

**VALUE CHAIN ANALYSIS IN THE**

**Rice SECTOR in sierra leone**

**By**

**Dunstan Spencer With**

**Daniel Fornah**

**September 22, 2014**

**DISCLAIMER**

**This publication was produced as a consultant report supported by the World Bank Sierra Leone Northern Growth Pole Diagnostics. It has not been formally reviewed or endorsed by the World Bank. The results presented and views expressed are the sole responsibility of the authors and do not in any way engage the World Bank**

Page 1 of 85

**Sanusi S. Deen Dunstan S. C. Spencer Chrispin E. Wilson**

**Senior Partner Senior Partner Senior Partner**

**Tel: +23276608663 Tel: +23276610441 Tel: +23276787890**

**Email:** [**sanusideen@edslimited.sl**](mailto:sanusideen@edslimited.sl) **Email:** [**dunstanspencer@edslimited.sl**](mailto:dunstanspencer@edslimited.sl) **Email:** [**chrispinwilson@edslimited.sl**](mailto:chrispinwilson@edslimited.sl)

**ENTERPRISE DEVELOPMENT SERVICES LTD**

**15 Mudge Farm, Off Sir Samuel Lewis Road Freetown ~ Sierra Leone**

**TABLE OF CONTENTS**

[**CHAPTER 1. INTRODUCTION AND BACKGROUND 5**](#_bookmark0)

* 1. [: Context 5](#_bookmark1)
  2. [: Objectives of the Rice Value Chain (RVC) Study 5](#_bookmark2)
  3. [: Scope of the study 5](#_bookmark3)

[1.4. FIELD DATA COLLECTION 5](#_bookmark4)

[1.4.1: Quantitative Data Collection 5](#_bookmark5)

[1.4.2. Participatory data collection 6](#_bookmark6)

[**CHAPTER 2. MAPPING OF RICE VALUE CHAINS 7**](#_bookmark7)

* 1. [: TRADITIONAL RICE VALUE CHAIN 7](#_bookmark8)
  2. [: MODERN RICE VALUE CHAIN 7](#_bookmark9)

[**CHAPTER 3. ANALYSIS OF RICE PRODUCTION IN THE NGP 10**](#_bookmark12)

* 1. [: RICE ECOSYSTEMS 10](#_bookmark13)
  2. [: RICE AREA AND PRODUCTION 10](#_bookmark15)
  3. [: RICE YIELDS 12](#_bookmark18)
  4. [: USE OF IMPROVED VARIETIES 13](#_bookmark21)
  5. [: USE OF FERTILIZERS AND AGRO-CHEMICALS 14](#_bookmark24)
  6. [: USE OF MECHANICAL CULTIVATION 16](#_bookmark29)
  7. [: CURRENT COST OF RICE PRODUCTION BY SYSTEM 17](#_bookmark30)
  8. [: PRODUCTION CONSTRAINTS 18](#_bookmark33)
     1. [Low use of fertilizers and the need for viable Agrodealers 18](#_bookmark34)
     2. [Current status of private sector input supply 19](#_bookmark36)
     3. [Use of mechanization 20](#_bookmark37)

[**CHAPTER 4.**](#_bookmark38)

[**ANALYSIS OF DOMESTIC RICE MARKETING AND**](#_bookmark38)[**DISTRIBUTION BY SYSTEM IN NGP 23**](#_bookmark38)

* 1. [: ASSEMBLY/TRADER LEVEL 23](#_bookmark39)
  2. [: PROCESSOR/MILLING LEVEL 23](#_bookmark41)

[4.2.1: Inventory of rice mills 24](#_bookmark42)

[4.2.2. Ownership of Rice Processing Machinery and Facilities 24](#_bookmark43)

[4.2.3: Efficiency of Rice Milling Operations 28](#_bookmark45)

[4.2.4. Adequacy of Installed rice milling capacity 30](#_bookmark49)

[4.2.5: Improving the efficiency of rice milling operations 31](#_bookmark50)

Page 2 of 85

[4.2.6. Future opportunities in the rice milling sector 32](#_bookmark51)

[4.3: DISTRIBUTION AND MARKETING LEVEL 33](#_bookmark52)

[4.3.1 Market Infrastructure and Storage 33](#_bookmark53)

* + 1. [Market Integration and pricing 33](#_bookmark54)
    2. [Marketing Margins: 34](#_bookmark55)
  1. [EMERGING (MODERN) INSTITUTIONAL TRADERS 36](#_bookmark59)
     1. [World Food Program - Purchase for Progress (P4P) program 36](#_bookmark60)
     2. [Sierra Leone Produce Marketing Company (SLPMC) 37](#_bookmark61)

[4.4.3 West African Rice Company (WARC) 37](#_bookmark62)

* 1. [THE EXPORT RICE TRADE 38](#_bookmark63)
     1. [The current informal rice export trade 38](#_bookmark64)
     2. [The prospects for expanding the rice export trade 38](#_bookmark65)
  2. [CONSUMER PREFERENCES 41](#_bookmark68)
     1. [Quality of rice sold in retail markets 41](#_bookmark69)
     2. [Premium market 42](#_bookmark71)
     3. [Institutional buyers 42](#_bookmark72)
     4. [Middle income consumers 43](#_bookmark73)
     5. [Low income consumers 43](#_bookmark74)

[**CHAPTER 5.**](#_bookmark76)

[**COMPETITION**](#_bookmark76)

[**BETWEEN**](#_bookmark76)

[**DOMESTICALLY**](#_bookmark76)

[**PRODUCED RICE AND IMPORTED RICE 45**](#_bookmark76)

[5.1. RICE IMPORTS /COSTS 45](#_bookmark77)

* 1. [BENCHMARKING RICE VALUE CHAINS IN THE NGP 48](#_bookmark82)
  2. [COMPARATIVE ADVANTAGE OF NGP RICE 51](#_bookmark84)
     1. [Input – Output Coefficients 51](#_bookmark85)
     2. [Competiveness under current conditions 53](#_bookmark88)

[**CHAPTER 6.**](#_bookmark90)

[**SUMMARY AND CONCLUSIONS : THE WAY**](#_bookmark90)[**FORWARD 54**](#_bookmark90)

[6.1. REDUCING THE COST OF LAND PREPARATION (MECHANICAL CULTIVATION SERVICES) 54](#_bookmark91)

[6.2 REDUCING THE COST OF CROP ESTABLISHMENT AND GROWTH 55](#_bookmark92)

[6.2.1 Establishing an effective and efficient agro dealer network 55](#_bookmark93)

* + 1. [Increasing the use of improved rice varieties 55](#_bookmark94)
    2. [Need to critically examine the use of input subsidies 56](#_bookmark95)

[6.3. IMPROVING THE PROSPECTS FOR GROWTH OF THE COMMERCIAL RICE PROCESSING AND STORAGE INDUSTRY 57](#_bookmark96)

[6.4 IMPROVING THE PROSPECTS FOR THE RICE EXPORT MARKET 58](#_bookmark97)

[**REFERENCES 59**](#_bookmark98)

[**ANNEXES 61**](#_bookmark99)

Page 3 of 85

[ANNEX 1: CHARACTERISTICS OF RICE ECOSYSTEMS IN SIERRA LEONE 62](#_bookmark100)

[ANNEX 2: RICE FARM SURVEY QUESTIONNAIRE 63](#_bookmark101)

[ANNEX 3: RICE PRICE DATA SHEET 68](#_bookmark102)

[ANNEX 4: BUSINESS PLANS FOR PROFITABLE RICE MILLING 69](#_bookmark103)

[1. Large Scale Mill 69](#_bookmark104)

[2: Medium Sized Mill 76](#_bookmark106)

[3. Small Scale Mill 81](#_bookmark108)

Page 4 of 85

**CHAPTER 1.**

**INTRODUCTION AND BACKGROUND**

* 1. **: Context**

The Sierra Leone Growth Pole diagnostic study identified three viable growth poles – the Northern growth pole, Coastal growth pole, and South-Eastern growth pole – to undertake coordinated investments in various sectors with a view to support self-sustaining industrialization across the country. Within these growth poles iron ore mining, agriculture, and tourism have been identified as priority sectors for driving growth and creating stable jobs

Within agriculture, rice, cocoa, coffee, palm oil, cassava and fisheries offer good potential for driving sector growth and strengthening dynamic linkages to other parts of the economy. Initial analysis by Government of Sierra Leone, World Bank Country team, and other donors resulted in the selection of Rice and Fisheries as priority sectors for value chain interventions. The process of designing strategies and business plans for these interventions however call for more in-depth value chain analysis, spanning production, processing, post-harvest industry, and trading development.

* 1. **: Objectives of the Rice Value Chain (RVC) Study**

The objective of the study is to assess key constraints along rice value chain and identify opportunities to generate greater returns and incentives for increased local and foreign direct investments. This value chain analysis builds on existing studies that have been conducted by the World Bank and other development agencies. A validation exercise is used to confirm strategic choices and/or suggest alternative options, and inform Bank strategies and interventions in rice value chains as well as policy dialogue to foster employment, growth, and competitiveness in Northern Growth Pole.

* 1. **: Scope of the study**

The main tasks performed in the study are:



Conduct of a review of existing literature on rice value chain analysis in Sierra Leone. The

review, based on materials from quantitative and qualitative sources, provides information on what is known about the structure, conduct, and performance of rice value chain.

Conduct of market analysis to examine the nature of demand for domestic and imported rice – size, segments, or potential niches – due to price and non-price factors, such as consumer preferences, current competition, market access, and quality.

Identification of potential target clients for Growth Pole interventions.

Targeted field data collection of quantitative and qualitative data in the two most important rice production systems in the Northern Growth Pole (mangrove swamps and bolilands) to help verify and complement existing information on rice value chain.







**1.4. FIELD DATA COLLECTION**

***1.4.1: Quantitative Data Collection***

Quantitative data was collected to (a) validate and update the information available in the literature, and (b) generate comparable information on medium and large scale rice producers in the NGP. A farm survey questionnaire (Annex 1) was administered to a purposive sample of about 30 farmers in

Page 5 of 85

the Bolilands and a similar number in the mangrove swamps. A price data questionnaire (Annex 2)

was used to gather price and transportation cost data from traders in daily and periodic markets in the two areas.

***1.4.2. Participatory data collection***

Qualitative methods of data collection were used to supplement the quantitative data collection. Key informant and focus group interviews were used to collect data from stakeholders as necessary. The aim was to collect information for examination of the nature of demand for domestic and imported rice – size, segments, or potential niches – due to price and non-price factors, such as consumer preferences, current competition, market access, and quality.

Key informant methods were used to obtain data from persons who have broad knowledge of the type of information being solicited on a particular topic. They were persons within a community who are knowledgeable of its services and people. key informants included stakeholders in the rice value chain such as public officials, beneficiaries of services, providers of services such as mechanical cultivation, inputs supplies, importers, etc.

Page 6 of 85

**CHAPTER 2.**

**MAPPING OF RICE VALUE CHAINS**

Two basic rice value chains (VC) for domestic rice can be distinguished in Sierra Leone, a traditional

and an emerging or more modern value chain.

