Suriname, the government has been involved since its beginning. Initially, the government involvement in the cooperatives was more personal than formal. It depended entirely on the individual motives and initiatives of individuals who toiled on the farms (Morenc, 1988). The role of LVV has changed now, but not decreased as they guide the current cooperatives towards sustainable development and progress. LVV stimulates the cooperative system in Suriname and sets this as the basis for better cooperation between farmers (LVV, 2021). Brief information is given below regarding the origin of the cooperative systems in Suriname and its development in time.

History

Surinamese agricultural cooperative development began around 1910 together with an agricultural bank of loans for those farmers. The motives of setting up cooperatives are still unclear, but could be linked to sudden increase in farmers' withdrawals around that time. These institutions were set up by the government and managed by locale notables, such as district commissioners. The participation of the members was almost insignificant at that time. The enthusiasm for active participation and organization were also absent in the members.

In the 1930's, the government also tried to unite the rice farmers in cooperatives. This was seen as an ideal solution in the rice sector, because the rice farmers had a common agricultural product to sell. But the debts of these farmers raised some objections and the initiative was not a success.

In the 1940s, the Department of Agriculture (of LVV) made another attempt to develop the cooperative industry. In 1944, the law on the cooperatives came into effect, which was an exact copy of the Dutch legislation. An important motive for this step was the government's aim to reduce the cost price by means of cooperative activities. Hence, the focus of these cooperatives were merely purchasing and sales. The form of governance of the established cooperatives of that time was undemocratic, resulting in low participation of the members. Most cooperatives died a silent death back then.

In the year 1953 there was a very famous development for the cooperatives in Suriname; cooperatives would be eligible for export quotas. Due to inadequate legislations, traders and other individuals set up numerous fictional/ pseudo cooperatives in order to secure the promised export quota. This resulted in a sudden increase of cooperatives in the districts. This improper use (misuse) of cooperatives damaged the trust of farmers regarding cooperatives.

In 1954 LVV recreated the Department for Cooperatives, this time with the aims of stimulating cooperatives and to monitor the management of the cooperatives. This department had the opinion that the establishment of credit cooperatives was the best way to restore the trust of the farmers. In 1959, a number of credit cooperatives were established and it was a success. The success was limited as there was a shortage of finance and the legislations were inadequate regarding the protection of rights and misuse.

In the 1970's, this department actually died and was reduced to just the administrative work for existing cooperatives, such as creating the annual balances. However, in district Nickerie there was a strong and big cooperative network as they knew the importance of the market dynamics. This successful cooperative was also a result of common agricultural products, rice in this case. The market dynamics played a crucial role to create these cooperatives in Nickerie (Morenc, 1988).

Private cooperatives can be put as the opposite of government initiated cooperatives. However, they cannot be directly characterized as the opposite, because there are 3 types of a private cooperative system:

1. Initially set up by LVV, but subsequently became independent
2. Initiative of farmers to set up cooperative, but after some time seek assistance of LVV
3. Independent initiatives, which do not change in nature

The motives could be strict materialistic or just ideal. Private cooperatives, born from the materialistic motives have been a success, e.g. cooperative Kwatta (1959). (Kwatta cooperative has been one of the most successful ones, however the government still has some kind of influence on it.) Most of the initiated cooperatives at that time were credit cooperatives. In 1980 there were 36 credit cooperatives with a total of almost 8,000 members. Credit cooperatives functioned better than the purchase and sales cooperatives (Morenc, 1988).

The political influence in the agricultural sector was stronger than ever before in the 1980's, after the coup. The priorities of the government in this era was the agricultural cooperatives. Much emphasis was placed on the credit cooperatives and the sale- and purchase cooperatives. The legislations regarding the misuse of the cooperatives would be sharpened in order to eliminate the pseudo ones. This was the responsibility of the department of cooperatives, but due to change in government it was sidelined after some time. This happened because of rivalry between political parties back then. During the reign of the new government, farmers were forced (directly and indirectly) to become members of cooperatives. A lot of plans and policies were based on political agendas, while the political parties of the coalition and opposition did not act for national interest. The result of these mentioned events lead to irresponsible land allocations to individuals. The state is still struggling with these illegal (or ill- considered) land issues when it comes to the integral development of the agricultural sector. Also, the mismanagement of the cooperatives and the ad- hoc decisions for setting up these cooperatives in the past are the direct reasons for the failure of these systems in Suriname (Morenc, 1988).

In general, the cooperatives did not contribute to the country's economic or social developments. The following points are the cause of the failure of cooperatives in Suriname (Morenc, 1988):

1. Lack of proper legislation regarding cooperatives; no internal/ external audits possible
2. Cooperatives were born from ad hoc decisions; no goals or plans
3. Lack of cooperative spirit and unity; disloyal to its own cooperative

Present state of cooperatives in Suriname

At present, agricultural cooperation in Suriname is characterized by a socio- economic organization of individual farmers. These individuals join the organization voluntarily to achieve common goals, which are almost impossible to achieve as individuals. The needs of the stakeholders are the basis of the nature of such a cooperative, such as sale of products, product purchase from members and production resources among other. In these cooperative

systems there is potential for more production, better production and joint growth. These cooperatives are supported by the cooperative department of LVV through capacity building and guidance by the department (LVV, 2021).

In table 6 an overview is given about the agricultural cooperatives from year 2013 till 2016. These are initiatives of the department of cooperatives of the LVV (LVV, 2021).

Table 6 Overview of cooperatives on initiative of cooperative department of LVV

No.	Name cooperative	District	Date of incorporation
1	Landbouw en Veeteelt cooperatie Patamacca	Marowijne	04-08-2013
2	Landbouw en Veeteelt cooperatie Borodong Matta	Para	05-08-2013
3	Landbouw en Veeteelt cooperatie Paradise	Nickerie	17-08-2013
4	Agro cooperatie Moengo	Marowijne	19-11-2013
5	Landbouw en Veeteelt cooperatie Para	Para	03-12-2013
6	Agro cooperatie Corantijnpolder	Nickerie	14-02-2014
7	Agro cooperatie Clarapolder	Nickerie	23-05-2014
8	Agro cooperatie uitbreiding Groot- Henar 1 en 2	Nickerie	17-07-2014
9	Veeteelt cooperatie Nannipolder blok3	Nickerie	08-08-2014
10	Agro cooperatie Hoi Tanga	Brokopondo	27-08-2014
11	Agro cooperatie Sidoredjo	Nickerie	29-08-2014
12	Agro cooperatie Helena Christina	Wanica	08-09-2014
13	Agro cooperatie Wanica E.O.	Wanica	09-09-2014
14	Agro cooperatie Ingi Kondre	Coronie	18-09-2014
15	Agro cooperatie Anjoemara	Marowijne	18-11-2014
16	Agro cooperatie Calcutta	Saramacca	23-11-2014
17	Agro cooperatie Greenfresh	Saramacca	24-02-2015
18	Agro cooperatie Tijgerkreek	Saramacca	13-03-2015
19	Agro cooperatie Kahwna Opo	Commewijne	27-03-2015
20	Agro cooperatie Groningen	Saramacca	30-03-2015
21	Hydroponics Greenhouses Cooperation Suriname	Paramaribo	18-04-2015
22	Agrarische cooperatie Koewarasan	Wanica	03-07-2015
23	Agro outgrowers cooperatie Saramacca	Saramacca	10-07-2015
24	Bio agrarsiche cooperatie in Suriname	Paramaribo	29-07-2015

25	Agro cooperatie Wooko- Makandi Ovia- Olo E.O.	Marowijne	06-08-2015
26	Agro cooperatie Tranga Wroko Uma Fu Marwina	Marowijne	27-08-2015
27	Agro cooperatie Taanga Nakie Kwakoe Gron	Brokopondo	19-03-2016
28	Agro cooperatie Brokopondo E.O.	Brokopondo	31-07-2016

Out of these, only a handful are active and have continuity and success. Most of these are focused on purchase and sale of the products. Table 7 shows the cooperatives that are the outcome of initiatives of private or individual farmers with a good plan and/ or enough knowledge and skills to run these cooperatives (LVV, 2021).

Table 7 Overview of cooperatives on initiative of non- governmental bodies

No.	Name cooperative	District	Date of incorporation
1	Agro cooperatie Wi Uma fu Sranan'	Paramaribo	N.A.
2	Cooperatieve vereniging van haitiaanse boeren in Suriname	Wanica	N.A.
3	Cooperatie Agrarische groei en bloei	Nickerie	10-01-2015
4	Landbouw cooperatie Stolkertsijver E.O. W.A.	Commewijne	N.A.
5	Landbouw cooperatie Boven- Commewijne E.O. W.A.	Commewijne	N.A.
6	Landbouw cooperatie Kwatta	Wanica	18-08-1948

There are only eight active cooperatives in Suriname that are mainly engaged in agricultural crops. The districts Para, Moengo and Nickerie have one cooperative each, while in Brokopondo and Paramaribo have three and two active cooperatives, respectively (LVV, 2021). Most of the cooperatives do not work due to mismanagement and passive attitude of the 'members'. These members do not see any benefits in paying contribution to the systems, which leads to the system ending up in a 'hibernation mode'. There is no exact reason why these cooperatives do not work. On the other hand, it seems that the private cooperatives have a better development compared to the government initiated ones.

As stated before, the foundation for the nature of cooperative agriculture was already laid in the past. They were very ill considered and ad hoc executed plans, with politics and governmental role as the basis of it. This is the reason why this country is struggling with these

cooperatives, even after a century. Emphasis must be put on the economic, environmental and social aspects of this sector (and not only the economic aspect, as we have seen in the past).

3. ISRAELI RURAL SETTLEMENT SYSTEMS

In this chapter, information about the concept and the principles are of a kibbutz and moshav will be stated briefly. The discussion will be about their definitions and what they actually are. There will also be information about the history of it, the values of it, its character and how it operates. Furthermore, the variant of Kibbutz (Moshav) will also be discussed shortly and the important differences will also be stated.

3.1 Introduction to Kibbutz and Moshav

The Kibbutz and Moshav are two forms of Jewish settlements. The Kibbutz is a worker-controlled, agricultural production cooperative, while in the Moshav the members are the individual farmers which reside within a common settlement or village (Rosenthal & Eiges, 2013).

The Kibbutz founders came to Israel around 1904-1914 during the immigration wave from East- Europe. They came from industrialized or populated areas to restart their lives with nearly no physical belongings. These people brought their values and emotions with them, which they were going to use in their daily live in the new country. Their values enclosed their closeness to the nature, combined with Jewish upbringing. They were fueled by one common dream, which was to establish a new type of human; a human powered by collectivity, teamwork and hard work. Because the first members had nothing with them, they valued agriculture and manual labor above everything else. They knew that it was fundamental to work hard on the lands, in order to survive. It was an extreme challenge to set up a kibbutz, as it requires a formation of sustainable and content community with members who had little to no expertise or materials. The kibbutz was the first ever sustainable settlement in Palestine in the twentieth century (Amir, 2005).

The other form, Moshav (Hebrew) literally means ‘village’. Similar to kibbutz, the Moshav is also based on communal labor. As stated before, the difference is that the members in the Moshav system are individual laborers. These laborers have their own farms, but their farms have the same fixed size. All of their output on their own property are used for themselves (Rosenthal & Eiges, 2013).

3.2 Kibbutz system

Kibbutz (Hebrew) literally means ‘gathering’ or ‘clustering’ in English. It is a rural, co-operative way of life, which was created in Israel. It is an unassertive communal lifestyle, which was initially based on agriculture only. It took about three decades to create a multileveled cooperative structure, which started at the beginning of the 20th century. Kibbutz might be seen as a place that has been created for a social capital as the main goal. It is an egalitarian organization maintaining direct personal relations. It is member oriented, not leader oriented, which enables trust and mutuality. It can be considered as a horizontal and non-hierarchical organization. Each member is free to sign up and to leave as they wish (Rosenthal & Eiges, 2013).

Basic Principles

The ideology of the kibbutz system is frugality, equality and rejecting private property.

The members perceived *frugality* as a value rather than a necessity. It was a key factor by which people adapted to the workers lifestyle. Frugality was a form of criticism towards the fake lifestyle of the middle class, which caused division between human beings and between people, nature and work. Additionally, frugality was also the continuation of the Jewish tradition of humility. For example, there were workers who walked bare footed and wore torn clothes purposely, only to get the feeling of being a worker. However, the value did not last long, but it still played an important role in the thinking and behavior of the members. It affected the design and equipment of their apartments (Amir, 2005).

Equality

Most of the aspects in the kibbutz were based on egalitarianism, or they were striving to achieve it. Especially housing; the outlook towards equality underwent dramatic changes.

Other aspects, such as education, food, culture, laundry, etc. were also based on equality and according to the needs. Work, which was the main aspect, had also the foundation of equality. Each member was expected to contribute according to his/ her maximum ability.

It was never easy to take such important decisions, as the whole kibbutz was part of the decision making process. There were difficult times when the members spoke against the ideologies, in order to sharpen them. At last, there was a formal expression of the ideology on a council meeting which stated: “Equality was at the foundation of the organized kibbutz movement. An organization which encompasses the life of the individual must care for him completely” (Amir, 2005).

Rejection of private property

The members were on par when it came to the rejection of private properties. There was a clear agreement between the members regarding this issue. However, there was a constant aperture between the possible and the ideal.

The principle of rejection originates from the following (Amir, 2005):

1. Kibbutz ideology stated unambiguously that the members would be prevented from owning any private property, as they would live only on kibbutz resources.
2. Economic gaps and social oppression were results of private property, according to the then famous ‘Marxist ideology’. This ideology was accepted by most members, as a means to ensure equality within the settlement and to differentiate the kibbutz and capitalist society.
3. It was very important for the kibbutz to prevent extravagant differences in clothing, travel, etc.

Operational system

The kibbutz system was based on one of the purest form of socialism and it worked quite well. The key to the success was that the people wanted it. The communal idea was applied to almost all aspects of life. Properties were held in common, except for basic movable things. Cars, machines and houses were owned collectively or belonged to the kibbutz. The income of the laborers went to a common fund. According to personal and family needs, these members would receive a sum. This budget was not based on the contribution of the member to the common fund. Furthermore, positions of power and work were rotated equally so that everyone got equal opportunities. The salaries were the same for everyone. The workload was based on one’s need, for example the older and weaker members would get a less strenuous work. As stated in the introduction, the kibbutz supported every member’s life in the form of shelter, basic services, money and food. It was mandatory for every member to come together at the common dining hall to have dinner, as it would enhance the unity. The most famous slogan you would come across in a kibbutz is “from each according to his ability, to each according to his need”. The slogan itself explains the level of socialism in these types of settlements (Rifkin, 2020).

Because of the fact that democracy and fairness are a core value of kibbutz, there are no members with more power or authority. Everyone has the same social status in the kibbutz. In order to discuss and in decision making processes, there is a gathering of a General Assembly. The assembly consists of every adult member of the kibbutz, each with their own vote and

opinion in the decision making. The members holding the management positions during the decision making process have the same weight and authority as every other member of the kibbutz. Traditionally, when a discussion has been closed, a vote is being held by the assembly and the majority wins (Rosenthal & Eiges, 2013).

Children

The upbringing of the children had a strong character of the collectivity, which is the foundation of the kibbutz. The children were raised on the kibbutz, but did not stay with the parents. Instead of living with their parents, they stayed in common children's home where the children were raised by not only the parents, but by every member of the kibbutz. In the daytime they interacted with their families, but in the night they would gather in the children's house to sleep. The children were the responsibility of every member. In this way, a sense of total security and safety was established as the children were allowed to roam and play freely at the kibbutz. This would generate an understanding of putting community and collectivity over individual desire.

However, as the kibbutzim developed after a period of time, parents had objections of raising the children away from home. Many families obtained full responsibility for their children. But still after the receding of this tradition, the sense and feel of communal responsibility remained. The children were still watched, loved, supported and motivated by everyone of the community (Amir, 2005).

Studies

Initially, education was not seen as an important aspect of life in a kibbutz as the work was only agricultural. The kibbutz had its own school, which was divided in 3 parts: Pre- School: aged 3 months to 6 years, grades 1-8 and grades 9-12 (mostly agricultural education) (Kibbutz Degania, 2020).

But as the kibbutz began to change and other sources of income were generated, such as manufacturing and industry, more of the younger generations pursued their higher education. The kibbutz paid all the education costs in the beginning, but after a crisis the amount was lowered. Percentage of kibbutz students in universities rose from 38% (1978) to 54% (1990). (Soffer, Grossman, & Grossman, 2015)

Gender equality

The issue of gender equality began as soon as the first ever child was born at the first kibbutz. Women were seen different only on the basis of being able to give birth to children, which automatically bind them to the domestic sphere. But still the goal was to give everyone equal

chances to continue their work at the kibbutz, including women. To solve these issues, child rearing, cooking, cleaning and laundry work were done communally to give women the freedom to work in every field. Freed from domestic duties, women participated in industrial, economical and agricultural sectors alongside men. However, in the 1960's, the (2nd generation) women rejected the ideas of their forefathers and returned to the domestic sphere by taking care of their children, cooking and cleaning. At present, most of the women do not participate in economic and industrial sectors. They form a big part of the service sector of the kibbutzim (Amir, 2005).

3.3 Current state of Kibbutz

Economic crisis 1985

After the state of Israel was established, the kibbutz movement faced a number of challenges. There was a change of (government) power in 1977, which had catastrophic effects on the organization of the kibbutz movement. The change of power meant reduced to no government support for the kibbutzim. Combined with this political change, there was also the economic crisis of 1985, which accelerated the transformation of the kibbutzim.

It was obvious that the new governmental policies regarding inflation would affect the kibbutz organization negatively. Many kibbutzim had taken huge debts in the 80's, but they were unable to pay back. The economic recession was the cause of their declined ability to pay back. The new government showed no mercy or sympathy and stated that the movements' problems were created by themselves only. As the new government rose in power, the kibbutzim lost their influences over national affairs and lost several political positions. The kibbutz faced a lot of financial and political distress and as a result, change was essential in order to maintain their communities (Reisinger, 2019).

These factors led to privatization of the kibbutz and changed the focus to responsibility of the individual one rather than the collective one.

This economic situation could be seen as difficult times, but it had positive sides. It forced the privatization of many kibbutzim and demanded to seek other types of profit making for its survival. The identity of the kibbutz was challenged, as they were expected to be responsible for their own services, rather than the community in its total (Reisinger, 2019).

Transformation

In the beginning of the 21st century, the kibbutzim started to have a lot of changes, such as seeking external assistance, allowing kibbutzniks to leave the kibbutz for work, allowing non-kibbutz children to be a part of the settlement, shifting towards industrialization, etc. The reason for these changes were the same; the financial pressure on the kibbutzim.

The kibbutzim could no longer keep up with the demand of the local and global market. The production rate decreased dramatically and some kibbutzim began to drown. Members were encouraged to seek employment elsewhere as a direct result of the underperformance. This would bring more income into the collective kibbutz economy (Reisinger, 2019).

However, limitations within the kibbutz itself also led to this transformation. The education on the kibbutz was limited to the expertise of the members itself. The community took decisions to send members away to university, not the individuals themselves. Upon the decision to study outside the kibbutz, the youngsters realized and experienced life otherwise and opted not to go back to the kibbutz life. This resulted in hiring outside specialists in order to achieve their goals of complex industry. The introduction of these salaried workers, combined with kibbutz members working externally, led to an increasing social and economic gap between members of the kibbutz (Reisinger, 2019).

Another interesting change was the decision of the upbringing of the child. There was a shift from collective to familial child upbringing. The parents felt that their children should be brought up by them in their own house, not in the children's home.

It is clear that the economic crisis did not bring these changes, but the kibbutz itself was moving away from the collectivity character. However, there was still a collective responsibility of the children of the kibbutz. Similarly, other communal aspects of kibbutz began disappearing at the turn of the century. For example, dining halls began having restricted hours or closing all together (Reisinger, 2019).

In the 90's, after the economic crisis, a number of kibbutzim declared their intention to offer differential salaries to its members. This was a very complex issue as there was a pressure to hold on to the fundamental socialist ideal of equal salaries, while still trying to attack the financial plight of the kibbutz. To combat these issues, a 'safety-net' budget was introduced in some communities. This budget still had the difference in salaries, but introduced progressive taxation on incomes. Kibbutzniks struggled with the controversial topic of unequal pay within their communities. Much discussion among the collective ensued in attempts to find the best solution to this problem. Kibbutzim across Israel had to change and adapt to changing circumstances of the evolving world in order to stay alive (Reisinger, 2019).

Out of 273 current collective farms in Israel, only 60 have not abandoned the socialist way of life. This had been a success for the kibbutzim from a practical point of view. However, arguments were present about abandoning the kibbutz founding principles.

After the declining trend of the 1980s and '90s, kibbutz life was again on the rise. According to the official Kibbutz Movement (an Israeli umbrella organization), the population of some 143,000 was at its highest ever in 2010 after a growth of 20% between 2005 and 2010. At present, the trends show more people are joining kibbutzim than leaving them. Today the kibbutzim treat their organizations as more of a social club than a way of life based on a political ideology (Pavin & Tabenkin, 2006).

Many contemporary Israeli kibbutzim are also serious businesses and accounted for 9% of Israel's industrial output and 40% of agricultural output in 2010. Some have developed profitable military and high- tech companies (McLaren, 2020).

To summarize regarding the transformation, we can say there are 3 basic types of kibbutz (Kibbutz Industries Association, 2020):

1. **The Communal type:** This is the initial way of the settlement, where division of income is communal and equal. Individual contribution to the community is not a measure for the salary.
2. **The Integrated type:** Member's income consists of 3 parts. Firstly, the equal sum for every member (just like in the communal type), secondly a fixed amount of an extra based on the seniority of the member and at last, an amount which is a percentage of the member's contribution to the kibbutz.
3. **The "Security Net" type:** This type actually needs a process, whereby the responsibilities shift from the kibbutz to the individual. Salary is determined on basis of the earning ability of the member itself; the more you earn, the more you receive. However, there is a measure for those who cannot earn enough. In this system, there is a security incorporated for members who cannot earn the minimum wage at the kibbutz. The difference is covered by a certain percentage of each member's salary. This percentage also includes the responsibility to cover community expenses.

3.4 Diversification in the Kibbutzim

From the 1970's and onwards, privatization of the kibbutzim has shown a growing trend.

The economic development and the status of kibbutzniks as people who are well educated and undertake good jobs in wider economy, are the direct causes for the privatization of the kibbutzim. Today, many of Israel's kibbutzim are privatized, however still maintain their communal roots as places with strong community cooperation and activities. A big number of these settlements have diversified over the years into manufacturing mainly, which is far from their initial agricultural roots. As for now, kibbutz companies account for about 10% of the country's agricultural output. Manufacturing and high-tech are much more profitable. Today, factories account for 11% of the country's industrial output.

Many kibbutzim which pursued industrial business, have gotten great success. For example, the first ever kibbutz named Degania, has diamond cutting factory and grosses several million US dollars a year. Kibbutz Hatzerim's company Netafim is a global pioneer in drip irrigation technique with a factory in the kibbutz and many more around the world. It has 9 subsidiaries, among which "Netafim Agricultural Financing Agency Private Limited", which is a non-banking financial company. Other kibbutzim have diversified into tourism with kibbutz hotels as popular places to stay (Kibbutz Degania, 2020).

Facts and figures

There is data available of the Kibbutzim in Israel in the form of annual reports. The most recent report is from the annual report of 2006. This data shows different figures and numbers of the members, the economic diversification and other relevant information about the kibbutzim from the very beginning till 2006. These data are published in the form of tables. These data are important, because it shows how the kibbutzim have developed over the course of all these years (Pavin & Tabenkin, 2006).

Table 8 Overview Kibbutz Population (1952-2004)

Year	Kibbutz Population (in thousands)	Percentage in general population (in %)
1952	69.1	4.2
1961	77.2	3.5
1972	89.7	2.8
1983	115.5	2.8
1994	124.6	2.3
1995	118.9	2.1

1996	116.8	2.0
1997	116.5	1.9
1998	115.5	1.9
1999	115.7	1.9
2000	115.3	1.8
2001	115.5	1.7
2002	115.6	1.7
2003	116.2	1.7
2004	116.3	1.7

After the 1985 crisis, there was a slow increase in the number of kibbutz residents. At the end of 2004 the kibbutz population reached 116,000 in 266 kibbutzim and its percentage in the general population was 1.7%. As for the current population, there are about 123,000 members in 273 kibbutzim (Kibbutz Industries Association, 2020).

Table 6 states that there is decline in agriculture, while manufacturing was on the rise in this period. Furthermore, we can also derive the diversification in the kibbutzim, which are a lot more branches than agriculture only (Pavin & Tabenkin, 2006).

There is no data about year 2004 and onwards, but 2004 saw a rise in investments in Israeli industry, export and number of employees in kibbutzim. The kibbutz industry had an increased sale of 10.4% in 2004 in comparison to 2003, while exports increased by 15.5% (Pavin & Tabenkin, 2006).

Table 9 Workers in Kibbutzim according to economic activity from 1995 to 2003 (in %)

Economic activity	1995	1997	2000	2001	2002	2003
Agriculture	16.3	13.9	14.0	12.3	13.3	10.6
Manufacturing	32.9	34.0	32.6	34.5	32.7	31.9
Electricity and water supply	-	0.2	-	-	-	-
Construction	3.1	3.0	2.4	2.3	2.7	3.6
Wholesale and retail trade	4.5	6.2	7.0	7.5	9.5	9.9
Accommodation services	7.5	6.1	7.4	6.2	6.4	6.9
Transport and communications	2.9	2.3	1.4	1.5	2.1	2.3
Banking, insurance & finances	0.1	0.2	-	-	-	-
Business activities	6.7	6.4	7.7	7.2	8.2	7.5

Public administration	1.2	1.3	1.2	1.9	1.9	1.6
Education	12.0	11.2	11.2	11.5	10.0	11.3
Health & welfare	7.5	8.5	8.5	8.5	7.5	7.6
Community services	4.3	6.1	5.4	5.4	3.5	5.5
Household services	0.5	0.4	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 7 shows the occupational structure in kibbutzim in the year 2003. It is noticeable that only 8.8% are skilled workers in agriculture, while the percentages of ‘manufacturing’ and ‘sales & marketing services’ are above this amount, 13.6% and 14.1% respectively (Pavin & Tabenkin, 2006).

