

Republic of Senegal

Preparatory survey for BOP business on
Tomato Cultivation and Processing in
Senegal

Final report

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Photos



Market where citizens buy groceries (City of Dakar)



At the market, tomato paste is sold by measure (City of Dakar)



The market of the city of Dakar.



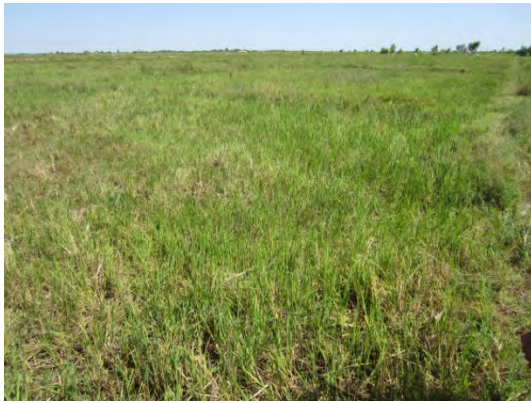
Thieboudienne - a Senegalese dish. Cooked in a broth of vegetables, fish, and tomato paste



Water source for fields for the cultivation of tomatoes for processing (Saint-Louis). The water is entirely sourced from the Senegal River.



A tomato cultivation field during the off-season. Rice is grown until September, when the rainy season ends.



A field in which cultivation of tomatoes was planned (Saint-Louis). This is after rice was harvested, but it is not plowed even two weeks before planned planting.



Plowing by tractor in a tomato cultivation field (Saint-Louis). This is only type of plowing done locally.



Common nursery bed (Saint-Louis). Farmers raise their own seedlings in part of the field.



Preparation of planting seedling (Saint-Louis). Pulled out from the nursery bed, bagged and taken to the field.



Tomato cultivation field (Saint-Louis). Furrow irrigation, in which water is run between ridges, is dominant.



Planting seedlings in the test cultivation field to investigate business viability (Saint-Louis).



Harvesting tomatoes at the test cultivation field (Saint-Louis). Harvesting tomatoes into crates (harvesting baskets).



Gathering crates to the side of the cultivation field and loading them into a shipping truck (Saint-Louis).



Loading into the shipping truck (Saint-Louis).



Shipped to a plant in a truck fully loaded with the crates (Saint-Louis).

List of Abbreviations

Abbreviations	Name
AEPP	Agricultural Export Promotion Project
ANIDA	L'agence nationale d'insertion et de développement agricole
APIX	The Investment Promotion and Major Projects Agency
CNCAS	Caisse Nationale de Crédit Agricole du Sénégal
CNCFTI	Comité national de concertation sur la filière de tomate industrielle
ECOWAS	Economic Community of West African States
GDP	Gross Domestic Product
GIE	Groupement d'intérêt économique
IFC	International Finance Corporation
LPG	Liquefied Petroleum Gas
OHADA	Organization for the Harmonization of Business Law in Africa
PAPRIZ 2	Projet d'Amélioration de la Productivité du Riz dans les Aménagements Hydro-Agricoles de la Vallée du Fleuve Sénégal 2
PETROSEN	—
PDIDAS	Projet de Développement Inclusif et Durable de l'Agribusiness au Sénégal
SAED	Société Nationale d'Aménagement et d'Exploitation des Terres du delta
SENELEC	Société National d'Électricité du Sénégal
TCI	Taxe Conjoncturelle à l'importation
TDP	Taxe Dégressive de Protection
UEMOA	L'Union économique et monétaire ouest-africaine
IPM	Integrated Pest Management

1 Summary

1.1 Proposed project and background

In West African countries, including the Economic Community of West African States (ECOWAS), an enormous amount of tomatoes is consumed. Among tomato products, tomato paste is taking especially deep root in the food culture as a basic seasoning, and it has become an absolute necessity in life. However, in the West African region, market competitive products in terms of quality and price cannot be produced, so the reality is that it relies almost entirely on imports from China and other places for tomato paste. Both the government and the private sector are trying to produce tomato paste domestically, but there has not been dramatic improvement. The region still continues to rely on imports.