**2.1: TRADITIONAL RICE VALUE CHAIN**

The traditional rice value chain starts with domestic rice production by small scale farmers in Sierra Leone, and ends with supply of rice of relatively poor quality, i.e. that cannot compare with the quality of imported rice) to both rural and urban consumers. The traditional VC is by far the most important VC, accounting for about 95% of the marketable surplus of domestic rice in the country. The flow chart is presented in [Figure 1:.](#_bookmark10) Rice supplied to consumers, can be raw milled or parboiled, usually containing impurities such as sand, “black-black”, and bran, with over 35% broken grains.

We can distinguish a number of variants in the traditional VC:

1.

local supply of rice paddy by farmers, dehusked by traditional systems (hand pounding) and

consumed in farm household or sold in local/village markets for local consumption

local supply of rice paddy by farmers dehusked in local village mills for household consumption or sold in local markets

local supply of rice paddy by farmers, with sale of paddy to village traders (assemblers) who then mill and sell to wholesalers and or retailers eventually landing in urban markets

2.

3.

**2.2: MODERN RICE VALUE CHAIN**

The emerging rice value chain currently accounts for 5-10 percent of domestic rice trade in the country ([Figure 2:](#_bookmark11)). It starts with production from small as well as large scale producers who market rice through institutional buyers such as the World Food Program, Purchase for Progress (P4P) program and the Sierra Leone Produce Marketing Company (SLPMC), or large scale producers who process and market their own produce as well as produce by neighboring farmers (e.g. Arul Company in Bo District or Abhajer Co in Bonthe District, and the West African Rice Company). The system is distinguished from the traditional system in that it delivers rice of the same quality as imported rice to consumers (no impurities and less than 25% broken grains), because quality standards have been established (P4P) or rice is milled in the more modern rice mills in Agricultural Business Centers (ABCs) or the Farmer Based Associations (FBOs) of the Rural and Private Sector Development Project (RPSDP).

Detailed description of the actors in the value chains (producers, processors, and traders), and the costs along the value chains are provided in the rest of this report.

Page 7 of 85



**Figure 1:**

**Market channels for marketed surplus of domestic rice in Sierra Leone: Value**

**Chain 1 – Traditional Rice Marketing Channels**

Note: Percentage distributions are proportions of total marketed surplus (187,000 mt) estimates by

EDS based on expert opinions using high variant for estimated marketed.

Page 8 of 85

**Flow of Paddy Flow of milled rice**

**Rural Consumers (8,000mt**

**milled rice)**

**Export Market (20,000 mt**

**milled rice)**

**Urban Consumers (78,000mt**

**milled rice)**

**67%**

**2 %**

**17 %**

**4%**

**Retailers**

**90%**

**Wholesalers**

**5 %**

**20 %**

**5 %**

**Machine Milling**

**70 %**

**0 %**

**Hand Pound**

**Hand Parboiling**

**70 %**

**Collectors/ Assemblers**

**25%**

**Rice Producers (187,000 mt paddy)**

**Small Scale Farmers (178,000 mt paddy)**



**Figure 2:**

**Market channels for marketed surplus of domestic rice in Sierra Leone: Value**

**Chain 2 – Emerging Rice Marketing Channels**

Note: Percentage distributions are proportions of total marketed surplus (12,000 mt) estimated by

the author to enter the emerging value chain producing rice that meets international standards.

Page 9 of 85

**Flow of Paddy Flow of milled rice**

**School Feeding (1,500mt**

**milled rice)**

**Urban Consumers (6,000mt milled rice)**

**80%**

**20 %**

**Retailers/Shops**

**WFP**

**Wholesalers/SLPMC**

**Machine Milling**

**25%**

**FBO/ ABC**

**75%**

**20%**

**5%**

**75%**

**Hand Parboiling**

**Large Scale Producers (9,000 mt paddy)**

**Small Scale Farmers (3,000 mt paddy)**

**Rice Producers (187,000 mt paddy)**

**CHAPTER 3.**

**ANALYSIS OF RICE PRODUCTION IN**

**THE NGP**

**3.1: RICE ECOSYSTEMS**

All but one of the one of the five rice ecosystems in Sierra Leone, the riverine grasslands, are found

in the NGP area. [Table 1:](#_bookmark14) gives the estimated distribution of the five rice ecosystems within the country and the distribution of rice area among the system in 2007, the only year since 1979 for which data on rice area distributed by ecosystem has been published. About 74% of the total land area of Sierra Leone is considered to be suitable for the cultivation of crops on a sustainable basis (UNDP/FAO, 1979). The data in the Table show that during the 1978/79 crop season less than 15% of the two important ecosystems in the NGP, the Bolilands and the mangrove swamps was under cultivation. The 2007 data shows that the proportion of both systems used has increased much more than the increase in the proportion of total land area cultivated, showing that there is a general shift towards cultivation of rice in the NGP of Sierra Leone. A summary of the characteristics of the different ecosystems is in Annex 1.

**Table 1:**

**Estimated Distribution and Use of Rice Ecosystems in Sierra Leone**

Source: \*UNDP/FAO (1979), \*\*CARD (2009)

**3.2: RICE AREA AND PRODUCTION**

As reported by EDS (2014), data on trends in food crop production are very confusing and questionable. Published figures by the USDA, show beautiful trends, indicating that rice acreage has increased but that crop yields have not increased over the last two decades, so that the production increases are due to massive expansion in area cultivated particularly during the last decade after the end of the civil war. In contrast, MAFFS and FAO data which report that crop yields have increased significantly. MAFFS data are the same as the FAO data – FAO reproduces the national statistics.

The data in [Table 2:](#_bookmark16) and [Table 3:](#_bookmark17) show current estimates of the distribution of total rice production by District, indicating that the five NGP Districts (Kambia, Port Loko, Bombali, Tonkolili and Western Area) account for around 45% of national rice production.

Page 10 of 85

**Ecosystem**

**Total Land\***

**Arable Land\***

**1978 Rice Area\***

**2007 Rice Area\*\***

**(km2)**

**%**

**Ha (1000)**

**%**

**Available Land**

**ha (1000)**

**% Arable Land**

**Ha (1,000)**

**%**

**Arable Land**

**Upland**

60,650

83.9

4,300

70.9

280

6.5

363.9

8.5

**Inland valley & Minor flood**

6,900

9.5

630

91.3

100

15.9

170

27.0

**Boliland**

1,450

2.0

120

82.8

10

8.3

50

41.7

**Mangrove**

2,000

2.8

200

100.0

25

12.5

70

35.0

**Riverine grasslands**

1,300

1.8

110

84.6

20

18.2

5.6

5.1

**Total**

72,300

100.0

5,360

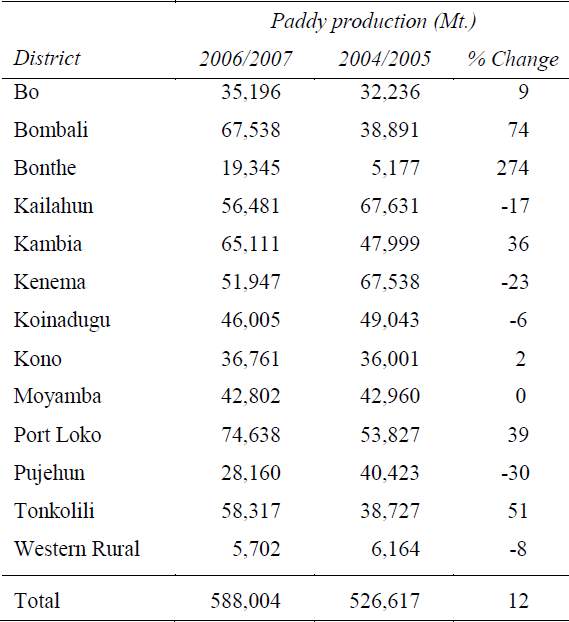
74.1

435

8.1

659.5

12.3



**Table 2:**

**Rice production by District in Sierra Leone**

Source: WFP (2008)

**Table 3:**

**Rice production by District in 2009**

Source: MAFFS (2011) ATS, Final Report

With current rice area estimates ranging between 550,000 ha and 850,000 ha (EDS, 2014), we can

surmise that area under cultivation is about double that in 1978/79, meaning that at least 70% of the arable area of rice ecosystems in the NGP is still uncultivated each year.

Page 11 of 85

**District**

**Yield**

**Area**

**Production**

**Kg/ha**

**Ha**

**mt**

**Bo** 481.8 73,097 38,405

**Bombali** 404.8 68,800 29,526

**Bonthe** 259.6 10,191 2,464

**Kailahun** 510.4 74,058 38,803

**Kambia** 431.2 66,832 30,750

**Kenema** 398.2 96,944 40,111

**Koinadugu** 609.4 60,776 35,661

**Kono** 420.2 72,166 29,620

**Moyamba** 327.8 69,379 21,894

**Port Loko** 356.4 109,587 42,524

**Pujehun** 367.4 31,739 10,640

**Tonkolili** 473 87,974 40,102

**Western - Rural** 330 4,849 1,517

**Western - Urban** 185 154

**Sierra Leone** 431.2 826,578 362,170

**3.3: RICE YIELDS**

As with area under rice cultivation, and national production, there rice yield estimates are highly variable as shown in [Table 4:](#_bookmark19)below.

A survey of rice farmers in Sierra Leone which included farmers in the NGP (Spencer et al, 2009) showed yields higher ([Table 5:](#_bookmark20)) than the national averages shown in [Table 3:Table 2:](#_bookmark17) above, with much higher average farm sizes, especially for the Bolilands which, as shown later, are partially mechanized farms. Yield for mangrove swamps are higher, almost double that for Bolis. The GP Validation survey undertaken as part of this study shows yields this year in line with the 200 averages ([Table 5:](#_bookmark20)). However all the yields, even the higher yields reported for 2008 and 2013, are substantially lower than have been demonstrated as possible in these ecosystem, indicating that there is still much room for improvement in rice productivity in the NGP. The reasons for the low yields are discussed below.