Table 10 Occupational structure of kibbutz in 2003

Occupational category	Percentage (%)
Academic and scientific	10.6
Other professional or technical	15.3
Management	11.1
Clerical and all office work	14.1
Sales, marketing services	16.9
Skilled work in agriculture	8.8
Skilled work in manufacturing	13.6
Unskilled work	9.7
Total	100

From table 8 it is derivable that in present time, industry is a very important part of the kibbutzim as it has a big share in the revenues of it. Also, agriculture revenues decreased in these years, while the opposite happened to industry (Pavin & Tabenkin, 2006).

Table 11 Kibbutz yearly revenues during 1998-2003 (in %)

	1998	1999	2000	2001	2002	2003
Agriculture	22.2	21.5	21.0	20.2	19.3	18.7
Services	8.6	8.4	8.0	6.8	6.5	5.7
Work outside	5.8	6.2	6.2	6.2	6.5	6.2
Kibbutz						
Total without	36.6	36.1	35.3	33.2	32.3	30.6
Industry						

Industry revenue	63.3	63.9	64.6	66.7	67.6	69.3
Total revenue	100.0	100.0	100.0	100.0	100.0	100.0

As we can see from the numbers, kibbutzim have developed from an agricultural village to big industrial businesses and plants. The total income of Kibbutzim agriculture is around 34% of Israel’s total agricultural production. The industry reaches to around 5.2% of Gross National Product and 9.2% of Israel’s industrial production. Industry accounts about 70% of the total income of the country’s kibbutzim (Kibbutz Industries Association, 2020).

3.5 Interconnection Kibbutz system and Surinamese agriculture

In the previous sections, the shortcomings/ complications of the Surinamese agricultural sector and the attributes of the Kibbutz systems have been addressed. This section will present a synthesis of these 2 subjects, resulting in a conceptual model. This conceptual model will lead to the ‘lessons learned’ from the Kibbutz system and the applicability of it in Suriname.

The Surinamese agricultural sector

As stated in chapter 2, a number of complications can be derived from the SWOT analyses and the strategic goals mentioned there. These are decisive factors for the development of this sector. The sector has no proper organization, leading to scattered entrepreneurships and productions. There is no cooperation or unity between most of the farmers, leading to the big gap in production, mechanization and technological developments. This results in unsustainable farming and its continuity at risk, bringing a lot of unemployment along with it. Suriname is already a high import and low export country, meaning that the output of the agricultural sector is inferior to the demand locally. The sector does not have the latest technologies and mechanization, leading to the unattractiveness under the youngsters. The scattered state and no investments are the direct result of no interest from the new generations. Furthermore, the insignificant investments in this sector is the cause of low quality and quantity products with high prices, as efficiency is very low. There are very few entrepreneurs who are investing in processing units to deliver end products for the very few international markets available for Suriname, but the prices are high.

The Kibbutz attributes

Kibbutz system has a character of equality, unity and cooperation in a village, whereby agriculture has been the main driving force to generate income for the members in that village. These communities are very organized and have a strong character of a SDG- template. This

system reinvests its money in the further development of its own people and village/ city, with accent on technology and business. The system went on to become very successful over the years, as it generates 40% of the total agricultural output of Israel. They have developed a very attractive system for the youth, as the enrolled members will get housing, good salary and top quality services will be available in the village, including higher studies for the children. Their strength lies in their unity, dedication and willingness to be the pioneer of agribusiness in Israel. In this manner, the continuity of such a system is also guaranteed.

With a setback in the form of an economic crisis in 1980's, the Kibbutz systems had less governmental support. This led to diversification in the Kibbutz income, with shifts toward industrialization and innovation. This shift also became very successful and the Kibbutz system now has a contribution of 9% of the total industry generation in Israel. After the crisis, the Kibbutz character changed from a so-called 'sect character' to a more open one, as outsiders were welcome to be a part of the system and Kibbutzniks were allowed to work outside the system. In the present time the driving force is still agriculture, but industrialization and farms have also been integrated in the system for diverse and higher income. Most Kibbutzim have also invested in other sectors, e.g. buying shares of companies or developing own branded instruments/ techniques for agricultural activities for the whole world, etc.

Below, a conceptual model is shown of the interfaces of these 2 subject. It is clear from the model what the important aspects are for Suriname, extracted from the Kibbutz system. Out of this, the methodological topics/ subjects will be derived and will be used to set a collection of questions for the fieldwork.

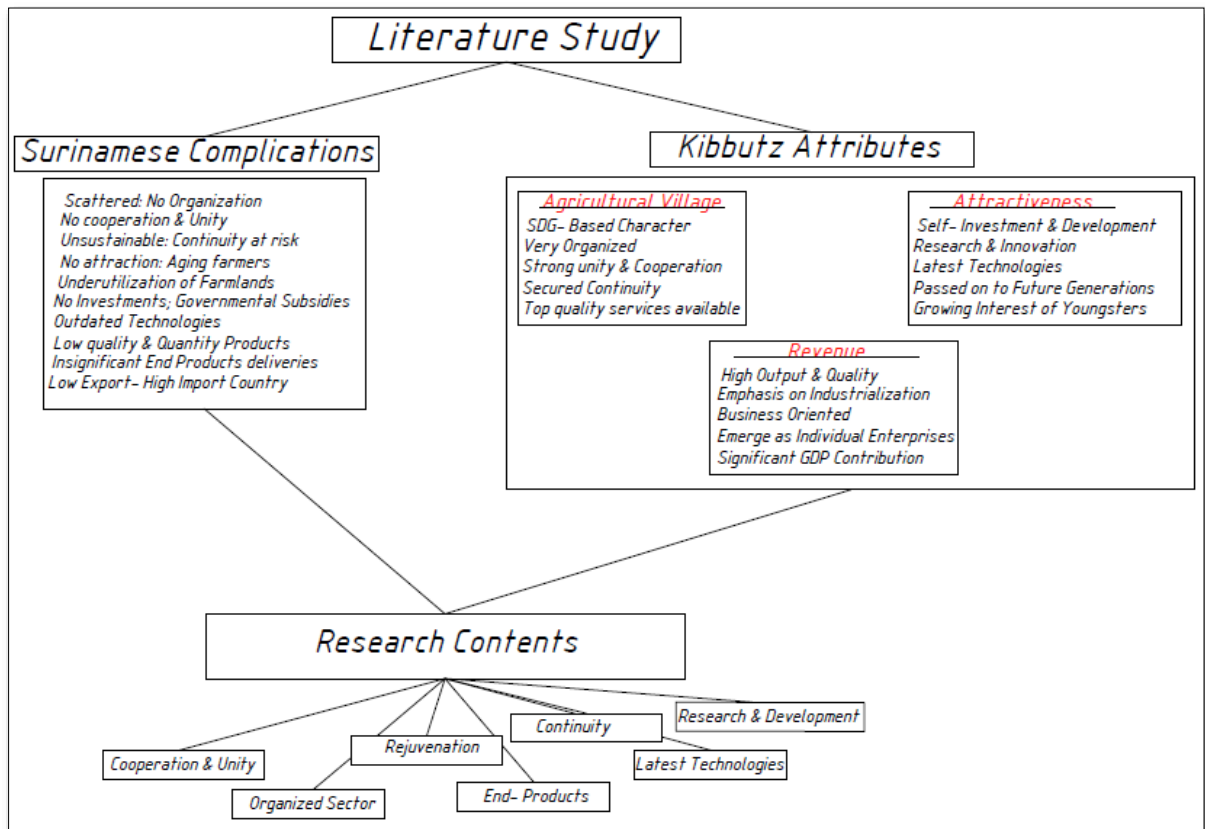


Figure 5 Conjunction of Surinamese agriculture sector and the Kibbutz system

4. METHODOLOGY

The methodology of the study is suitable, considering the fact that it is peculiar for the Surinamese community and the experts in the agricultural sectors. This thesis attempts to understand and modify the Kibbutz system as much as possible towards the local standards in order to make the agricultural sector blossom and attractive to the youth particularly.

Quantitative research has been carried out for this research to acquire as much as data possible and to get enough responses to conclude the most common/ general answers from agricultural students from the Anton De Kom University of Suriname (ADeKUS) and Polytechnic College Suriname (PTC).

Qualitative approach is used to collect data from the agricultural experts from different institutes and organizations, whereby they respond to interviews regarding the Kibbutz system and its potential modifications. It is a combination of desktop study (theoretical research) and field work consisting of questionnaires and interviews. However, in both cases the data analysis has been done using the quantitative approach (results are expressed in percentages and in categories). This study adopted an interview- and questionnaires method, because this method has the ability to collect firsthand and quality data from research subjects (Kumar, 2018).

4.1 General topics of measuring tool

As stated before, the topics of research are derived from a strong synthesis of the Kibbutz system and the complications of agriculture in Suriname, shown in figure 4. The first part of the results has been carried out by interviewing different agricultural persons (experts) regarding the sector and the kibbutz system, while the second part has been carried out using an online survey among agricultural students (upcoming farmers). Both questionnaires had 2 parts, starting with general information about the agricultural sector and closing with the kibbutz system and the opinions about the system. The questionnaires are shown in appendix 3.

Around 24 questions were designed for the students particularly, of which the important focus points were (among other):

- Personal future plans regarding agriculture
- Problems regarding current situations
- Kibbutz definition

- Opinion about the ‘agricultural city’
- Desired services in it
- Desired salary structure
- Desired form of government/ management
- Opinion on starting factories and mills
- Agricultural tourism options

On the other hand, a number of agricultural experts were interviewed from different agricultural institutions and organizations. This group consisted of people from the ministry, NGO’s, agricultural lecturers, policy makers, etc. The questions were designed in such a manner that the major complications would be stated and respondents would ponder on the applicability of Kibbutz system. It focused on the following points (among other):

- Problems that created current situation
- Aging farmer population
- Unattractiveness
- Governmental issues
- Government’s role in agriculture
- Investments for development and sustainability
- Latest technologies
- General considerations on Kibbutz system
- Governmental gaining’s
- Focus on end products
- SDG’s as basis for the cities
- Self-sufficient city (energy, water)

4.2 Process of research methodology

In order to answer the research questions and obtain the goals of the study, the following steps were taken into account (starting from the beginning):

- Problem identification; at first the problem was identified, followed by a problem description with objectives and the research questions. For assessing the questions, it was important to get a better understanding about the agricultural sector of Suriname.

- To get a better grasp about the subject, literature review and studies were done about the policy development and the objectives of agriculture in Suriname. Furthermore, literature study about the Israeli kibbutzim was also done in order to dive deeper into the character of the kibbutzim, as Israel has one of the highest developed and successful agricultural sector in the world.
- Based on the literature reviews, it was clear that the authentic Kibbutz system would not work in Suriname. So it had to undergo some changes and be modified accordingly. Questionnaires were composed to get the opinions of the locals regarding the kibbutz life and what changes they would like to have. The target of the questionnaires was students of the agricultural schools and faculties exclusively. This, because the focus of this study lies more in the new generations and rejuvenation of farmers in the country. More so, interviews were taken from agricultural experts from different agricultural organizations.
- The acquired data was analyzed and based on the results the original Kibbutz character and organization were modified specifically for local standards. Also, a spatial plan of an exemplary Kibbutz is proposed on how to establish the settlement/ village in a specific way. The physical conditions, such as soil fertility, irrigation and sea level rise threat for Suriname were taken into account while proposing the spatial plan.
- At last, further research and recommendations are given to polish this subject even more.

Below a flow chart is given to get a better overview of the methodology of this study.

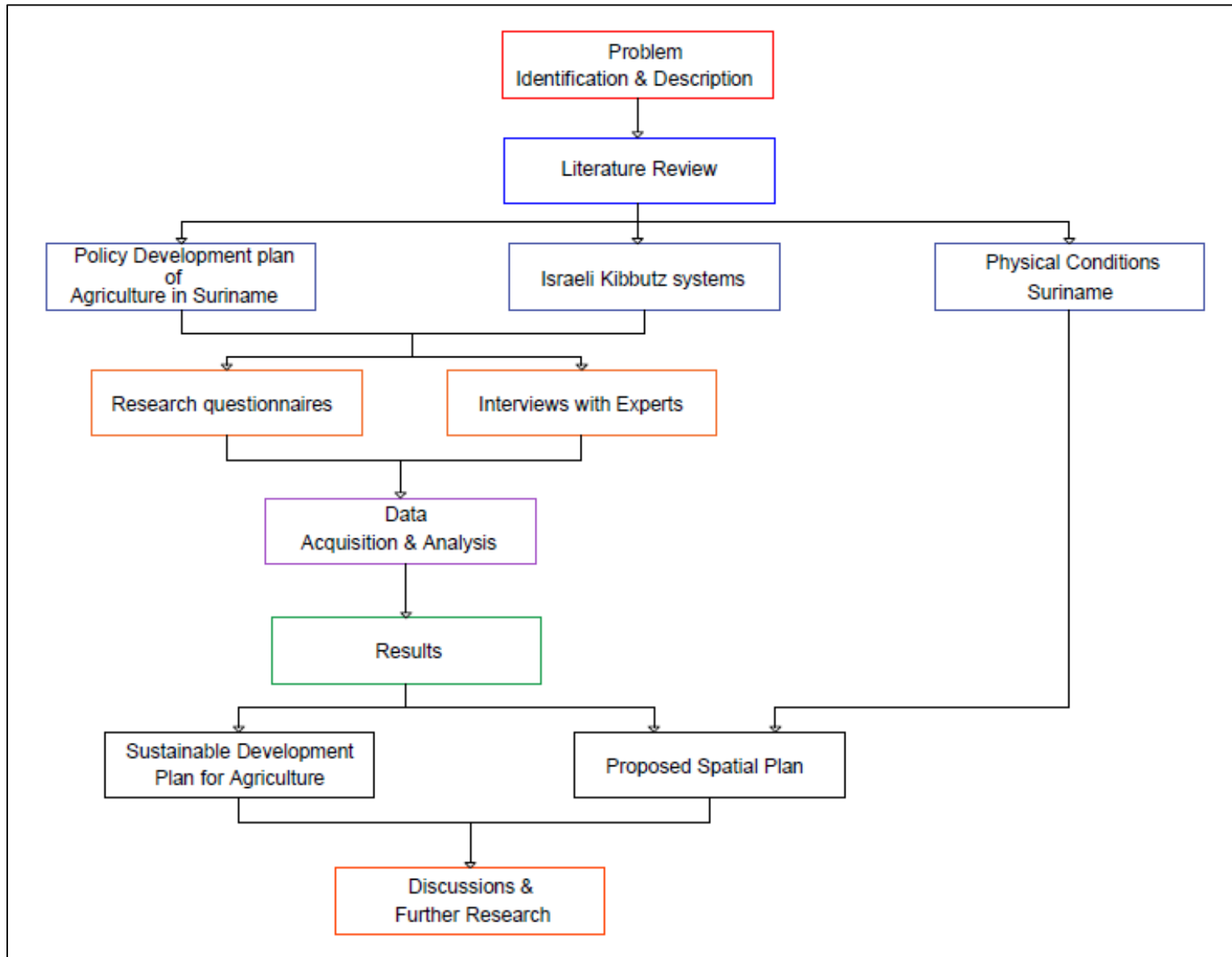


Figure 6 Flowchart of the research methodology

4.3 Field Survey

In order to design the sample, the following aspects were taken into account:

1. Demarcation of the target audience; agricultural students and experts
2. Identification of significant parameters regarding the Kibbutz
3. Sampling method; questionnaire is the best suited method for this
4. Calculation of the sample size; stratified sampling

Sample calculation

The method which is used for the data acquisition is the stratified sampling. At first, a sample size has been calculated with a confidence level of 95% and the margin of error (E) of not more than 10% (Jairam, 2011). The distribution is assumed to be a normal one. Because there is no information on the proportion of how many students are enrolled for an agricultural program, the 0.5 factor (\hat{P}) is used for the estimation.

- C.I. 95% → $Z^* = 1.96$ (from statistics Z- table)
- $\hat{P} = 0.5$, $E = 0.1$
- Equation: $(Z * \sqrt{\frac{\hat{P}(1-\hat{P})}{n}}) \leq E \rightarrow n = (\geq) \hat{P} * (1 - \hat{P}) * \left(\frac{Z}{E}\right)^2$
- $n = 0.5 * (1 - 0.5) * \left(\frac{1.96}{0.1}\right)^2 = (\geq) 97$ (calculated/ minimal sample size)
- $n^* = 101$ (actual sample size)

The actual sample size differs slightly from the minimal (calculated) sample size. The reason for this difference is caused by using the online platforms for data acquisition, the ‘google form’ service. In practice, there is no controlled or fixed influx of responses on daily basis (fluctuates heavily as it depends strongly on the respondents’ actions/ moods). However, this is not a problem as the actual sample size is slightly bigger than the calculated one (the calculated one is minimum, keeping the error maximum 10%).

Experts

The goal was to include different types of institutes and organizations as much as possible. At least 10 experts would be sufficient for their inputs. In total, 10 experts have been interviewed; 2 from CELOS, 1 from ICCA Suriname, 4 from the University, 2 from the Ministry of LVV and 1 member of a management team of an agricultural cooperation.

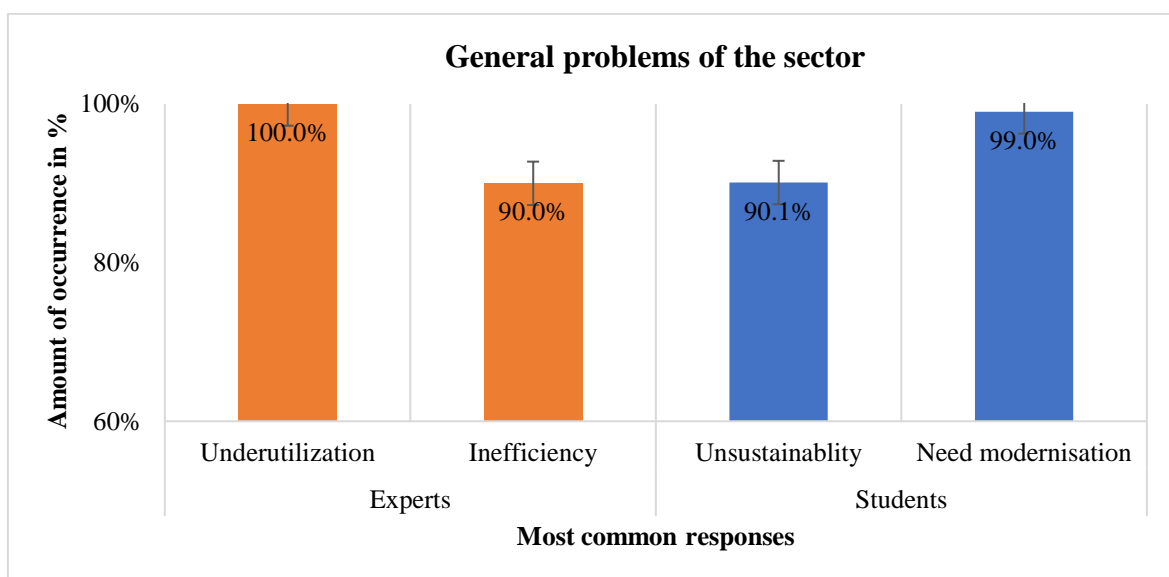
5. RESULTS & DATA ANALYSIS

This chapter will dive deeper into the fieldwork and the collection of data. As stated before, the core of this study is to know and understand to what extent the Kibbutz system can be applied in Suriname. There is a number of aspects which needs to be taken care of. There are two groups of people who were a part of the data acquisition; the policy makers and experts in the field of agriculture (i) and the youngsters or students who are currently enrolled for agricultural studies (ii). These 2 groups are the most important ones in the sector. At one side, it is important to know how the policy makers are looking towards such revolutionary, non-traditional ideas regarding agriculture and at the other side it is important to know how the future generations, the youngsters are thinking regarding the agricultural sector in the country and particularly about this system.

As stated before, the results are divided in two parts; first one is the experts' opinions and the second one is the survey from the agricultural students. The 'experts' are persons who have been working in the sector for a long time and have a lot of experience in it. Be it as successful farmers/ entrepreneurs, key persons of institutes, university lecturers or policy makers in context of agriculture. These results have been obtained using sets of questions about the sector and the kibbutzim. However, not all the complete results will be presented in this section, as there will be a huge number of graphs to present otherwise. The significant and important aspects will be merged together (where possible) and the data analysis will be done on them. These results are enough to do statements about the research objectives and the proposed plan. The complete and detailed data results (graphs) and questions will be shown in the attachments/ appendices. In total, 10 experts have been interviewed and 101 students have reacted to the survey. The results and analysis of the agricultural experts' and of the respondents (students) are shown below. There are topics in both parts that interact with each other and are shown together to have a better analysis and conclusions about that specific topic. The results of the experts represent the feasibility of the system, while the responses from students/ youngsters show their desire or nature of the sector they want to work in.

To begin with, the general complications of the sector are pointed out in graph 1 below. The graph shows the perspectives from both the sides; the experts and the students. The results show the four most occurring issues from both sides. Most of the experts stated that underutilization (100%) and inefficiencies (90%) are the biggest problems, while most of the students felt that outdated techniques (99%) and unsustainability (90.1%) in the sector also are main problems. However, there are several issues stated in the detailed graphs and these can

be found in the appendix 2 (graphs: ‘labor intensive work’ and ‘underutilization of resources’ (experts) & ‘sustainability in agriculture’ and ‘need of new techniques’ (students)). The graph below shows only the highest occurring responses, derived from the detailed graphs. These 4 main issues do converge, as outdated technology will cause inefficiencies and underutilization of e.g. farming land/ area and production. This will lead to unsustainable production causing low quantities, qualities and continuity, while the prices will go up because of high inputs (such as expensive labors) for small quantities. It can be concluded from the graph that both sides have actually the same opinions regarding the general complications of the agricultural sector. This is very important, as the problems can be defined unambiguously and practical/ effective solutions can be proposed directly.



Graph 1: General problems of the sector (experts & students)

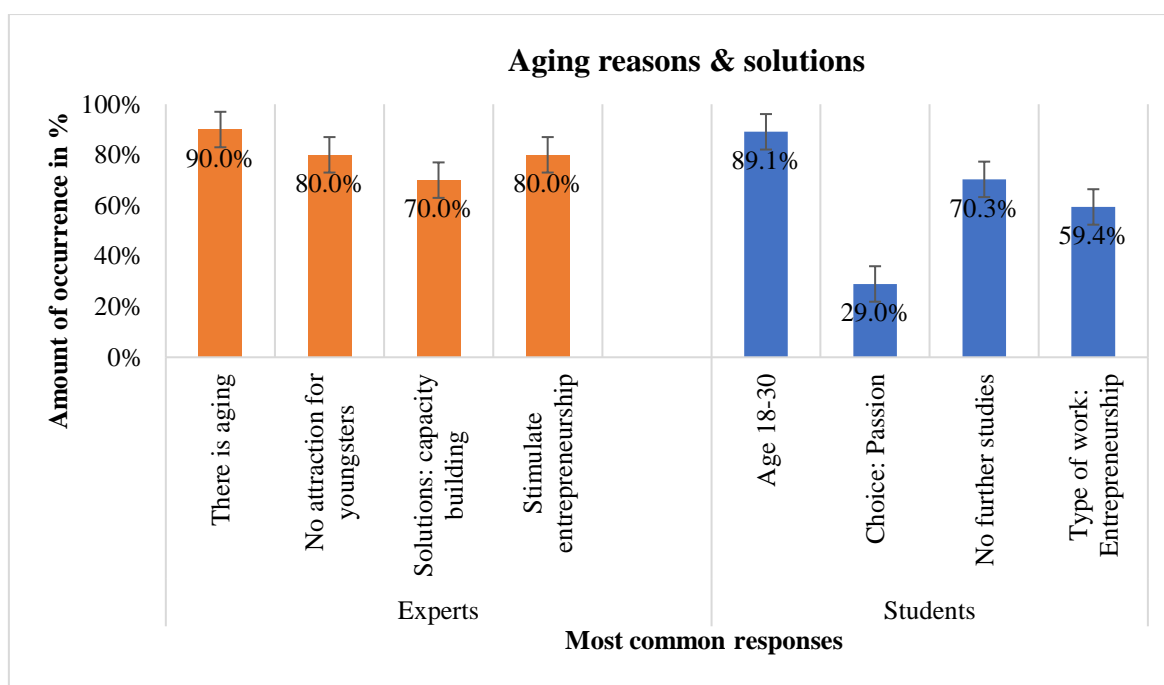
In graph 2, the responses of experts regarding aging in the sector and its reasons are shown. Linked to this subject, results obtained from the students are also presented in it. This, in order to show the direct possible solutions and conjunctions regarding the aging problems in the sector.

Aging was stated as a fact by 90% of the experts, whereby 80% experts said that unattractiveness is a direct result of the aging problem. They further pointed out that capacity building (70%) and stimulation for entrepreneurship (80%) will attract youngsters to join the sector.

On the other side, 89.1% of responses were students between 18- 30 years. This is a good sign, as it indicates the interest of a lot of youngsters (who are in their prime) for agriculture. The most common reason to choose this career was their passion (29%). However, there is a loop in this connection, as passion is relatively a very weak reason to pursue farming and could

cause decision change in extreme life situations. Furthermore, there is no surety that these youngsters will end up in the primary agriculture (producer). There is a need for a systematic platform/ solution to keep these upcoming farmers motivated and make them stick to production, rather than the administrative works in the sector.

