

# **Executive Summary**

## **Preparatory Survey on BOP Business for Small-Scale Farmer Access to Agriculture Machinery**

**March 2019**

**Japan International Cooperation Agency**

**YANMAR Co., Ltd.**

OS
JR
19-024

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Pictures

		
<p>Spare parts shop in Tamale</p>	<p>Inventory of an agricultural machinery spare parts shop</p>	<p>Workshop next to spare parts shop</p>
		
<p>Machinery spare parts shop in Accra</p>	<p>Official John Deere dealer shop in Tamale</p>	<p>Repair of agricultural machinery (tractor) at Kpong</p>
		
<p>Demonstration of YANMAR's power tiller at Kpong irrigation scheme</p>	<p>Lecture after the demonstration of power tiller at Kpong</p>	<p>Demonstration of YANMAR's mini-combine at Kpong</p>
		
<p>Demonstration of mini-combine at Kpong irrigation scheme</p>	<p>Lecture after demonstration of combine and demand survey</p>	<p>Chinese combine harvester (Jiangsu World Agriculture Machinery)</p>
		
<p>Chinese power tiller</p>	<p>YANMAR's power tiller with cage wheel</p>	<p>Locally manufactured cage wheel for Chinese power tiller</p>

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### Abbreviation

Abbreviation	Official Titles
2KR	Second Kennedy Round: Grant Assistance for Underprivileged Farmers (Former Grant Aid for the Increase of Food Production)
AESD	Agricultural Engineering Service Directorate
AMSEC	Agricultural Mechanization Service Center
BOG	Bank of Ghana
BOP	Base of Pyramid
CAM	Computer Aided Manufacturing
CARD	Coalition for African Rice Development
DTRD	Domestic Tax Revenue Division
ECOWAS	Economic Community of West African States
EPA	Environmental Protection Authority
FASDEP II	Food and Agriculture Sector Development Policy II
FOB	Free on board (Incoterms)
GDP	Gross Domestic Product
GIDA	Ghana Irrigation Development
GIPC	Ghana Investment Promotion Centre
GPRS	Ghana Poverty Reduction Strategy
GRA	Ghana Revenue Authority
GRATIS	Ghana Regional Appropriate Technology Industrial Service

GSGDA	Medium-term National Development Policy Framework Ghana Shared Growth and Development Agenda II, 2014-2017
IMF	International Monetary Fund
JICA	Japan International Cooperation
KIS	Kpong Irrigation Scheme
MDGs	Millennium Development Goals
METASIP	Medium Term Agriculture Sector Investment Plan
MOFA	Ministry of Food and Agriculture
NGO	Non-Governmental Organization
ODA	Official Development Assistance
RGD	Register General's Department
TIN	Tax Identification Number

## 1-1. Outline of the Study and Consistency with Development Issues

### 1) Overall picture of the Study

This study determines the feasibility of the proposed business model and prepares a detailed business plan for sales of YANMAR products for smallholder farmers in Ghana. The outline of the study is shown in the table below.

Item	Contents
Purpose	The purpose of the study is to determine the feasibility of proposed business model and to prepare a detailed business plan for sales of YANMAR products for smallholder farmers in Ghana.
Period	From July 2017 to December 2018
Target area	Irrigation schemes in southern Ghana (Kpong irrigation scheme of Eastern region, Ashaiman irrigation scheme of Greater Accra, and Okyereko irrigation scheme of Central region)
Outline of proposed business	The product is a small-sized agriculture machine called a <i>power tiller</i> which is equipped with a small engine (15hp or less). It is planned to be sold as a Ghanaian model with reduced cost by localizing some parts as well as manufacturing locally. As an economic aspect, this will allow higher competitiveness with other manufacturers (especially Chinese manufacturers) by extending durability through the provision of proper after sales service.
Development outcome and beneficiaries	It is expected that the productivity and income of smallholder farmers will increase with the efficient and on-time farming capabilities gained from the improvement of access to agriculture machinery.
Activities	<ul style="list-style-type: none"><li>● Introduce machine products to the smallholder farmers, a survey of machinery demand: baseline survey, market survey</li><li>● A trial of local manufacturing and quality and cost verification of attachments and parts of machinery: Local manufacturer survey, a trial of local manufacturing of attachments and parts</li><li>● Verification of smallholder farmer mechanization model: a pilot project</li><li>● Affordability analysis: A study of financial service for agricultural machinery: preparation of farmer's business model with machinery introduction to crops.</li></ul>

### 2) Background of the study

It is reported that in general, agriculture productivity in Ghana is low because cultivation technology in rice production is relatively low, and labor shortages in the busy farming season stemming from the difficulty of access to agriculture machinery or its hiring service hinders proper time farm management. Furthermore, most agriculture machinery owners and their employees are not adequately trained to operate and maintain the machinery properly. Moreover, the unavailability and a high cost of spare parts shortens the machinery life.