**Table 4:**

**Area and Yields of Lowland Rice from Agricultural Surveys in Sierra Leone**

Source: Spencer (2010)

Page 12 of 85

**CSO 1970/71**

**MAFFS 1984/85**

**WFP VAM 2006/07**

**ATS (2009)**

**SNAP Baseline (2010)**

**Swamp Rice**

**Lowland Rice**

**Lowland Rice**

**Lowland Rice**

**Lowland Rice**

**District**

**Ha/HH**

**mt/ha**

**Ha/HH**

**mt/ha**

**Ha/HH**

**mt/ha**

**Ha/HH**

**mt/ha**

**Ha/HH**

**mt/ha**

Bo

0.59

1.36

2.91

0.58

1.20

0.57

0.79

Bonthe

0.53

1.28

2.05

1.00

1.37

0.69

0.30

Moyamba

0.64

1.68

3.30

0.83

1.40

1.30

0.38

Pujehun

0.26

1.26

2.72

0.64

1.14

0.61

0.47

**South**

**0.52**

**1.46**

Kailahun

0.55

1.56

3.36

0.72

1.30

0.93

0.52

0.79

0.63

Kenema

0.69

1.48

3.38

0.70

1.22

0.69

0.49

Kono

0.94

1.95

3.17

0.82

1.35

1.13

0.50

**East**

**0.69**

**1.61**

Bombali

0.43

1.38

1.87

1.70

1.00

1.13

0.44

0.65

0.51

Kambia

0.57

1.24

3.49

1.17

1.65

1.30

0.49

Koinadugu

0.91

1.61

3.06

1.15

1.21

1.17

0.66

1.1

0.69

Port Loko

1.05

1.58

2.89

1.11

0.95

0.61

0.40

Tonkolili

0.46

1.26

2.43

1.23

1.01

0.77

0.54

0.81

0.61

**North**

**1.02**

**1.43**

WA

0.65

1.58

0.96

0.97

1.54

**All**

**0.83**

**0.61**

**Sierra Leone**

**0.79**

**1.48**

**2.96**

**0.97**

**1.23**

**1.01**

**0.50**

**Table 5:**

**Rice Yields in NGP**

Source: (1) Spencer et al, 2009; (2) NGP Validation Field survey

**3.4: USE OF IMPROVED VARIETIES**

Local rice varieties are well-known and have been used by farmers over a long period of time. Despite their reputation of low yielding capacities, they have their own advantages including their adaptability to local conditions. Improved rice varieties are available through the Seed Multiplication Project (SMP) and include the ROK and the new NERICA varieties disseminated by the Sierra Leone Agricultural Research Institute (SLARI). They have advantages (high yielding potential, short-cycle, palatability, high protein content) but present some constraints (short straws, harvest during rainy season, etc.) that are not well documented in the local context, making it difficult for the extension services to convey well-founded messages to the farmers, and to have a clear understanding of farmers’ constraints when these new varieties are introduced in the farming system.

A study conducted in the NGP area in 2010 (Spencer, 2010b) showed that over 80% of rice farmers in the Bolilands have access to and use improved rice varieties, but few use fertilizers ([Figure 1:](#_bookmark22) and [Figure 2:](#_bookmark25)). This implies that despite the fact that improved varieties perform best with fertilizers farmers have selected such varieties and grow them without fertilizers. Farmers also use modern varieties of other crops, with over 50% using improved varieties of cassava and oil palm.

**Figure 1: Access & Use of Improved Varieties by farmers in Bombali District**

Source: Spencer (2010b)

Page 13 of 85

Othe crops

Vegs Other Trees Oil Palm Sweet Pot Cassava

Rice

0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0

**Percent of farmers**

2008 Survey (1)

2014 Survey (2)

District

Rice Type

Area per farm

Yield

Area per

Yield

Ha

Kg/Ha

Ha

Kg/Ha

Bombali

Boli

7.3

706.1

27.9

815.9

IVS

1.8

826.4

Upland

2.5

664.0

Tonkolili

Boli

10.2

1,185.0

IVS

1.5

1,535.6

Upland

2.1

657.0

Kambia

Mangrove

3.4

1,318.8

5.1

1603.4

Boli

2.0

1,581.5

Information was obtained from farmers for the different varieties in the three ecosystems as shown

in [Table 6:.](#_bookmark23) In the analysis all local varieties were grouped together and the improved varieties grouped as the ROK series, Pa Kiamp, the NERICAs and other improved varieties.

**Table 6: Groups of varieties covered in the CARE Farmer Rice Variety Assessment Survey**

Source: Ngaujah and Spencer (2010)

The main findings of the survey can be summarized as follows:



Over 80% of farmers use improved varieties, but less than 20% use fertilizers, so farmers

have found improved varieties to use without fertilizers

The most highly rated improved variety in the three northern districts covered in the survey is Pa Kiamp, which is a very plastic variety as it is successfully grown in uplands, IVS and bolilands.

Overall the improved varieties rated as well and usually better than the local varieties

The improved varieties are rated better than locals for yield, earliness, taste and marketability in the sense that they usually command a slightly higher price in the market For height, the improved varieties are rated better in the uplands, and as good or better in the other ecologies

All the varieties, including the NERICAs are rated only slightly above poor for weed competition











The main conclusion from the survey is that in spite of the lack of use of fertilizers and other minor

deficiencies that they have, farmers assess the improved varieties as better than the local varieties and have adopted and are using them. Development agencies should therefore continue to offer the existing improved varieties to farmers as the alleged disadvantages (poor height, earliness, etc) are not substantiated by farmers

**3.5: USE OF FERTILIZERS AND AGRO-CHEMICALS**

The CARE study also showed that less than 15% of rice farmers in the Bolilands use fertilizers ([Figure](#_bookmark25) [2:](#_bookmark25)). The study by EDS in 2008 that included NGP farmers (Spencer et al, 2009) showed that, unlike the case in the Bolilands, almost a third of mangrove farmers used fertilizers and about a quarter use pesticides, mainly to control crabs ([Table 7:](#_bookmark26)). The data from the ATS ([Figure 3:](#_bookmark27)) confirm the level of fertilizer use in the mangrove swamp rice producing Districts (Kambia and Port Loko). However, application rates of fertilizers were very low, mainly under 100 Kg/ha of 15-15-15 NPK. Supplies were obtained from private sector traders who import the fertilizers and pesticides from Guinea, and provide them on loan to the farmers to be repaid at harvest in the form of supplies of paddy to the traders at agreed prices that are usually below the open market price for paddy at harvest time.

Page 14 of 85

Upland

IVS

Boli

Variety

No

%

No

%

No

%

Local

252

32.5

410

58.5

46

16.7

ROK

102

13.2

137

19.5

58

21.0

NERICA

18

2.3

20

2.9

2

0.7

Pa Kiamp

389

50.2

63

9.0

170

61.6

Other Improved

14

1.8

71

10.1

0

0.0

Total

775

100

701

100

276

100

**Figure 2:**

**Access & Use of Agro Chemicals in Bombali District, 2009**

Source: Spencer (2010b)

**Table 7:**

**Percentage of farmers using different inputs and average quantities used by**

**farmers who used the input on their largest rice field in 2008**

Source: (Spencer et al, 2009)

Page 15 of 85

**District**

**Rice System**

**Mechanical Cultivation**

**Fert**

**Pesticides**

**Plow**

**Harrow**

**Seed Harrow**

**Combine**

**Kg/ha**

**US$/ha**

**US$/ha**

**US$/ha**

**US$/ha**

**US$/ha**

**Bombali**

Boli

% Using

3.1

0.0

37.5

31.3

18.8

12.5

Average

12.5

50.1

15.8

13.5

33.0

IVS

% Using

0.0

0.0

5.9

5.9

5.9

0.0

Average

89.0

52.3

52.3

0.0

Upland

% Using

0.0

0.0

20.0

10.0

0.0

0.0

Average

16.7

5.4

**Tonkolili**

Boli

% Using

0.0

0.0

93.9

48.5

69.7

15.2

Average

33.4

25.8

15.5

206.4

IVS

% Using

0.0

0.0

0.0

0.0

0.0

0.0

Average

Upland

% Using

6.3

0.0

0.0

0.0

0.0

0.0

Average

76.9

**Kambia**

Mangrove

% Using

28.3

24.5

0.0

0.0

0.0

0.0

Average

45.9

5.7

0.0

Boli

% Using

57.1

0.0

42.9

14.3

Average

106.7

138.2

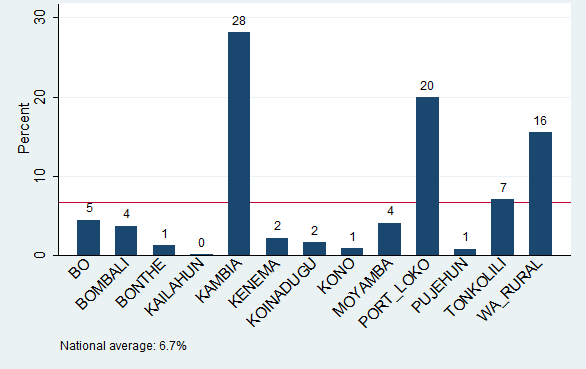
Insecticides

Herbicides

Fertilizers

0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0

**Percent of Farmers**



Source: ATS, 2010

**Figure 3:**

**Percent of households using fertilizers by District in 2010**

The GP Validation survey in 2014 showed that the use of fertilizers and agrochemicals has

increased in the Bolis to about a third of the farmers ([Table 8:](#_bookmark28)). This is the result of MAFFS fertilizer distribution during the crop season. About a third of farmers in the mangrove swamps continue to use fertilizers supplied by the private sector, as MAFFS’s fertilizers were not available to them.

**Table 8:**

**Farmer use of modern inputs in the NGP in 2013 crop season**

GP Validation Field Survey (April, 2014)

**3.6: USE OF MECHANICAL CULTIVATION**

Data in [Table 7:](#_bookmark26) shows that virtually all Boliland farmers in the Tonkolili mechanically plowed their fields in 2008. In the bolilands in Bombali the proportion was about a third. The proportion of rice farmland harrowed and seed harrowed mechanically is much less than that plowed. However the GP Validation survey shows that all commercially oriented Boliland farmers in Bombali as well as Tonkolili mechanically plowed their fields in 2013 ([Table 8:](#_bookmark28)). With all the attendant difficulties discussed later, the private mechanical cultivation service providers are successfully servicing Boliland farmers.

Page 16 of 85

**Rice Ecosystem**

**No Farmers**

**Percent of farmers**

**Fertilizers**

**Mangrove**

13

37

**Bolilands**

12

34

**Agrochemicals**

**Mangrove**

9

26

**Bolilands**

12

34

**Mechanization**

**Mangrove**

1

3

**Bolilands**

35

100

**3.7: CURRENT COST OF RICE PRODUCTION BY SYSTEM**

Data in this section is from Spencer et al (2009), who report on a survey of rice farmers located in the NGP Districts (2008 crop season), selected to represent the average rice farmers who produced both for home consumption and the market, as well as the GP Validation survey in April 2014 targeted specifically at commercially oriented farmers (2013 crop season). The data is presented in a format that would allow benchmarking comparisons with data from Senegal and Ghana, reported later. Thus, family labor is valued at the going wage rate for hired agricultural labor by farmers in the Districts covered.

[Table 9:](#_bookmark31) shows that in 2008, farm sizes of surveyed farmers ranged from 1.5 ha for Inland Valley Swamps (IVS) in the Tonkolili District to 10.2 ha for boliland farms in the same District. Mangrove swamp farms in Kambia District averaged 3.4 ha. Data in [Table 10:](#_bookmark32) shows that, as expected, the commercially oriented farmers have larger crop areas.

As indicated earlier, a relatively new development over the last decade in Sierra Leone is that almost a third of mangrove farmers now use fertilizers and about a quarter use pesticides, mainly to control crabs. However, application rates of fertilizers are very low, mainly under 100 Kg/ha of 15-15-15 NPK. Supplies are obtained from traders who import the fertilizers and pesticides from Guinea, and provide them on loan to the farmers to be repaid at harvest in the form of supplies of paddy to the traders at agreed prices that are usually below the open market price for paddy at harvest time.