The good sign is that 70.3% of the respondents will pursue work after their graduation and most of them will renounce further studies. These farmers will be open to/ available for further training and upgrades regarding techniques (capacity building). Also, 59.4% respondents showed interest in entrepreneurship in agriculture. This shows a good junction of the experts' opinion (80%) and the students' interest (59.4%) regarding entrepreneurship in agriculture. The detailed graphs regarding 'aging' and its 'reasons', 'reasons of career choice' and 'dream jobs' are shown in appendix 2.

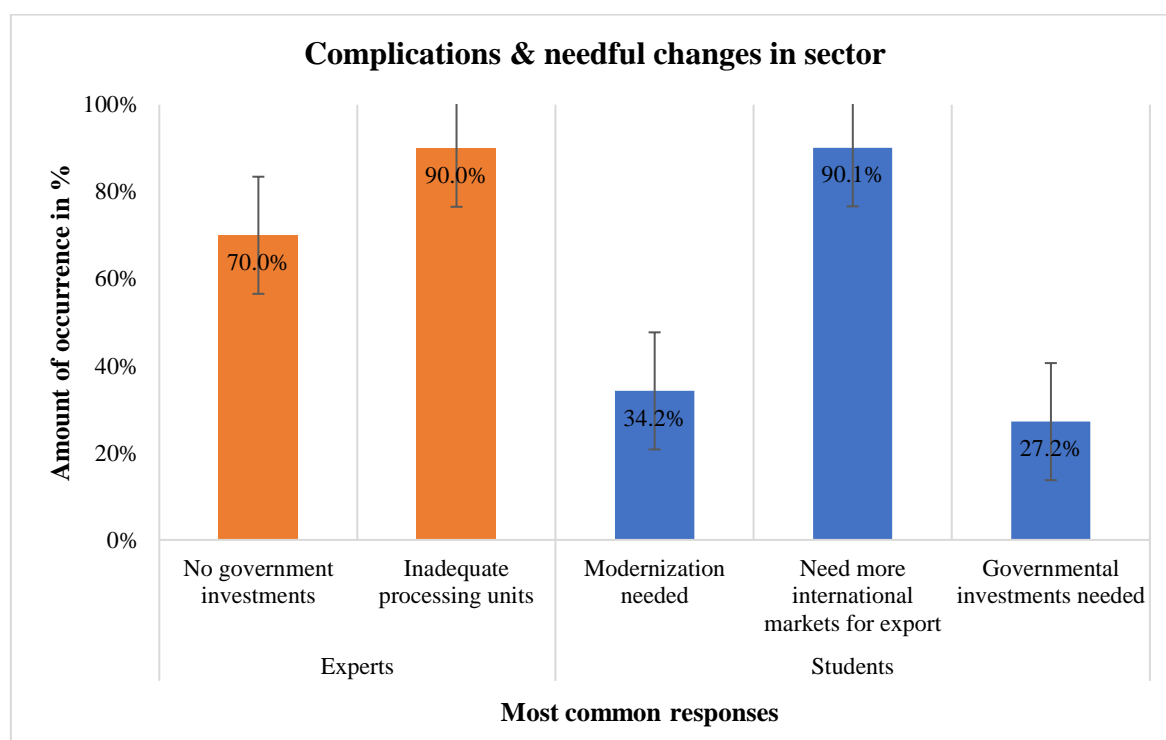


Graph 2: Aging reasons and solutions (experts & students)

Graph 3 shows more detailed and practical complications in the sector, whereby factors are stated that need to undergo changes in order to create a sustainable sector or to pave the way towards sustainability, at least. The stated complications are the most common ones, while their detailed graphs ('investment behavior government', 'realize processing units' (experts) & 'needful changes in the sector' and 'desirable changes in agriculture' (students)) are available in the appendices. The experts stated (70%) that there is insufficient to no investments from the government's side. Experts (90%) also indicated inadequate processing units in this sector and the need of change in this, as the country should proceed towards producing end products for more income.

On the other hand, the students responded that modernization is needed in the sector (34.2%) and more international markets should be available (90.1%) for the country. In order to create more international markets for Suriname, it is important for the government to create or modify its foreign policies in such a manner that more options are available for the agricultural sector. However, the country needs to be ready for continuity and quality assurance of products. The students (27.2%) also feel that the government has to make investments in this sector. As we can see, both the experts (70%) and the students (27.2%) share the same opinion about governmental investments.

These results (the detailed ones, in particular) strongly indicate that the government has to perform better and give more attention to this sector. In context, the government has to do organized and sufficient investments regarding technology, long term planning & policies and work towards the attractiveness of the sector. For an organized sector, thoughts could go towards new and practical guidelines and legislations to create an integrated legislation, measures, rules and regulations in the form of a manual for the agricultural sector. This would eliminate the obstructions generated by other sectors, e.g. mining sector.

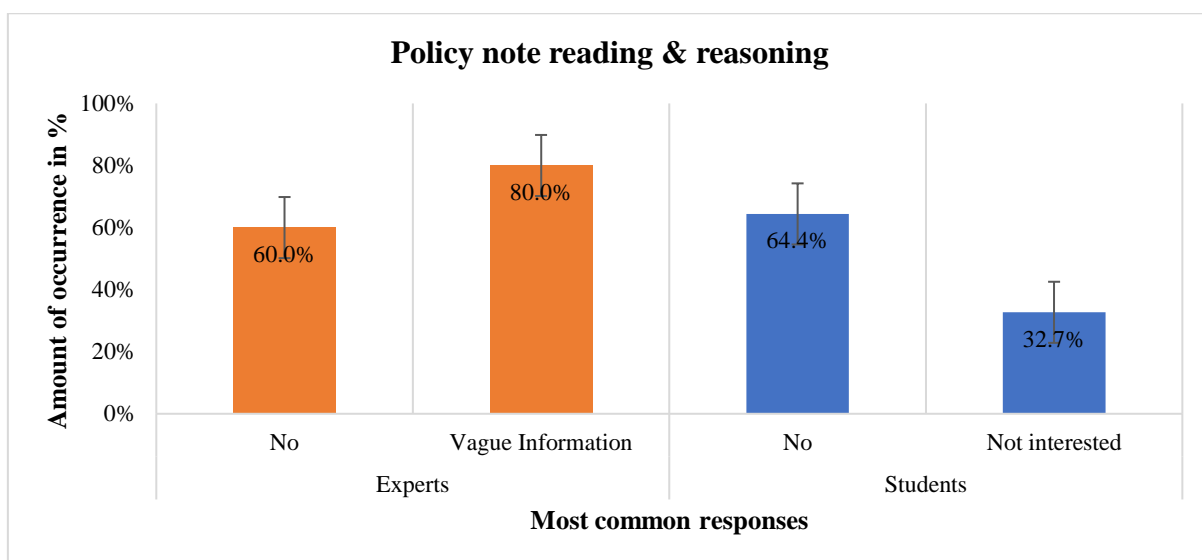


Graph 3: Complications & needful changes in the sector

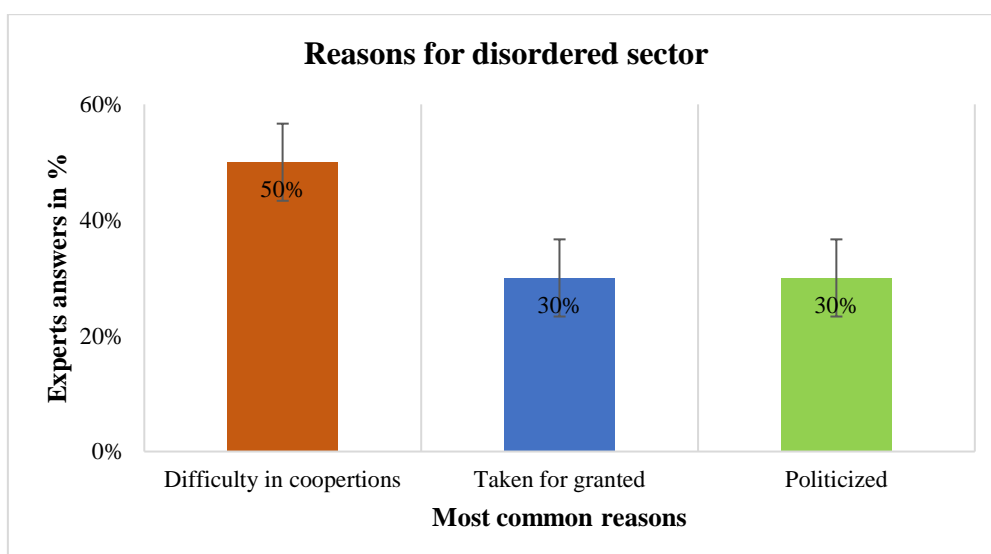
Graph 4 presents the interest in the policy memorandum of the Ministry of LVV from both, the experts and the students and their opinions regarding it. Experts (60%) showed no interest for the reading, as they felt (80%) that there is always vague information incorporated in it.

The detailed graph regarding ('reasoning of policy note') not reading the note, presents more aspects of it. The 2nd most popular reasoning was the political dialogues, followed by no execution (see appendices). This again shows the underperformance and low interest from the government, in the form of inadequate planning and policies.

Most students (64.4%) do not read the policy note, as they are not interested in it. The detailed graphs will show the other common responses regarding the policy note reading. These results indicate that there is very weak cooperation between stakeholders. Biggest part does not read the policy and planning regarding the production, indicating no trust and scattered production. To support the statement above, graph 5 presents the insights of the experts on why the sector is disorganized. Important to state that 70% of experts said that the sector is disorganized and disordered (see attached detail graphs), while 30% found the subject a bit sensitive to answer. Graph 5 clearly shows a lack of cooperation, no interest and political aspect in the sector.

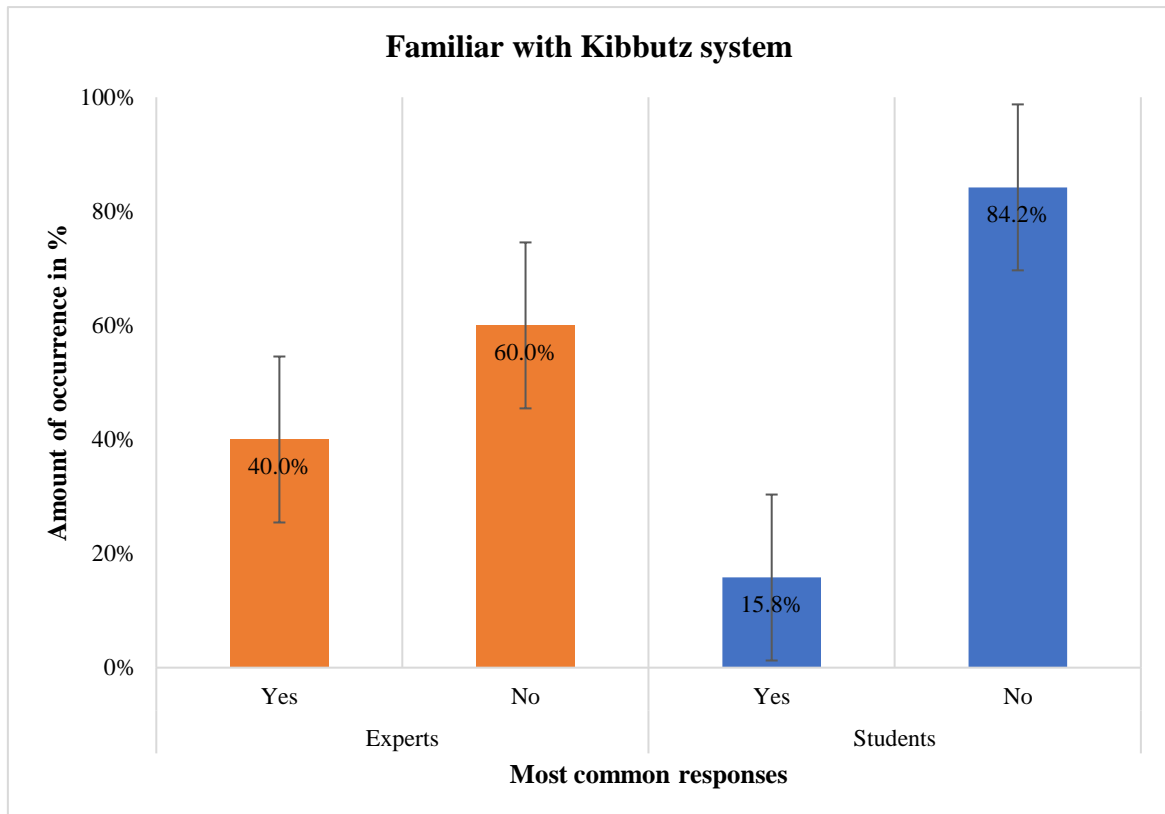


Graph 4: Interests for policy memorandum



Graph 5: Reasons of disordered sector (experts)

Graph 6 shows the amount of people who know about the kibbutz system or at least, are aware of it. Only 40% of experts know the system. This amount is even lower in the student's portion; only 15.8% students know about the system or have heard about it. These results indicate a strong absence of this system's knowledge in the society. This also means that before implementing or planning such a system, the stakeholders have to be informed in details about the system and how it works. This also includes integrating the changes accordingly, based on the local way of life and culture in Suriname. If this step is omitted, the whole project could get negative reviews only because of misinformation and misinterpretations.



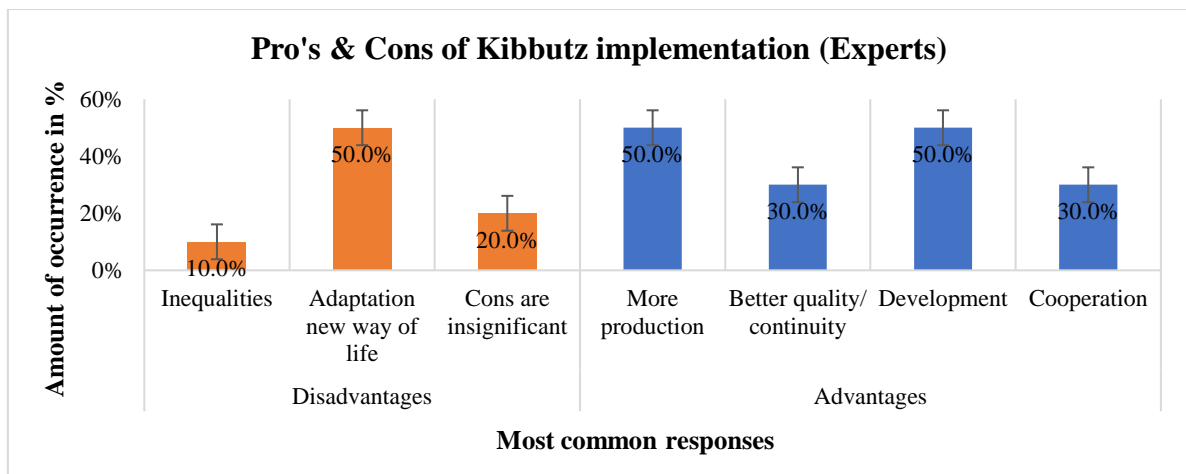
Graph 6: Abreast of Kibbutz system

Graph 7 gives an overview of the thoughts of the experts regarding the authentic kibbutz system and the most common factors are incorporated in the data. The advantages and disadvantages have been stated. Experts stated the adaptation of a new way of life (50%), with a strong communal and social character as 'very difficult' and will be a major setback for implementation purposes. 20% stated that the advantages weigh much more, pointing that the disadvantages are insignificant, relatively. 10% stated that inequalities will be a big problem, such as unequal chances and opportunities and will cause cracks in the unity and communal lifestyle.

The experts stated that such a system would realize higher production (50%), with better quality products and assurance of continuity (30%). Furthermore, such systems would have a

strong foundation for developments in every field related to agriculture (50%), leading to constant innovation and upgrade in the sector. Lastly, a very important aspect, cooperation would be in place as the cohesion and unity would be strong between members/ farmers (30%). According to the experts, cooperation is a big problem in the sector. The kibbutz system could bring a positive change in this aspect.

If we look at the advantages, they correspond to the desirable achievements to reach sustainability in the sector. The only problem is the human aspect; adapting to a new way of life. A solution to this is responding to the addressed changes, in particular to modify the so-called 'sect character' of the kibbutz to the local situations, tolerable for the locals. This requires a good stakeholders' management, along with careful planning and correct information exchange with the (agricultural) society, in particular.

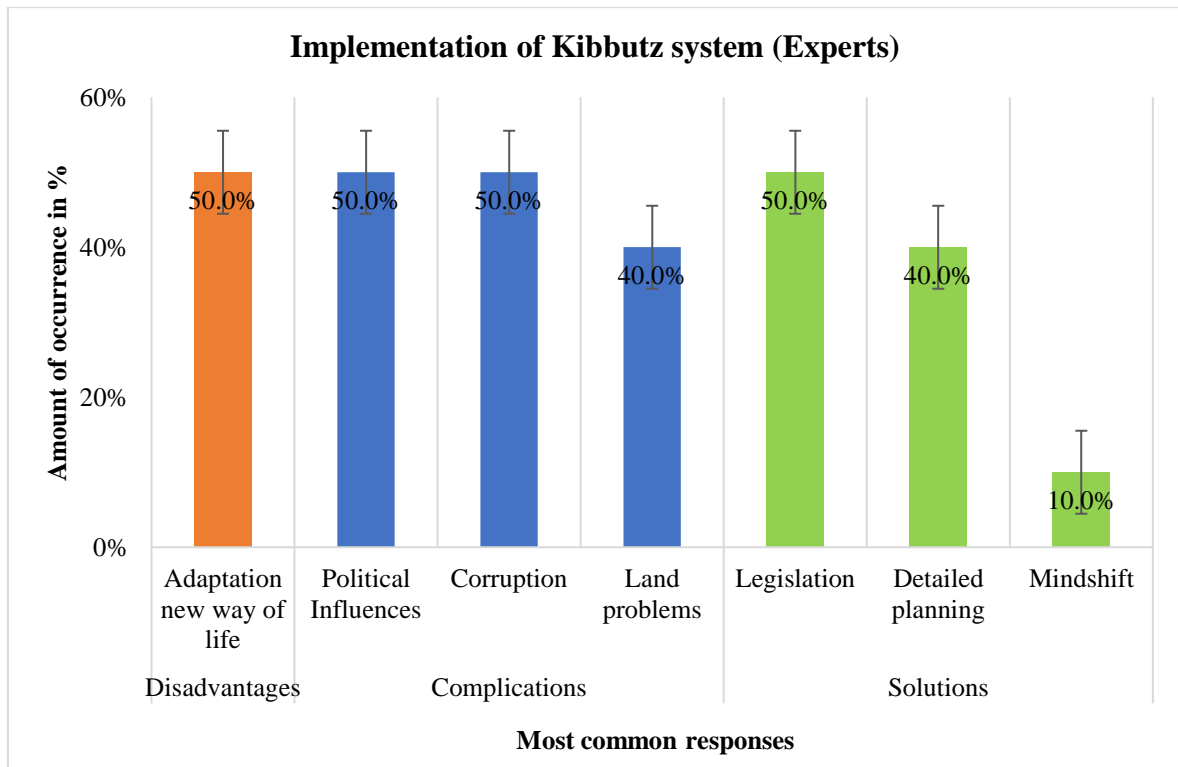


Graph 7: General consideration of Kibbutz system

Graph 8 presents the aspects occurring in the implementation phase of the system. As stated before, the new way of life is a big disadvantage of the system, but there are some additional complications in the implementation phase. Experts state that political influence (50%) is a major problem in the country, as it is very likely that the government will be the biggest investor for this project. These political influences create the platform for corruption (50%), which will cause failure of such projects. It has been happening in the past, in different sectors with different projects. Another problem is the land occupation (40%). There are lots of farmlands issued to individuals for allotments, who will never let go of these illegally obtained lands. The government will have to buy back these lands, which will bring extra costs, making such projects unattractive for investors.

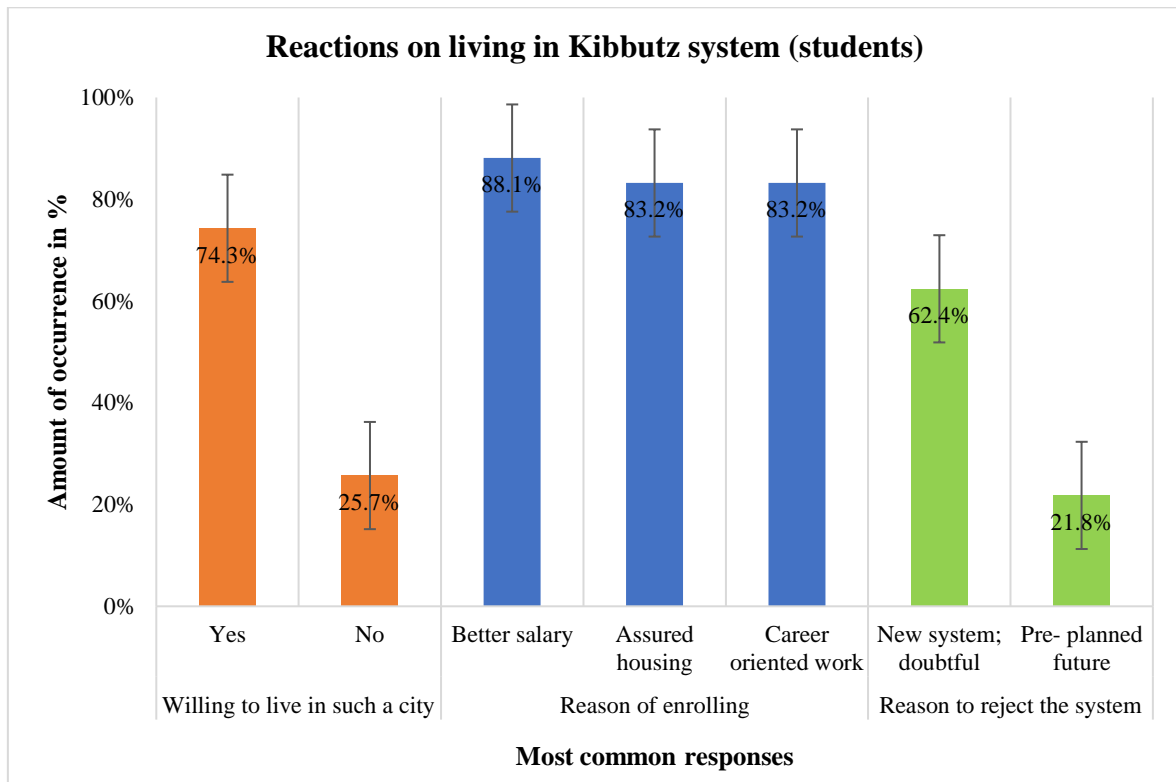
The solutions are strong and clear legislations and implementation (50%) of it on ground level. As stated before, a carefully detailed plan (40%) will also bring solutions to several

unpredictable problems. Mind shift is needed (10%), starting from the new generations in primary schools.



Graph 8: Implementation aspects of Kibbutz system

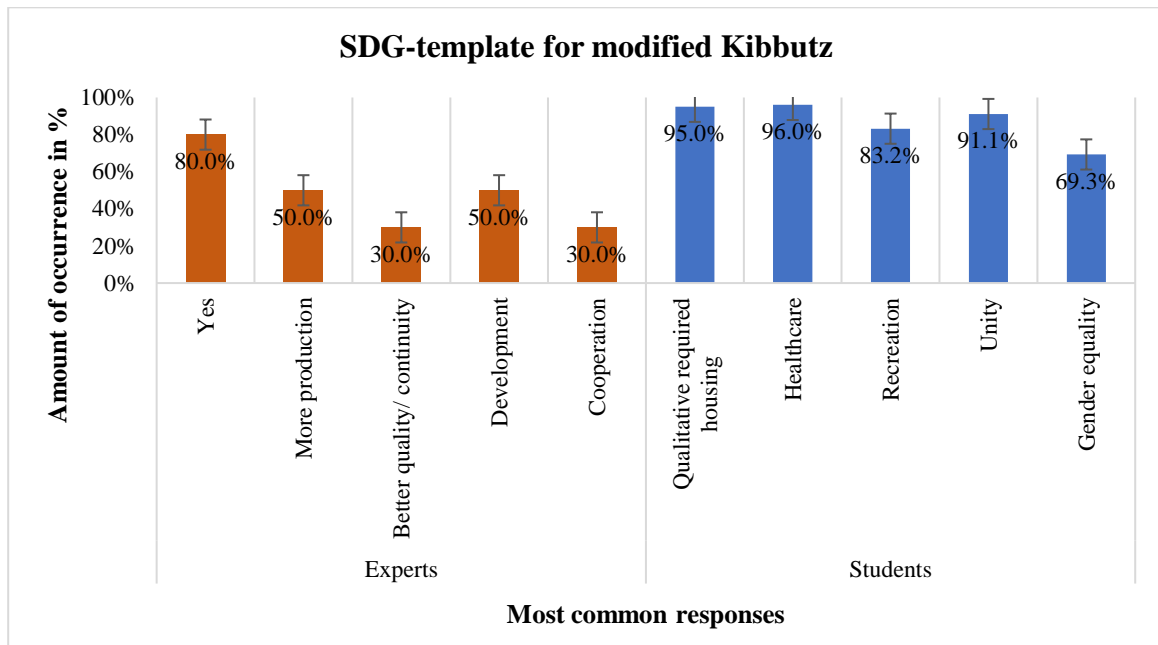
Opinions were taken from the students regarding life in a similar agricultural city (graph 9). 74.3% were positive about living in such a system with modifications. The students pointed out a better salary (88.1%), assurance of housing (83.2%) and career oriented work (83.2%) as direct conditions/ reasons to live in such a city. More aspects can be found in the detailed graph in the appendix 2 (reasons to stay in kibbutz). About the housing, it should be pointed out that in Suriname, people want to own their own houses. The authentic kibbutz system has a system of owning the houses and ‘hiring’ them to the members. In the modification, this factor should be changed to members owning their homes, using unambiguous contracts and legislation. The other 2 aspects will come in place automatically, as the city has a nature of agricultural production. They were also asked to point out a reason for rejecting such a system, or being part of such a city. The most common reason was that it is a new system in Suriname, meaning there will be a lot of doubt (62.4%) regarding its success. People would not take a chance to ruin their live or waste time of their life. Another 21.8% stated that they already have planned their future. These are mostly people who inherit agricultural lands from their parents or forefathers. The detailed graph is shown in the appendix 2 (factors that resist kibbutz life).