Kagome Co., Ltd (hereinafter referred to as “Kagome”) has operations throughout the entire value chain of the tomato processing industry from development of tomato seeds, cultivation, primary processing (producing tomato paste by concentrating tomatoes) and secondary processing (producing final products such as tomato source, pizza sauce and tomato paste repackaged into smaller sizes by further processing the primarily processed product - tomato paste). The region may be able to break away from the current import-dependent situation, if it becomes possible to locally produce internationally competitive, inexpensive and high-quality tomato paste by using the company's technology/knowledge about development of seeds, cultivation and processing tomatoes, as it could replace imports. Mitsui & Co., Ltd. (hereinafter referred to as “Mitsui”) intends to promote the world's tomato processing industry from West African countries by broadening the market for the product, as well as increasing the competitiveness of Kagome's value chain by utilizing the company's marketing knowledge and capability to build sales/distribution networks.

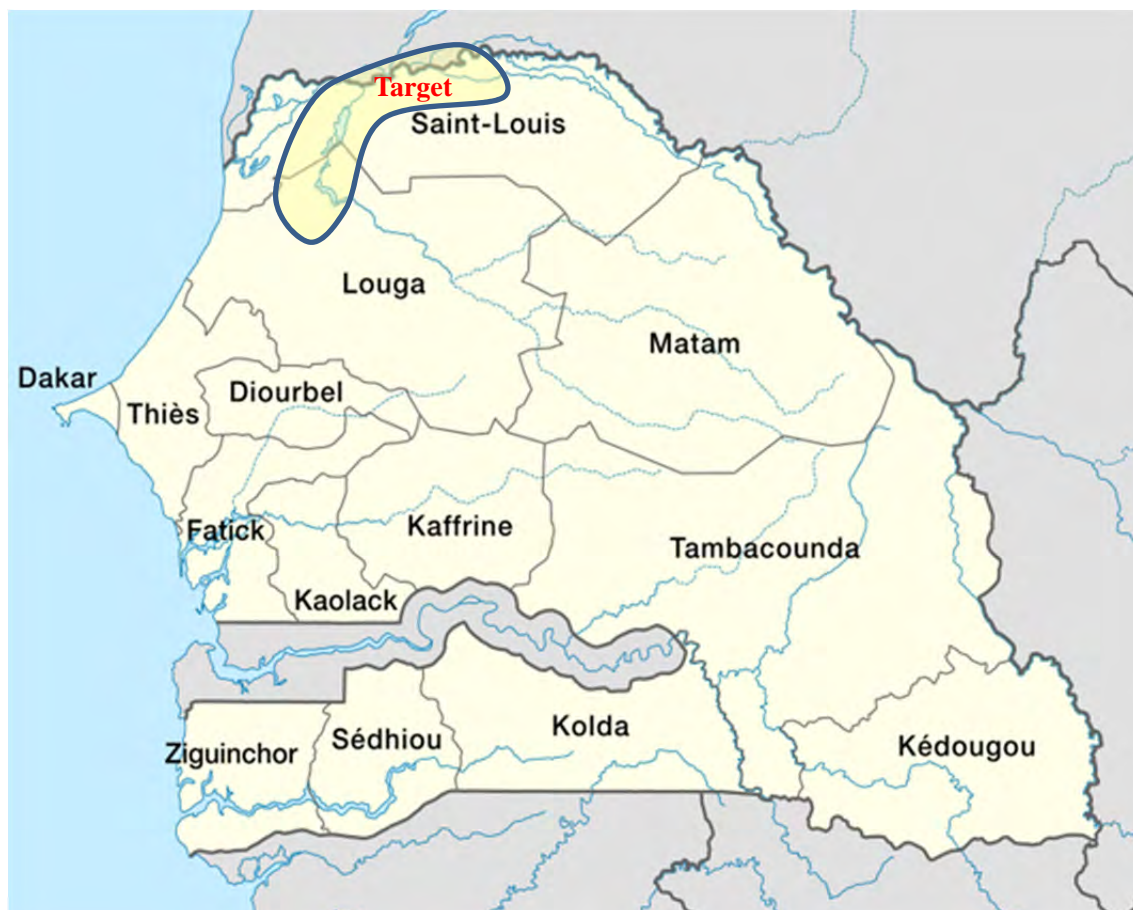
The aim of this project is to develop a series of value chain of tomato products, which starting from growing tomatoes for processing in West African countries including the ECOWAS. We expect that not only will the project help to solve food problem and poverty, but also become a solid cornerstone for the entire West African region to achieve independent development as a sustainable agricultural/food processing business operation. This survey is conducted in order to investigate business viability and create a detailed business plan to realize our expectations.