About a third to a half of mangrove and Boli farmers pay rent for their field, ranging from almost US$6.700 per ha in the bolilands, to almost US$66.90 per ha for the more productive mangrove swamps. Mechanical cultivation costs in Bolilands higher in 2013 because the commercial farmers used private sector service providers who are charging a commercial rate. The GoSL subsidized service used by some farmers in the 2008 is no longer available.

The estimated cost of production per ton of paddy (husk rice) ranges from US$206.00 to US$458.00 per metric ton, depending on the system of rice production. As expected, costs are highest in the Upland rice system. Cost of production were about the same in 2008 and 2013 in the most important boliland and mangrove swamp rice production systems. The comparative advantage of these systems using existing technologies and more efficient systems are discussed latter.

Page 17 of 85

**Table 9:**

**Cost of production of NGP rice (US Dollars/metric ton) – 2008 Crop season**

Source: Spencer et al (2009). Leones converted to US Dollars at the 2008 Exchange rate (2990

Leones = US$1.00)

**Table 10:**

**Cost of production of NGP rice by commercial producers (US Dollars/metric ton) –**

**2013 crop season**

Source: GP Validation Field Survey, April 2014

**3.8: PRODUCTION CONSTRAINTS**

***3.8.1. Low use of fertilizers and the need for viable Agrodealers***

As shown earlier rice yields in Sierra Leone are very low, averaging less than 1.5 mt per hectare compared to a world average of approximate 4 mt per hectare. The need for use of fertilizers, both organic and inorganic is critical to improve and sustain crop yields for national food security. The

Page 18 of 85

**Bombali (Bolilands)**

**Kambia (Mangrove)**

Boli

Mangrove

**Crop Area (ha)**

27.9

5.1

**Cost of Production (US$/mt)**

**Land Clearing**

2.88

6.59

**Seasonal Land Prep - Mech**

81.56

0.12

**Seasonal Land Prep - Hand**

5.13

79.77

**Crop Establishment (Seed +Fert+Chems)**

61.53

45.27

**Crop Care (Weeding + Bird Scare)**

23.54

4.00

**Harvest + Post Harvest**

55.47

44.76

**Fixed Cost (Land rent + Family Lab)**

18.24

42.34

**Financing Cost**

**Total Cost of Production**

248.36

222.85

**Bombali**

**Tonkolili**

**Kambia**

Boli

IVS

Upland

Boli

IVS

Upland

Mangrove

Boli

**Crop Area (ha)**

7.3

1.8

2.5

10.2

1.5

2.1

3.4

2.0

**Cost of Production (US$/mt)**

**Land Clearing**

1.43

0.00

31.38

2.30

21.35

42.50

1.47

0.00

**Seasonal Land Prep - Mech**

43.02

13.78

5.84

72.51

0.00

0.00

0.00

40.51

**Seasonal Land Prep - Hand**

33.77

103.84

66.39

9.31

119.14

81.62

100.59

137.47

**Crop Establishment (Seed + Fert + Chems)**

36.85

33.18

30.75

67.20

28.48

48.93

45.70

88.88

**Crop Care (Weeding + Bird Scare)**

11.22

2.64

28.35

8.44

24.60

38.07

0.00

0.00

**Harvest + Post Harvest**

39.50

49.00

51.01

18.40

41.86

59.30

46.16

32.14

**Fixed Cost (Land rent + Family Lab)**

39.97

59.32

95.85

54.92

129.15

188.07

41.78

61.26

**Financing Cost**

**Total Cost of Production**

205.77

261.76

309.57

233.09

364.59

458.49

235.70

360.26

classic study by Odell et al (1974) is still the best information on the effect of fertilizers on rice

production in Sierra Leone. As shown in [Table 11:](#_bookmark35) it is possible to obtain up to 7.1 mt/ha in the mangrove swamps and 4.8mt/ha in the Bolilands if properly fertilized.

**Table 11:**

**Response of rice (kg)/ha) to N, P, K, and lime fertilization at various locations,**

**1965-1967**

**Rokupr(tidal swamp)**

7,100

5,800

6,400

6,300

3,600

**Kontobe1 (Boliland)**

4,800

3,500

4,200

4,100

1,900

**Sama**

4,200

3,900

3,800

3,700

2,100

**Kontobe 2 (Boliland)**

3,800

2,500

3,700

2,600

1,800

**Average**

4,725

4,088

4,400

4,114

2,433

Source: Odell et al. (1974)

Realizing this critical need, GoSL, through the extension service of MAFFS, has been procuring and

apparently supplying fertilizers to smallholder farmers for a long time. NGOs and other development partners’ programs have also been supporting this effort. However, this practice of state handouts of inputs to farmers is inherently unsustainable and is indeed counterproductive to the ultimate goal of agricultural transformation through commercialization. Furthermore, the practice has discouraged private sector participation in developing markets for agricultural inputs supply to smallholder farming communities. This situation calls for corrective action by the development of private agro dealers networks to serve the farming communities.

***3.8.2. Current status of private sector input supply***

MAFFS initiated an agro inputs dealership program in Sierra Leone in 2012 under the IFAD/GAFSP Smallholder Commercialization Program (SCP). The Agrodealers Strengthening Program ASP-SL was a 24 month $1.5 million pilot program managed by the Citizens Network for Foreign Affairs CNFA in USA. The Program commenced in February 2012 with the following objectives, to:



Begin developing a private network of agrodealers by establishing a one-stop-shop solution

where small holder farmers can access improved inputs (seeds, fertilizer, crop protection products), services (advice, machinery, micro-insurance, credit), and output marketing (processing, crop aggregation, packaging).

Train and certify selected entrepreneurs in rural communities as agro dealers.

Foster increased demand for improved inputs through demonstration plots, exhibitions and farmer field days;

Build and strengthen private sector associations that supply agricultural inputs, provide various member services, and advocate for member interests;

Improve access to working capital in order to increase the flow of productive inputs to farmers through the establishment of a suppliers’ credit guarantee facility;

Increase the yields of smallholder farmers through the better access to inputs and services.











The output targets of the pilot project were:



At least 40 agrodealers would be trained and certified in Bombali District, and at least 10 of

them would work in collaboration with the GoSL’s Agricultural Business Centers (ABCs),

Page 19 of 85

**Njala (upland)** 3,400 3,100 3,000 2,700 2,100

**Kenema farmer field (Upland)** 3,500 3,800 3,500 3,500 -

**Njala lower nursery (river terrace)** 4,600 3,900 4,200 - -

**Rokupr (upland)** 6,400 6,200 6,400 5,900 3,100

Location

Treatments

N P K L

-P

-K

-L

None









Providing access to improved inputs to at least 10,000 farmers

Foster increased demand for improved inputs by at least 12,000 farmers

At least $240,000 in trade credit would be leveraged through a credit guarantee facility. increase the yields of over 10,000 smallholder farmers by 40% for cereals and 50% for horticultural crops.

On average, the household revenues will increase by at least 20%.

A $30,000 credit guarantee facility will catalyse the extension of credit from supply companies to agrodealers

At least 40 matching grants would be given through a competitive application process for shop creation and expansion. The average grant size will be $750 and must be matched 1:1 by the entrepreneur.







To foster sustainability of the program the Sierra Leone Agricultural Market Development Trust

(SALMARK) was to be formed. ASP-SL was to propel SALMARK’s institutional growth by building its administrative and implementation capabilities.

For reasons unclear to observers, the project was terminated after 12 months. Actual Outputs Achieved:









17 Agro-dealers were trained and certified.

15 dealerships were established 1878 farmers were serviced

$60,000 leveraged through the credit guarantee scheme

***3.8.3. Use of mechanization***

Until recently mechanical cultivation service was provided to farmers by MAFFS. Inaugurated in

1951, GOSL intended the mechanical cultivation scheme to encourage the extension of rice production. Acreage mechanically cultivated fluctuated over the years reaching a peak of about 22,000 hectares in 1975/76. Because it was concentrated in the Riverine grasslands and Bolilands, areas with unutilized land and low population density, the scheme had no adverse effect on aggregate employment. In fact there is evidence that mechanical cultivation encouraged rural to rural migration in the 1960s and 1970s (Njoku 1971 and Whittaker 1971), and increased farm sizes resulting in higher rice output per family (Spencer and Byerlee 1976).

Unfortunately, there is also some evidence that the impact of this technology has an adverse effect on the sexual division of labor within the family. The workload of women apparently increases as they are called on to weed and harvest larger acreages while that of men fall (Spencer and Byer1ee 1977). At the national level the scheme had a negative return. The management of the scheme was very inefficient and costs were high. It was estimated that it cost GOSL up to Le 148,000 to plow one hectare while farmers were charged Le 25 (Whittaker 1971)! Very little attempt was also made to get farmers using mechanical cultivation to adopt yield increasing practices. Happily, GoSL is no longer directly providing mechanical cultivation services to farmers.

The current means of GoSL support to large and medium scale food production enterprises is the subsidization of mechanical cultivation and post harvest activities through provision of subsidized equipment hire purchase scheme currently operated through the First International Bank (SL) Limited. Through an Indian Government loan, MAFFS acquired a set of agricultural equipment which it has used to set up the Hire purchase scheme. FIB was given the following equipment for the scheme:









Page 20 of 85

265 new Indian tractors

100 used tractors Rice threshers

25 Trailers





26 Alvan Blanch 500-800 Kg/hr rice mills with accessories, stores etc

2 Indian rice 1000 kg/hr rice mills with accessories, bricketting machines, etc

All the equipment are offered to clients at a subsidized rate (40% of the cost to MAFFS), the

burrowers make a down payment of 20% of the subsidized cost, with equal yearly payment (over 15 pears for the rice mills and 7 years for the tractors and equipment), plus 4% interest, half of which is the fee to FIB.

The Hire purchase scheme has already run into some difficulties with repayments – the majority of clients have not met the repayment schedule. Management of FIB and MAFFS believe these are initial teething problems because equipment was given to clients late in the cropping season, etc., and hope to resolve them.

Currently the private sector is providing mechanical cultivation services to farmers in the Bolilands. The GP validation survey provides information on their operations which is summarized in Box 1. The data shows that private sector operators who are using machinery independently acquired claim that the mechanical services they provide to farmers is lucrative. On the other hand, service providers using the MAFFS equipment claim the service they try to provide is not lucrative due to the poor quality of the equipment obtained on hire purchase which have frequent breakdowns and

high maintenance

obtained.

costs

so

that

they

are

unable

to

service

the

subsidized

hire

purchase

loans

Page 21 of 85

**BOX 1; MECHANICAL CULTIVATION SERVICE PROVIDERS IN SIERRA LEONE**

**Abhajar Rice Development Co, Torma Bum, Bonthe District**



Company registered in 2007; Initial capital – own resources; operating capital – 18 month loan (le

500m) from FIB in 2010. Le 150m per year since then;

Equipment Owned (cash purchase):1 Chinese crawler – 100HP – (Cost US$ 46,500), 2 Massey Fergusson – 65HP (Second Hand Cost US$15,000 each), 1 Track Marshall crawler – 120HP (Second hand Cost US$ 12,000), 1 Combine Harvester (Second Hand cost $10,000 – not operational), Vehicles (1 Tipper, 1 HiLux, 2 motorbikes), 1 Wingin Rice mill (3mt.day)

Equipment from MAFFS on hire purchase (20% down payment and following year 10%): 90HP Sonaliker Tractor (2), 35HP Sonalika (4), Combine Harvesters (3 – only 1 operational)

Annual Operations: 80 ha nucleus farm for seed production and 400 ha minimum (600 ha in 2013) for out-growers. Initially 100% given on loan with repayment of 410Kg/ha for plowing + 100Kg/ha for seed harrowing. Repayment rate about 70%. Now requires cash payment of Le445,000/ha with 50% down payment.