Graph 9: Students' reactions on kibbutz life

Experts were asked about using the SDG- template as a base for modification and implementation of the Kibbutz in every aspects, such as organization, incomes, work, inequalities, cooperation, etc. Meanwhile the students were asked about the services they wanted in such a city. These 2 results were combined and is presented in graph 10. It shows that 80% of the experts are positive about using SDG's as a base for modification, planning and implementation of the kibbutz system in Suriname. They stated that there are advantages such as more production (50%), better quality and continuity (30%), more development (50%) and better cooperation (30%) in the city. The students showed interest in qualitative housings (95%), good healthcare (96%), recreation (83.2%), unity (91.1%) and gender equality (69.3%). Looking at the responses from the students and concerns of experts, it can be said that all of their interest cover the SDG's. This shows that adopting the SDG template as a base should work for Suriname.

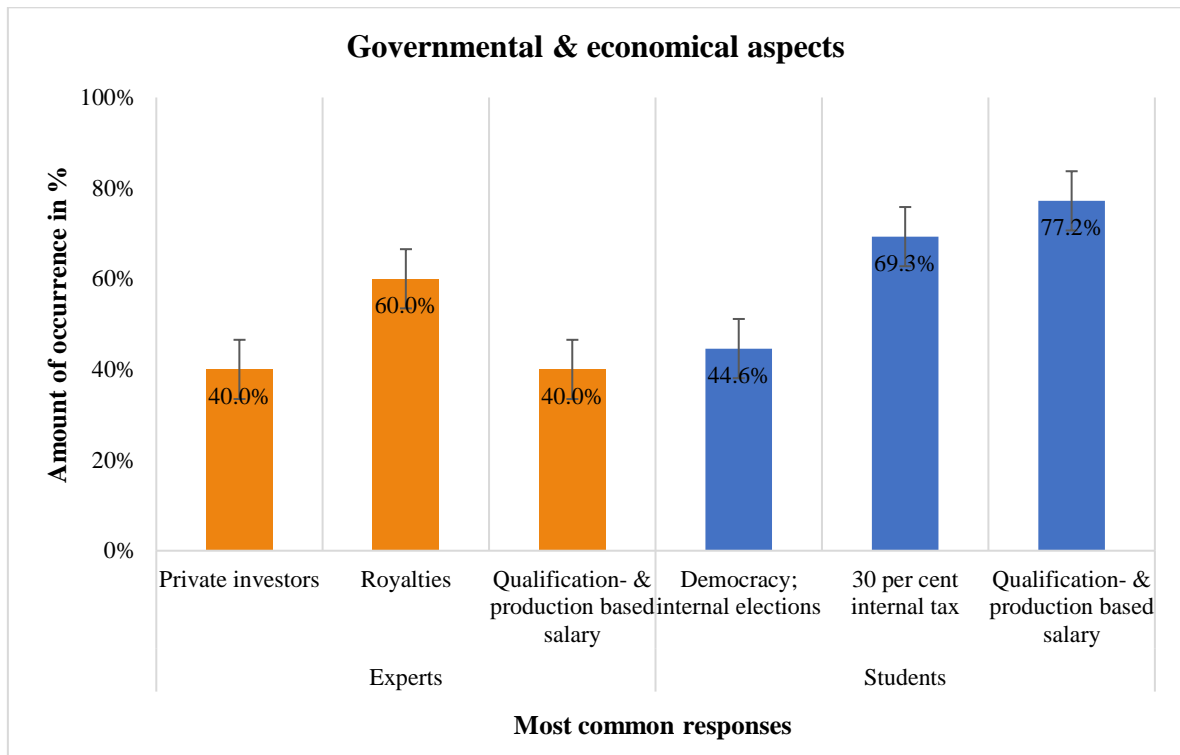
Further details are shown in the graphs ('services in the city' and 'advantages of kibbutz system') under 'appendix 2'.



Graph 10: Opinions on SDG-template for Kibbutz planning

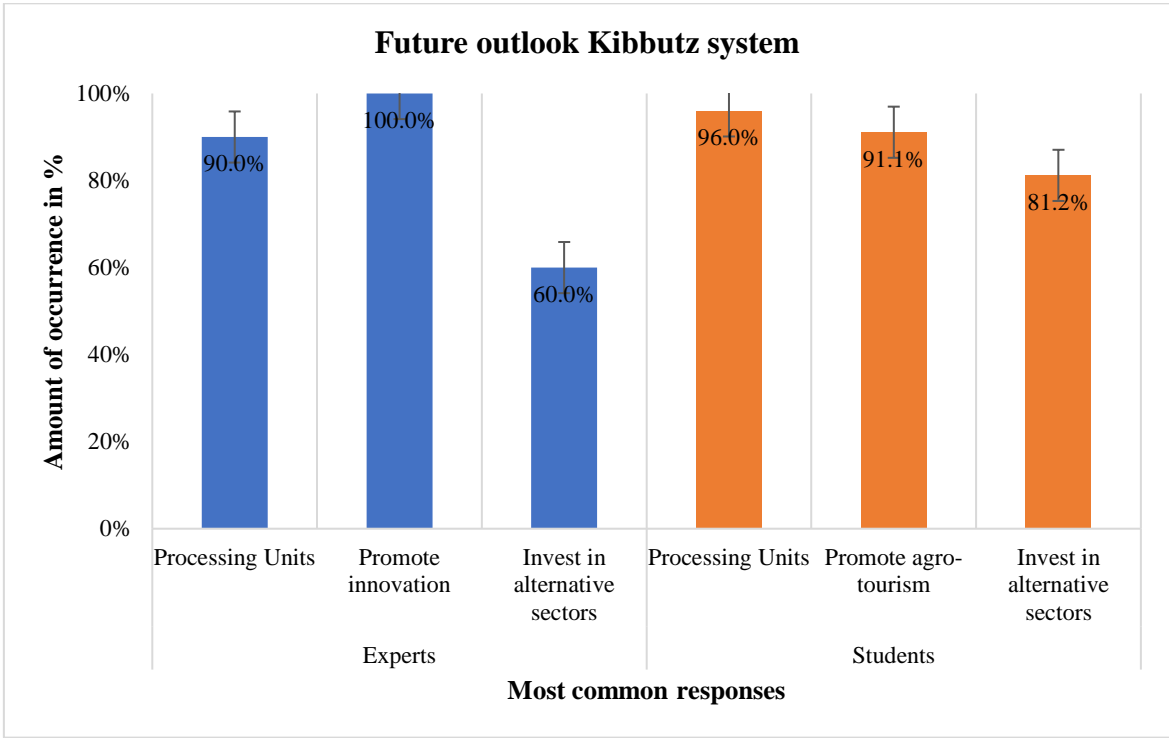
Both parties were asked about economic aspects and organizational issues in this intuitional city, see graph 11. The experts stated (40%) that the government should not invest, as the project will be prone to misuse, inequalities and corruption. 30% saw a tender system a good way of choosing the investor, while 20% did not answer the question. The experts stated (60%) that the government must get their profits in form of royalties, just like the foreign mining companies in Suriname, without any interference. Further details are given in the appendices (graph: 'set- up investor'). The majority of experts (40%) felt qualification- and production based salary as the best way of income for the members. This income- system will assure a safety/social net for all members, as they will get a minimum salary based on their schooling. This means a minimum income for all in the city, especially in difficult times, e.g. failed harvest/ crops or health problems/ old age.

The students were clearly pro for a democratic organization (44.6%), with internal elections every 5 years. These pseudo members (69.3%) also agreed to pay 30% of internal tax, for a common goal. The tax finance would be used for city maintenance and flexible loans for the members. It is also meant for making good investments in other sectors and businesses, to generate more income for the city and diversify it. They also desired the qualification- and production based salary for themselves (77.2%).



Graph 11: Governmental & economical organization

Graph 12 show a future outlook of the city. It indicates what kind of developments the respondents want to see in the city as a function of time. Both parties were subjected to voice their opinion on this matter. Experts stated (90%) that processing units are indispensable, while all the experts see stimulation of innovative ideas as an important driving force in the city, be it regarding practical technology or research development. 60% also felt that the city should invest (from reserve finance) in alternative sectors, such as mining, tourism and oil/ energy industries as part of a crisis plan. These investments will diversify the income of the city and in hard times (extreme drought or rain, e.g.), these incomes can be used to bounce back from it. The students (96%) also said that processing units are very essential for exports and generation of finance. The students also found it important to invest in other sectors (81.2%), to diversify the income, eliminating monotony by integrating kibbutz services, such as promoting agro- tourism (91.4%) and other tourism activities as a part of the city's income.



Graph 12: Future outlook of the kibbutz system

6. THE MODIFIED KIBBUTZ PROPOSAL

A written proposal, as well as the preliminary work for setting up a Kibbutz system is presented in this chapter. The proposal is to give an insight on the practical of the implementation phase of such a plan, keeping in mind all the hurdles and processes that have to be taken into account. This piece of information gives a very good and quite a detailed explanation on whether Suriname should consider to implement this system or not. If positive, then the different actions, effects and explanations are presented in this part. It should be notable that a results- based proposal will be presented with a strong character of sustainable development.

After analyzing the results of the research, the sustainable development goals (SDG's) are the targets to achieve, which should result in the final proposal of setting up an agricultural settlement with sustainable development and innovation as its basis, keeping in mind the responses from the field work. The SDG's are the driving forces of this plan and its success is strongly dependent on achieving those goals. Extensive information regarding the modified kibbutz proposal is given in appendix 1.

6.1 Sustainable Development Goals (SDG's)

Sustainable development is a development that meets the needs of the present generation, without compromising the ability of future generations to meet their own needs. Sustainable development can have different interpretations or formulations for different people, regions or institutions. However, the core remains the same, namely an approach for development while balancing different needs against awareness of limitations (environmental, social and economic) we face as a society.

Around 178 countries adopted the Agenda 21 in Brazil, Rio de Janeiro at the Earth Summit of 1992. Agenda 21 is an action plan to build global partnerships regarding sustainable development in order to improve human lives and environmental protection.

In 2000, the Millennium Declaration was adopted, which led to 8 Millennium Development Goals to reduce poverty by 2015.

The Johannesburg Declaration (adopted in 2002) then reaffirmed global commitment to poverty elimination and environment by including stronger multilateral partnerships.

In 2012 at the UN Conference on Sustainable Development, an outcome document was adopted; members decided to launch a process to develop a set of SDG's which would be the

successors of the Millennium Development Goals. A year later, a working group was installed to develop a proposal on the SDG's.

At the beginning of 2015, negotiations began on post- 2015 development policies. The result was the 2030 agenda for Sustainable Development, with 17 SDG's as the core, which was adopted in September 2015 (United Nations, 2020).

Re- arranging SDG's

In order to set out the goals for the plan, the 17 SDG's need a re- arrangement as it is specific for the agricultural development of this country with a character of job opportunities, production, rejuvenation, export and eliminating import to a certain extent.

The attempt is to integrate SDG's as much as possible, based on the responses from the acquired data. Some goals may not fit completely within the template of the kibbutz planning. But the attempt is still to integrate all of these goals in the system.

The first step is to re- arrange the SDG's in such a manner that the first level include the most important goals while the last one the least important ones. Between these 2 extremes there is an intermediate importance level. But still, a combination of these goals will form the basis of the operational system of this localized kibbutz; be it technical, management, social or organizational.

An explanation about the ranking per goal is given in appendix 1, as for why the one is more important than the other one in the context of this agricultural city planning. As stated before, the combination of (explanations of) these goals will form a big part of the character, rules & regulations and the measures of this city/ plan. Also, you can see the re- arranged SDG's for the Kibbutz planning according to its importance in appendix 1, figure 4.

6.2 Potential locations

The next step for this project is the choice of the location of it. There are a lot of potential locations where such plans can be carried out, but it is important to know how the choices are made. As stated before, there are a number of factors that influence the location of the agricultural spatial planning. The most important aspects are the sea level rise (SLR), the water supply from existing rivers, the land fertility and accessibility. All these factors are put in a multiple criteria analysis (MCA) to get the best option for the plan. However, the chosen location will not be the only one as there are several places in the country that have the same

qualities as the chosen location in this project. In appendix 1, section “Potential Location” the additional information is given about the SLR, MCA and other relevant information regarding the determination of the location.



Figure 7 Pseudo Kibbutz Area



Figure 8 Kibbutz Area close-up

6.3 Implementation

In this paragraph, the focus will be on the implementation phase and the setbacks that will come along with it. This part of the study is more of a practical execution of the plan, in order to be familiar with a similar spatial plan and the problems that could arise if such is carried out. It is worth noting that some processes, such as choice of the area, detailed soil tests and investments are skipped due to the limitations of the study. However, the chosen area has an agricultural history and is in region A. The cited setbacks in this chapter are translations from the inputs of the experts, taking into account the most popular issues/ complications according to them.

A pseudo spatial plan was created and projected on an area in the district Wanica, taking into account the important criteria from the previous chapters. This area has been chosen randomly, but it has still some basis to it. The area is an alleged old aquaculture plant, whereby the aerial photos show the evident character of it. The agricultural area will be near this plant as the whole area has an agricultural character. The existing structure will be kept as a potential aquaculture option for the future. A rich waterbody flows through this area too, solving the water and irrigation issues for the plan. The aerial shots, the relative placement and the pseudo spatial plan of the cited area are shown in appendix 1.

The setbacks in implementation are stated below. These are the most popular opinions of the experts in agriculture.

A. General complications in implementation

There is a sum of general complications stated by the experts. The most popular ones are the illegal land allocations, the political influences, investments, corruption and the diversity of the population.

Illegal land allocations

In the past, a lot of land has been issued to big political figures and others in improper ways. These are mostly fertile soil and are being used for buildings and allotments. The problem will arise when the state wants to take back these lands for the agricultural sector (such systems). It will be a huge legal battle that will go on for years or it will cost a lot of money to buy these parts back from the owners. This issue has to be structured with strong legislation and the proper implementation of it. The most important aspect hereby is good governance and integer rulers.

Political influence & Corruption

Politics has a big influence on this sector in the country, as stated above. All big and important decisions have a strong political character. This can cause further degradation of the sector. During the practice of such systems, political decisions can be taken which can have adverse effects on these innovations and its development. Such a big political influence accommodates corruption on different levels, such as investment capital, overcharging and handing project tenders to family and friends (quality compromise). The generated revenues could be exposed to large scaled corruptions too, instead of beneficial investments. Influence of politics should be minimized to only needful investments, marketing and policies, using strong and clear legislations and measures for this sector.

Diversity of population/ lifestyle

This system was a big success in Israel, because the Jews have the same culture and race. They were the same type of people and they were in extreme situations then, which lead them to take such steps with strict rules. In Suriname, it is quite the opposite of this; there is a big diversity in the population. Binding so many different cultures, religions and races can be a big problem. The attitude of the people will also play a big role in the success of the system. These human aspects should be taken into account and managed properly before implementation. The system has to be adjusted in such a manner that it works for the people of Suriname (SDG- based proposal with inputs of respondents). Mind shift is needed in the new generation, starting from the primary school. The system should be encouraged as a strong character of and big opportunity for business, employment and production settlements, rather than the social dimension.

B. Investments and revenues issues

The source of investments for the system should not be a problem. However, most of the experts state that the government is not a good investor. If the government invests, the politics will come into play; the influence will be much bigger and the corruption may be facilitated. Furthermore, the government will not be keen to invest in further development of the system arguably, leading to compromises and degradation. Suriname should be open to private investors, who focus on the business aspects only.

The investments can be very big, so it is quite possible that the government will do the biggest part of the investments. Using clear legislations and measures, the influence of the government should be eliminated or minimized from this system.

The revenues of the system can be given to the government in royalties (if they do not invest) or it should have the form of a favorable loan and they will become a shareholder eventually (if they invest). It should be kept in mind that the bigger part of the revenues still has to go to the system in order to keep developing further. The country will have additional benefits from this system, so it should be regulated with good interlocution and deals between the stakeholders.

C. Disadvantages

Numerous potential disadvantages for this system have been identified. At first and most importantly, the character of this systems looks like a strong Amish one or a sect community. This could work negatively on the influx of members and development of it, leading to the death of such systems. In order to tackle this, a very strong production and business character has to be given to it in Suriname.

Another human aspect is the feeling of owning things that you work with on daily basis, e.g. material. The system should implement a way of owning most of the things, except the bigger machines, etc. Unlike the traditional kibbutz system, every member will be the owner of their stuff. Next, the diversity could lead to a very disorganized and hectic community. Factors such as religion, culture and way of life amongst other, need to be taken care of very thoroughly (it is also integrated in the SDG- based proposal).

Cooperation in this sector has been one of the fundamental problems. This is possible; at present we see many allotments where different looking people live in harmony and peace, setting an example of unity and cohesion at a certain level.

On technical level, the system will involve a lot of environmental pollution and deforestation. There needs to be a detailed and adequate plan for waste management. Also, such systems are highly dependent on market demand; the foreign policy should be in place.

Next, there is a very high chance that the whole area could get infected with diseases spread, leading to food shortages and loss of capital or investments.

There needs to be a balance between agriculture, animal husbandry and aquaculture, as a trend development of deterioration of other sub sectors of agriculture sector as a whole is possible. It is realistic to manage these disadvantages in order to eliminate them eventually, however the investment costs will be on the higher side.

D. Benefits

The benefits of the systems weight more than the cons. Most of the experts have the same opinions regarding the benefits of such a system in Suriname. Firstly, the focus will be in the same direction and on identical goals. This will result in production with higher quality and quantity with a lot of possibilities in product diversity.

The continuity of the sector and the uniformity of the (end) products will be better, which will secure organized exports of high quality products for longer periods and better prices.

The fundamental problem of this sector is cooperation, which can be developed and such problems may be eliminated with the system in the future. There will be unity, better communities and cohesion in this sector. This will lead to an attractive, organized and better developed agricultural sector in this country, which will interest the younger generations.

The system will not only generate job opportunities, but also has a lot of scope for business possibilities, industry and developments of other sectors, e.g. agro tourism.

In short, strong benefits of this system will bring a lot of development for this sector, the people and the country's economy. The disadvantages of this system have the possibilities to be solved with good management, correct information about it and proper motivation.

Below, there are is a SWOT analysis shown, which must be taken into account when considering to set up a modified system in Suriname. It can be used as a guidance during the initial phase to develop strategic planning for execution purposes.

Table 12 SWOT analysis to consider for implementation

Strengths	Weaknesses
1. Country has a long agricultural history	1. Investments can be huge to set up such a system or city
2. Agricultural lands and networks are available in large quantities	2. Mindset of people can be a setback, as they will have to adapt to a minimal change
3. Waterways are favorable for irrigation purposes and to reach harbor	3. No initial diversification of income possible, so members will be strongly dependent on agriculture in beginning
4. Geographical location is advantageous	4. New concept; so trust issues will be present about the continuity of the system
5. Modern agriculture will be the new way to produce and process	5. Techniques should be borrowed and built upon it from foreign experts
6. Diversity in agricultural products will be realized	
7. Security of quality and continuity	

<ul style="list-style-type: none"> 8. Attractive for youngsters to become member 9. Enhancement of unity and cooperation between members will be realized 10. Stronger focus on the common aspects will lead to better performance 11. Healthy competitions between cities will push the sector to higher heights 12. Will be carried out far from coastline (no SLR effects) 	<ul style="list-style-type: none"> 6. Initial organizational executions; very few experts will be available in the beginning phase with no experience, thus it will be an iterative process 7. Is a long term plan, so no significant profits will be seen at the beginning 8. Less diversity with respect to soil condition, while new techniques could solve this issue 9. Traffic networks should be expanded and will bring extra costs
<p>Opportunities</p>	<p>Threats</p>
<ul style="list-style-type: none"> 1. (Agro)Tourism potential; system could accommodate tourists in own lodges 2. There will be development in agroforestry, which will cause less deforestation for agricultural purposes 3. Factory establishment will be realized 4. Export; end products will be exported to earn foreign exchange 5. There will be decreased or no imports; will cause retrenchment of foreign money and lower prices for products 6. Diversification of kibbutz income and economy will be realized on long term 7. System will deliver experts locally 8. Immense options of combination with aquaculture and animal husbandry 9. Strengthening of institutions 10. Green Energy development (hot item) can be stimulated 11. Systematic medicinal plants farming development will get a platform 	<ul style="list-style-type: none"> 1. System will be highly dependent on government investments initially, which can have political dimensions to it 2. Current structure of agriculture could be demotivating, because of the disorganized investments and no cooperation 3. Climate change & sea level rise effect are unknown, locally. This will cause problems in the planning process. 4. Needs capable managers and technocrats to execute and manage such cities; there is a crisis for that in Suriname 5. Corruption; it is hard to get people with honesty and sincere conscience. This will need strong and clear legislations.

6.4 The stakeholders' Analysis

If the activities of (a group of) people significantly affects the project or if the project itself affects the interests of people or organizations, then these groups (or individuals) are the stakeholders of the project. These parties should be fully involved in participation in projects concerning themselves, as it contributes to a better effectiveness of the project and commitment to achieve the objectives will be maximized too. The idea is that people should be actively involved in issues concerning themselves, otherwise you could experience resistance. The effectiveness and sustainability of the project depend, to some extent on the stakeholders' participation (Sampietro, 2019).

Stakeholders' involvement also has some disadvantages, as conflicts may arise if too many stakeholders with conflicting stance are involved. Also, the project organization must be willing to share their control over the project with these stakeholders. These aspects can delay or even fail the projects.

As this project has wide objectives and goals can only be achieved by willingness and cooperation of people, government and organizations, the stakeholders' involvement, analysis and management is essential (Sampietro, 2019).

Analysis

The stakeholders' analysis is made up of the 3 following steps (Sampietro, 2019):

➤ Identification of key stakeholders

To make sure all the important stakeholders are identified, it is sensible to use the following combination of approaches in identifying them:

- Project team members may have information to identify; approach them
- Using written documents to identify
- Stakeholder self-selection (announcements in meetings, newspapers, etc.)
- Questionnaires: to gain more information by sending questionnaires
- Interviews in order to identify

There is a number of additional questions that could guide to identification or support to identify the stakeholders (Sampietro, 2019):

- Potential beneficiaries?
- Group that could be affected adversely?
- Who has existing rights?

- Group that is likely to be voiceless?
- Group that could mobilize resistance?
- Who are the capitalists, technocrats and people with information?
- Who has to change attitude in order to make the project successful?

In the agriculture sector of Suriname, the most important stakeholders are stated below:

1. Government (Ministry of Agriculture, Animal Husbandry & Fisheries)
2. Agricultural institutions (CELOS, ADRON, University, Etc.)
3. Private agricultural industries
4. Individual processing industries
5. Cooperative exporters
6. Individual exporters
7. Farmers' organizations
8. Farmers' cooperation
9. Individual farmers
10. NGO's
11. International partners
12. Agricultural students
13. Inhabitants

➤ Stance and attitude of stakeholders must be defined towards the project

In order to know the proper way of managing the stakeholders or to ensure their cooperation, it is important to know their circumstances, interests and characteristics. There should be a clear point or clarification of the stakeholders' willingness to participate in the process. This will be extracted, using 4 factors (Sampietro, 2019):

1. Benefits that a person will derive from stakeholders' involvement
2. Person's capabilities and abilities to participate
3. Person's opinion of stakeholders' involvement
4. Social pressure to participate in stakeholders involvement

- Relationships and social network between stakeholders must be identified

As stakeholders may influence each other, understanding the relationships can give insights on how to deal with the specific groups or persons. There are organizational power, economic power, resources and cultural influence amongst other interactions between them. The stakeholders should be grouped on basis of power and interest in order to have better overview (Sampietro, 2019).

Power Interest Matrix

Power means the capability of persuading or forcing others to go with a specific decision. Interest means how much concern is present by a group or person. However, it also can indicate the priority given to satisfy the stakeholders' needs through the project.

The stakeholders' power and interest can be combined in a matrix that characterizes stakeholders, meaning it can give indication for prioritization and insights for strategies prior to partaking (Sampietro, 2019).