1.2 Survey area

We chose the Republic of Senegal (hereinafter referred to as “Senegal”) for the project. The target area was the northern region of the Senegal River basin. The reasons for the selection were as follows:

- It is a West African country and has stable security conditions.
- It is inferred that the product can be distributed within the ECOWAS region.

- Senegal has a history of growing tomatoes for processing.
- The climate in northern Senegal is particularly dry and suitable for growing tomatoes. In addition, a rich source of water can be used for agriculture in the Senegal River basin.
- Continuous support from JICA for farmers in the Senegal River basin and utilization of the networks built there can be expected.



Source: Wikimedia Commons

Figure 1-1 Area to be surveyed1-1

1.3 Needs and significance of the project in the target country

The Senegalese government recognizes the importance of the agricultural sector in its development plan from the following three perspectives. Given the situation that many residents in rural areas, where about half the population of Senegal lives, earn their living in the agricultural sector, it is important from the first perspective of "reducing poverty" by improving the livelihood of rural residents. The second point is its importance as a sector that produces products for export. Peanuts and cotton have always been the main income source for the country, and vegetables and beans such as asparagus and black-eyed peas, as well as fruit, such as mangoes, have also been positioned as an important sector for acquisition of foreign currencies, that is, for

increasing the national income. The third point is the importance of the agricultural sector from the perspective of food security and various public investments have been made with a view to diversifying agricultural products and increasing total crop production. Ensuring food security and improving self-sufficiency in food products will allow reduction of imports and reconstruction of the nation's finances. Expectations for the tomato processing industry as one of main industries of Senegal are high. The industry may build a supply demand structure contained within the region by consolidating the self-contained cultivation/production system within the country without relying on imported raw materials to meet domestic demand and by developing the West African market as well.

Kagome expects that the worldwide demand for tomatoes for processing will increase at least by 25% in the next ten years, exceeding 50 million tons. Given the growth of population in African countries in the next ten years, it is easy to predict that African countries will account for a great proportion of the rise in demand. What Kagome is aiming for are efforts to develop/cultivate and commercialize varieties of tomatoes suitable for the soil, water and climate of each area of consumption and a global-scale, locally-grown and locally-consumed type of tomato business. It also defines growing important crops in each region as well as tomatoes as a crop rotation system of tomatoes as one of its objectives. Senegal is dependent on imports of rice as a staple food, so the Japanese government led by JICA has helped the country improve rice productivity for many years and this effort is starting to achieve results. In Senegal, rice and tomatoes are produced in the same area, and a crop rotation system with rice will be considered, taking into account the compatibility with tomatoes as a rotational crop. This is sustainable agriculture, which protects farmers and land, and is different from conventional agricide. We would like to contribute to increasing income/stability of the people at the BOP by aiming to achieve sustainable agribusiness through synergy effects from the cooperation of Kagome's project and JICA's rice project. Furthermore, we would like to develop similar agricultural promotion business in other countries in the future by using the knowledge acquired from this project. Same as the efforts to help promote agriculture in the disaster area, which Kagome is currently working on in Japan, our dearest wishes for this project are to deploy the idea of a business operation that balances contribution to society with business overseas and to contribute to the promotion of agriculture on a worldwide level.