Managers assessment: Very little response to fertilizer, even on nucleus farm; high response to herbicides but cannot get supplies; MAFFS equipment very unreliable – maintenance cost very high, so work sporadically; estimated annual rate of return on investment – 40%









**Addax Farmer Development Program & Services (FDP), Makeni, Bombali District**







FDP is a mitigation measure against loss of food security due to land acquired for Addax plantations

Equipment: 80HP 4x4 Tractors (12), Trailers (12), Diesel Threshers (32), Support Vehicles (3-4) Annual operations: plow, harrow, seed harrow, machine threshing, provide seed rice in first year only, target is about 0.104 ha/person; 25,000 people in 51 villages since 2011. Villages join the

program over a 3 year period as they were impacted. They graduate out of the program after 3 years. Estimated cost (full cost recovery for 22 departing villages) – Le50,000/hr, Farmer payments are scheduled as follows: Year 1 (zero); Year 2 (33%); Year 3 (66%), but have not been collected to date collected to date!). But graduated farmers were asked to pay full recovery cost in 2014 and demand exceeded supply



**Saidu & Aruna Bamba, Mile 91, Tonkolili District**





In operation since 2005; Capital – own sources + family members overseas

Current Fleet (all directly imported, all operational): Chinese Combine Harvester (1); 150HP MF Tractors (2); 85HP MF Tractors(3); 1 Trailer; 1 Pick-up, 1 motor bike

Annual Operations; Own farm + contract plowing for others (contract plowing fees – Le 220,000 – Le 400,000 per day + 10 gals diesel)

Managers comments: Major problems are high cost, and unavailability of fertilizers Le 150,000 – Le 200,000/50 Kg sack – not profitable to use at that price; None availability of herbicides; High harvesting losses during hand harvesting; Fleet works full time March – July; demand from out- growers exceeds supply; Operations are profitable.





**Madam Yeabu Koromah – Mile 91, Tokolili District**





Long term Trader; Capital – Own resources

Equipment: 65HP MAFFS Sonalika Tractor (1) acquired in 2010; 35HP MF Tractor (second hand imported by son)

Annual operations: 2010 (150 ha); 2011 (150 ha), 2012 (120 ha), 2013 (60 ha)

Managers Comments: Major Problems are serious break downs of tractor, therefore very high maintenance cost, this making custom plowing unprofitable – unable to service hire purchase loan; lack of labor for harvesting; expensive & unavailable fertilizer (Le 210,000/50 kg)





Page 22 of 85

**CHAPTER 4.**

**ANALYSIS OF DOMESTIC RICE**

**MARKETING AND DISTRIBUTION BY SYSTEM IN**

**NGP**

**4.1: ASSEMBLY/TRADER LEVEL**

Most rice sales take place in 2 - 3 batches a year in the farmers’ village [(Table 12:](#_bookmark40)). However about a quarter of mangrove farmers make sales in the nearby periodic (Lumor) market and chiefdom headquarter towns. Most sales is in the form of paddy to Traders (Assemblers/Wholesalers) who process the rice for sale to other traders (wholesalers and retailers). Because of the availability of small mils in the mangrove swamp areas, more farmers process their paddy and make sales of clean rice.

**Table 12:**

**Commercial Farmers Sale Points in NGP, 2013 crop season**

Source: NGP Field survey, April 2014

**4.2: PROCESSOR/MILLING LEVEL**

et. al. (2014) report on a recently completed technical and financial evaluation

Spencer

of

commercial rice processing and storage in Sierra Leone. Results are presented for the national

inventory of commercial rice processing and storage facilities in the country; an assessment of technical status of facilities using a selected representative sample of establishments serving the five types of rice production agro-ecologies in the country (mangrove swamps, river-rain grasslands, bolilands, inland valley swamps and uplands); and technical/economic assessment of the processing channels. The information collected was used to design complete packages of Small, Medium and

Page 23 of 85

**Mangrove %**

**Boli %**

**Farm Gate**

Paddy

2.9

2.9

Clean

0.0

0.0

**Village**

Paddy

31.4

74.3

Clean

25.7

2.9

**C/Dom Headquarters**

Paddy

11.4

0.0

Clean

0.0

0.0

**Periodic Market (Lumor)**

Paddy

14.3

0.0

Clean

2.9

0.0

**Makeni**

Paddy

0.0

8.6

Clean

0.0

2.9

**Freetown**

Paddy

2.9

0.0

Clean

0.0

0.0

**Total**

Husk

62.9

85.7

Clean

28.6

5.7

**Sales as percent of production**

Total

91.5

91.4

Large scale rice processing plants suitable to produce rice that will meet the quality and

environmental standards for the domestic and ECOWAS markets.

***4.2.1: Inventory of rice mills***

As part of the study, EDS conducted a national inventory of rice mills in Sierra Leone. This revealed the existence of approximately 401 rice mills installed in all the districts in the country ([Table 13:](#_bookmark44)), up from the 53 estimated to be operational after the civil war (GoSL, 2004). Thirty-eight (9.5%) of the mills are not operational, primarily because of breakdowns, or in the case of the large mills, lack of proper business plans for their operation.. As to be expected, the table shows that there is a concentration of rice mills in the major rice producing Districts which are in the NGP, led by Port Loko District with 67 operational mills, Kambia with 59, Tonkolili and Bombali with 29 and 30 operational mills respectively.

Nationally, twenty-five percent (25%) of the mills are privately owned and operated, all being small capacity mills. Within the NGP a much higher percentage (76%) of the mills are privately owned because as indicated earlier the major rice producing belts of the country are located there, an attraction for private sector investment.

The five large integrated rice milling plants, installed in Bo, Kenema, Makeni, Torma Bum and Mambolo are each of 1 ton per hour capacity. Four (4) are of Indian manufacture, installed by MAFFS, each with a Bricketing machine, while the mill in Bo is of Chinese manufacture and was installed by the Chinese Government as a gift to Sierra Leone. None of these mills is in operation for various reasons including:



The Chinese plant, the oldest, was installed in Bo town, instead of in a major rice belt where

its services would be in demand.

The MAFFS mills, though located in major rice belts of Sierra Leone, or as in the case of the Kenema mill, in the middle of a large Inland valley Swamp, are under management arrangements that do not include business plans as bases for their installation and operation.



***4.2.2. Ownership of Rice Processing Machinery and Facilities***

The ownership of rice processing machinery and facilities in the country could be classified as follows:















State Sponsored Project Mills

Agribusiness Centres (ABC) funded under the Smallholders Commercialization Project (SCP) Rural and Private Sector Development Programme Mills – World Bank funded

Government owned mills slated for privatization NERICA Dissemination Project mills

NGOs and development partners donated mills Privately owned mills

Page 24 of 85

**Table 13:**

**Location, ownership and condition of rice mills in Sierra Leone, by District**

Sizes:

Small

Med Large

= < 500Kg/hr

= 500-999 Kg/hr

= 1000Kg+ Kg/hr

Source: Spencer et. al. (2014)

1 Large Mills are all Government mills in various stages of privatization

Page 25 of 85

SCP - ABCs

RPSDP - FBOs

Private

District

No of Mills

Small

Small

Med

Large

Small

Large**1**

**Operational**

Kambia

59

13

3

17

-

25

Port Loko

67

11

2

10

-

44

-

Tonkolili

29

15

-

11

-

3

-

Bombali

30

16

-

10

-

3

Total in NGP Total

185

55

5

48

0

75

0

Bonthe

13

8

-

-

-

5

-

Kailahun

34

14

-

8

-

12

-

Moyamba

18

10

-

8

-

-

-

Pujehun

22

14

-

1

-

7

-

Bo

17

14

1

2

-

-

-

Koinadugu

23

11

3

9

-

-

-

Kenema

24

13

-

11

-

-

-

Kono

22

13

1

8

-

-

-

Western Area

5

1

1

3

-

-

-

Sub Total

363

153

11

98

-

99

0

**Not Operational**

Kambia

8

2

1

1

3

1

Port Loko

9

4

-

2

3

-

Tonkolili

2

2

-

-

-

-

Bombali

2

2

-

-

-

-

1

Total in NGP

21

10

1

3

6

-

2

Bonthe

-

-

-

-

-

-

1

Kailahun

2

1

-

-

-

1

Moyamba

3

3

-

-

-

-

Pujehun

1

1

-

-

-

-

Bo

2

2

-

-

-

-

1

Koinadugu

1

-

-

1

-

-

Kenema

5

3

-

2

-

-

1

Kono

3

2

-

1

-

-

Western Area

-

-

-

-

-

-

Sub Total

38

22

1

7

6

1

5

Grand Total

401

175

12

105

6

100

5

As shown in [Table 13:,](#_bookmark44) mills in the NGP are the small scale ABC, RPSPD or private sector funded mills,

and the large scale mills which are not operational.

***The ABC Mills***

**Agribusiness Centres (ABCs)** are established and financed under the Small holder Commercialization Programme (SPC) for farmers based organizations which constitute themselves into agribusiness groups. The groups, made up of two to four Farmer Based Organisations (FBOs) are provided with a three-compartment Agribusiness Centre (ABC) comprising of rice milling house, a store and an office. A concrete drying floor of sizes ranging from about 15m x 20m – 15x 25m is also provided in each centre, along with a water well fitted with a lift pump. Each ABC is supplied with a rice mill and generator. Some ABCs are also supplied with a power tiller, cassava grater, television and DVD player.

The largest number of rice mills in the country are those installed in the Agribusiness Centers of the Smallholder Commercialization Program. There are 175 of these mills installed. The mills are in the small size category, rated at 200 to 250 kg per hour. They are **Engleberg model mills, m**ost of which are Chinese manufactured mills made of a steel de-husking and polishing cylinder that rotates at 650rpm to 750rpm. A single blade is incorporated in the milling chamber to create the required friction for de-husking and polishing. A pair of screens at the lower part of the milling chamber allows rice husk to flow through and expelled through an aspirator. The de-husking and polishing operations are done in two separate operations, requiring the rice to be passed twice through the mill. *Rice recovery rate vary from 55% - 60%,* depending on whether the paddy is parboiled or not.