Therefore, the sale of quality machinery and provision of appropriate after sales service to customers as the direct approach, and the provision of a hiring service to neighbor farmers using our machinery as the indirect approach would solve the issues mentioned above which rice farmers are facing.

Meanwhile, JICA has supported the improvement of irrigation technology and rice cultivation technology to increase rice productivity. These conditions help to maximize the impact of agriculture

mechanization.

YANMAR would be able to improve access to agriculture machinery for smallholder farmers, utilizing price competitiveness taking advantage of YANMAR's international manufacturing network, high capability of human resource development on operation and maintenance, and the know-how of after-sales service and financing. YANMAR takes a problem-solving approach so that smallholder farmers can achieve proper time farm management and less post-harvest losses which results in the increase of both production and income.

### **3) Purpose of the study**

The purpose of the study is to determine the feasibility of the proposing business model and to prepare a detailed business plan for sales of YANMAR products for smallholder farmers in Ghana.

YANMAR has supplied small-sized agriculture machinery to Ghana through other ODA projects. Based on this experience, YANMAR has considered expanding their business on a commercial basis, and this is met with good timing as agriculture mechanization has become one of the Government's priorities, and YANMAR has already acquired experience and sales achievement in Ghana.

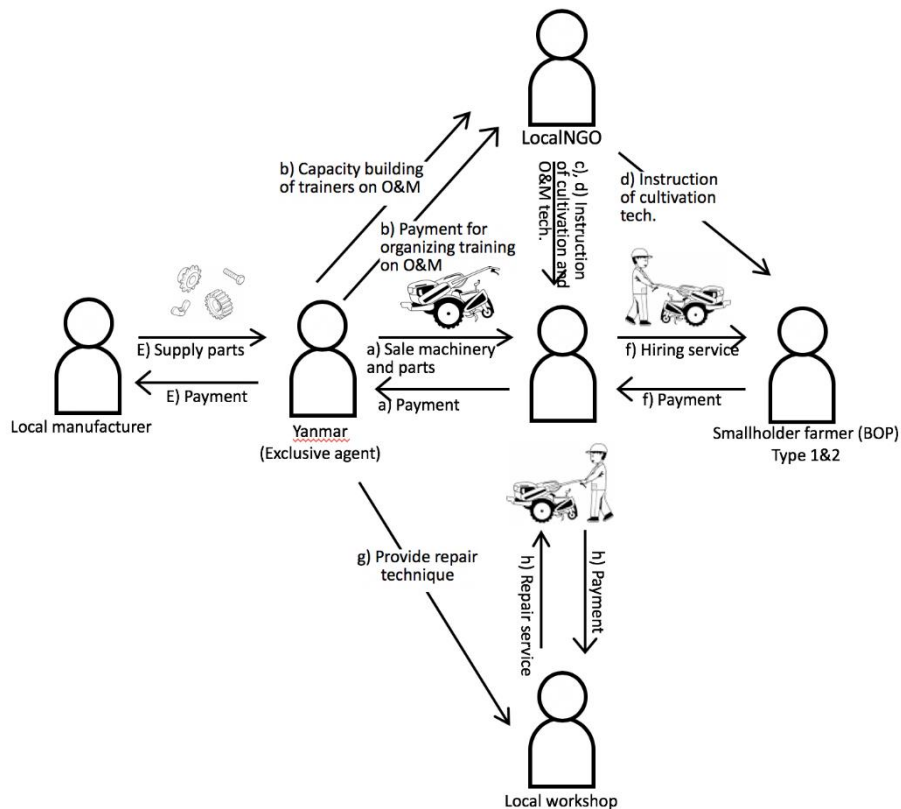
In addition, other African countries also promote rice production cooperating with Coalition for African Rice Development (CARD). YANMAR also focuses on ECOWAS countries, such as the Ivory Coast and Nigeria, to apply the proposed business model in the future.

### **4) Outline of the proposed business model**

The proposed business model is depicted in figure 1.

- a) YANMAR will sell the machinery to farmers through an Exclusive agent.
- b) YANMAR, with an Exclusive agent, will provide technical training to local NGOs on operation and maintenance.
- c) With the support of an Exclusive agent, the local NGOs will provide training and support to farmers on operation and maintenance.
- d) The Local NGO will provide advice on rice production to customers and farmers (Type 1 and 2 in the figure) who receive machinery hiring service from the customers utilizing a production manual and a guideline of the JICA project.
- e) Yanner will contract out parts manufacturing of attachments and parts to local manufacturers to reduce machinery cost and shorten delivery time.
- f) Farmers (Type 3 and 4 in the figure) will provide machinery hiring service to neighboring farmers (Type 1 and 2 in the figure) who cannot afford to buy machinery.
- g) YANMAR, through an Exclusive agent, will provide a series of training to mechanics of local repair shops and promote capacity development.
- h) An Exclusive agent with a local repair shop will provide appropriate after-sales service to their customers (farmers).