Below, the Power-Interest matrix is given for the agricultural sector of the country:

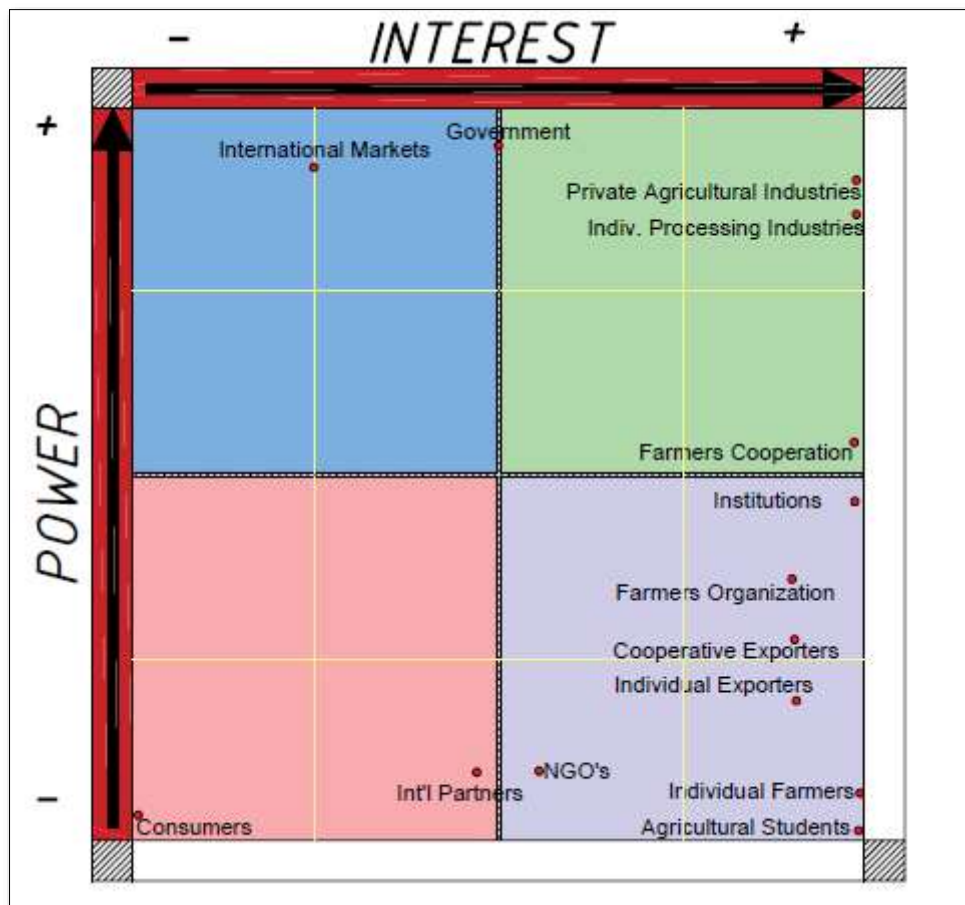


Figure 9 Current situation stakeholders

With the introduction of the Kibbutz- system, the power- interest matrix will undergo dramatic changes as the stakeholders' roles will be changed. Below, the forecasted power- interest matrix is given with the Kibbutz- system in place/ as a reality. This new matrix shows how important the Kibbutz- system role will be in order to have balanced stakeholders, in context of power and interest.

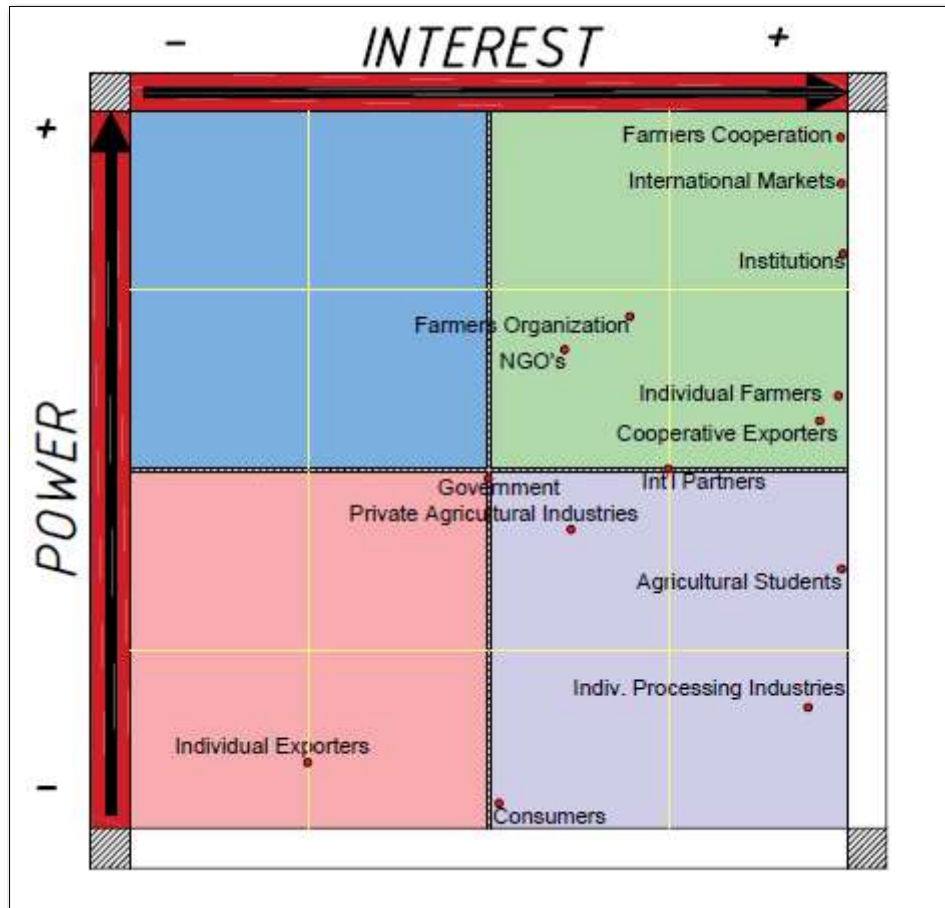


Figure 10 Stakeholders' position influenced by Kibbutz system

As it can be seen, there is a major shift in interest and power of some key stakeholders. The government will have less power, as the policies will be set up by the largest body in the sector, which will be the 'Kibbutzim'. The government will be relieved from this sector indirectly. The interest of the consumers will be more, as it will open up more options for them, not only regarding more local quality products, but also thoughts of joining the sector or agricultural faculties. These are the most important shifts in the analysis, as a direct influence of the modified kibbutz system. Furthermore, the institutions will be based on technology (not politicizing them) and will gain much more power, as it will be trusted fully by the sector regarding their researches, findings and conclusions. It is important to state that currently the international market has a very big influence on the sector, but has low interest in it. The reason is quite obvious, pointing towards the facts that the sector is scattered, unorganized,

inconsistent, underqualified and low in export quantities. With the developments stated above the interest will come back, which is going to be very important for the export policy and opportunities of the country. The agricultural students too, will experience their positive influence on the community, which will act as a motivation for them to pursue working in the sector, in this particular system.

7. DISCUSSIONS

7.1 Agricultural potential in Suriname

The agricultural sector as we know it today, has a character of population farming mostly. Raw products are being produced and exported. However, the quality and quantity do not have a standard continuity, as the resources and techniques are underutilized. Aging has become a big issue in this sector, as the former generation could not pass the activities on to the present generation with success. This is due to a number of factors that influence the thinking process of the youth, who do or do not have an agricultural background. This sector in Suriname demands a lot of physical labor, as the mechanization and modernization is way behind in time. It is very scattered, with unorganized productions and initiatives with very short lifespans generally. The views of different governments have been negative mostly, as they never invested sufficient enough to give the sector a boost. One of the most important complications of this sector is the lack of unity and cooperation between farmers. With this problem, the sector cannot make progress as the potential developments stay put. All these factors make the sector very unattractive for the youngsters, as they believe in modernization, science and technology.

Based on several reports from LVV and responses from experts, Suriname has the potential to score better on the international market, especially in the Caribbean. But this is very complex, as Suriname does not produce on large scale nor at the highest qualities and also do not have prodigious foreign policies regarding agriculture. This makes the products very costly, gaining little to no interest from the handful of available markets. The input cost should be decreased or the production needs to be increased. The former one is not possible, as most of the inputs are imported and it is already in practice (input cost as low as possible). The only solution is to produce high quality products on large scales, which will cause a lower price at the market. For this, a strong unity, cooperation, research and latest technologies are needed. In short, an investment is needed in this sector. Together with investment, an adequate, integrated plan or project is needed that could solve these issues stated above. The response of this quantitative research has showed that the Kibbutz system is applicable in order to solve this and bring development in this sector. Of course it needs modifications based on the desires and insights of the locals and youngsters.

7.2 The feasibility of the Kibbutz system

The Kibbutz system has a great potential in Suriname, because over 74% of youngsters are interested to live on a similar Kibbutz system. It needs to undergo some changes, which are all realistic and manageable. The modified Kibbutz system can solve all the stated issues in one single practice. It will bring rejuvenation, cooperation, sustainability and continuity in the sector.

The most important change is the strict rules about not owning anything on the kibbutz. In Suriname, the modified system will be allowed to rent out houses to its members, with the options to buy them from the Kibbutz itself, using internal loans. However, a clause would be incorporated regarding the rules and regulations of the Kibbutz, e.g. if he/ she wants to sell it or wants to leave the Kibbutz, etc.

About 95% of the students from the experiment has shown interest in housing, indicating that this factor is a strong attraction to join the system. These students are in their prime and are in need of basic services. Another attraction for over 85% of them is top quality services available in the village, from health services to recreation. Furthermore, with the strong character of development, modernization and research, 99% of the new generation would be attracted as they want to do a respectable job based on their qualifications, not laboring with outdated techniques and low efficiency. 96% of the students are attracted by the processing units and farms on the Kibbutz, which would allow them to produce end products, meaning more income. The most interesting part is their salary structure, which over 77% of them has accepted during the research. They showed interest in salary based on their own production, with a fixed income based on their education, additionally. This structure is attractive for them, because it would push every member to produce as much as they can for the city and themselves. Also, it would create a safety net for them in times of low to no production. Another change is that about 70% of students have agreed to pay up a 30% tax for the services, investments and maintenance on the Kibbutz. This means that every single member would get a salary from the kibbutz management at the end of the month, based on their production and education, with a cut of 30% for maintenance of all services, including the agricultural machineries and networks.

The automatic solution of the main problem is the promotion of unity and cooperation by living on the Kibbutz. The input costs would go down, because they would share all the machineries for agricultural activities. All the machineries would be property of the Kibbutz itself.

50% of the experts on the other hand, has stated that the change of lifestyle would be a disadvantage of this system. Therefore, it was important to know to which extent the current generation would be able to adapt to the system. However, 20% of the experts said that the advantages weight more than the disadvantages of the system, so it can be overseen.

The benefits of the system are more significant, as 60% of experts state that there will be more production. This is due to the fact that there will be better cooperation and more unity in the system, according to 40% of experts. Another 60% of experts believes that the system will bring a lot of development and modernization as there will be investment by and in the Kibbutz itself. Another 30% experts stated that it will secure the continuity of production in the sector.

This Kibbutz system could be a total shift in the Surinamese agriculture, as it has some underlying benefits or advantages. Kibbutz will realize the multiple use of lands, making agriculture not only a source of employment, but also giving it a social, economic and environmental dimension. It will bring development in a lot of other sectors, such as the agro-tourism and eco-tourism. Another very important benefit would be the attraction to agriculture caused by the Kibbutz's success, as it will gain a lot of interest from general public and youngsters to join such a system due to its organization and high quality of life.

Potential locations

A number of factors should be taken into account, before deciding the location of a Kibbutz. The most important aspects are the SLR, fertility, fresh water supply and accessibility to it. Based on early data, the coastline will recede to the contour line of Lelydorp at a SLR of 2 meters (100 years from now). This means that all the projections have to be done behind this line. A MCA is essential to decide the location of the Kibbutz. It should be noted that Suriname is a vast country and there are numbers of potential locations available. It is important to know the process of identification of the potential locations. A detailed planning process is stated in chapter 6 with extensive information in appendix 1, which talks about the implementation of such a Kibbutz in Suriname.

Implementation setbacks

As stated before, this system has a very strong character of the SDG's. It is also important for the modified system to not lose these attributes in the process. So, a SDG- template should be the base for the implementation and planning of the system. For implementation purposes, a stakeholders' management is essential. It is very important to include all stakeholders in the processes of planning and implementation of it. This Kibbutz system is very new for Suriname, as it is unknown to 85% of students and 40% of the experts. This indicates that the correct

information has to reach all stakeholders, the general public and youngsters particularly. Due to lack of or incorrect information to the stakeholders, the project could fail very badly. The previous chapter has shown what the role of a stakeholders' management is in these types of projects or plans.

8. CONCLUSIONS & RECOMMENDATIONS

Conclusions

A number of interesting conclusions has been drawn from this study. These conclusions are strongly based on the analysis of data that was obtained for this study.

At first, it can be stated that the feeling of ownership changes the attitude and the willingness of the members. The local people of Suriname will not be able to adapt to the strong socialism character of the initial Kibbutz- system. If the members have basic ownership of e.g. their house, car and land, the attitude will change and involvement will be much more intimate. It will result in attraction, better development of the village and sector. Socialism on such a high level (as in the initial Kibbutz systems) will not attract people or even make people quit the village or system in Suriname. The ownership of things should be regulated with strong and clear legislation and measures, which will protect the members and the kibbutz itself. If the ownership is in place, then clear agreements can be made for cooperation between the members.

Cooperation is one of the most important and fundamental problem in this sector. Poor cooperation is a direct result of very bad or absolutely no management and stakeholders' involvement in the process of decision making. The lack of a project management unit or incompetence of the existing units result in a disorganized sector, which can be experienced clearly in Suriname. The sector needs to work on this unit very seriously in order to make it function in a proper way. In order to make this project successful (or any other agricultural projects), a properly working (stakeholders') management unit needs to be in place. This project requires cooperation and stakeholders' active involvement in all phases, otherwise it is not going to work. Not only a management team should be in place, but the different agricultural institutions need to be looked at also.

These agricultural institutions in Suriname have been damaged significantly by politicizing them and accommodating family and friends, while they need qualitative and upright technocrats. A weak institution will cause very low to zero development or initiatives towards development, innovation and new technology. The very first step is to recover these institutions by installing qualitative and young personnel. After the accomplishment of these factors, the actual regulation of agricultural production needs to be addressed.

Agriculture in this country should be based on economic, environmental and social pillars. Agricultural lands/ areas should not be looked at as a solo source of food production, but the management systems have to be in such a manner that it is compatible with other potential

uses. The multiple benefits of agricultural areas should be captured, such as agro tourism, innovative and modern settlements, agribusiness, industries, agro forestry and food production. This indicates the need to implement a national agricultural management unit, whereby structured sustainable development systems of agriculture will be the focus.

In order to produce food, there is a need of a comprehensive system, meaning that forest policy, mining policy, agricultural policy, water policy, housing/ building policy and (bio) energy policy need to be introduced, coordinated and/ or integrated in order to avoid competitions, by translating this into a proper land use planning system with clear instructions and conditions. These land use systems will make sure that there are no contradictions between the different policies.

The conducted tests indicate that this system could widely be accepted by the emerging young farmers. However, they are uncertain about the livelihood and sustainability of such a system. This is partly due to nescience about the system, the current behavior and look towards the agricultural sector, combined with the fact that this system and take are totally new in the agricultural sector of Suriname.

The 'power- interest matrix' shows that the impact of such a system will incite more interest in the general public regarding agriculture, while the influence (power) of farmers, institutions and upcoming farmers will increase in the sector. This transition is crucial for the development of the agricultural sector; a sector will develop only if it gets attention from and is interesting for the bigger general public. The increasing interest will be a direct result of the improved economics of the sector, the systematic 'incentives' and career goals with a lot of opportunities.

Recommendations

During this study, some very interesting topics were identified, which could be a follow-up to the study and to further refine or modify the system if necessary.

If we look at the current farming systems, it cannot cope with this new kibbutz system. The farmers are settled and are also old for adaptation and changes. So, a study regarding the possibilities of integrating the current situation (or the current farmers) into this new system of agriculture is interesting and could create new opportunities for the current structure. In line with this, a detailed research on the failure of agricultural cooperation's in the country and how to improve that in context of this system should also be carried out.

The new system needs a source of investments for the execution. It is essential to assess the economic feasibility of this system. This should be done to get an overview of the financial aspects (investments, net present value, payback capacity, etc.), based on the Surinamese standards regarding prices and international markets.

Climate change should also be taken into account, with its adverse effects (SLR) on the soil and water quality. There is a strong need for a sea level rise study (effects of climate change), exclusively for Suriname in order to understand the threats in context of the agricultural sector and sustainable long term management and planning of it. Together with the climate change studies, a detailed environmental and social impact assessment study (ESIA) template, especially for Kibbutz system should be created for the future placement of these villages.

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APPENDICES

Appendix 1: Proposal- Execution of sustainable development plan based on Kibbutz project

Re- arrangement SDG's

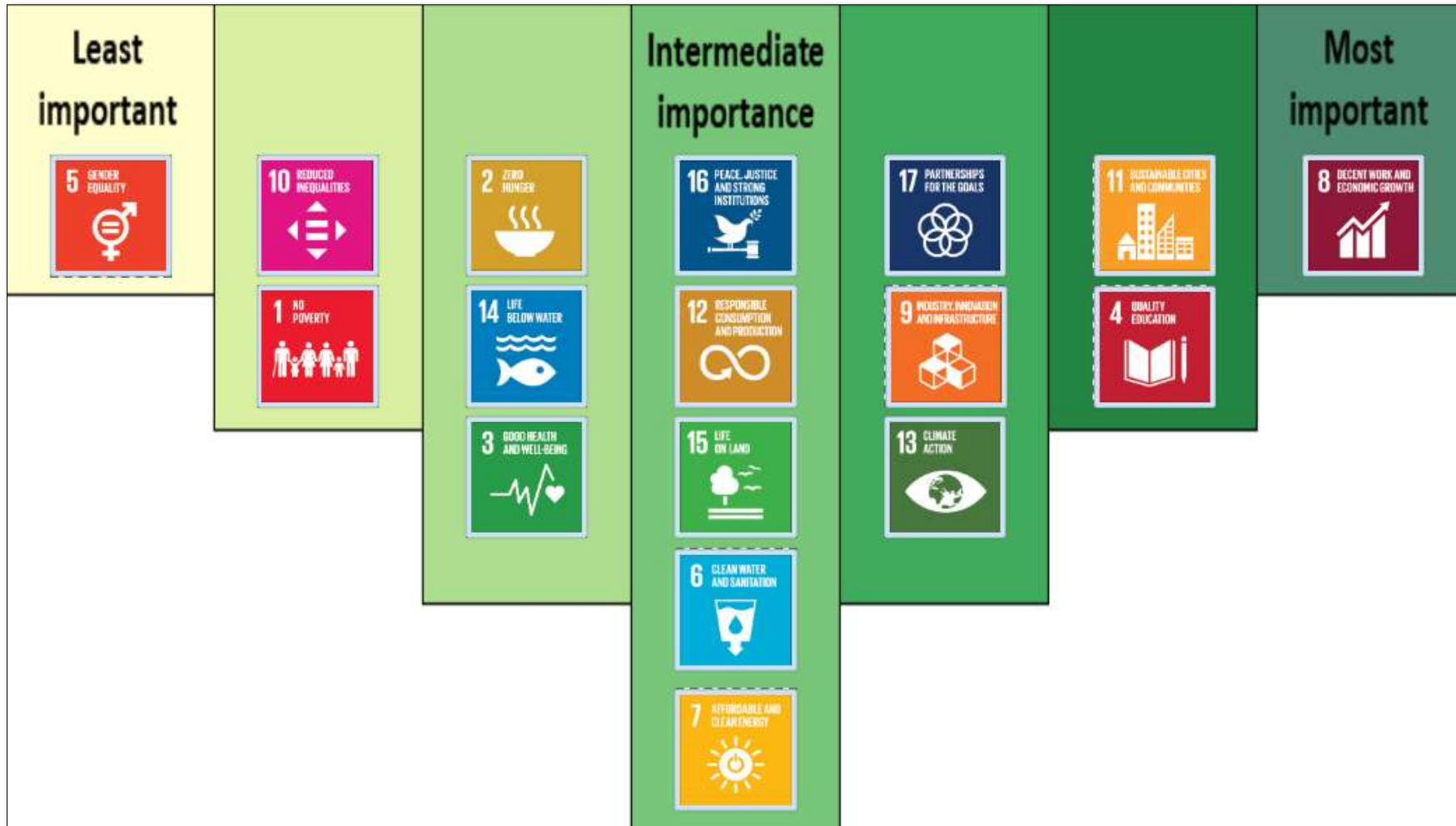


Figure 11 Re- Arranged SDG's for the localized Kibbutz Planning according to its importance

A. Organization using the SDG's according to importance

Below, the reasoning for the re- arrangement of the SDG's are given in order of importance. These reasoning will be an important part of the organization, the rules and the measures in this agricultural village.

a) SDG 8: Decent Work & Economic Growth

This SDG promotes economic growth, productive employment and decent work for all the members of the city in this case. Taking the plan into account, it is important to state that economic growth and decent work for all is one of the most important aspect to make this plan succeed.

Income sources

The 'modified kibbutz' economy will be strongly dependent on agriculture (crop cultivation) initially and later industry and other services/ businesses will join. At first, most of the work will be mainly in the agriculture (besides the standard service works), but as time elapses the investment should be diversified in other sectors, such as agro- tourism, processing industries, technique, animal husbandry, aquaculture and green energy. This, in order to create a resilient and strong financial environment for the community. Also, the commercial services will be expanded, from basic (kindergarten, schools, crèche) to advanced (swimming pools, laundry, and cinema). The shift should happen in maximum 3 years.

Labour

It must be noted that most if not all the agricultural work will be done in modern ways and with latest technologies and tools. The aspiration is to become as much technical as possible regarding agricultural activities and to stay updated all the time. The goal is to be machine intensive, but it is a process and will take time to implement and adapt. There will be a 'no rotation' policy in labor, as the goal is to have experts in every field.

Wages and Income

Salary will be based on the production / output / productivity or nature of the work and he/ she will receive a monthly amount according to their education. This system encourages a safety net system for every member in the form of a minimal income, based on your qualifications. This is much needed in cases of health problems e.g., which could compel members/ farmers to lower their activities in the system. This could lead to lower or no income in some cases.

Independent team

There will be a yearly report on the economic growth and the future investment plans for the city, keeping in mind job opportunities for all and quality & efficient productivity. There will be working groups regarding the economy of the city, the business investments and employment issues. All these plans will be presented to the council and the members for feedback.

b) SDG 11: Sustainable Cities & Communities

SDG 11 promotes safe, inclusive, resilient settlements and cities. The aspect of sustainable city is deeply rooted in the kibbutz character itself and healthy economy is the driving force of it. These types of cities will include every aspects of the urban cities as known generally and aims to be better than the quality of life in urban areas with unity as the highlight.

Commercial services

From top quality medication to innovative and updated banking systems should be available. There will be modern supermarkets, gyms, swimming pools, restaurants, coffee shops and even cinema houses. At some point the products in the markets will be from the city itself, meaning it will be a self-sustaining city eventually. The aim is to have virtual money in the city, whereby every member will have a credit card with their balance on it. The possibility of these options should be checked with the banking authorities of the country. The ultimate goal is to be independent as much as possible from the 'outer world' or government regarding finance, thus a city that has no loans outside.

Housings & property

The housings will be contemporary and according to the size of a family. The land and housing will be city/ community property and members will be subject to a contract regarding these issues for the safety for both, the member and the city. All other (movable) objects, such as cars, etc. will be for the members' account and thus members' properties. Every member or family will have the same rights and access to all commodities in the city, meaning that everyone will be treated equally. Schooling and crèche options will be available for everyone.

Family, social and cultural life

It will be a family- centered community, whereby all children will live with their parents as we normally do in Suriname. The community will be encouraged to hold several festival to enhance the cohesion between all members. Common dining area in the city will be available to have at least once a week a team building. Entertainment has become home- and family-

centered as the internet and satellite services are developing fast. Every member/ family will have the freedom to keep or choose their own culture and faith.

Governing system

There will be a democratic approach in the city, with internal elections every 5 years. The kibbutz members will be allowed to participate in the elections. This is also supported by the pseudo members, based on the obtained results.

Independent specialists

Again, there will be working groups regarding the environmental policies, regular maintenance, expansion, upgrading, civil and urban planning for the city and they must stay up to date in their field.

c) SDG 4: Quality Education

SDG 4 talks about ensuring quality education and promotes lifelong learning opportunities for all. Education is one of the pillars of sustainable development.

Educational system

In order for this city to keep developing in a sustainable way, it needs a lot of investment in its educational systems and generate opportunities in this manner. The plan has a character of own (accredited) education on professions that will be needed for the city to run. There will be profession oriented subjects for students until high school, whereby the conjunction with an university shall happen smoothly. There will be schools from crèche up to high school, initially. In future, these cities could have their own faculties regarding lab research, agriculture techniques, agribusiness, food policy, business management, agro- tourism, agroforestry, animal husbandry, etc. All students/ members will be free to take up any course they want in the city or outside and the city will fund all (at least bigger part of) the costs regarding education. Of course, there will be clear agreements between the city and its policy regarding the education of a member.

Education board

There will be a team to ensure not only the quality education for students, but also to keep all the members updated regarding latest technologies, innovations and ideas for expertise and personal & communal development purposes. The board will also hold the responsibilities regarding new 'immigrants', who will be tested according to their curriculum in order to become a member and the type of job they deserve.

d) SDG 17: Partnership For The Goals

SDG 17 promotes strengthening the means of implementations and revitalize global partnership in order to achieve sustainable development. In the context of this agricultural system, it is very important to include all the important and significant stakeholders for active participation regarding trade, finance, technologies and capacity building. The stakeholders vary from the individual member of the kibbutz to international markets and NGO's. The most important factors are stated below.

Finance & Trade

Initial investments will be from the government, so this entity will have a big participation at the beginning stage in order to stabilize the settlements. There will be clear and fair agreements between the income of the settlement and the incentives or share for the government. The government will also have an important role in export increase of the settlements. It has to improve its international relationships and enter multilateral agreements on the international markets.

All the settlements have to work together on national level and create a healthy competition between them in order to have better efficiency, better quality products and the best techniques possible. It is very important for the settlements to have internal cooperation on several levels. For example, profits could be given from a settlement to another one and techniques could be shared in return. There must be an association which will function as the cohesion between the different settlements.

Technology & Capacity building

As stated above, the settlements need cooperation to have better techniques and efficiency. Most important in this matter is the active participation of each settlement and every member of the settlement. The members should have healthy competition within the community and help each other to get the best for their productions. The university will have a big role in developing techniques and keeping these settlements updated. Different NGO's could be attracted to share their international experiences and technologies. Good internet will be essential for the fast developing techniques and for communication on several levels. The focus will be put on the members' ability to cope with these updates and the rate of the development should also be monitored.

e) SDG 9: Industry, Innovation & Infrastructure

SDG 9 talks about promoting inclusive and sustainable industrialization, fostering innovation and building resilient infrastructure. SDG 8 and SDG 11 have a strong correlation with SDG 9, as they all are about the economic growth and development of the city.