Most of the mills are almost all poorly maintained and managed. The mill operators are very poorly trained and do not follow any routine maintenance schedules. Furthermore, there are major conceptual drawbacks in the establishment of the ABCs which affect their operations and should be rectified if they are to achieve their agribusiness development objectives for the smallholder farming communities. These drawbacks include:



Inadequacy of space in the design of the standard building for the shop and fertilizer

storage,

Locating the trading shops for farmers’ products out of town in isolated areas rather than in the business areas of town.

The qualifications and experience requirements and appointment process of the managers of ABCs and

The nature of the group marketing arrangement for the produce of members in the Centre.







Since the ABCs are supposed to introduce farmers to modern business practices, decisions relating

to their establishment should be based on rational choices and best business practices. Given this standard, one would suggest that:



The ABC shops should not store chemical fertilizers and processed commodities in the same

room as is the current practice. . The space provided for these two products is inappropriate and grossly inadequate.

The trading points for the members’ products should be in the main market centres, where buyers normally go to purchase those items; not in the remote locations currently selected for the ABC buildings. These locations are suitable for the storage of fertilizers, processing activities and administration. But just as no serious businessman will set up his/her new shop in a remote location, such a location is equally not suitable for the trading shops of the ABCs.

Recruiting a manager to carry out a serious activity as trading the annual output of an ABC of 50 to 100 or more farmers must be done through a more businesslike process; certainly not





Page 26 of 85

through an election by farmers who are not familiar with the terms of reference required of

a good business manager. Such an appointment should be by competitive selection and appointment based on the the recommendations of a competent panel after interviewing a list of highly qualified candidates.

The ABC concept should encourage specialization for greater efficiency. In this regard, it would be beneficial to members of ABCs if they agree (contractually) to centralize the processing and marketing of all their produce in their ABCs. This will make for standardized processing and greatly increase the volume and value of products going through the ABC shops. This arrangement will also make the hiring of a well qualified manager cost effective. Fortunately, all of the above recommendations can be achieved by:

Having the ABC shops in their area market centres.

Vetting all managers and replacing unqualified ones with suitably trained managers.

Using the existing donated facilities for only for processing, storage of fertilizers/inputs and administration.

Establishing a brand name and quality standards for all ABC products.













***RPSDP Mills:***

**Rural and Private Sector Development Project (RPSDP) Centers** are funded by the RPSDP with a similar concept as the ABCs and are provided with similar equipment and facilities. In addition to a rice mill, RPSDP Farmer Based Organisations (FBOs) are each supplied with a rice thresher, a de- stoning unit and a rice cutter.

Most of the mills donated by the RPSDP are of medium size, rated around 500 Kg per hour. They are mainly Single Pass Rubber roll mills **of** SB5 – SB10 size mills that have milling capacity of about 2 tons per day manufactured in China and Japan. Instead of the cast iron cylinder employed in the smaller mills above to de-husk and polish, these mills use a pair of rubber rollers moving at high differential speeds of 1500-1650 rpm to de-husk the rice which falls vertically by gravity to the polishing chamber made of steel cylinder that rotates within a set of indented hexagonal screen. The mail also have small rice de-stoners about 3-tons per day capacity capable of removing stones and other impurities from paddy. They are driven by a 1.5HP electric motor which is powered by a 3.5 KVA generator and are basically equipped with a de-stoning screen assembly and works under the combined influence of reciprocating and vertical forces that act on the rice. If the de-stoner and cleaner are used these mills are capable of up to 70% recovery of milled rice from parboiled paddy, and can produce rice of the same quality as imported rice.

The RPSDP mills are better maintained than the ABC mills, but they are also plagued with many constraints, such as unavailability and high cost of spare parts. These have caused some FBOs to replace the mills with machines they have acquired themselves.

***Private Mills:***

Private Mills are owned by individuals without any financial intervention from Government or donors. Most of these mills are installed and operated by private investors in the major rice producing areas of the country, where the demand for milling services are high. Some are equipped with single pass rubber roller mills, but as shown in Table 14, none are equipped with pre cleaners or de-stoners and are therefore not capable of producing rice of equal quality to imported rice.

Of the 28 privately owned mills in Kambia District, eleven (11) are in Mambolo town and seventeen

(17) are located in other towns in the district.2 In Port Loko district 47 privately owned mills were

2

Tombo Wala, Rotaim Bana, Kalainkain, Robali, Rokel, Matayti, Rowolon, Makot, Royak, Yeleboya Fokol,

Malambay, Mayaki, Rotaimlol, Romando, Rokitebeh, Katainma.

Page 27 of 85

identified, of which, 42 are located in 16 towns in Lokomassama Chiefdom3 which produces an estimated 40% of the rice output of the District. Kalangba Town and Gbinti Wala in the chiefdom have the largest numbers of mills, 8 and 6 respectively. Koya Chiefdom ranks second in the District, producing an estimated 20% of the District output. Masemera and BMK are other important rice producing Chiefdoms in the District. Rice from the Lokomassama is shipped mainly to the Kono District via Bombali. From Koya Chiefdom rice is shipped to Bamoi Market in Kambia District. In the Tonkolili and Bombali Districts 3 and 4 respectively4privately owned mills were identified.

***4.2.3: Efficiency of Rice Milling Operations***

A sample of forty two mills, about 10% of small mills in the country, were visited during the EDS survey in 2013 and data collected on their operations during the preceding crop season. On the average the mills operated for 7 – 9 months during the year ([Table 14:](#_bookmark46)) with the privately owned mills operating for longer than the ABC or RPSDP established mills. While most private sector mill buildings are wooden, most of the donated mills are housed in cement block buildings. In addition, the private sector mills are in buildings which are about half to a third the size of the institution buildings. None of the mills have mechanical dryers or parboilers. None of the private sector mills have de-stoners, but half of the RPSDP and about 10% of the ABC mills have them installed. It is evident from the data in Table 14 that private sector mills have less capital investment that the institution mills. This is a reflection of Government policy of “modernizing” the sector through the Government funded projects.

**Table 14:**

**Physical characteristics of rice mill establishments in Sierra Leone**

Source: Spencer et. al. (2014)

[Table 15:](#_bookmark47) presents data on the characteristics of the mill operator/managers, showing that there is

not a great difference between managers of Institution and private sector mills – a third to half have had some basic technical training (usually as apprentices), with usually 10% or less having had any business (book keeping) training.

3 Gbinti Wala, Babara,Kalangba Town,Kabulor, Katick Wala, Mapang, Konta wala,Lumpa, Petifu Wala, Wareh Mapla, Katonga, Katoma, Kickam, Bemkia, Masiaka, Making

4 The independent estimates of the District Extension Officer and a prominent business woman in Mile 91

Page 28 of 85

**RPSDP Mills**

**ABC Mills**

**Private Mills**

**Average Months Work/year**

7

8

9

**Wooden Building**

0.0%

0.0%

60.0%

**Corrugated Iron Building**

0.0%

12.5%

0.0%

**Mud Building**

11.1%

31.3%

10.0%

**Cement block Building**

88.9%

56.3%

30.0%

**Mean Building Size (sq ft]**

1,457

1,196

576

**Mean Drying floor area [Sq ft]**

1,252

1,895

1,306

**Mills with de-stoners**

50.0%

11.8%

0.0%

**Mills with mechanical parboilers**

0.0%

0.0%

0.0%

**Mills with Dryers**

0.0%

0.0%

0.0%

**Table 15:**

**Characteristics of Managers/Operators of Small rice mills in Sierra Leone**

Source: Spencer et. al. (2014)

It is in the operation of the mills as business ventures that the institution supplied mills perform

poorly in comparison to the private sector mills ([Table 16:](#_bookmark48))! While institution mills operated at an average of between 1% -2% of their monthly capacity (defined as the amount of paddy that can be milled by the mill operating for 8 hours per day, 24 days a month), capacity use by private sector mills averaged 10% with almost 50% by one of the mills. So the private mills processed over 3,500 bushels (27.3 Kg) paddy ( during the year, compared to an average of 600 – 800 bushels for the institution mills. This higher level of operation is reflected in the bottom line of the businesses. With custom rates for milling a bushel of paddy being about the same (US$1.05), gross returns (income over operating cost) at US$1,316 for private mills are four times higher than that achieved by ABC mills, and eight times higher than that earned by RPSDP mills. The situation is even bleaker when a depreciation charge of the value of the investment in the milling equipment is deducted from the Gross returns. [Table 16:](#_bookmark48) shows that while the resulting Gross Profit averages US$780 for the private sector mills, it is slightly negative for the lower valued ABC mills (-US$161), and substantially more negative for the higher valued RPSDP mills (- US$748).

**Table 16: Cost and Returns for Small Rice Mills (Leones)1 in Sierra Leone**

Page 29 of 85

Minimum

Maximum

Mean

Std. Deviation

RPSDP Mills (N=9)

Capacity Use (%)2

0.23

2.67

1.08

0.74

Milling charge per bushel3

2,000

7,000

4,722

1,439

Bushels Paddy Milled

162

1,377

605

424

Total Revenue (Leones)

372,000

5,508,000

2,781,406

1,731,022

Total Operating Cost (Leones)4

309,500

5,016,802

2,078,538

1,573,779

Gross Returns/(Loss) (Leones)

(2,192,802)

3,425,700

702,868

1,839,161

Gross Profit/(Loss) (Leones)5

(7,692,802)

(178,900)

(3,252,688)

2,415,760

ABC Mills (N=13)

Capacity Use (%)

0.00

7.33

1.89

1.92

Milling charge per bushel

3,000

6,000

4,538

967

Bushels Paddy Milled

38

3,200

817

818

Total Revenue (Leones)

190,000

19,200,000

3,832,654

4,866,379

Total Operating Cost (Leones)

41,250

7,814,000

2,384,094

2,221,055

Gross Returns/(Loss) (Leones)

(2,482,000)

11,386,000

1,448,560

3,460,118

Gross Profit/(Loss) (Leones)

(4,632,000)

9,236,000

(701,440)

3,460,118

**RPSDP**

**ABC**

**Private**

**Average Age (Yrs)**

29.00

38.38

33.70

**Male Manager**

100.0%

100.0%

100.0%

**Manager with some Business Training**

8.3%

11.8%

7.7%

**Manager with some Tech Training**

50.0%

41.2%

38.5%

Notes:

1 Le 4350 = US$1.0

2Percent of one shift capacity monthly capacity (mill operating for 8 hours per day, 24 days a month)

3Bushel = 27.3Kg;

4 Excludes depreciation cost of capital investment

5Includes straight line depreciation of cost of mill equipment over 10 years

Source: Spencer et. al. (2014)

In summary:



Millers do not take ownership of paddy for milling but provide the service on a custom basis

to traders and consumers

Milled rice produced is not of a quality to match the best quality imported rice (0-5% brokens), since none of the private sector or ABC mills have the equipment to produce that quality rice, and although half of the RPSDP mills have the necessary equipment they are not used, and the large scale mills which also have the necessary equipment are not functional. However, as noted later most of the imported rice in the market is 25%-100% brokens which all the mills are capable of producing if properly operated.