1.4 Business viability survey and assessment of commercialization

In order to realize the possibility of tomato cultivation/processing business envisioned in this project, we conducted in each of the tomato cultivation and processing business based on the task recognition. As for the tomato cultivation business, we conducted test cultivation three times over three years (the first test cultivation was conducted by Kagome/Mitsui by themselves before the project was started) to evaluate its feasibility. The first test cultivation was a small-scale test to

determine if Senegal is suitable for growing tomatoes. Kagome directly taught local farmers cultivation, achieved a yield per unit of land of 30tons/ha in Senegal, far greater than the average yield per unit of land, and was able to demonstrate that Senegal is suitable for growing tomatoes. With the assumption that raw tomatoes are procured through contract cultivation, we investigated the feasibility of a contract cultivation system, in which the whole amount is purchased under a technical package and guidance on cultivation techniques provided by Kagome, by subcontracting the operation to a local partner company during the second test cultivation. We were able to verify that the contract cultivation system works, but the yield per unit of land could not be realized. The result made us realize that it is difficult to improve profitability and price competitiveness in farming that maintained the current size of farmers, and decided to change policy. In the third test cultivation, based on the experience of the past two years, we conducted the study of the possibility of improving the profit per farmer and the reduction of the tomato procurement cost of the factory by newly introducing the technical resources of Kagome and increasing the cultivation area. As a result, we were able to set a certain prospect for yield, cost and farmer's earnings, and judged that it is possible to study commercialization. The verification of the rotation system of tomato and rice could not be carried out during this investigation period.

As for the tomato processing business, the existing tomato processing companies use imported tomato paste because of its price, the unit price of the primarily processed product using Senegalese tomato material was calculated and its price competitiveness was compared with that of the imports. The results showed that the price of imported tomato paste distributed in West African countries was lower than it had been estimated. Therefore, it will not be easy to gain a competitive edge in price against the imports even if the productivity of tomato cultivation in Senegal is improved to a certain degree, so it was made clear that at the time of the survey, a business to produce the least processed primarily processed products such as tomato paste cannot easily overcome the current import-dependent situation. It was determined that in order to develop an economically rational tomato processing business in Senegal, a business concept that includes not only the initially-envisioned cultivation/primary-processing business, but also a production business of more highly-processed secondarily-processed products and promotion through a consumer business would be necessary.

1.5 Remaining challenges for business development and future policy

In this study, we aimed to develop a series of value chains of processed tomato products starting with tomato cultivation, and first we have been examining the viability of tomato cultivation and primary processing. As a result of the study, we found a possibility for the tomato cultivation business, but regarding processing, we could not change the composition of the current Senegalese tomato processing industry only by the primary processing business that was

supposed at the start of this survey and we decided that commercialization of primary processing business is difficult. In order to secure business ability in the processing business, it is necessary to consider entering not only primary processing but also secondary processing business such as consumer business and etc., but first we would like to contribute to the development of Senegal's tomato processing industry by entering into tomato cultivation business. While continuing to consider entering the tomato cultivation business, we plan to work over our plan about tomato processing business. Tomato processing is continued every year in Senegal, and basically we cultivate tomato only one time per year, there is no reason to have a blank in the start of the tomato cultivation business. In commercialization of the tomato cultivation business, problems such as technical improvement and procurement to make it profitable business, issues of procurement, standardization of operations accompanying expansion of the scale, etc. are assumed. Regarding farmers' farming finance to make contract cultivation systems sustainable, we need to continue to have close observation. The crop rotation system of tomato and rice has not been verified, it remains in the hypothesis. We will verify whether it can be realized or not, including its effect.

2 Detailed survey results

2.1.1 Tomato cultivation and processing business verification

(1) Tomato cultivation business

The cultivation test for the profitability verification has been conducted for 3 years since 2014.