**Figure 1: Proposed Business Model**

Source: Created by the study team

## 5) Consistency with Development Issues

The Government of Ghana sets “agriculture modernization and sustainable environment management” as one of its development goals. Rice is one of the essential crops, and the Government is aiming to increase rice production with the participation of the private sector. So, promoting agriculture mechanization for smallholder farmers is consistent with the Government development strategy, and it is expected that in the future agriculture mechanization will grow significantly in Ghana.

### 1 – 2. Survey Plan

#### 1) Survey Schedule

	Period	Main Objects
1 <sup>st</sup> field survey	January-March 2017	<ul style="list-style-type: none"> <li>➤ Field macro environmental survey</li> <li>➤ Selection of re-consignees</li> <li>➤ Survey of local manufacturing enterprises</li> </ul>
2 <sup>nd</sup> field survey	August-November 2017	<ul style="list-style-type: none"> <li>➤ Preparation for 1<sup>st</sup> pilot project</li> <li>➤ Preparation for baseline survey</li> <li>➤ Survey of financial services</li> </ul>
3 <sup>rd</sup> field survey	March-May 2018	<ul style="list-style-type: none"> <li>➤ Implementation of 1<sup>st</sup> pilot project</li> <li>➤ Preparation for 2<sup>nd</sup> pilot project</li> <li>➤ Survey of local repair agents</li> </ul>



		<ul style="list-style-type: none"> <li>➤ Survey of local spare part distribution channels</li> </ul>
4 <sup>th</sup> field survey	October - December, 2018	<ul style="list-style-type: none"> <li>➤ Implementation of 2<sup>nd</sup> pilot project</li> <li>➤ Project risks survey</li> <li>➤ Survey on the possibility of local spare parts and attachments</li> </ul>

## 2) Survey Period

January 2017 – December 2018

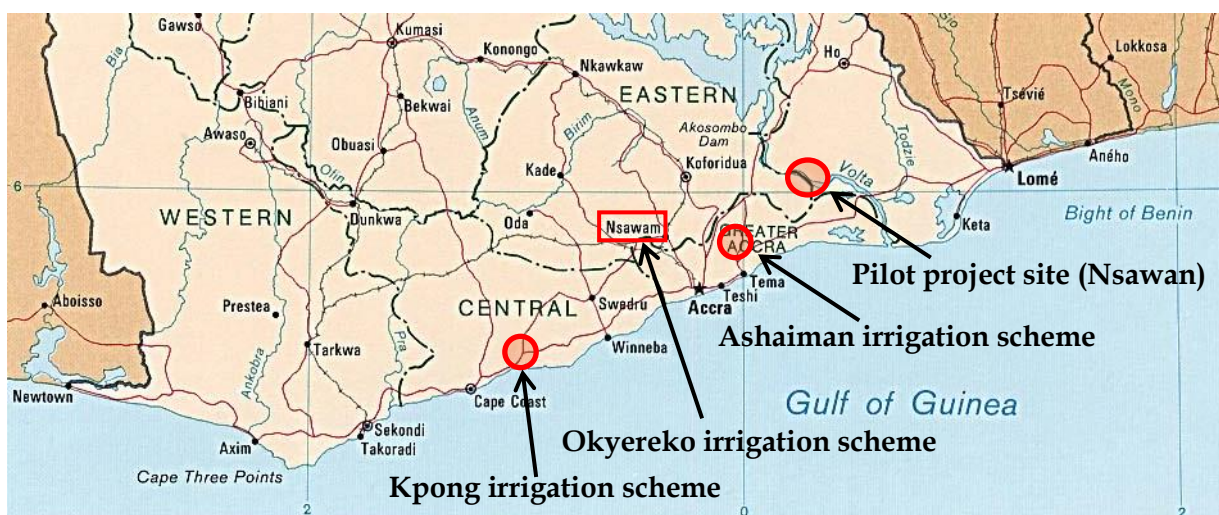
## 3) Survey Areas

The main focus areas for the initial stages of this business cover the Ashaiman irrigation scheme and Okyereko irrigation scheme in the southern coastal area, and the Kpong irrigation scheme in the Accra Plain. Table 1 describes irrigation areas and the number of farm households within each irrigation scheme. Figure 2 shows the location of each irrigation scheme and pilot project site.