The cost of milling paddy is about the same for private and institutional mills – average Le 4500 per bushel (27.3Kg), i.e. US$37.90 per mt.

Millers do not commercialize bran from their operations as it is often of poor quality (mixed with husk and foreign matter) and there is little or no demand for it from the livestock sector.







***4.2.4. Adequacy of Installed rice milling capacity***

The EDS study shows that ***Sierra Leone has sufficient installed milling capacity.*** Even with the high estimates of production and marketable surplus (the EDS estimates), the mills installed and assessed as “operational” have enough capacity to mill all the marketed rice in Sierra Leone operating only one shift of 8 hours per day, 24 days a month and 9 months a year. The recent investments by the Government and donor partners in increasing the rice milling capacity of the country through the ABCs and RPSDP as well as private sector investments have provided the country with sufficient milling capacity to serve its needs over the next five to ten years. But the distribution across Districts is not optimal, with substantial excess capacity in Kailahun, Koinadugu, Kenema, Kono, Moyamba and Pujehun Districts. The largest deficits are in Tonkolili and Port Loko Districts. The case for investment in additional milling capacity in Sierra Leone is therefore quite weak. However, there is a very strong case for greatly increased, and more efficient use of the installed capacity.

Page 30 of 85

Minimum

Maximum

Mean

Std. Deviation

Private Mills (N=10)

Capacity Use (%)

0.27

46.67

10.35

15.58

Milling charge per bushel

2,500

8,000

4,850

1,733

Bushels Paddy Milled

156

15,680

3,555

5,033

Total Revenue (Leones)

933,600

39,200,000

12,886,160

13,138,013

Total Operating Cost (Leones)

1,000,080

29,524,200

7,159,830

8,802,714

Gross Returns/(Loss) (Leones)

(66,480)

17,276,000

5,726,330

6,635,822

Gross Profit/(Loss) (Leones)

(2,216,480)

13,276,000

3,391,330

6,295,093

***4.2.5: Improving the efficiency of rice milling operations***

The **technical situation** of rice mill establishments as indentified in this study can be summarized as follows:



The concrete drying floors provided at the ABCs and RPSDP Centres in the communities have

encouraged some farmers to dry their rice on them before milling, thereby reducing the incidence of contamination of rice with impurities, but a lot of farmers still dry their rice on tarred roads and in some cases on bare ground, resulting in contamination of paddy

The parboiling methods in Sierra Leone are out-dated and crude; a lot of heat energy is lost to the ambient environment during parboiling process resulting in higher costs due to absence of insulation system; and there is Low durability of parboiling equipment due to lack of knowledge to maintain them. Improved methods using simple equipment are generally lacking, even in the Government provided large mills, and are needed.

The engines being used to provide power to the milling machines are outdated models which overheat quickly due to absence of radiators and effective cooling systems. As such, operators have to stop periodically to replace the cooling water.

Farmers and entrepreneurs (middle men that buy paddy and process paddy) mostly refuse to use the de-stoners provided at the processing centers, hence a lot of contaminants are still found in the milled rice in Sierra Leone

There is a lot of breakage of both raw milled and parboiled rice especially with the Engleberg mills due to lack of conditioning of rice before milling, and the recovery rates for both raw and parboiled milled rice are low.

Although broken rice is marketable and fetches higher prices, millers do not separate or grade milled rice.

The milled rice contains a lot of dust in the form of husk and bran especially with the rice milled by the Engleberg mills.

The quality of the parboiled milled rice is poor in terms of appearance and cooking qualities.

The running costs of all the mills were observed to be minimal. However, the rubber roll mill seems to require more maintenance cost from frequent wear of the rollers, polishing bars and sieves.

The storage facilities used by traders in rice markets are poor and there are no strategic storage facilities e.g Silos and warehouses in the country

Most of the large mills are not in operation, not because of unavailability of paddy, but due to lack of an arrangement or mechanism for getting paddy supply from the rural farming communities.

Some of the mill operators do not have basic training in running the mills

Almost all rice threshers in the country are lying idle while traditional methods, which result in high post harvest losses, are employed

























The **economic situation** can be summarized as follows:



Private sector mills have less capital investment that the institution mills. This is a result of

Government policy of “modernizing” the sector through the Government funded projects. On the average the mills operated for 7 – 9 months during the year with the privately owned mills operating for longer than the ABC or RPSDP established mills. While institution mills

Page 31 of 85

operated at an average of between 1% -2% of their monthly capacity (defined as the amount

of paddy that can be milled by the mill operating for 8 hours per day, 24 days a month), capacity use by private sector mills averaged 10% with almost 50% by one of the mills. So the private mills processed over 3,500 bushels (27.3 Kg) paddy ( during the year, compared to an average of 600 – 800 bushels for the institution mills. This higher level of operation is reflected in the bottom line of the businesses.

Why are the institution supplied mills performing so poorly, compared to the private sector mills? The answer lies in the lack of entrepreneurial drive of the managers and beneficiaries of the institution mills, and the poor location of most of the mills relative to the sources of supply of paddy for custom milling. The vast majority of private sector mills are located in the Scarcies area (Kambia & Port Loko Districts) the major surplus rice producing area of the country, while the institution mills are distributed all over the country, obviously for social and political reasons, but with sometime difficult access to sufficient customers for higher capacity use.



***4.2.6. Future opportunities in the rice milling sector***

The problems of the rice milling sector, identified and discussed above, can be solved mainly in the following ways:



Modernization of existing Small, Medium and Large Scale Processing Centers in major rice

production zones of the country, to equip them with the full complement of milling equipment. This should include provision of improved mechanical parboiling systems.

Provision of appropriate storage facilities- warehouses and Silos. The Sierra Leone Produce Marketing Company should be capacitated to erect and manage public warehouses and silos in the major rice producing districts, in association with the private mills.

Training should be provided in improved modern rice processing technology especially on threshing, parboiling, drying and milling, including in the organization and management of paddy supply systems for:

Extension officers in all the Districts who will go to the communities to train the farmers Small and Medium Scale Processing groups who will directly apply them in their mills

Full privatization of all institution mills (ABC, RPSDP, etc.). The analysis clearly showed that institution operated mills are inefficient compared to the privately owned and operated mills











**Business plans** (BPs) for profitable private sector operation of the model mill establishments

examined in the EDS study, demonstrate, using state-of-the-art technologies, how rice can be marketed and sold profitably, by ensuring that the most effective and efficient processes are employed (see Annex 3). The models are for large, medium and small scale businesses that purchase enough paddy rice in bulk during the buying season that normally lasts from November to March for milling during the rest of the year. Sufficient storage capacity is required to enable the Companies to store enough paddy to keep the mills busy for 280 working days. The rice will be marketed through different channels. To achieve a reasonable level of profitability (around 12% for small mills to 25% annual return on equity capital for small and large mills) the businesses must:



Make significant capital investment in structures and equipment ( $230,000 for small mills to

$2million for large mills

Have sufficient operating capital to purchase and store paddy over a five month period for milling and sale of the product throughout the year (equity and loans amounting $130,000 for small mills up to $2 million for the large mill)



Page 32 of 85

**4.3: DISTRIBUTION AND MARKETING LEVEL**

The EDS rice marketing study (Spencer et. al., 2014) provides all the necessary information on rice marketing in the NGP, summarized below.

***4.3.1 Market Infrastructure and Storage:***

About two-thirds of daily and periodic retail markets in Sierra Leone have market buildings. However, almost half of periodic markets have no market stalls of tables with most retailers displaying their goods on the ground. Water and sanitation facilities in markets are inadequate: About a third of daily markets and over half of periodic markets have no toilet facilities Over half of both daily or periodic markets have no source of drinking water. Only about 10% have taps. However, market buildings are often not used by retailers. Although there are permanent buildings with cement walls and corrugated iron sheets in about 80% of markets in Sierra Leone, about 70% of the rice traders in the markets, and 60% of traders in general, sell outside the structures. Traders give a variety of reasons for not selling in the market structures including the inappropriateness of the structures (too hot etc), poor accessibility to customers, etc. But the most often cited reason is that they will be disadvantaged if they locate in the buildings as customers would be high jerked by other traders who display their wares outside the market on the foot paths into the market. This calls into question continued investment in market infrastructure

A concerted campaign called for to:



Locate and design structures according to requirements of traders (need strong

consultations)

Create conditions that remove incentives for traders to sell outside the structure (e.g. grouping traders by commodities, and enforcing no street trading laws)



**Storage Use:** Most retailers store produce overnight in their homes. Virtually all rice traders have

access to storage facilities and store produce at least overnight. Very few traders (less than 2%) report that they do not have access to storage facilities and must sell all their stock the same day. But the majority of retailers store their commodity overnight in their homes. Next in importance for retailers (about 15% of traders) is storage in a communal facility in the market owned or rented by their Traders Association.

Although home storage provides security and reduces risks of losses to retailers, it is an inefficient commodity storage strategy. Markets should have sufficient and secure storage facilities which can be rented by Associations for use by their members.

***4.3.2. Market Integration and pricing:***

Rice markets have a fair degree of integration in the country. Analyzing price trends, volatility and seasonality, there are indications that the rice market in Sierra Leone is fairly well integrated. There are also indications that the price of locally produced rice is determined by the price of imported rice in addition of course, to the level of production in the country. In addition to the international price for imported rice domestic transportation cost play a part in determining imported rice prices in the different urban areas of the country.

**Market entry:** The study found no evidence of significant entry barriers.

**Credit constraints:** Lack of capital and credit are the most important factors constraining retail rice market expansion.

**Rice price setting:** Wholesale and retail rice market price setting is not collusive, but there are questions relating to price setting by importers. There is some recent evidence that there may be collusive behavior among rice importers.

Page 33 of 85

***4.3.3. Marketing Margins:***

The data in [Table 17:,](#_bookmark56) [Table 18:](#_bookmark57) and [Table 19:](#_bookmark58) show the Gross Marketing Margin (GMM) for an average transaction, defined as the percent difference between the value of sales and cost of purchases. As a gross margin measure it is not a true profit measure as traders must cover their fixed cost, and other variable costs out of the revenue. The main fixed cost items are market dues for retailers which should be spread over all the commodities traded, and storage costs. Other costs not reflected in the analysis are local cost of transporting goods from point of purchase as well as to and from stores daily.

Retailers of imported rice purchase their supplies in bags from wholesalers. The average transaction size for retailers is between 1-2 bags of rice ([Table 17:](#_bookmark56)). However retailers of local rice mainly purchase their supplies from sellers in periodic markets (farmers and traders) in cups – 95% of transactions for local raw milled rice and 75% of transaction for local rice ([Table 19:](#_bookmark58)).