1) First test cultivation: November, 2014 to March, 2015

The first-year test was conducted in Thiango and Bokhor in northern Senegal, on a scale of 0.4 ha, respectively (this test had been independently conducted by Kagome and Mitsui, before this project was started). The main purpose was to decide whether tomato cultivation for processing in Senegal has growing potential adequate for commercial use, compared with other production areas overseas. At the same time a variety test of 25 types of processing tomato and a comparative test of cultivation methods between furrow irrigation and drip irrigation were conducted. The cultivation program was provided to a local supervisor from Kagome, and it was performed in the form of Kagome instructing the field supervisor, who it was assumed was a farmer. As a result of the test, the average unit crop of 30tons/ha in Senegal, more than twice the average one was achieved, which demonstrated aptitude for tomato cultivation in Senegal. Also, the types of tomato with a high aptitude under the conditions in Senegal were chosen, and drip irrigation came to be recommended as a cultivation method.

2) Second test cultivation: October, 2015 to May, 2016

Based on the results of the previous year's verification, the assumed contract farming system was designed. It was entrusted to a local company to attempt to reproduce the cultivation based on the effectiveness of the contract farming system and the previous year's cultivation program. It was extended to a total area of 10 ha for 21 farms in the 3 regions of Thiago, Thiagar, and Keur Momar Sarr in northern Senegal in order to conduct the test in multiple production areas with a view to the future extensibility of contract farming production areas. Although it was suggested that there was a possibility that the contract farming system would function, the unit crop was lower than the targeted one in all 3 areas, and the first test results were not reproduced. Also, the costs affecting the profit of farmers exceeded the expected one. As the target could not be achieved only by entrusting the contract farming system to local companies, it was understood that comprehensive management inclusive of the farming environment as well as technical aspects needed to be carried out.

3) Third test cultivation: November, 2016 to April, 2017

Based on the previous year's results, the test was decided to be continued in the form of entrusting the contract farming system to local companies, but it was carried out with everything under control. It was conducted in a total area of 12.5 ha in the 2 regions of Thiago and Thiagar. As an improved technology package, raising seedlings in specific seedling raising facilities was performed to verify the cultivation with high-quality seedlings. Also, it was verified whether it was possible to raise the profit per farmer, and, in addition, to decrease the unit purchasing price for a factory procuring tomatoes by installing multiple agricultural machines exclusively used for tomatoes to increase the cultivation area. As a result, it was found that the technology package needed to be improved further, but certain prospects were seen for the unit crop, costs, and farmer's income.

(2) Tomato processing business verification

The tomatoes obtained from the growing tests in the last 3 years have been sold to 3 companies operating processing plants in Senegal by way of the entrusted companies for growing tests. Although we have been negotiating with them to provide quality information on the tomato paste manufactured from the tomatoes delivered to the plants, agreement was not obtained with any of them. We succeeded in obtaining from only one company the answer that the tomatoes delivered as raw materials were better than the usual Senegalese tomatoes processed into tomato paste, and we felt that the types of tomatoes exclusively used for processing could contribute to the processing business.

The price advantage of Senegalese tomato processed products in the global market was calculated with the help of the local companies engaged in processing business. As a result, it was found that tomato paste produced in Senegal could not be priced competitively against imported

paste even at the minimum unit price of the tomato cultivation business.

2.1.2 Business profitability verification assessment

This investigation was performed for the purpose of developing a series of processed food product value chains beginning with tomato cultivation for processing in Senegal.

It was demonstrated that it was possible to improve farmer's profits while improving productivity in tomato cultivation business. The realization of a rice-and-tomato crop rotation system was envisioned at first, but it could not be verified during the review period.

As for tomato processing business, at this research stage, the status quo of import dependency cannot be easily broken by the business of manufacturing primary processed products with a low degree of processing, such as tomato paste. It was evaluated that project design up to the secondary processed products of a higher processing degree made from these and its development in the consumer product business was necessary.