Infrastructure

As there will be a whole new city to be built, infrastructure towards and in the city are important aspects and must be well-planned. Infrastructure not only includes roads, but also waterways for shipping the products to the main harbor for distribution and export purposes. Docks for smaller ships or boats should be in place to reach the settlement. It includes paved roads that can accommodate container trucks for collection and distribution of products to other parts of the country and export.

Industry

Initially there will be very less to no operating industries in the city as it has to focus on agriculture first, in order to stabilize and produce on a certain scale and quality. Processing units for simple and fast growing vegetables, dairy products and chicken farms may be established initially. The goal is to start with industries in maximum of a 2 years' time after the establishment of the city. In these 2 years foundation should be laid for the industrial revolution especially for the crop cultivation and potential aquaculture, as aquaculture is arguably the fastest growing food-producing sector. Optimal production and quality of agriculture should be such that there is enough to start in producing the end-products on the highest level. In the meantime, people will be trained to work in these factories and all related researches will take place. There should be a beforehand extensive plan for the industry department, just as for the agriculture department (see SDG 12).

Innovation

A settlement will have at least one laboratory that will work towards innovation regarding agricultural products from the very start. Efficiency and quality will be important, while research for diversity of agricultural products in the city itself will be an ongoing process. The lab will also have a division of food technology for the production and testing of end products for local and international markets. There will be constant researches in order to become better. There must be a cooperation between the labs and the university in order to have the latest instrument upgrades and trainings for the personnel. The laboratory is very important for innovation in the city regarding agriculture and industrial revolution.

There will be an extensive, long term planning for green energy in the city. Developing green energy for a community and using bio gas for several activities will be the highlights. The goal is to become the driver of green energy and its applications across the whole country. These techniques can be sold off to different organizations and communities.

Furthermore, research on innovative agricultural activities and techniques, such as biological fertilizers and pesticide will happen in order to be able to sell and/ or teach them to other organizations and regions.

f) SDG13: Climate Action

SDG 13 urges to take immediate action to combat climate change and its impacts. Fortunately, Suriname is blessed in context of natural calamities and is also a high forest low deforestation country. It is a global responsibility to combat the damage to our ozone layer and the effects of climate change. Suriname is no exception for the negative effects and has to integrate climate action in all its current and future plans. In context, agriculture in these settlements should be done in a way that the production does not get threatened while implementing actions against adverse impacts of climate change. The city has a character of modernization, meaning green (solar & hydro) energy, low emissions (efficient machines only), agroforestry and bio gas will be put in place. Other actions must be included in an extensive (crisis) management plan for the settlement regarding climate change impacts. For example, promoting the use of only bicycles within the settlement itself. The crisis management plan will be based on the location of each settlement after extensive ESIA studies are conducted.

g) SDG 16: Peace, Justice and Strong Institutions

Goal 16 promotes peaceful societies, provision of or access to justice and building accountable institutions on several levels. The Kibbutz has a character of unity peace, meaning all the members will undergo a strong screening before they are selected to live and work in the community. Clear conditions and agreements will be made for each member before they are enrolled in the settlement. At last, it should be all about a civilized city.

Peace & Justice

The same national rules and regulations will be applicable regarding (all forms of) crime in these settlements. There will be a police station in each settlement with full authority and control, together with all objects and matters regarding the eradication of criminality in all its forms. If a member commits any form of criminal act, their membership will be cancelled and

will be banned from the settlement (and all other). It is not about the act of crime, but the thinking and honesty of each members that matter the most in these settlements. Trust in the city and between the members is very important and needs to be in place all the time.

Strong Institutions

There will be an independent legal team in the city regarding all legal activities, be it drawing up contracts for the city deals, contract signings, criminality or trainings for the members regarding legal activities among other things.

h) SDG 12: Responsible Consumption & Production

SDG 12 is about ensuring sustainable consumption and production patterns.

The first action to reach the goal is to know your markets, local and international. The goal is to keep food loss as low as possible. There should be audits to know how big the demand is. The government will play a big role hereby, because the international market demand largely depends on the policy of the government. The collaboration with other countries and the negotiations are the stepping stones for the market sizes. Based on the audits regarding the demands (local and international), each city should set up its own action plan to reach their own production demand. This is also the process to define the size of the agricultural lands that are needed, meaning that only the required amount of land should be used. The maximum preservation of natural forest (or reforestation) should be integrated in the lands, of course in balance with the required amount of production. This process is the initial step in the planning process. One of the solutions could be coming up with 3- 6- 9 and/ or 12 months plans regarding types of crop cultivation, with the extremes regarding the output analyses obtained from the audits.

i) SDG 15: Life on Land

This goal is about promoting the terrestrial ecosystem, manage forests, combat desertification and land degradation. These aspects form the basis of a healthy life and of a community, indicating that agroforestry will be compulsory and conform contracts. There will be rules & regulations regarding agroforestry, whereby every parcel will have a minimum area covered by trees. The aim is to have an uniform design so that the machineries can do the work without any obstacles. This will hold the diversity in balance and land degradation will have no chance, while the production will be even better. Agroforestry is the new way of agriculture, taking into account the climate change factor and its effect on production. This will also have a

positive effect on agro- tourism. The environmental policies, e.g. waste management will also be set in place and the city will have to follow these regulations. The goal is to coexist with the present environment as much as possible. Animal husbandry is a great combination with horticulture in these cities as they are strongly dependent each other. There must be land reserved for cattle breeding with enough natural space, so this section promotes indirectly a balance between natural areas and modified areas.

j) SDG 6: Clean Water & Sanitazion

SDG 6 is about ensuring availability and sustainable management of water and sanitazion for all. Although Suriname is a country with enough freshwater sources, it has to use freshwater sparingly for the future. There are no extensive or proper water management units or water treatment plants. Thankfully, these cities have a character of sustainability and innovation. This opens the door to a lot of innovative ideas regarding the water management in the city.

Freshwater- & Wastewater treatment plant

If assumed that there are sources available for only freshwater, then the city could set up a treatment plant for freshwater for drinking and cooking purposes. The available wastewater can be recycled and no water would go waste. According to the usage of the waste water, a wastewater treatment plant could be set up for the treatment. The waste water can be treated again and reused for sanitazion (water closet, etc.) and for the irrigation. An extensive plan, based on available water quality for (waste) water management and its plant with technical aspects needs to be in place.

Surface water- & wastewater treatment plant

If assumed that there is only surface water from the rivers and no freshwater sources in or around the city, then there is a need for an extra section in freshwater treatment plants. Because it has to undergo extra process in order to be drinkable. The goal will be then to reuse surface water as much as possible for drinking and cooking purposes and treating the wastewater for sanitization and irrigation purposes.

Of course, rain water will be collected for domestic and irrigation purposes, but the amount and repetition are unreliable. Additional advantage will be rest material that can be used as biological fertilizer, originating from waste ‘cakes’. Furthermore, it is a small scale plant thus can be managed very easily by the specialists of the city itself.

k) SDG 7: Affordable & Clean Energy

SDG 7 promotes affordable, sustainable, reliable and modern energy for all. In context of this agricultural city, energy is needed for housing, communal services, machinery needed for irrigation (pumps, etc.) and the processing units. There will be an exceptional area reserved for a PV- solar panel field in order to generate green energy using our sun. Available water surfaces will be used as solar fields by covering the biggest water areas with the panels. The panels will be attached on a floating device made of PET bottles or other floating materials. These floating solar field will have locking systems and will be locked at the shores of the canals, ponds and rivers. There will be batteries to store the generated energy in order to be used in the night time. Members will be triggered to do most of the energy consuming activities in daytime just to be assured of no power failure in nighttime. There will be 2 benefits from this system;

1. There will be less land needed for the panels so the land could be used for agriculture
2. The coverage with PV- solar panels will prevent evaporation of surface water, which means the loss of water due to evaporation will be minimized.

Every system needs maintenance, thus the system will be checked and maintenance will be needed regularly.

Domestic activities will be done using biological cooking gas, derived from the water treatment 'cakes' and rest materials from agriculture using innovative techniques. However, the members will be encouraged to purchase and use electric devices mostly.

l) SDG 1: No Poverty & SDG 2: Zero Hunger

These 2 goals talks about ending poverty in all its forms and achieve food security by promoting sustainable agriculture. The 'kibbutz' already is about sustainable agriculture, thus the SDG 2 is achieved automatically. The wage and salary system is already described in the SDG 8, however there will be a social safety net in case members have difficulties to work (e.g. old age, injuries, accidents, etc.). This group will be taken care by using this system in order to meet the basic needs and have the 'no poverty' and 'zero hunger' policy in the settlement.

m) SDG 14: Life Below Water

SDG 14 talks about conservation and sustainable use of marine ecosystems. The settlements will of course have a network of waterways for irrigation and there needs to be water available for it of a certain quality. There are opportunities for a combination of crop cultivation and aquaculture in these systems. Exotic fish and shrimp species can be bred which could have decent prices on the market. The water quality has to be such that healthy and qualitative aquaculture is possible. There will be policies for waste disposal and waste management in order to have zero pollution and to protect marine life and keep the aquaculture healthy. All liquid waste will go through treatments before it is discharged in the waterbodies. Water quality will be measured regularly in order to maintain the marine ecosystem.

n) SDG 3: Good Health & Well-Being

SDG 3 is about ensuring healthy lives and promoting wellbeing for all ages. This aspect is already stated in the description of SDG 11, whereby all members will get the top medication services and will be encouraged regularly for healthy lifestyle. The city will have their own healthcare department and the quality will be, at least the same as the national healthcare.

o) SDG 10: Reduced Inequalities

Equality has been strongly incorporated in the old kibbutz systems. In the modern kibbutz, there is a decreasing trend regarding equality. The aim is to minimize and even eradicate inequality in terms of communal services, such as food, health care and education. However, there will be inequalities in terms of the wages as stated in SDG 8. There will be little to no control on the wages inequality and other sources of income such as rent from apartments outside or money inherited. But the differences in the city itself will be only based on the salary and it is determined by the education and work of the member, as it is a fair option for every member. The economic status of a member has nothing to do with his influence on the city policies.

p) SDG 5: Gender Equality

SDG 5 promotes gender equality and women and girl empowerment. In the kibbutz system, equality has always been a core part. All members have the free choice to work in every sector and on every post, regardless of their gender. There will never be a choice made for a specific job, based on the gender or sexual preferences of a member. Be it in the commercial service,

agriculture, business or processing. The choice is up to the member him/ herself which kind of work he/ she wants to pursue.

B. Potential Locations

Sea Level Rise

The sea level rise has been going on for a long time now. Researches have suggested that sea level rise was always present on earth. The best proofs are the submerged cities and temples in India, which date back to as far as 800 AD. The observed sea level data are relatively very young, dating back to the 1800's only.

The sea level rise can be traced back to 200 BC. There has been a reconstruction of the sea level rise of the last 2 millennia and divided in four phases (Kemp, et al., 2011):

1. Stable sea level: from 200 BC until 1000 AD
2. A rise by about 6 cm per century: 1000 AD up to 1400 AD
3. Another stable period: 1400 AD up to the late 19th century
4. A rapid rise by about 20 cm since

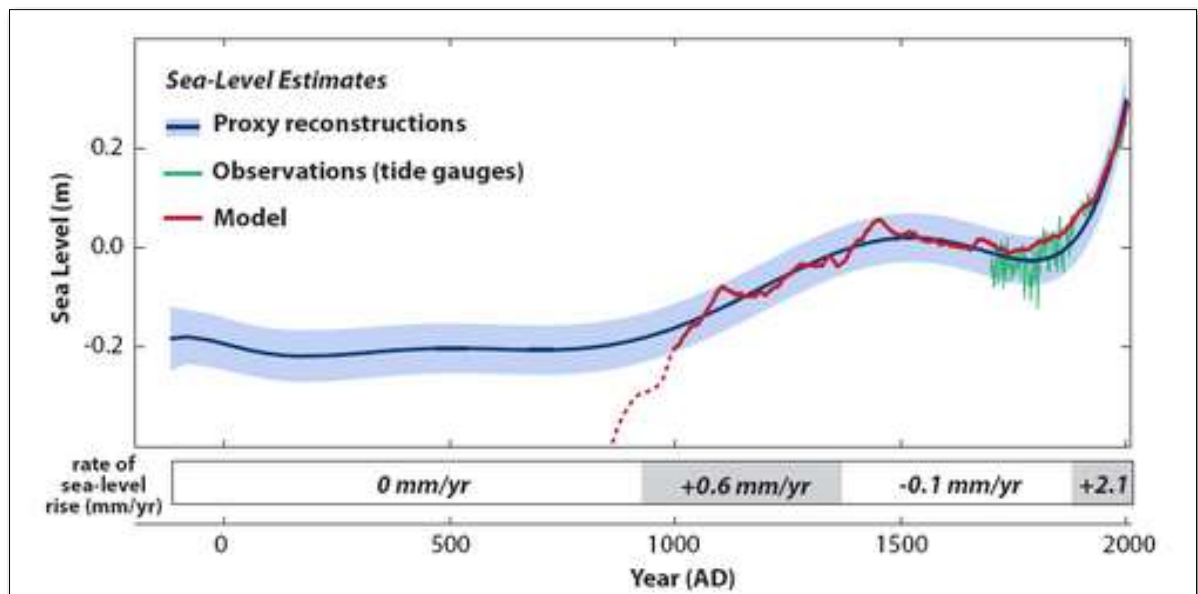


Figure 12 Sea Level Reconstructions and Estimates for the last 2 millennia (Kemp, et al., 2011)

The sea level rise will oscillate at a world average between 0.3 m (low emissions GHG) and 2.5 m (high emissions GHG) for the coming century (Lindsey, 2020). The problem with this prediction is that we, as a country do not know how much the SLR will affect us. It could be 0 mm, but it could be 2 m also. It is very vague to predict the sea level rise for Suriname. But even at the lowest SLR, we will have huge impacts as the population is concentrated in the coastal area. The premise of this study is that there will be an SLR of at least 1 m for the next

50 years and a maximum 2 m when we reach year 2100. Taking into account these numbers, we can see the effects on Suriname in the next 2 figures, respectively 1 m and 2 m SLR (Floodmap.net, 2020).



Figure 13 Effects of SLR of 1m for Suriname (Floodmap.net, 2020)

We can derive from figure 13 that the 1 meter SLR will give us a new coastline, as some districts will lose a lot of area (Nickerie, Saramacca, Paramaribo, Commewijne and Marowijne). The new coastline will be around the line of Wageningen, Groningen and Meerzorg. We should also take into account the salinization of the lands.



Figure 14 Effects of SLR of 2m for Suriname (Floodmap.net, 2020)

Figure 14 shows that the new coastline as a result of 2 meter SLR will be at the level of Lelydorp. This is the most unfavorable situation for Suriname for at least the next century. The occurrence of it is indistinct. There is also the factor of accessibility. The further you go land inward, the bigger the investment, thus the project becomes less attractive.

So, the base of the location choice will be the new coastline as a result of 1 meter sea level rise. All the projections will be behind the line of Wageningen. In figure 8, the red line represents the new coastline.



Figure 15 New Coastline Suriname as a result of 1 meter SLR (Google Earth)

Rivers, accessibility and land fertility

All these factors have been described beforehand. The choice regarding the land fertility will be such that diversity will be present regarding the production. The feeding of the rivers will play a pivotal role in the placement as there is no agriculture without freshwater irrigation. The accessibility factor implies the existing infrastructural network and there should be a minimal investment of reaching the settlement.

A multiple criteria analysis (MCA) has been done regarding the placement of the settlement. The criteria are fresh water feeding, available or existing accessibility and usable land fertility. For the options, there has been a division of Suriname in 3 different regions from north to south, parallel to the coastline. The division has been done to ease the choice of location as Suriname is a vast country and is based on the geological diversity. As stated before, there are a lot more locations for the placement and this method only shows the process and important factors when selecting an area. The 3 different regions are shown in the figure below.

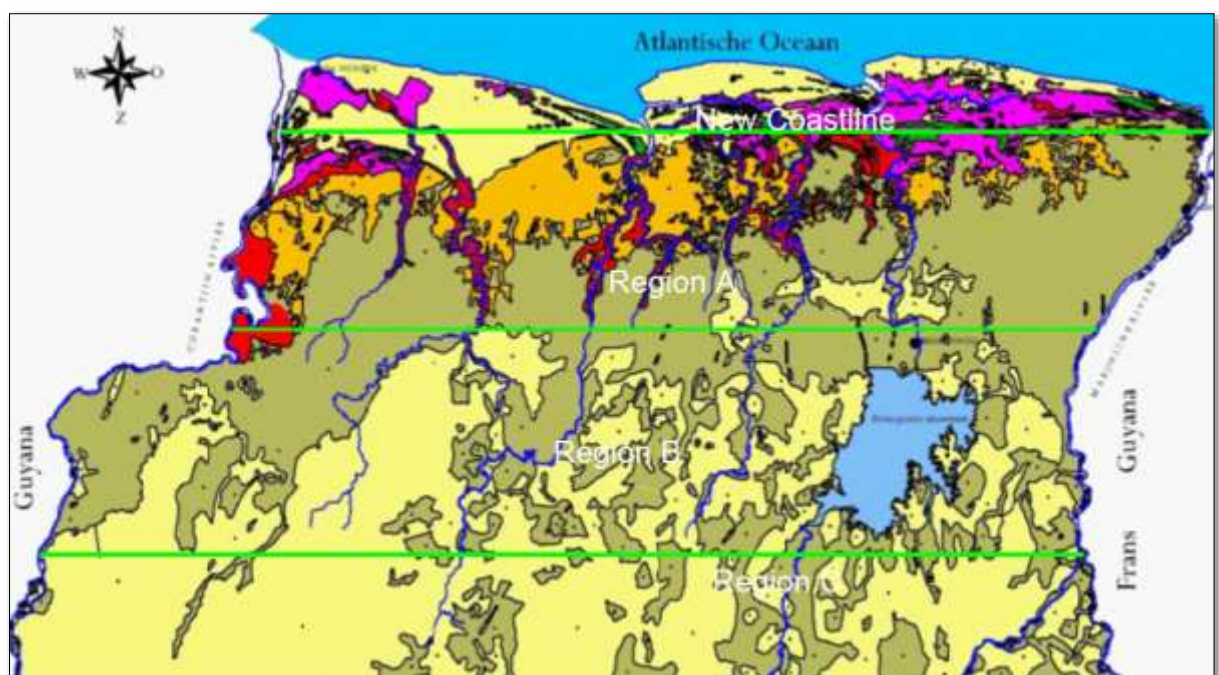


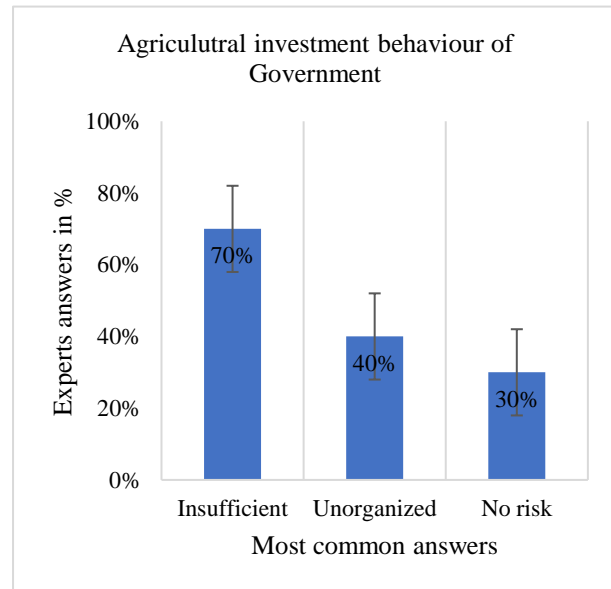
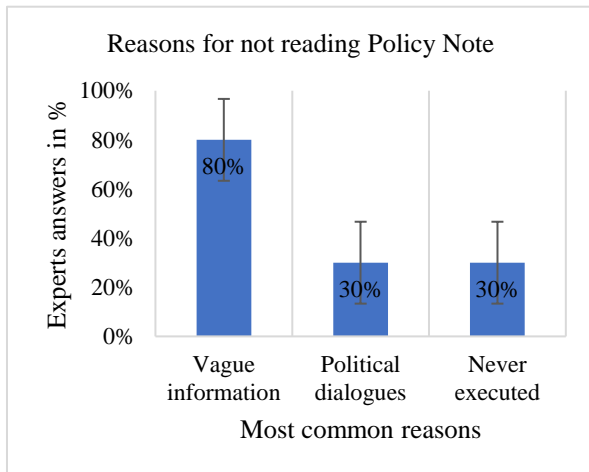
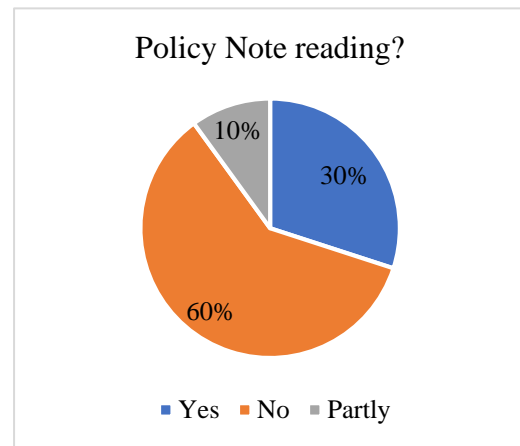
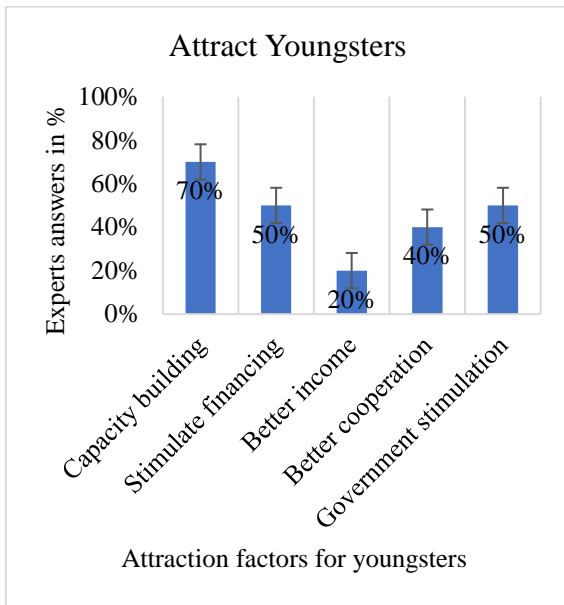
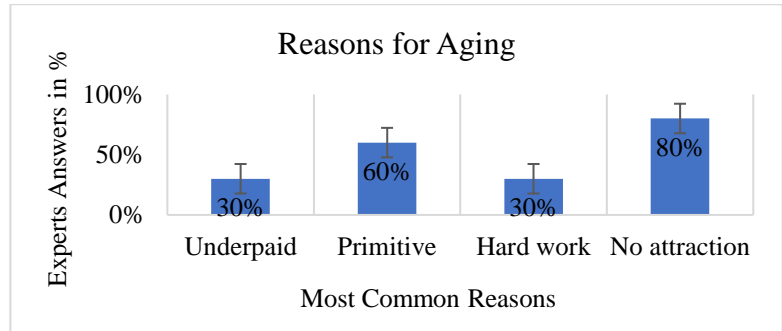
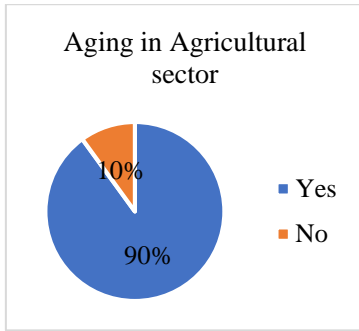
Figure 16 Virtual partition of Suriname by regions A, B & C (Government of Suriname, 2017)