**Table 1: Irrigation area and number of farm households**

Name of irrigation scheme	Planned area (ha)	Irrigated area (ha)	Number of farm household	Average cultivate area (ha/household)
Ashaiman	200	71	107	0.66
Okyereko	81	61	129	0.47
Kpong	4,001	3,028	2,700	1.12
Total	4,282	3,160	2,936	Average: 1.08

Source: Interviews with authorities from the irrigation schemes



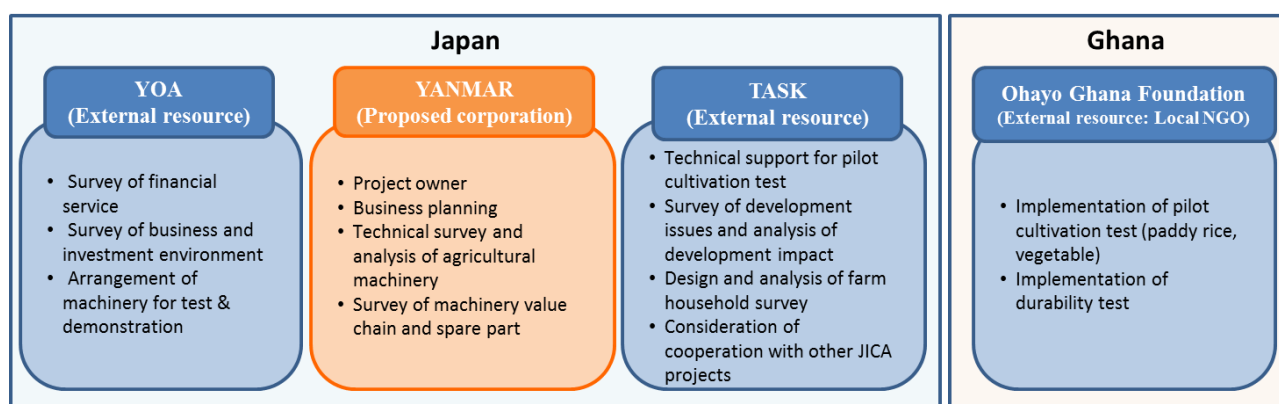
**Figure 2: Map of Initial Business Target Areas**

Source: Created by the study team

The main target areas of this business will be irrigation areas and rain-fed areas in southern Ghana. At first, the business will focus on the southern coastal area near the irrigation area of Accra Plain where an exclusive agent is located, and then promote sales to the rain-fed lowland area in the South. The rain-fed highland area in the North is not included as a sales target area, because they have wider plots for power tillers, so four-wheeled tractors are popular there.

#### 4) Implementation organization of survey and role of each organization

The proposed corporation, YANMAR assumes the roles of project management, technical survey and analysis of agricultural machinery, business planning, survey of local production (spare parts, attachments etc.) and survey of exclusive agent prospects. TASK, an external resource partner was assigned to support pilot cultivation testing for technical aspects, to plan and analyze the baseline survey, and to conduct a development impact evaluation of this business. Furthermore, YOA, another external resource partner, plays a role to implement survey of financial services including loan scheme conditions that the financial institutions provide, and business environment including investment, authorization and regulation in Ghana. On the Ghana side, the local NGO “Ohayo Ghana Foundation” which is also an external organization assumes implementation of pilot cultivation testing at NGO’s farm, and durability tests for project target agricultural machinery and competitive products.



#### 5) Verification items

This survey verified the following items and considered the assessment of business feasibility.

	Item of Verification	Necessity of Verification
1	Possibility of achieving lifecycle cost advantage against competitive products	By indicating advantages other than price compared to other competitive products, expand usership and differentiate YANMAR’s product in the market.
2	Identify affordable financial schemes and conditions for farmers to purchase agricultural machinery	Generally, payment for machinery should upfront, however it is possible to expand target customers by providing financial support (loan scheme).
3	How realize local production and price reduction	It is necessary to minimize price disadvantage against competitive products by promoting price reduction and enhance competitiveness.
4	How skills and resources of local NGOs should be secured to maintain support and provide technical assistance for farmers to operate agricultural machinery properly.	It is necessary to create a business structure to conduct continual support such as training of machine operation and maintenance by exclusive agent(s) from a perspective of sales marketing of the machinery.
5	The challenges and support structure for purchasing agricultural machinery, payment of machinery and providing machinery service.	There is necessity to remove obstacles for farmers to purchase machinery by considering challenges of target farmers and conduct appropriate supports for those issues.

#### 6) Brief of the Survey

In order to clarify the above items, the following research and survey was conducted.