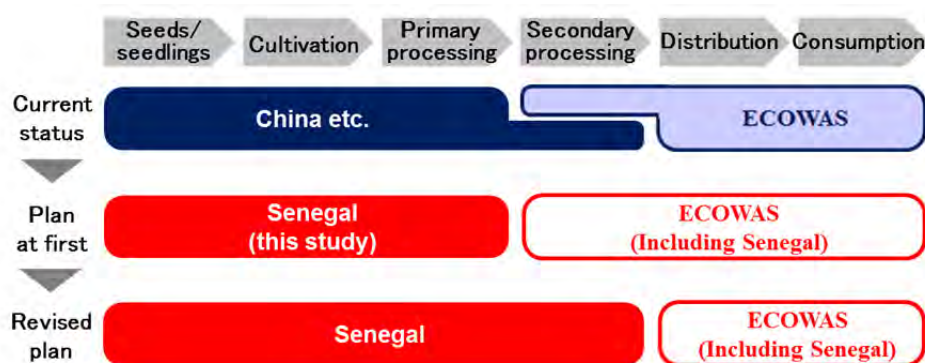
2.2 Business model and business plan

2.2.1 Business Plan

As described above, in this preparatory business survey, based on the fact that a huge market for tomato paste in West Africa, including in Senegal, already exists, but as the unit crop is so low, competitive raw tomatoes cannot be grown in their own countries, and almost 100% of consumed tomato paste depends on imported products in the present situation, the research was started on the hypothesis that if competitive tomato paste can be produced by improving the unit crop of tomato cultivation using Kagome's technologies, the imported tomato paste can be replaced with that produced in West Africa, with custom duty and freight use benefits as well. Therefore, the manufacturing and sales of primary processed products, which were expected to easily replace imported products, compared with the manufacturing and sales of final products in consumer product business etc., were assumed as business areas.

However, through this preparatory business survey, it was revealed that the tomato paste distributed around the West African region is the lowest grade and lowest priced product among all products distributed in the global market, and has a lower price than initially expected. Some prospect of productivity improvement is seen for tomato cultivation in Senegal, although on a small scale, but it is still difficult to earn at the profit in the price competition with these imported products, and the commercialization of primary processing business only is not easy. Therefore, for the commercialization of tomato cultivation and processing business in Senegal, project design up to the secondary processed products of a higher processing degree made from primary processed products as well as primary processing business and the development of consumer

product business are considered to be necessary, and the business profitability verification in the case of more extended business area will be necessary in the future.



Source: Based on the survey results, Kagome and Mitsui prepared.

Table 2-1 Overview of business plan²¹

2.3 Development effects

2.3.1 Development effects and business issues

The farming income of Senegalese domestic tomato growers at the BOP targeted by this project is thought to be sales 342,173 XOF/producer (589 USD/producer); total cost 195,074 XOF/producer (337 USD/producer); profit 147,099 XOF/producer (253 USD/producer) on average at present, as described in 2.2.2. But, according to information from some local farmers, they have not made even a little profit in the farming of tomatoes for processing, and the field survey of the people at the BOP will be required in the future as well.

The food policy, conditions of the people at the BOP, current status of the tomato processing industry in Senegal are as described above. This project is designed to contribute to (1) income increase of the people at the BOP, (2) food self-sufficiency ratio improvement, and (3) food safety improvement, by developing a series of tomato processed product value chain beginning with the tomato cultivation for processing.

The business issues required to achieve them are recognized as follows;

1. A mechanism for sustainable tomato cultivation is established.
2. A crop rotation system with rice is established.
3. The production of domestic tomato processed products is increased.

2.3.2 Expression scenario of development effects (target value)

The expression scenario in which the target values beneficial for the people at the BOP from this project are added to the above business issues is as follows.