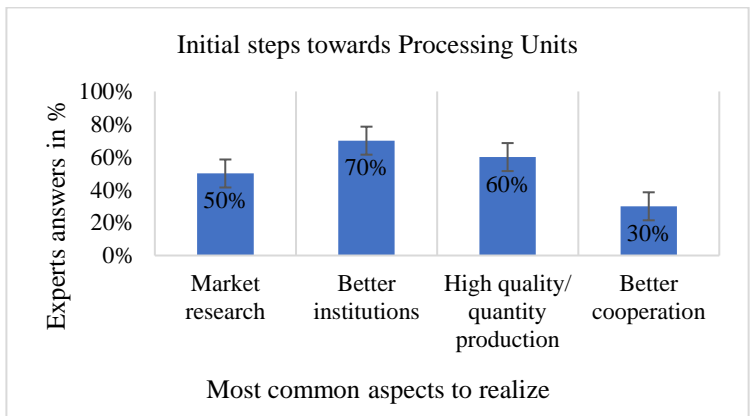
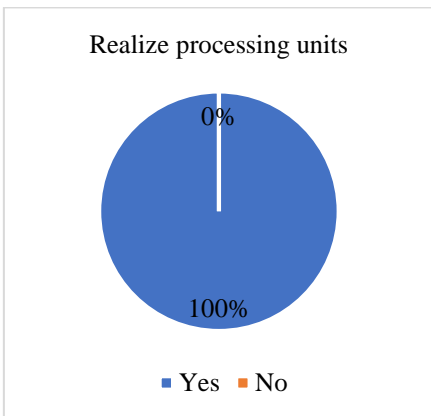
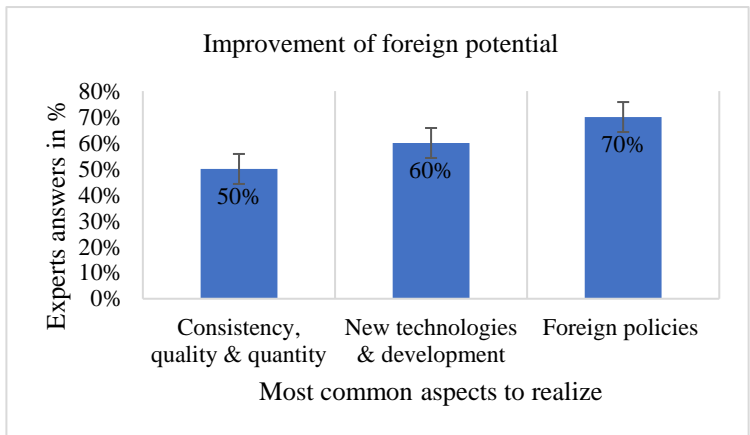
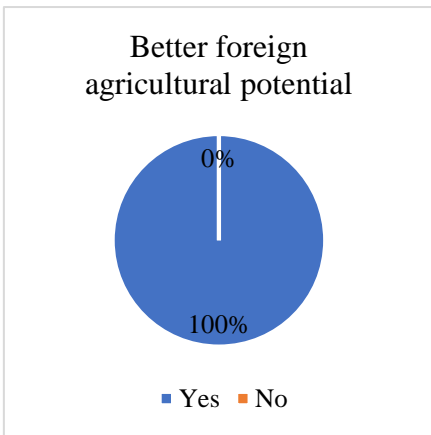
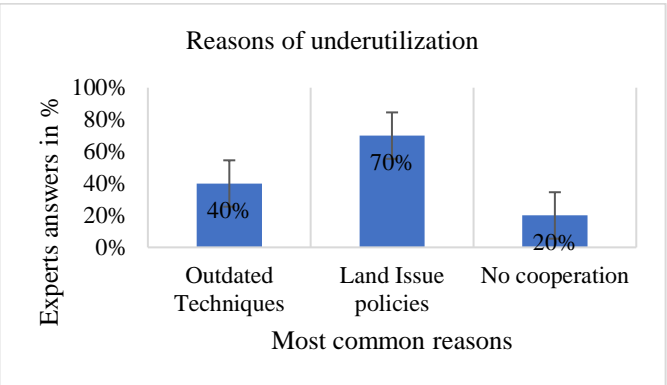
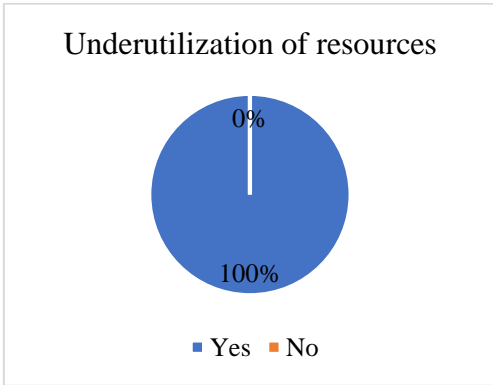
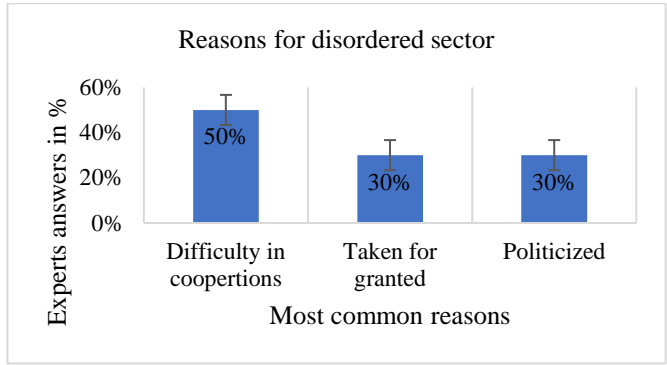
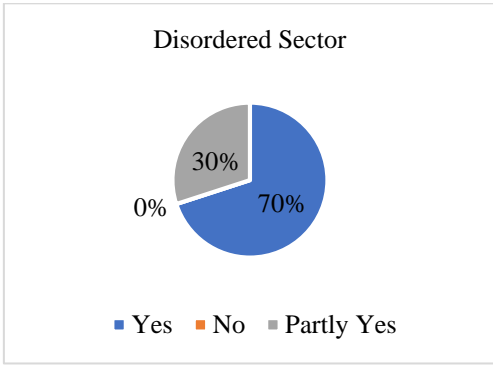
Table 13 Multiple Criteria Analysis of Kibbutz location in Suriname (0=1, +=5, +=3, +=2, -=3, -=5)

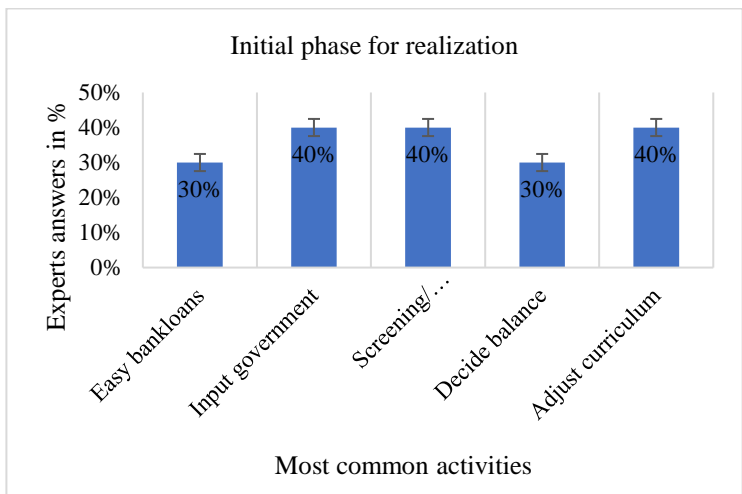
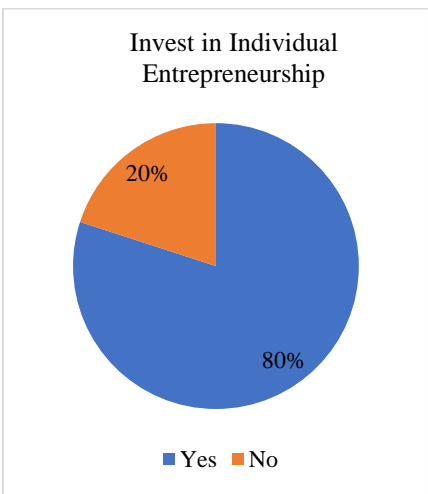
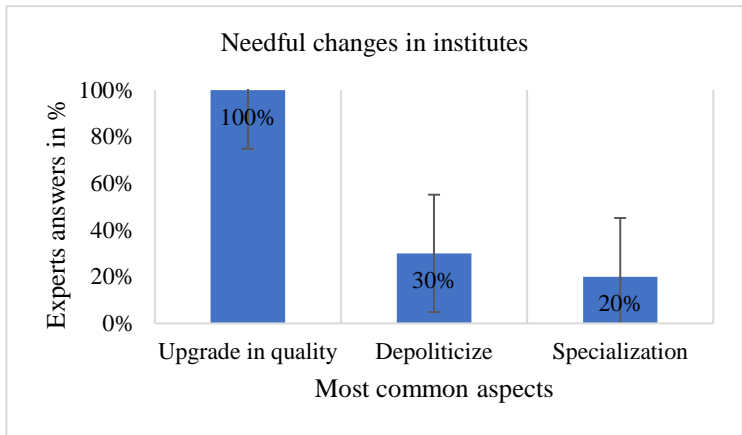
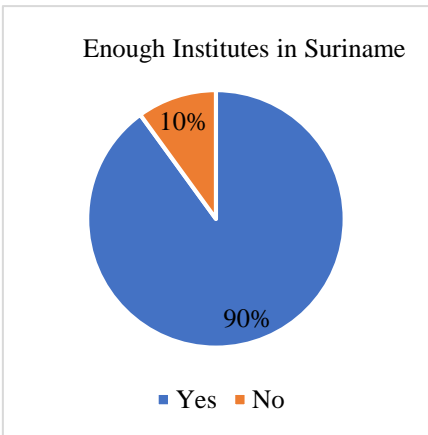
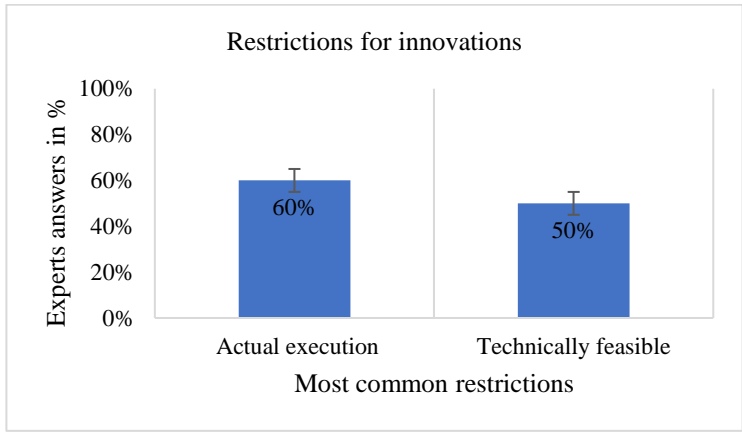
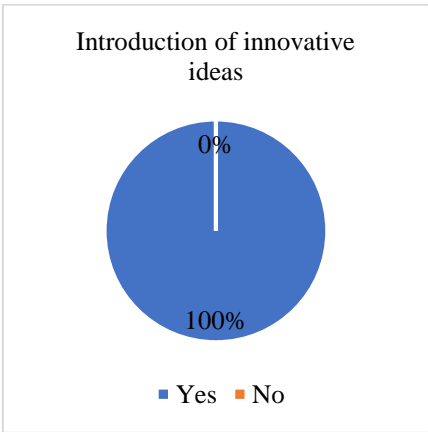
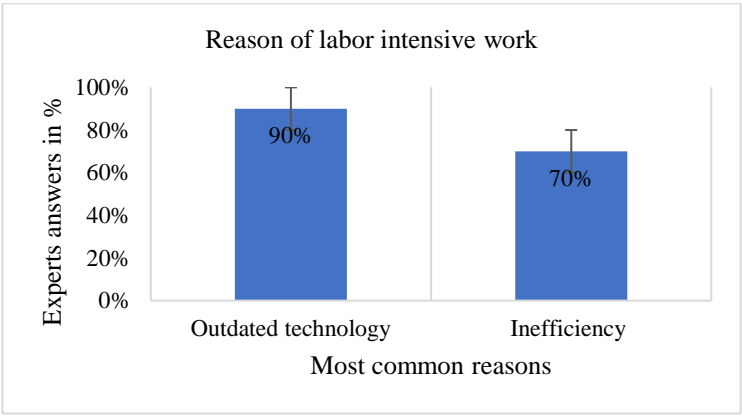
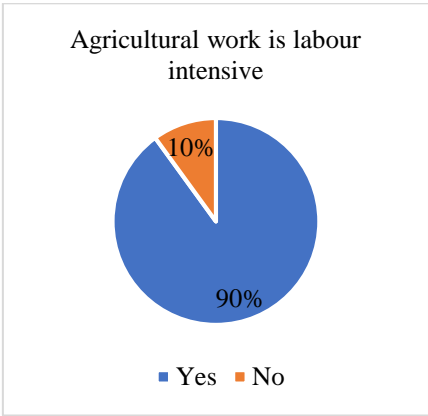
Criteria / Options	Region A	Region B	Region C
<i>Obtainable Fresh Water</i>	++	+	+
<i>Usable Land Fertility</i>	++	+	0
<i>Existing Accessibility</i>	+	0	--
Total Score	13	7	-1

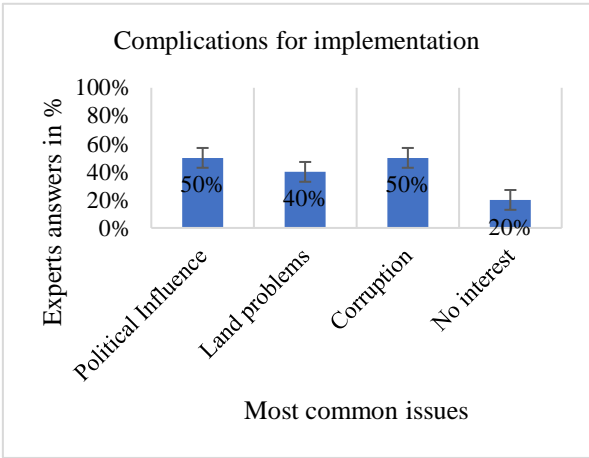
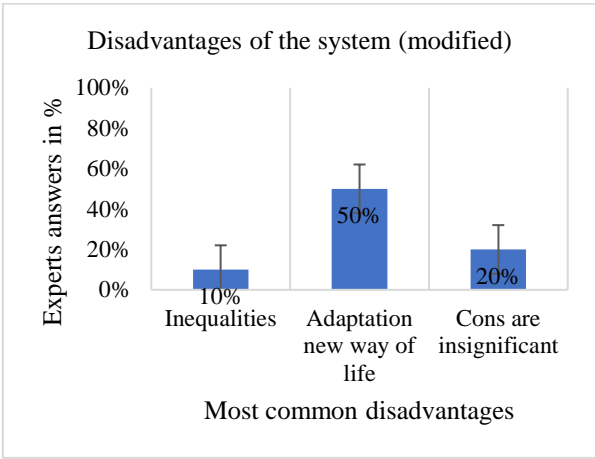
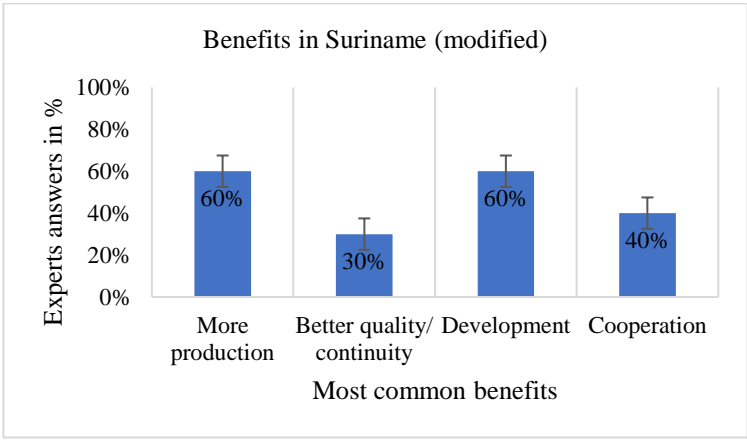
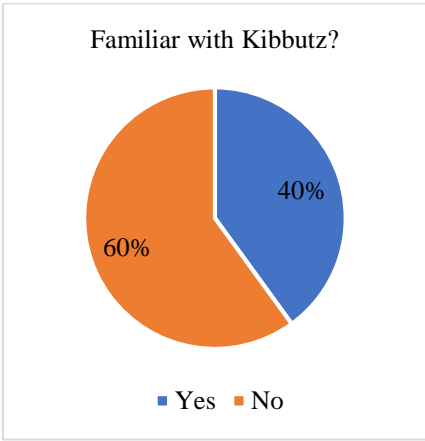
Region A score is the highest, therefore the plan should be executed in this region. This area has accessible fresh water for irrigation, usable & diverse land fertility and existing networks to reach the areas. It is important to state that there are uncountable number of areas in this region to carry out the plan. In the following chapter, a random choice will be made for the execution of the plan.

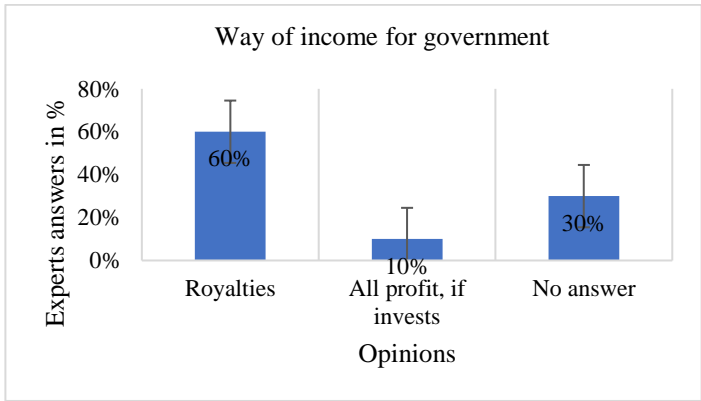
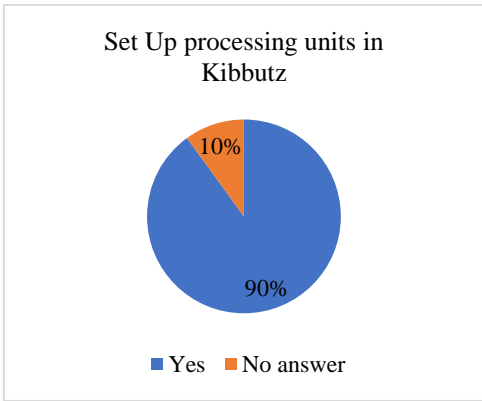
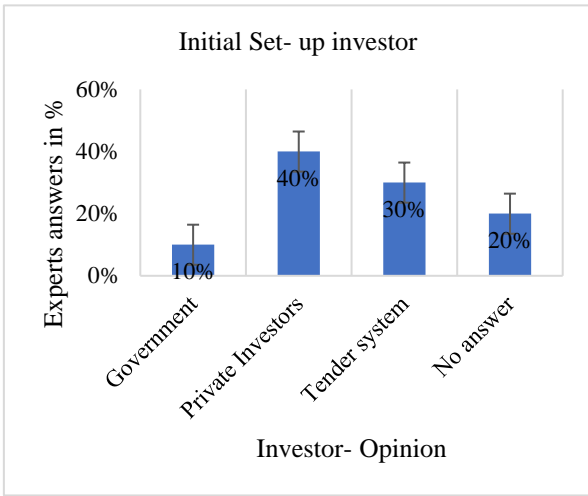
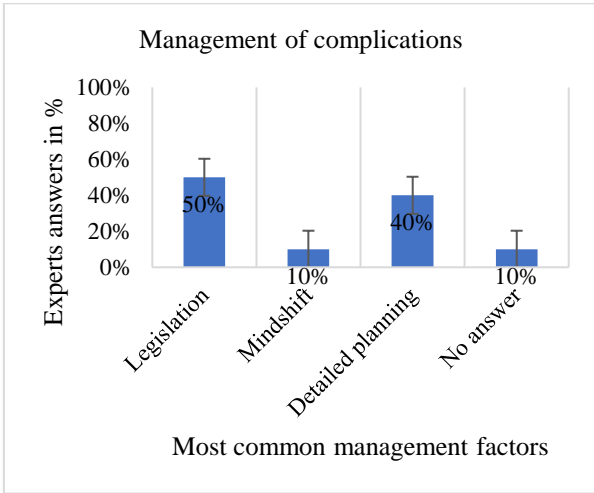
Appendix 2: Detailed research results of agricultural experts



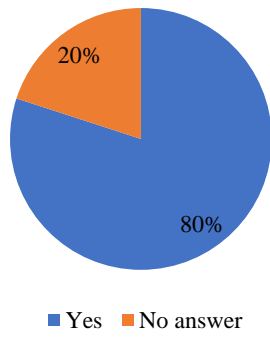




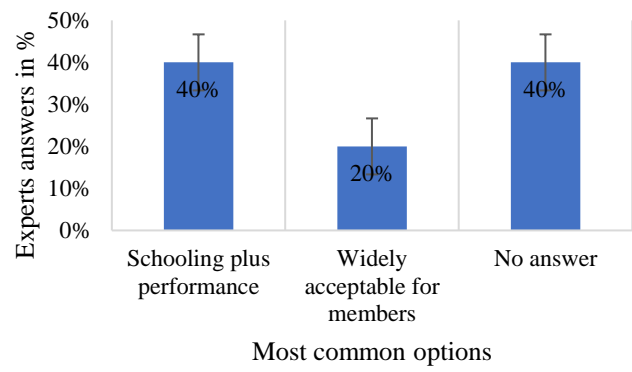




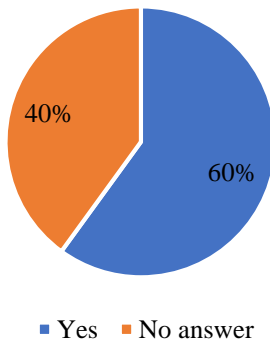
SDG template as guideline to set up Kibbutz



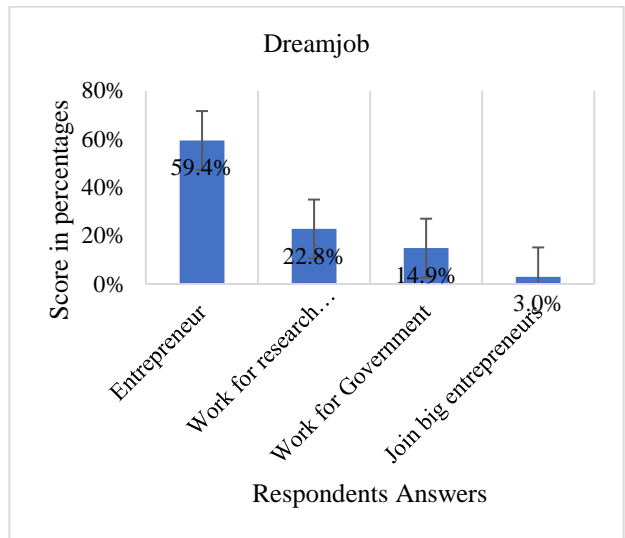
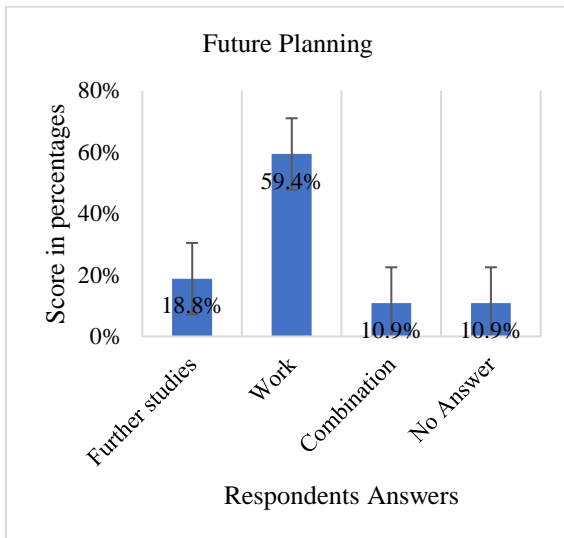
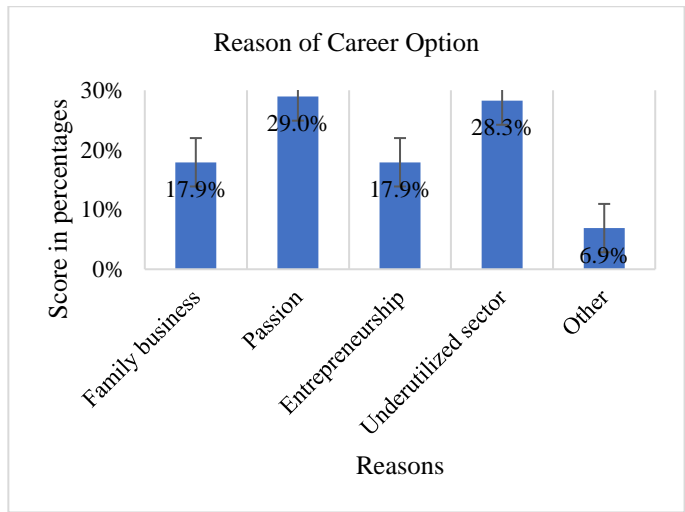
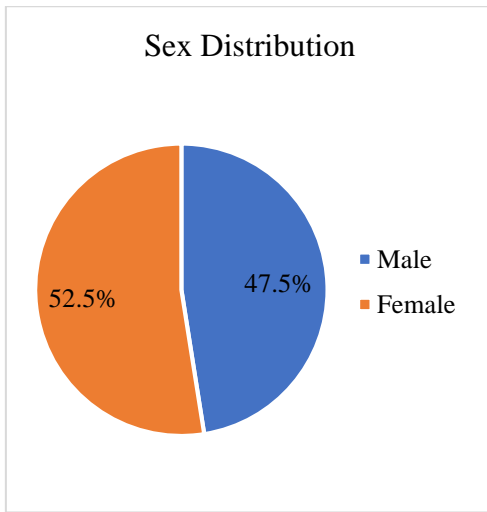
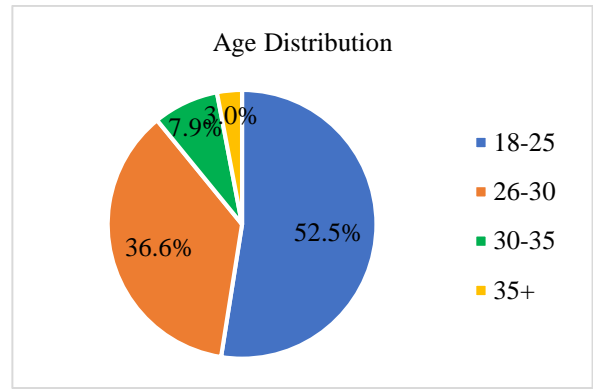
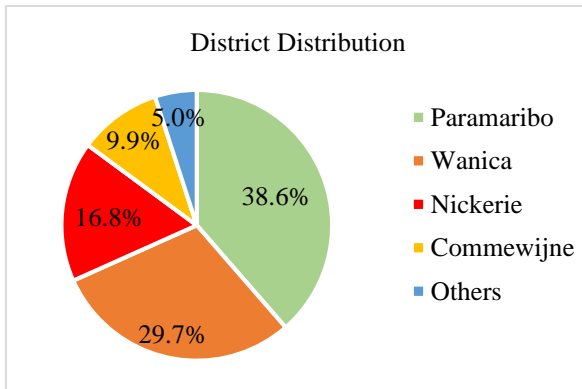
Basis of salary for Kibbutz members

