

# Country Presentation Paper: Fiji Islands

## PRESENT STATUS AND PROSPECTS OF AGRICULTURAL MECHANIZATION IN FIJI ISLANDS

**Penaia Mua, *MSc.***  
Senior Research Officer  
Agronomy Section, Korinivia Research Station  
Research Division  
Ministry of Agriculture  
Fiji Islands

### I. Introduction

Republic of Fiji is a Melanesian island group located in the South Pacific at 175 degrees east longitude and 18 degrees south latitude. The islands are about 1,770 kilometers (1,100 miles) north of New Zealand. The group comprises 332 volcanic islands scattered in a horseshoe across an area of ocean some 595 kilometers (370 miles) across. Fiji has a total land area of 18,270 square kilometers (7,054 square miles), of which 87 percent is made up by its 2 largest islands, Vanua Levu and Viti Levu. Comparable in size to New Jersey, with a coastline of 1,129 kilometers (702 miles), Fiji has more land mass and people than all the other Melanesian islands put together. The capital of Fiji is Suva (pop. 77,366), on the southeast shore of the island of Viti Levu. The country's highest point, also on Viti Levu, is Mt. Victoria (Tomanivi) at 1,324 meters (4,344 feet).

### Population

Fiji's population was estimated in 2000 at 832,494, up from 775,077 in 1996, and 715,375 in 1986. If its annual growth rate of 1.41 percent continues, Fiji's population will have passed the million mark by 2014. Relatively high standards of health care have given Fijians a life expectancy at birth of 67.94 years, with an infant mortality rate of 14.45 per 1,000. The population remains young, with a median age of 21; about 34 percent of the population is clustered between the ages of 5 and 20.

Only a third of Fiji's 332 islands are inhabited, and three-quarters of Fijians live on Viti Levu, the largest of them. In 1996 53.6 percent of the population lived in rural areas and 46.4 percent in cities. Of the latter group, 46.7 percent, or a little less than a quarter of the total population, live in the greater Suva district. The other main urban center is Lautoka (pop. 36,083), on the northwest shore of the island of Viti Levu.

Fiji's ethnic composition is largely split between indigenous Melanesian Fijians, who constitute a narrow majority (51 percent), and those of Indian descent (44 percent); the remaining 5 percent is comprised of Europeans, Chinese, and other Melanesians. Fiji's religious situation reflects this division: 52 percent are Christian (including 37 percent Methodist and 9 percent Roman Catholic), 38 percent Hindu, and 8 percent Muslim.

Fiji enjoys two seasonal climate conditions (hot wet and cool dry) with rainfall averaging 1,500mm to 4,000mm annually. The topographic effect means that much of the rainfall is within the windward side of the islands. Up to 80% of the rainfall is recorded in the wet season and 20% in the dry season.

Agriculture has been the backbone for Fiji's economy over the past decade. However, its contribution to the national GDP has declined from 20% to around 16% recently. This has been mainly due to shift of labour force from farming to other sectors such as tourism, manufacturing and the garment industries.

Food security had become an increasingly important agenda especially with the climate change in the island countries in the South Pacific. Modernizing the agriculture industry requires infusion of the needed agricultural infrastructures, development of agricultural enterprises and mechanization in the countryside. As in the experience of other advanced countries, agricultural mechanization played a key role in raising production and market efficiencies. Of all the modern agricultural technologies introduced however, mechanization is probably one of the most controversial. Mechanization is usually blamed for escalating rural unemployment. The trend however, that most of the younger generations is now more inclined to 'urbanization' will make mechanization a very important agenda to help attain food security. Due to the tedious nature of work involved in the agricultural sector, agricultural mechanization plays a pivotal role in sustaining this industry.

## **II. Status of Agricultural Mechanization in Fiji**

Generally, the level of farm mechanization in Fiji remains low compared to other Asian countries. Majority of the farmers in the country mainly relies the contributions from human, and animal powers and minimal from mechanical power.