Table 2-2 Expression scenario of development effects²²

Business issues	Measures	Development effects and indicators
1. A mechanism for sustainable tomato cultivation is established.	(1) Full amount purchase contracts are concluded. (2) A farming fund procurement system is established (3) Farming support is implemented. – Business management – Bulk procurement of materials – Cultivation technique guidance – Work management (4) Farming resources are augmented. – Raising seedling facilities – Special machine	<ul style="list-style-type: none"> • Employment creation by cultivation 30 persons/ha (income increase of the people at the BOP) • Farmers' income increase 312 USD/person (income increase of the people at the BOP) • Increase in domestic raw materials (Food safety improvement) • Departure from import dependency [Food self-sufficiency ratio improvement]
2. A crop rotation system with rice is established.	(1) Cooperate with rice farmers and organizations. (2) Mechanization is promoted.	<ul style="list-style-type: none"> • Farmers' income increase 312 USD/person (income increase of the people at the BOP) • Departure from import dependency [Food self-sufficiency ratio improvement]
3. The production of domestic tomato processed products is increased.	(1) Cooperate with rice farmers and organizations. (2) Mechanization is promoted.	<ul style="list-style-type: none"> • Employment creation in the manufacture and sales sector 100 persons in a factory with 500 tons/day throughput (income increase of the people at the BOP) • Improvement of food processing technology (Food safety improvement)

		<ul style="list-style-type: none"> • Departure from import dependency [Food self-sufficiency ratio improvement]
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Source: Based on the survey results, Kagome and Mitsui prepared.

2.3.3 Target values of development effects

The basis of the argument on the above indicators is summarized as follows;

- Employment creation by cultivation

The number of workers requested by farmers during harvest is estimated to be 30 persons/ha. As compensation is paid to workers, this compensation contributes to income of the people at the BOP.

- Farmers' income increase

The income and expenditure of rice farming in the Senegal River basin during the rainy season is the large scale irrigated land ward 191,712 XOF/ha; village irrigated land ward 127,171 XOF/ha, and private irrigated land ward 63,552 XOF/ha. If rice double cropping is performed, it is 254,342 XOF/ha by simple calculation. If USD = 580 XOF is applied, it turns out to be 219 USD/ha for single cropping and 438 USD/ha for double cropping. In this project, a return of 1,000 USD/ha from single cropping of tomatoes, and that of the double cropping with rice are tentatively set up. Given that the present main stream is double cropping of rice, it will increase the return by 781 USD/ha by comparison. When it is calculated assuming that the average area per farmer is 0.4 ha, it will contribute to an income increase of 312 USD/person.¹

- Increase in domestic raw materials, improvement of food processing technology

The increase in domestic raw materials used will not necessarily contribute to food safety improvement directly, but keeping the cultivation program under control, supplying products based on international quality control, and improvement and disclosure of traceability through this project will contribute to the improvement of food safety and domestic food processing technology.

- Departure from import dependency

The quantitative value, which depends on the cultivation area and unit crop finally achieved in this project, cannot be determined here, but as the promotion of this project will contribute to the

¹ Senegal national rice farming reorganization investigation final report, JICA (2008)

increase in the domestic procurement rate of processed tomato products without fail, a numerical target value is considered to be unnecessary here. Also, the cash flow of producers' farming is considered to be improved without fail by selling tomato raw materials, and it is expected to be effective for an increase in the domestic rice production ratio, although a specific numerical target cannot be calculated.

- Employment creation in the manufacturing and sales sector

Employment will be created at plants that manufacture tomato paste, though the number of workers depends on the throughput. Including seasonal workers, it is expected to be 100 persons at a plant with a throughput of 500 tons/day.