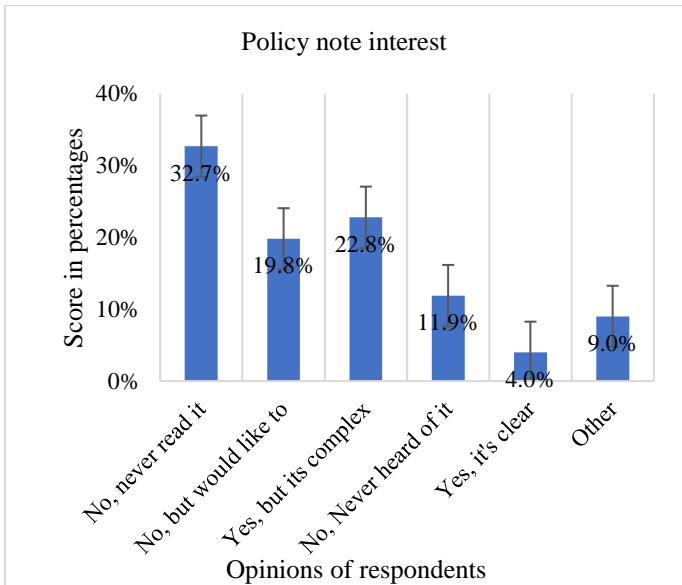
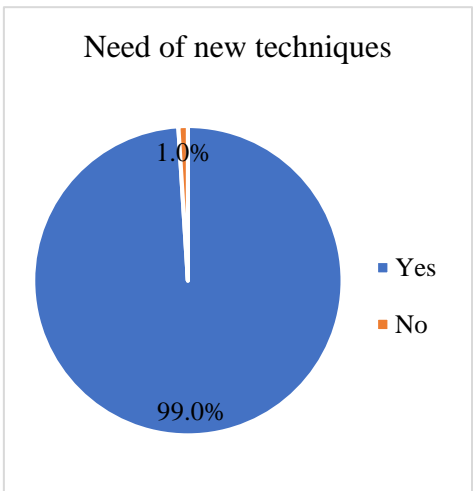
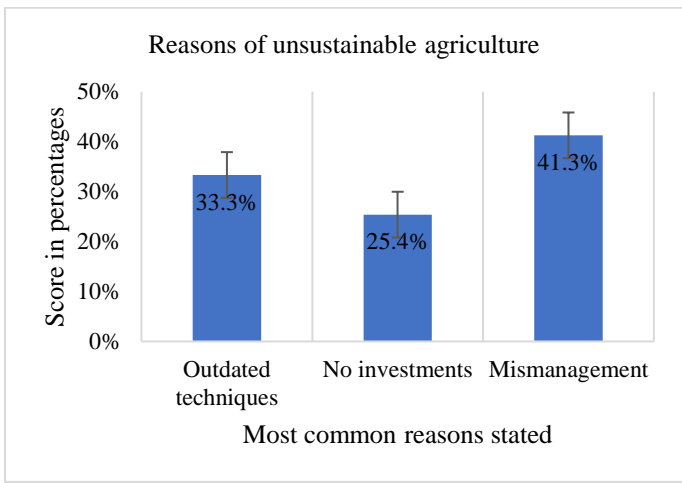
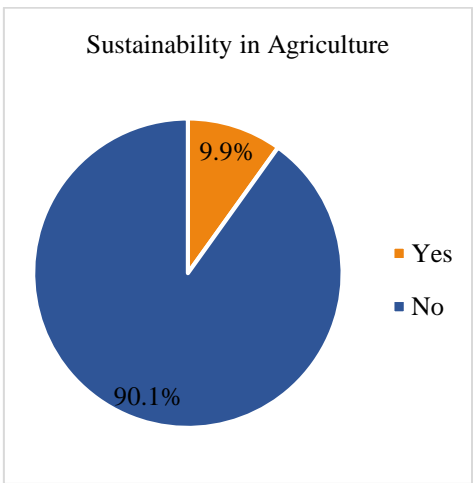
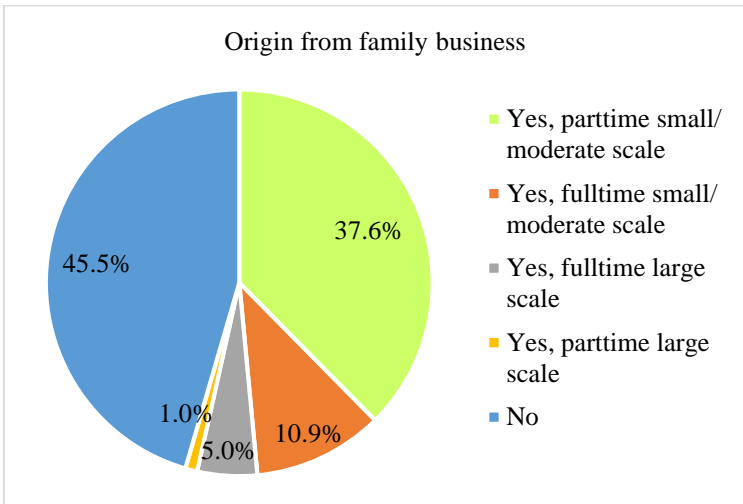


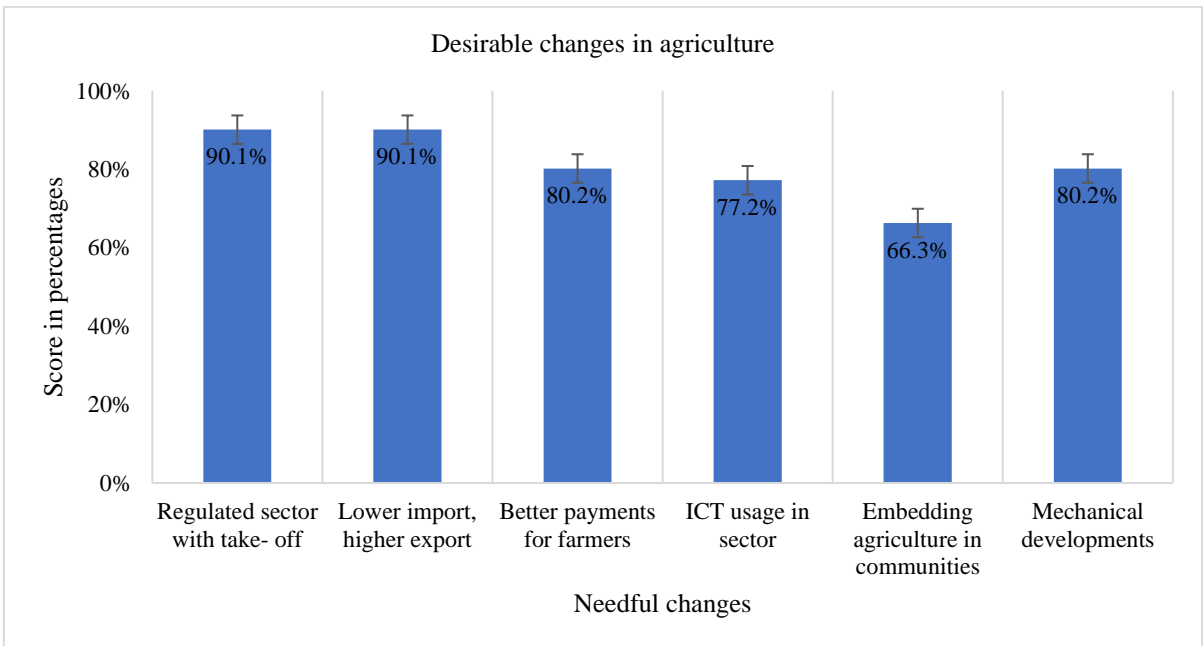
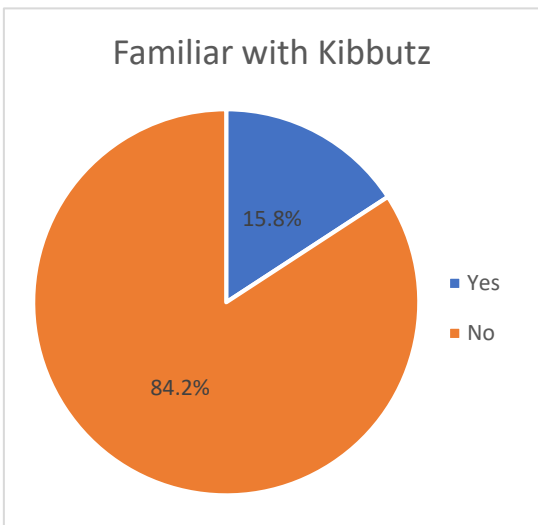
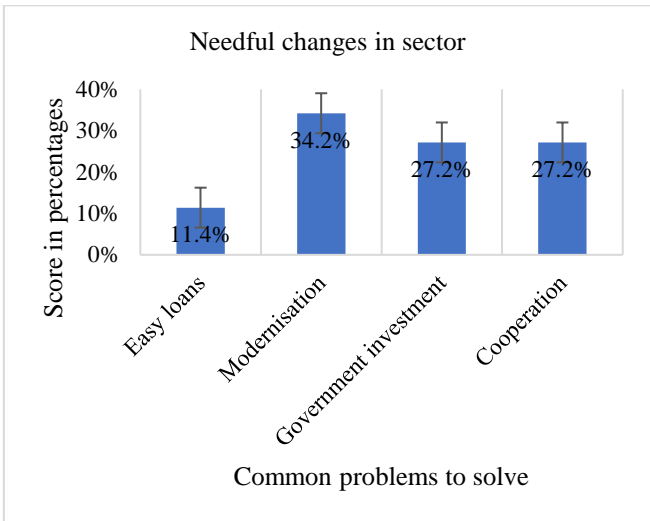
Long term investments in other sectors

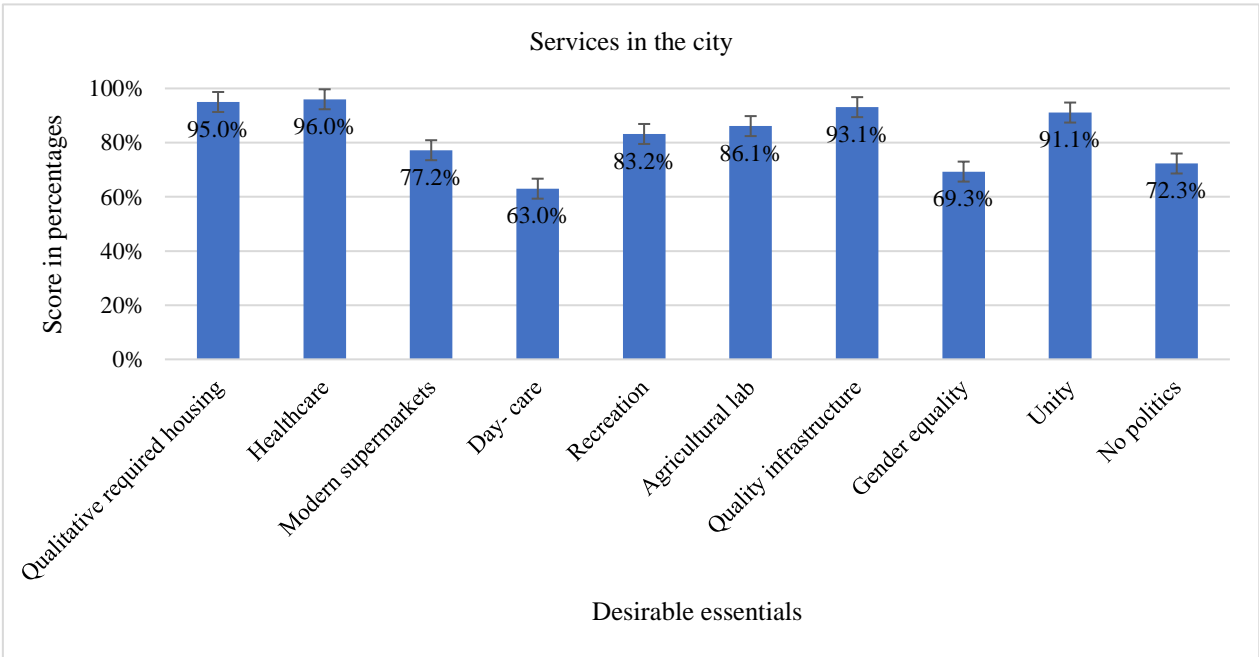
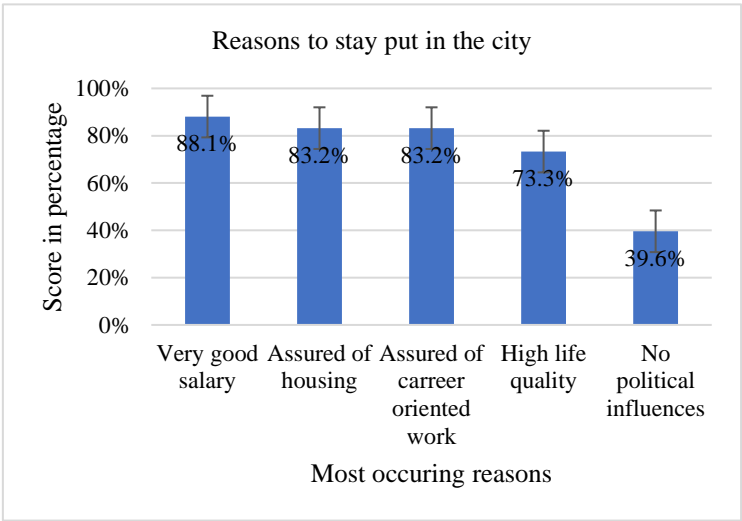
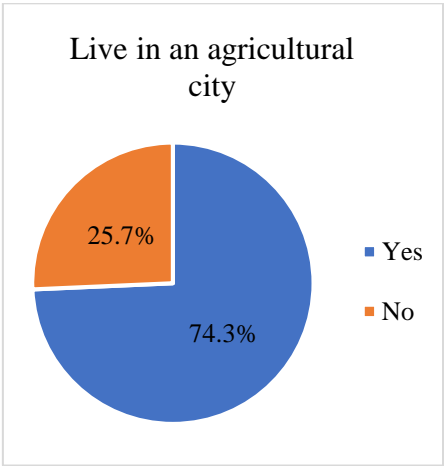


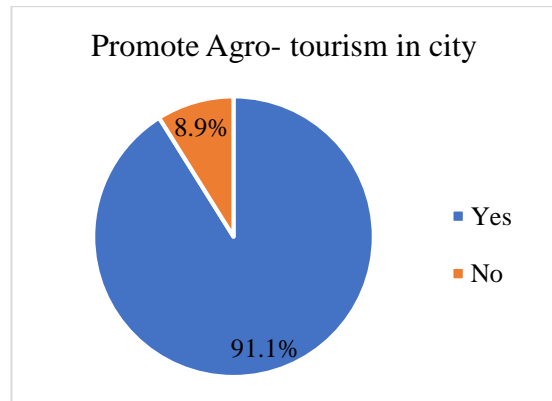
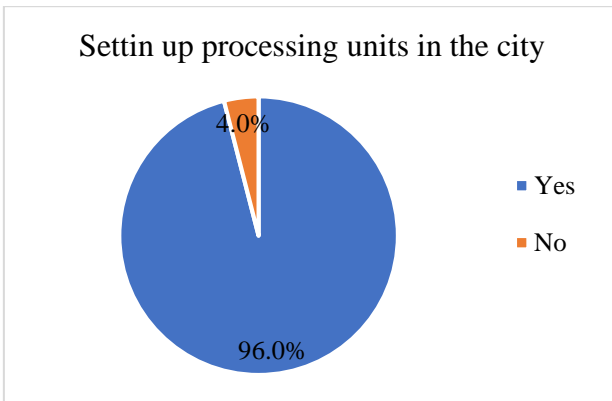
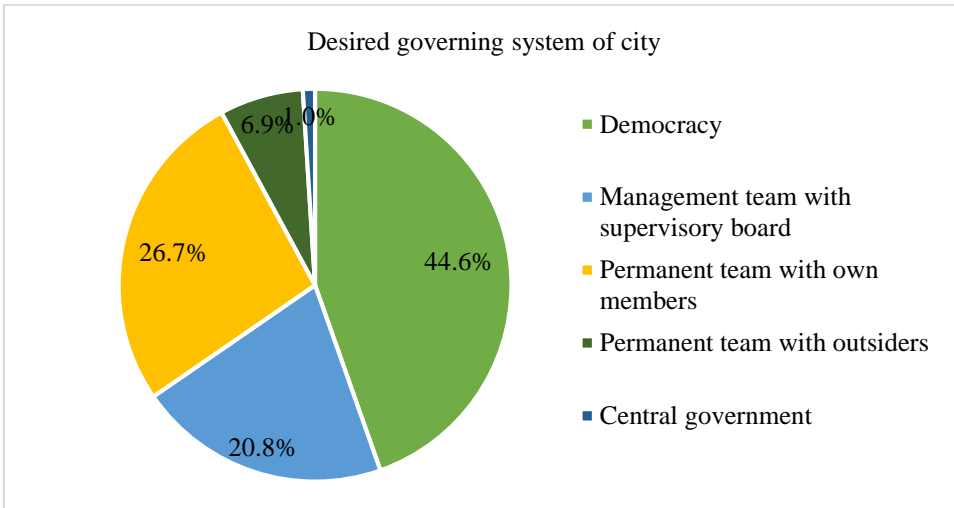
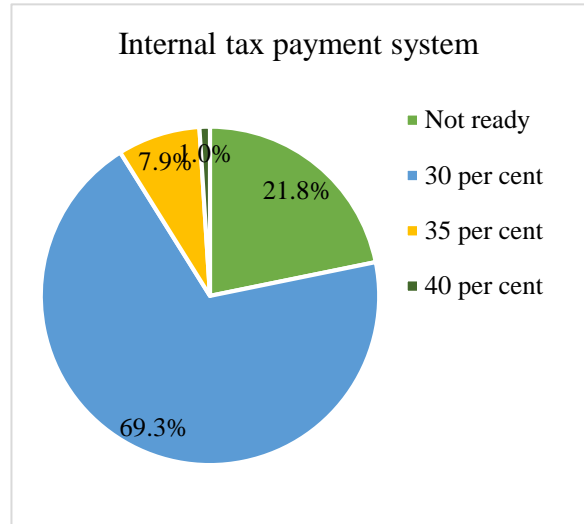
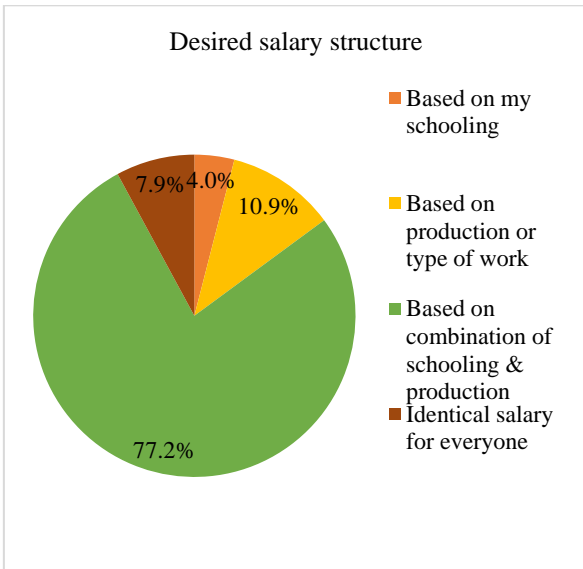
Appendix 3: Detailed research results of agricultural students



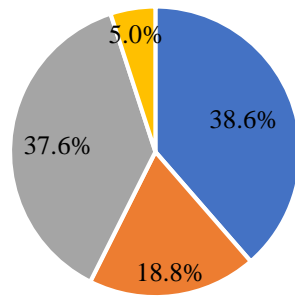






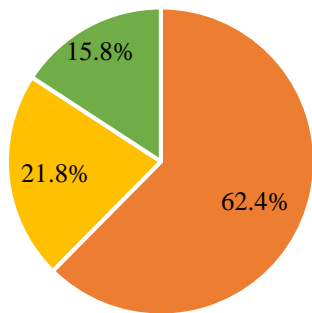


Members' working outside city



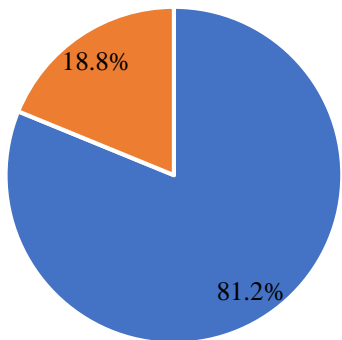
- Yes, should pay equal tax
- Yes, should pay more taxes than normal
- No, all members should be dedicated to the city
- Other

Factors that could hold back from participation



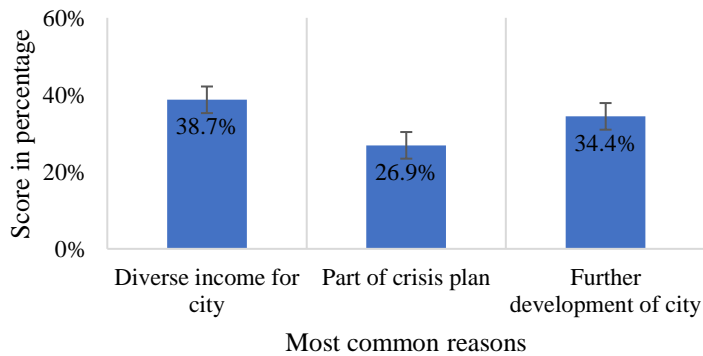
- New concept in Suriname; doubts
- Already planned my future
- Other

Kibbutz investments in alternative sectors



- Yes
- No

Reasons of investment in other sectors



Appendix 4: Questionnaires

Experts' Questionnaire

AGING

1. What do you think about Suriname's policy regarding our agricultural sector?
 - a. Do you think that aging of / in agricultural (ers) is taking place? If so, what do you think is the cause of this?
 - b. How do you think you can approach this, in particular how could we attract young people?

POLICY NOTE L.V.V.

2. Do you regularly review the LVV policy memorandum? Why not? Your opinion about it?
3. Do you believe that our agriculture sector is disordered and is not being addressed? Why not?
4. Do you think there is under-utilization regarding agricultural land and potential as a nation? Why do you say that?
5. What is your opinion about Suriname's investment pattern in the agricultural sector?
6. Couldn't we score better in international markets? How should we approach this?
7. What is the reason that we have few local products available (or at higher prices) and thus increase our expenditure?
8. Do you think Suriname should set up processing industries to increase exports in quality and quantity? What should be the first stage to make this happen?
9. Do you believe that we work labor-intensive in the fields, resulting in low efficiency?
10. Should new and innovative ideas be given the opportunity to renew, improve and further develop this sector against traditional policy?
11. Do you think there are sufficient institutes in Suriname to take this sector to greater heights? Shouldn't we invest in stronger institutions?
12. What is your opinion on the idea that people should be encouraged to start their own business in agriculture, instead of just working as a helper for a large farmer? Or with the latest techniques and modernization.

KIBBUTZ

13. Are you familiar with the Kibbutz System of Israel? Yes No? (if not, see links <https://en.wikipedia.org/wiki/Kibbutz>
https://www.youtube.com/watch?v=ies2R_4c58&t=40s)
14. What do you think are the benefits of this if we implement the custom in Suriname?
15. What do you think the drawbacks will be after implementation?
16. What problems do you think would arise if we proceeded to implement such a plan? (laws and regulations, land, capital, abuse?)
17. How do you think the complications can be resolved or managed?
18. Should it be a problem for the government regarding investments? Should it go to private investors?
19. How and what do you think about setting up factories in such a city to produce end products for local and international markets?
20. How do you think the state should earn from such a Kibbutz? Should the kibbutzim sell their products to the government (thus become dependent), which in turn visit the international markets? Or directly abroad and does the government only receive the taxes (and royalties or partnership) from the profits?
21. Would there be complications with a reduction or no import of products at all if we started to produce locally ourselves? Should the kibbutz for local production sell their (end) products to distributors or act as 1 themselves?
22. Is it good to use the SDGs template to plan such a city? Why?
23. What do you think about the way of salaries and income of these city members? Based on production, training, nature of the work or a combination? Best option?
24. Do you think it is a good starting point to plan such a city through the SDGs?
25. As for institutions, every city would have one that is obliged to stay up to date through interactions with eg. ADeKUS. How could we achieve this? And the additional complications?
26. What do you think about long-term investments of the kibbutz itself in other sectors?
27. Going towards self-sustaining cities; green energy, waste and surface water purification... etc. What are your insights on this?

Students' questionnaire

General

1. Why did you choose agriculture as a study?
2. After current studies, pursue working or further studies?
3. Preference of work in your career?
4. Do you have agricultural background (family)? Type of farmers?

Local agriculture

5. Is the agricultural sector sustainable in the country?
6. Does Suriname need upgrade in techniques of agriculture?
7. Do you read policy memorandum of the ministry?
8. Opinion about policy memorandum?
9. What is the biggest/ most important problem in the sector?
10. What kind of changes would you like to see in the sector?

Kibbutz

11. Are you familiar with Kibbutz system?
12. Would you like to live in an agricultural city/ village with great prospects on you agricultural career and production?
13. What services would you like to have in such a community in order to be able to live there?
14. What are the main factors for your survival and maintenance in this city?

Salary and organization

15. According to you, the best salary structure in this city would be?
16. Would you be willing to give up some (how much?) Of your salary for the city's organizational costs? The costs of all maintenance, training, investments, purchase of materials & equipment, personal loans, etc. will arise from these funds.
17. What is your opinion about the management of/ how to run the city/ town?

Industry

18. Would you encourage processing units in the city/ village?
19. Would you encourage tourism in the village?

20. Do you think that in the future such a city should also look for ancillary industry, apart from the agricultural factories? Why?
21. Would you agree that people would live in the city (get home, etc.), but would work outside of this city? What conditions would you set for such a membership?
22. Finally, what could stop you from coming to live / work in such an agricultural town?