Item of Survey		Contents of Survey / Survey Method
Major items	Minor items	
(1) Socioeconomic condition	Socioeconomic conditions surrounding the proposed business	<ul style="list-style-type: none"> <li>• literature reviews</li> <li>• Interview with JICA Ghana office at the beginning of the survey</li> </ul>
	Relevant regulations, laws and authorizations pertaining to the proposed business	<ul style="list-style-type: none"> <li>• Financial services such as loans, finance leasing, and rental in the agriculture sector.</li> <li>• Survey of investment permits</li> <li>• Survey of the import tax and tax reduction</li> </ul>
	Market (needs, competitors)	<p>Conduct literature reviews and field survey to grasp current market conditions by collecting information on the following items.</p> <ul style="list-style-type: none"> <li>• Market research on small agricultural machines (price, specification, etc.)</li> <li>• Analysis of comparative advantage with competing machines. (Performance analysis such as fuel efficiency and working efficiency by using actual machines)</li> <li>• Interviews with users of competitor products</li> <li>• Survey on the use status of YANMAR customers for the consideration of the Ghanaian model.</li> <li>• Survey of possible affiliated repairer shops in the target area</li> <li>• Survey on locally distributed spare parts (kinds, price, distribution, distribution network, etc).</li> <li>• Interviews with the Chamber of Commerce and related authorities.</li> </ul>
	Financial service	<ul style="list-style-type: none"> <li>• Survey on both private and public financing institutions, funding from development partners and NGO for the agriculture sector etc.</li> <li>• Survey on the establishment of financial institutions</li> <li>• Survey on the repayment capacity of farmers</li> </ul>
(2) Status of target BOP	Baseline survey	Conduct a baseline survey targeting smallholder farmers in the target areas in cooperation with a local NGO. Type of cultivation, farm economy, demand for agriculture machinery etc., will be collected in the 3 target areas and analyzed.
	Development issues	<ul style="list-style-type: none"> <li>• Set development indicators based on the expected development impact.</li> <li>• Survey of development issues with a local NGO.</li> </ul>
(3) Value chain	Survey of existing value chain	Identification of stakeholders in the value chain through the above-mentioned market survey.
	Materials procurement	Survey of local manufacturing companies and production trials.
	Distribution or sales network	To be covered in the above-mentioned market survey.
(4) Pilot project	Preparation of the pilot business plan	Target areas and survey items verified, then feasibility survey in the target areas.
	Implementation of pilot project	<ul style="list-style-type: none"> <li>• Measurement of economic return and capital investment efficiency through testing various small machinery in the target areas.</li> <li>• Economic analysis of small machinery (on-time work and labor alternatives).</li> <li>• Development of business models of smallholder farmers by cultivation type and use of machinery, and repayment options</li> </ul>
	Business deployment plan	Considering the result of the pilot project, prepare another pilot project plan, if necessary.

(5) Business plan	Verification of benefits for BOP	Verification of benefits including an economic and investment analysis by the introduction of machinery based on results of the pilot project, through discussions with JICA and the development partners.
	Preparation of procurement plan	Preparation of the procurement plan based on the field survey.
	Sales plan	Preparation of the sales plan based on the results of the field survey and the pilot project.
	Human resource development plan	Preparation of the HRD plan based on the results of the field survey.
	Fundraising plan	Own funds
	Risk analysis	Identify various risks based on the results of the field survey and the pilot project.
	Financial analysis	Preparation of the budget plan, profit and loss plan, cash flow plan, and profitability analysis based on the results of the field survey and the pilot project.
	Implementation schedule	Preparation of the implementation schedule based on the results of the field survey and the pilot project.
(6) Development impact	Development indicators and monitoring	Set the development indicators and preparation of a monitoring plan.
	Verification of benefits to BOP	Estimation of benefits created by the proposed business based on the results of the pilot project.
(7) Possibility of Cooperation with JICA	Cooperation with JICA	Consideration of the possibility of cooperation with existing JICA projects, “The Project for Enhancing Market-Based Agriculture by Smallholders and Private Sector Linkages in Kpong Irrigation Scheme” and “Sustainable development of Rain-fed Lowland Rice Production Project, PHASE TWO”

### 1–3. Result of Validation

#### 1) Business Plan / Assessment of Business Feasibility

The proposed corporation, YANMAR, determined that there is business feasibility with agricultural machinery sales in Ghana through this survey. However, the government of Ghana is going to import about a thousand power tillers heavily subsidized by the Brazilian government in the first half of 2019, and they will be distributed to farmers at approximately half the market price with the government subsidy. It is considered that the business plan for the power tiller which would be the initial main sales item will take more time to gain traction in actual commercial business.

#### 2) Business feasibility assessment and result of verification

The following points are key elements to promote small-scale agricultural machinery business sustainably.

- ① Affordable commercial sales price for target class (upper middle class)
- ② Possibility of local repair and maintenance
- ③ Affordable spare parts for purchased machinery
- ④ Partnership with local exclusive agent who can support the above 3 elements
- ⑤ Possibility of investment recovery (Possibility to pay off purchased machinery)

As mentioned in the previous section, the initial target machinery of this business was the power tiller, and the survey plan was designed based on this. However, the impact of Brazil giving subsidized power tillers will have significant impact on the local market for power tillers. The survey team has

therefore included the mini-combine as a target for this business. Hence, the proposed company is going to aspire to expand its offering to rice value-chain machinery, which would be; power tiller, mini-combine and rice miller.

The following table summarizes the basis for judgment of business feasibility.