### **Looking back at the history of agricultural mechanization in Fiji**

1. During the colonial era, mechanized farming where animal and machine powers were extensively used was mainly focused in sugarcane belts of Western parts of Viti Levu and Vanua Levu islands of the country. In other areas of the two main islands and outer islands, farmers were just reliant on farm hand tools and animal power.
2. After the post independent of Fiji, four-wheel tractors, and associated farm machinery and equipment were introduced to meet the new challenges in sustainable development of the agriculture sector. Introduction of large four-wheel drive tractors and associated machineries and equipment in the sugar industry was a major challenge for the benefit of the industry. Use of these machines was concentrated in the sugar industry, which enjoyed assured market in the United Kingdom. Large scale mechanization activities were also undertaken by the Native Land Development Corporation (NLDC) and Ministry of Agriculture, Sugar and Land Resettlement.
3. Towards the end of the last century, more sophisticated and appropriate agricultural farm machineries and equipment were introduced to meet the demands of the modern agricultural farming. A wide range of farm machines and associated equipment were available and introduced in the country from various company dealers, but without much emphasis on applied research for testing and evaluation on the applicability and appropriate use of these machines to suit our local conditions.
4. With the down-fall of NLDC operations, and deregulation of the rice industry in the early nineties, the mechanization priorities within the ministry also had a setback.
5. Then Ministry made an effort for a proposal to revive the farm mechanization project under the Commodity Development Framework (CDF) programme. But the proposal was not able to progress and has been shelved due to the

funding constraints. The potential of the farm mechanization can be realized should the Government pursue to support the proposal in the near future.

### **III. Need for Mechanization**

Farm mechanization continues to play pivotal role as part of the agronomical practices to ensure economic viability of the agriculture sector.

Fiji farmers had been struggling for ages to transform agricultural farming practices from traditional method of production to modern farming technologies. The mechanization technologies are very efficient and thus yields higher farm returns in terms of export earnings and as food security.

The importance of using the appropriate tools and machines in farm operations cannot be overemphasized, as mechanization increases labor efficiency, eases-up the drudgery of farm work, saves time and promotes technical accuracy. Moreover, the level of mechanization technology increases as the source of power shifts from human to animal to mechanical power.

### **IV. Overview of the statistic system for agricultural mechanization in Fiji**

#### **1. Responsible agency:**

There are three (3) agencies/units in the Ministry of Agriculture responsible in the implementation of the farm mechanization program:

- a) Extension Division is given the responsibilities to provide farm mechanization services to the farmers but on a limited scale.
- b) Economic Planning and Statistics (EP&S) is responsible for conducting the agricultural census and market surveys of all agricultural commodities and farm machinery and equipment.
- c) Agricultural Engineering Unit Agronomy Section in Koronivia Research Station of the Research Division is responsible in research and development of appropriate agricultural engineering practices and technologies; and provide technical advice in agricultural machinery and equipment appropriate to local condition.

#### **2. Channels, ways and frequency to collect, report and disseminate the agricultural mechanization statistics**

- a) The Agricultural Engineering Unit is disseminating the results of the research and development of agricultural machinery in the monthly, quarterly and annual reports; and providing technical services and advice in the ministry especially to the Extension Division & stakeholders to the needs of appropriate agricultural machinery and equipment suitable to particular crop commodities and local conditions.
- b) The latest National Agriculture Census (NAC) was conducted in 2009 and the status of farm mechanization in the country was included in the census.

The following procedures were used in conducting the 2009 National Agriculture Census:

- The questions used in the 2009 NAC were based on previous census questions (to facilitate comparisons) and on internationally recommended questions (FAO) addressing the issues of globalization of markets, food security, poverty and gender equality.
- The questionnaire was designed and tested by the staff of the Agricultural Statistics Unit and training manuals were prepared for supervisors and enumerators.
- A Pilot Census was carried out in several locations to evaluate the content and layout of the questionnaires and the completeness of the census documents. The questionnaire and training materials were updated as the result of the Pilot Census.
- The survey design used the multiple sampling frame methodology.

This methodology combines the advantages of an area frame (complete coverage) and a list frame (rare commodities and large and special farms). In the 2009 NAC, it was expected to provide reliable results at district level for most tables, although results for smaller districts might not be possible. In addition, a small island strategy (SIS) was used where complete enumeration of villages occurred within some districts.

### **3. Quantity and quality of agricultural mechanization statistics in Fiji**

Intensive quality control programs were undertaken during the first three weeks of the census data collection in the four Divisions of the country. Divisional quality control teams were tasked with the responsibility of monitoring and evaluating the responses during interviews, ensuring that good quality data and information would be obtained from the farmer/respondent at farm level. Stringent procedures and instructions were put in place for all census teams to follow strictly in order to minimize field errors during interviews. These measures were necessary and critical in order to obtain data that would provide reliable and consistent estimates for the different types of farming systems within the agriculture sector of the country. This activity was conducted with success during the census data collection contributing to the effectiveness of the data collection around the country.