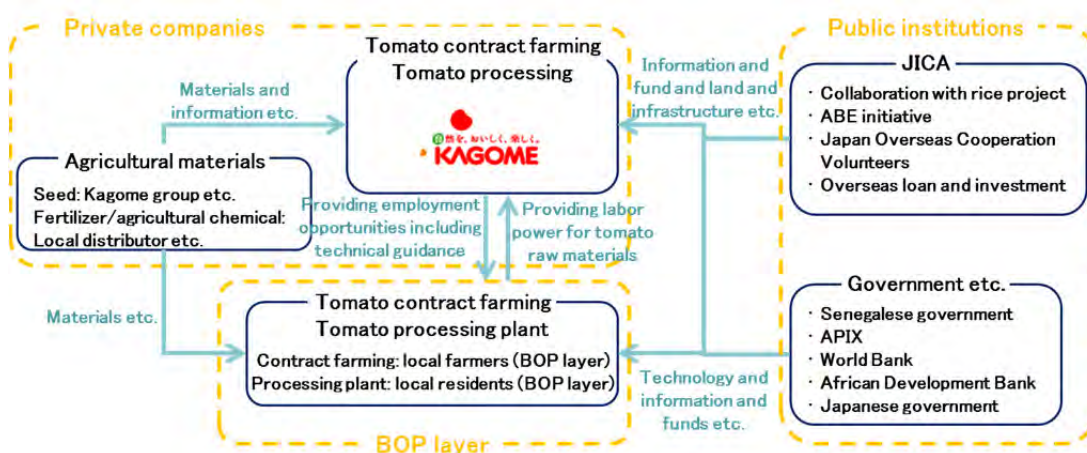
2.4 Potential for collaboration with JICA

2.4.1 Necessity for cooperation project

JICA had been proceeding with the Project on Improvement of Rice Productivity for Irrigation Schemes of the Valley of Senegal (PAPRIZ 2) up to March, 2014. As the project succeeding it, PAPRIZ 2 phase 2 has been carried out since October, 2016. In this project, cooperation with the rice farming promotion that JICA has been proceeding with is essential for any sustainable agriculture realization, improvement of income of producer households, and contribution to Senegalese national policies.

2.4.2 Assumed project scheme

The cooperation with JICA assumed in this project is shown in the flow chart below.



Source: Based on the survey results, Kagome and Mitsui prepared.

Table 2-3 Image of cooperation with public institutions including JICA23

2.4.3 Cooperation project

(1) Project on Improvement of Rice Productivity for Irrigation Schemes of the Valley of Senegal

The tomato production area in Senegal is the Senegal River basin, and this area corresponds to the area where JICA has been engaged in a rice farming program for years. In this project, we want to work on increasing productivity throughout the year by promoting double cropping with rice in the rainy season and tomatoes in the dry season, taking advantage of the network with local farmers that JICA has been established, etc. For its realization, using networks, joint farming guidance, joint promotion of mechanization, etc. are assumed. We are confident about the synergy effect created by cooperation with the JICA project.

(2) ABE (African Business Education) initiative

JICA has been accepting into Japan promising talents from African countries. The ABE initiative program is being promoted in order to create the personal connections between Japan and African countries that will contribute to industrial development in Africa as well as acquisition of knowledge and skills, and cultivate highly advanced industrial talents who will be pilots for Japanese companies to advance their economic activities.

As this project is “From Africa to Africa” tomato cultivation and processing and selling business aiming at the utilization of the West African market based in Senegal, local human resources with an understanding of Japanese companies is essential to the promotion of the business. Concretely, human resources in various fields, such as a field manager who gives instructions on tomato cultivation techniques and know-how, primary processing plant administrator, business operator, administrator etc., will be required. Therefore, with a view to cultivating executive candidates for the medium-to long-term development of this project, cooperation with ABE initiative will be studied.

(3) Japan Overseas Cooperation Volunteers

In this project, it is assumed that tomato cultivation techniques etc. will be taught to local farmers, and such technical guidance needs to be given to many farmers for commercialization. In order to give technical guidance effectively and efficiently, it would be possible to dispatch technical experts to associations organizing local farmers. Furthermore, a partnership with the Japan Overseas Cooperation Volunteers can be considered, as seen in the dispatch of the two volunteer members in January, 2016 during this project. They have been fully helping us with this project survey, including communications with local farmers.

(4) Overseas loan and investment system

While this project is a business that contributes to social development through improving the living standard of those in poverty, it is a business involved with the people at the BOP in

developing countries, and as the business risk is expected to be high, we want to consider the use of JICA's overseas loan and investment system for commercialization as well.