Table 2: Elements for determination of business feasibility and method of achievement

Elements for determination of business feasibility	Result of verification / Method of achievement
① Price reduction	<ul style="list-style-type: none"> <li>• Local production of attachments is an effective way to realize price reduction</li> <li>⇒ Already selected a candidate (local trailer manufacturer)</li> <li>• Cut costs of logistics and local assembly will contribute to reduce sales price of YANMAR's machinery</li> <li>⇒ Already selected a local assembly candidate company for agricultural machinery</li> </ul>
② Local repair network	<ul style="list-style-type: none"> <li>• By contracting with appropriate exclusive agent, a local network can be established</li> <li>⇒ Already selected a candidate as an exclusive agent who has agricultural machinery engineers and service network</li> <li>• It is possible to utilize local resource persons in target area</li> <li>⇒ Local mechanics who can repair and maintain power tillers in the target sales area have already been confirmed.</li> </ul>
③ Procurement of local spare parts	<ul style="list-style-type: none"> <li>• This can be realized by holding inventory with the exclusive agent shop</li> <li>⇒ Need to negotiate with candidate of exclusive agent about spare parts stocking</li> <li>⇒ It is expected that distribution of unofficial spare parts will increase with the sales of YANMAR's machinery</li> </ul>
④ Settlement of exclusive agent	<ul style="list-style-type: none"> <li>• Prospective candidate of an exclusive agent was confirmed by the survey</li> <li>• The agent has original loan scheme for customer, therefore it is expected to realize sale on a credit system</li> </ul>
⑤ Possibility of investment recovery (Initial investment for user)	<ul style="list-style-type: none"> <li>• It is expected that the increase of machinery service in addition to income growth by farming activities will generate more revenue locally.</li> <li>• Advantages of durability, fuel consumption and repair/maintenance fee were verified through the survey (Compared with a Chinese power tiller)</li> </ul>

This survey was mainly targeted to clarify the above ①~⑤ elements for power tiller and mini-combine. The main results can be summarized as follows.

- As horizontal water-cooling single-cylinder diesel engines for power tiller and mini-combine are basically the same mechanism, local mechanics in target area who have experience to repair YANMAR's power tiller installed by 2KR program can fix the machinery as heretofore.

Through the results of durability test with Chinese power tiller, advantages of YANMAR's power tiller was confirmed

#### Sales price reduction

In order to minimize price gaps between YANMAR's machinery and other competitive products, it is necessary to reduce the proposed machinery's sales price. An effective way to realize sales price reduction is by local production of attachments for power tillers such as trailers, cost cut of logistics

and local assembly etc. This survey verified possibility of sales price reduction of proposed machinery. Although it is difficult to achieve competitiveness against Chinese machinery by sales price reduction only, this factor will contribute to enhance competitiveness of proposed machinery as a part of whole strategy.

Elements of sales price reduction	Result of verification
Local production of attachment machine for power tiller	Plough: Procurement and processing of high-quality durable steel is difficult in Ghana, therefore feasibility of local plough manufacturing is relatively low. Trailer: An Indian manufacturer produces trailer for tractor in Ghana. According to the company, it is possible to produce small trailer for YANMAR's power tiller.
Decrease logistics cost	If local assembly of machinery (semi knockdown system) is possible in Ghana, the proposed company is able to reduce logistics cost by increasing number of loading machinery per one shipping container.
Local assembly	A candidate machine assembly company was selected. The company is assembling Indian tractors in Ghana, thus the possibility of power tiller assembling by the company is high.
Local procurement of spare parts	Although there are general common spare parts shops who sell screws, nuts, metallic washers and bearings etc., these are no dedicated spare parts shops for power tillers in Accra. Most YANMAR machinery users currently utilize specific spare parts from broken or second-hand power tillers, and distribution of specific spare parts in local market is very limited.

Possibility of repair and maintenance by local mechanics

Since YANMAR's power tillers were installed in the past by the 2KR program, the tillers are well recognized in the sales target area and many farmers are still using them. Based on this background in the target area, local mechanics have experience in repairing horizontal water-cooling single-cylinder diesel engines, and it is expected that they can repair similar engines by utilizing local mechanic network. When the survey team conducted interviews with local mechanics in the targeted irrigation scheme area, they replied that if the basic mechanism of the mini-combine is same as the power tiller, they can basically repair mini-combine's diesel engine.

Possibility of local spare parts procurement

There are still a certain number of workable power tillers that were installed by the 2KR program in target irrigation scheme areas. The survey team interviewed farmers who are still using YANMAR's machines and asked about the current situation with spare parts. Initially, at the beginning of the survey, it was expected that many imitated spare parts would be available from Thailand or China. If so, users of YANMAR's machinery would have more choice outside of expensive official spare parts. However, based on the interview and survey, there were no spare parts shop who sells even imitated new parts. Most users procure necessary spare parts by picking up spare parts from broken scrapped machinery or requesting to local workshop to custom make imitated parts. It is expected that the distribution of unofficial spare parts will increase from sales of YANMAR's machinery in future.

However, in the near term, an exclusive agent should stock official spare parts to fulfill demands of spare parts from customers.