4. The National Agricultural Census in 2009 covered the 2 element of mechanization: Farm Equipment and Farm Tool in agricultural mechanization in Fiji

The level of mechanization in the country is low as shown in Table 1. The 46% of the four wheel tractors and animal power are mostly used in sugar cane farming in the country. Human power is predominantly used in root crops (Taro, cassava, sweet potato & yam) production which is the staple food of the Fijians. Small percentage of mechanical power is also used in land preparation and threshing in rice and corn farms and is being adapted in limited area. Irrigation, harvesting, and drying have also low levels.

Likewise, it was also observed that in rice production in the country, the present pool of implements and machines of the Extension Division of the ministry is mainly used for land preparation, threshing, and milling. Custom hiring of land preparation is widely practiced in sugar cane, rice, corn and vegetable growing areas in most part of the country.

**Table 1. National level of the farm mechanization in Fiji as of 2009**

Type Farm Machinery & Equipment	National Level (Total No. of Farm - 9341)	
	Equipment owned	% Level
Hand Tractor/Power tiller	293	3
Four Wheel Tractor	4289	46
Wheel Tractor Driven Plow	2667	29
Animal Driven Plow	7647	82
Hand Thresher	64	1
Rice/Corn Husker	51	1
Motorized Thresher	42	0
Hand Water Pump	340	4
Motorized Water Pump	413	4
Motorized Chemical Pump	110	1
Chainsaw	2628	28

Source: Fiji National Agricultural Census 2009

The three levels of mechanization, which include manual, animal and mechanical power technology, characterize the farming system in the Fiji. In Table 2, showed the country's mechanization level in terms of percentage of farms using the three sources of power from which they observed that:

1. Farm operations are predominantly utilizing human power in Central and Eastern Divisions.
2. Only land preparation apply mechanical power and animal power to accomplish the job in most of the sugar cane farm area.
3. Land preparation is still dominantly using animal power in some part of the Central Division. However, the use of powered machines is gaining acceptability in country.

**Table 2. The level of farm mechanization by division in Fiji as of 2009**

Type Farm Machinery & Equipment	Central Division		Western Division		Northern Division		Eastern Division	
	(No. of Farms - 2407)		(No. of Farms - 3421)		(No. of Farms - 2012)		(No. of Farms - 1501)	
	Equipment owned	% Level	Equipment owned	% Level	Equipment owned	% Level	Equipment owned	% Level
Hand Tractor	23	1.0	235	6.9	34	1.7	1	0.1
Four Wheel Tractor	237	9.8	3034	88.7	1016	50.5	2	0.1
Four Wheel Tractor Driven Plow	26	1.1	1760	51.4	880	43.7	1	0.1
Animal Driven Plow	85	3.5	5283	154.4	2279	113.3	0	0.0
Hand Thresher	0	0.0	54	1.6	10	0.5	0	0.0
Rice/Corn Husker	0	0.0	35	1.0	16	0.8	0	0.0
Motorized Thresher	0	0.0	34	1.0	8	0.4	0	0.0
Hand Water Pump	8	0.3	276	8.1	24	1.2	32	2.1
Motorized Water Pump	21	0.9	319	9.3	72	3.6	1	0.1
Motorized Chemical Pump	1	0.0	79	2.3	30	1.5	0	0.0
Chainsaw	310	12.9	1201	35.1	1102	54.8	15	1.0

Source: Fiji National Agricultural Census 2009

Imports of agricultural machinery will be increasing the coming year that includes four-wheel tractors with farm implements, engines, rice threshers and reapers.. This can be attributed to the priority program of the Ministry of Agriculture in the country to increase the agricultural productivity. This importation trend is expected to continue due to the relaxation

of import duties on agricultural tractors and engines pursuant under the program of the government.

### **ISSUES AND CONSTRAINTS IN THE ADOPTION OF AGRICULTURAL MECHANIZATION**

The current status and trends of agricultural mechanization in Fiji can be attributed to the following:

1. High cost of machines
2. Lack of promotion - lack of farmers' awareness of new mechanization technologies and the unfavorable attitudes and orientation of farmers caused by risks in adapting locally manufactured equipment.
3. Poor quality of machines due to low capability of the local manufacturing industry
4. Lack of access to formal credit facilities
5. Low income of farmers/small farm sizes - Landholding distribution in the country also affects the pace of farm mechanization.