#### Feasibility survey of candidates for exclusive agent

An exclusive agent of YANMAR's agricultural machinery should have appropriate corporate status to promote and expand commercial sales business. The agent should be selected considering comprehensive enterprise power including financial ability, customer service network, sales network and self-organization.

Throughout the survey, the proposed company selected a likely candidate as an exclusive agent. They are expected to provide continual after-sale service, local attachment manufacturing and local assembly for further cost reduction, by contract with candidate agent. Regarding customer service and maintenance, local mechanics in the sales target areas should be utilized for prompt customer support. The selected exclusive agent will play a significant role for local resource networking and improvement of their technical skills through seminars. The major candidate exclusive agent is providing original credit sale system to large-scale agricultural machinery customers currently. The proposed corporation will discuss about the possibility of a loan scheme and stocking of spare parts for YANMAR's small-scale agricultural machinery with the candidate agent.

#### Durability test

A durability test with YANMAR power tiller and a Chinese competitor power tiller was conducted to compare efficiency of operation and fuel consumption by operating both machinery and measure spending time for maintenance, repair and spare parts exchange at a pilot test farm in Nsawan. The Chinese power tiller sank and got stuck in a wet paddy field because of its heavy weight. The operation of the Chinese power tiller was hard to manage and it takes time for operation of land preparation compared to YANMAR's one. After procurement of local manufactured wheel cage in Asutuare for the Chinese power tiller, the durability test could restart.

Regarding the rotary blade, the Chinese one has less resistance to abrasion and it required more blade changes. The YANMAR power tiller showed 25% less fuel consumption than the Chinese tiller. Based on these results of the durability test and other survey, it is possible to pay off initial investment if purchaser operates the machine for 2 years for own farming activity and providing machinery service, despite the higher initial price with the Chinese one. Considering that the economic durable life of the power tiller is 10 years, there are economic benefits for farmers who are willing to use the machine. In fact, many farmers in Kpong irrigation scheme area who installed YANMAR's power tiller from the 2KR program are still using the machine more than 10 years later. This situation reinforces the toughness under actual farming operation in Ghana.

### **3) Business model**

Basically, there is no change of business model for commercial agricultural machinery sales business as planned. However, there are some new findings through this survey. Before starting this survey, the team assumed that the introduction of agricultural machinery will contribute to increase rice yield in target area, but the yield of rice production in the area is higher than expected due to ongoing technical assistance from JICA project. Therefore, there is limited capacity to increase rice



yield through technical support by local NGO. The implementation of cultivation assistance by local NGO will be considered depending on actual demand from farmers in the area.

On the other hand, the initial business plan was mainly focusing on power tillers as the sales target, but this sales plan will be postponed because of the widespread instillation of new Brazilian power tillers under governmental loan agreement. Under this circumstance, the focus will shift more to other agricultural machinery to create an agricultural machinery value chain (power tiller, mini-combine and rice miller) to avoid relying solely on sales of power tiller. This value chain contributes to increase and stabilize farmers' income by operation of different types of agricultural machinery all year round. Additionally, this chain will be the base for scaling-up from small type to medium and large-scale machinery.

There is no change towards target customers who are middle and upper class of BOP, but the business will expand out to upper and lower class through those layers. Naturally, there is no hesitation to sell to upper or lower class customers if they have enough paying capacity. However, upper class has larger cultivation areas where tractors would be more suitable (not power tillers in general). Moreover, lower class has more uncertainty of financial ability and it is necessary to conduct evaluation of solvency. For these reasons, initial sales customers are still targeted to MOP layer and upper BOP layer.

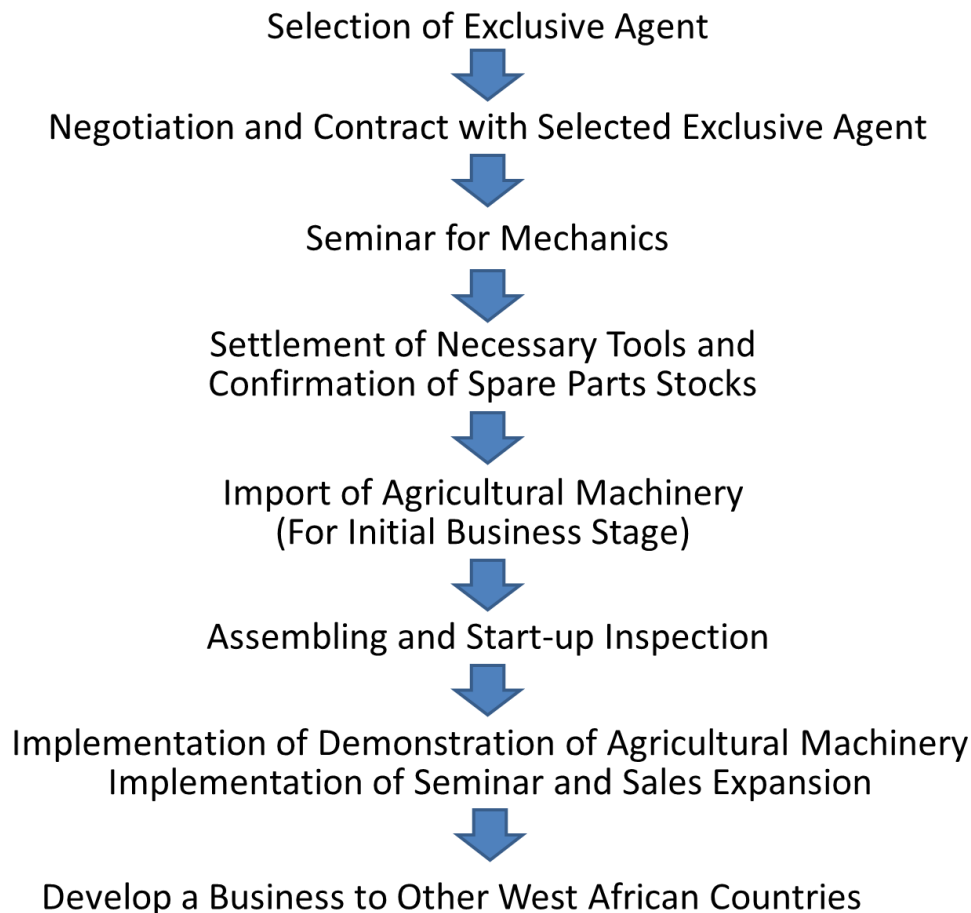
#### 4) Remaining tasks and solutions

When this survey was completed, YANMAR is going to discuss about condition of contract with candidate exclusive agent and conclude a treaty about regarding agricultural machinery sales. After the contract with the exclusive agent, YANMAR is planning to upgrade level of after-sale service by implementing technical seminars for mechanics within the exclusive agent by Japanese engineer able to recognize technical level of mechanics. Those technical staff members will then conduct technical seminars for local engineers in sales target areas to strengthen the support network for customers. At the same time, YANMAR is going to confirm the possibility of local production through trials of attachments for power tiller (such as trailer) in order to realize sales price reduction.

Item	Remaining Topic	Solution / Countermeasure	Schedule	Main (Sub)
Distribution, Sales, Marketing	Selection of an exclusive agent	Discuss about condition of contract with a candidate for exclusive agent	~ September 2020	Yanmar / Exclusive agent
	Sales promotion	Implement a demonstration of Yanmars' machinery	~ September 2021	Yanmar / Exclusive agent
Local Manufacturing	Confirm possibility of local trailer production and procurement	Trial production of trailer for Yanmar's power tiller by Indian agricultural machinery company	About 1 year after the contract with exclusive agent	Yanmar / Exclusive agent
	Confirm possibility of local leveling machine (attachment for power tiller) production and procurement	Selection of local producer, Trial production of trailer for Yanmar's power tiller	About 1 year after the contract with exclusive agent	Yanmar / Exclusive agent
Service, Maintenance	Settlement of branch shop which covers target sales area	Discuss with an exclusive agent (Basically agreed about branch)	~ September 2020	Exclusive agent (Yanmar)
	Increase technical level of mechanics	Seminar for mechanics in an exclusive agent	About 2 years after the contract with exclusive agent	Yanmar / Exclusive agent
Seminar for mechanics	Understand technical level of mechanics	Conduct seminar by Japanese engineer	Conduct continuous seminar (Mid-term)	Yanmar / Exclusive agent
Rice miller	Research for demand and market of rice miller (Outside the scope of this	Additional research, Planning and implementation of demonstration	~ September 2021	Exclusive agent (Yanmar)

## 5) Plan for Business Operation

The plan for commercial business operation is as considered as follows (see Figure 3). An exclusive agent will play a significant role for sales and after service in Ghana, therefore, it is necessary to select a reliable partner considering the ability of staff, financial stability and implementation system of after-sale service. The first step, selection of an exclusive agent and conclusion of a contract, is the most significant process to realize actual commercial business in Ghana.



**Figure 3: Process for Business Operation**

Source: JICA Survey Team

## 6) Suggestion for the Government of Ghana

According to a custom tariff table published by GRA in 2017 which is based on The Customs Act, 2015 (Act 891), agricultural machinery is subject to duty following order when imported; 10% for power tiller, 0% for reaper, thresher and combine harvester, and 5% for rice miller. However, those tariff rates are not well recognized to custom inspectors at the actual operational level. Therefore there are many cases that an inaccurate tariff rate (40% tariff rate as general machinery) was applied to agricultural machinery. Originally, a tax exemption system was established to accelerate agricultural mechanization in Ghana, but farmers cannot utilize the cost benefit from the system and the actual customs situation is causing a negative effect on agricultural mechanization due to the functional failure of tariff system. It is expected that a pragmatic establish tariff collection system will be established by cooperating with MOFA and GRA to realize the policy for agricultural mechanization.