Generally margins are higher for retailers of imported rice compared to retailers of local rice - around 24% for imported rice and 15% for local rice ([Table 17:](#_bookmark56) and [Table 18:](#_bookmark57) However, wholesalers of local rice earn a higher margin (20-30%) than wholesalers of imported rice (about 8%). ***The GMM shown in the tables are not considered as excessive, and indicate that the rice trade in Sierra Leone, which is completely in the hands of the private sector, is competitive at both the wholesale and retail levels.***

**Table 17:**

**Marketing margins of imported rice traders for an average transaction**

Notes: (a) 1 bag – 50 Kgs of imported parboiled or raw milled rice

Source: EDS field survey, July, 2013

Page 34 of 85

**N**

**Minimum**

**Maximum**

**Mean**

**Std. Deviation**

Parboiled Rice

Retailers

Quantity purchased (Bags) (a)

60

1.0

5.0

1.4

0.9

Duration of stock (Days)

59

1.0

14.0

5.2

3.9

Cost of purchase (Leones)

57

118,000.0

800,000.0

197,298.2

139,529.1

Value of sales (Leones)

58

140,000.0

1,040,000.0

260,510.3

175,605.1

Gross Marketing Margin (%)

57

7.1

41.7

24.6

7.1

Wholesalers

Quantity purchased (Bags)

45

2.0

300.0

35.5

49.2

Duration of stock (Days)

45

2.0

100.0

16.2

16.3

Cost of purchase (Leones)

45

280,000.0

40,800,000.0

4,449,188.9

6,552,130.8

Value of sales (Leones)

44

290,000.0

46,500,000.0

4,980,318.2

7,463,088.3

Gross Marketing Margin (%)

44

1.6

20.0

8.4

4.4

Raw Milled Broken Rice

Retailers

Quantity purchased (Bags) (a)

192

1.0

10.0

1.6

1.3

Duration of stock (Days)

191

1.0

21.0

4.4

3.8

Cost of purchase (Leones)

191

112,000.0

1,200,000.0

206,968.6

158,350.6

Value of sales (Leones)

191

140,000.0

1,600,000.0

272,873.3

210,700.1

Gross Marketing Margin (%)

191

6.3

40.0

23.3

6.3

**Wholesalers**

Quantity purchased (Bags)

83

1.0

200.0

34.1

33.8

Duration of stock (Days)

82

2.0

78.0

14.4

10.8

Cost of purchase (Leones)

82

66,000.0

25,200,000.0

4,079,243.9

4,125,164.9

Value of sales (Leones)

82

68,000.0

26,200,000.0

4,451,878.0

4,419,973.9

Gross Marketing Margin (%)

82

1.2

20.5

8.5

4.3

**Table 18:**

**Marketing margins of local rice traders for an average transaction in Sierra Leone**

Notes: (a) Bags purchased (1 bag local or parboiled local rice = 60 Kg)

(b) Butter Cups purchased (1 butter cup milled rice = 0.25 Kg) Source: EDS field survey, July, 2013

**Table 19:**

**Transactions by retailers of local rice in Sierra Leone**

Page 35 of 85

**N**

**Minimum**

**Maximum**

**Mean**

**Std. Deviation**

**RAW MILLED RICE**

Purchases By Bag (a)

Quantity purchased

1

3.0

3.0

3.0

Duration of stock (Days)

1

7.0

7.0

7.0

Cost of purchase (Leones)

1

570,000.0

570,000.0

570,000.0

Value of sales (Leones)

1

648,000.0

648,000.0

648,000.0

Gross Marketing Margin (%)

1

12.0

12.0

12.0

Purchases By Cup (b)

Quantity purchased

26

20.0

1,000.0

207.0

260.0

Duration of stock (Days)

25

2.0

30.0

12.5

9.3

Cost of purchase (Leones)

25

20,000.0

820,000.0

190,088.0

236,171.7

Value of sales (Leones)

25

24,000.0

1,000,000.0

225,120.0

275,514.6

Gross Marketing Margin (%)

25

6.8

23.1

16.8

4.8

**N**

**Minimum**

**Maximum**

**Mean**

**Std. Deviation**

**Local Parboiled Rice**

**Retailers**

Quantity purchased

34

0.5(a)

3,000.0(b)

227.0

524.3

Duration of stock (Days)

34

2.0

30.0

12.0

7.7

Cost of purchase (Leones)

32

9,000.0

2,400,000.0

335,093.8

553,026.2

Value of sales (Leones)

32

10,000.0

3,000,000.0

390,375.0

672,751.4

Gross Marketing Margin (%)

32

(14.6)

25.0

13.1

8.6

**Wholesalers**

Quantity purchased (Bags) (a)

3

4.0

140.0

86.3

72.4

Duration of stock (Days)

3

5.0

62.0

43.0

32.9

Cost of purchase (Leones)

3

720,000.0

19,600,000.0

12,906,666.7

10,571,004.4

Value of sales (Leones)

3

880,000.0

28,000,000.0

17,293,333.3

14,432,537.3

Gross Marketing Margin (%)

3

18.2

30.0

22.7

6.4

Local Raw Milled Rice

Retailers

Quantity purchased

30

3.0 (a)

1,000.0(b)

206.8

255.8

Duration of stock (Days)

29

2.0

30.0

13.1

9.9

Cost of purchase (Leones)

29

20,000.0

820,000.0

199,593.1

231,161.5

Value of sales (Leones)

28

24,000.0

1,000,000.0

234,000.0

273,328.3

Gross Marketing Margin (%)

28

6.8

23.1

16.6

4.6

**Wholesalers**

Quantity purchased (Bags) (a)

1

30.0

30.0

30.0

Duration of stock (Days)

1

62.0

62.0

62.0

Cost of purchase (Leones)

1

4,500,000.0

4,500,000.0

4,500,000.0

Value of sales (Leones)

1

6,600,000.0

6,600,000.0

6,600,000.0

Gross Marketing Margin (%)

1

31.8

31.8

31.8

1. 1 bag local raw milled or parboiled local rice = 60 Kg
2. 1 butter cup milled rice = 0.25 Kg Source: EDS Field survey, July 2013

**4.4. EMERGING (MODERN) INSTITUTIONAL TRADERS**

The analysis in Section 4.3 above covers the activities of the established traders in the rice marketing sector. There are a number of new institutions that have entered the market recently and are attempting to market high quality domestic rice to compete with imported rice. Although they are minor players at present, and are high cost operators, there are prospects that they could become major players in the near future. A brief description of their operations is provided below.

***4.4.1. World Food Program - Purchase for Progress (P4P) program***

The WFP Purchase for Progress (P4P) which seeks to build the capacities of smallholder low-income farmers to increase their returns by increasing their productivity and marketing of staple food commodities, cereals, pulses (peas and beans) and oilseeds.

Globally, the P4P employs pro-smallholder procurement processes to help smallholder farmers and their organizations access the WFP market. Participating WFP country programmes earmark at least one tenth of their local and regional purchase (LRP) resources for P4P’s smallholder-friendly procurement modalities.

As of 31 December 2011, WFP has concluded P4P purchase contracts globally for over 207,000 tons of food valued at US$75 million. Purchases through P4P modalities will amount to approximately 15 percent of WFP’s total spending on local food procurement in the pilot countries over the five years (WFP, 2014)

In Sierra Leone P4P buys 20% of the 7,200 mt produce required for the school feeding program, as well as for the “Food for Assets” activity, and is currently working with the Government to expand the school feeding program into a national program feeding an estimated 1,200,000 children and requiring 34,000 mt of food annually. If the proportion of rice is maintained at 20% of the requirement, the P4P would provide a substantial market for small scale commercial rice farmers, including the ABCs.

P4P has acted as a catalyst for collective sales by Farmers Organizations (FOs), allowing the majority of organizations to sell quality processed rice in bulk for the first time. Nearly all FOs have been able to fulfil WFP quality requirements which are equivalent to the quality of imported rice, indicating the success of capacity development activities carried out by WFP and its partners.

Page 36 of 85

**N**

**Minimum**

**Maximum**

**Mean**

**Std. Deviation**

**PARBOILED RICE**

Purchases By Bag (a)

Quantity purchased

8

0.5

11.0

2.8

3.5

Duration of stock (Days)

8

2.0

14.0

9.5

4.6

Cost of purchase (Leones)

8

100,000.0

2,200,000.0

563,750.0

710,089.3

Value of sales (Leones)

8

120,000.0

2,640,000.0

621,000.0

845,948.3

Gross Marketing Margin (%)

8

(14.6)

16.7

6.9

12.0

Purchases by Cup (b)

Quantity purchased

25

10.0

3,000.0

303.8

595.3

Duration of stock (Days)

25

3.0

30.0

13.1

8.4

Cost of purchase (Leones)

23

9,000.0

2,400,000.0

265,782.6

493,934.1

Value of sales (Leones)

23

10,000.0

3,000,000.0

321,913.0

618,451.9

Gross Marketing Margin (%)

23

-

25.0

15.1

6.4

However, because local food prices in Sierra Leone are highly volatile and often more costly than the

international price of the same commodity, and because WFP’s procurement policy obligates the organization to buy maximum quantities of food at the lowest prices available, thus requiring it to set its purchase price at import parity levels, procurement from smallholder farmers in Sierra Leone has been limited. In addition, WFP’s lengthy payment process compared to direct selling at the farm gate has caused some farmers to sell their produce to other buyers, defaulting on WFP contracts (WFP, 2014).

***4.4.2. Sierra Leone Produce Marketing Company (SLPMC)***

The SLPMC was established 21 years after the demise of the Sierra Leone Produce Marketing Board (SLPMB) as a public-private sector institution to carry out some of the functions of the public SLPMB. Its share holding is 51% Government and 49% private. However, to date there has been no private take-up of shares.

The major objective of the SLPMC is to create a profitable market outlet for small farmers. But it has not been able to carry out that function to date due to a shortage of capital to effectively compete in the market, especially for cash crop exports

It has traded in the rice market, purchasing from ABCs, packaging and selling rice of the same quality as imported rice through retail shops and supermarkets. However it has faced major challenges in getting rice of the required quality from farmers. In 2013, at the request of Government to help mop up surplus rice from farmers it purchased milled rice at Le 170,000 per 50 kg bag from farmers, but has not been able to trade in the market this year as it still has some of the rice purchase last year in store.

Cost of own assembly and marketing operations per mt5:

o

Cost of purchasing paddy (include logistic cost for aggregating from many farmers) =

Le1,700,000

Cost of transportation to rice mills = Le 150,000 Processing cost = Le 340,000

Cost of grading, bagging, etc = Le100,000

Making total cost = Le 3,523,100 per mt milled rice (using 65% recovery rate) Distribution and marketing cost in urban markets (parboiled Rice/White rice)

o o o o o











Freetown Supermarkets - Le 50,000,

Makeni/Lunsar - Le 160,000, Moyamba - Le 190,000

Bo - Le 250,000

Kenema Le 350,000

***4.4.3 West African Rice Company (WARC)***

The West African Rice Company, with investors from the UK and Middle East started operations in the beginning of 2012, cultivating rice on a nucleus farm of almost 400ha in Torma Bum, Bonthe District. In collaboration with a micro finance company, WARC provides machinery and input services to a small group of out growers. Loan repayments are collected in kind (paddy). Processing is done in a small mill in Bo. In 2013 WARC produced 200mt in its nucleus farm and 100-200mt from the out-grower scheme.

5 Personal communication from Mr. Henry Kamara, MD, SLPMC

Page 37 of 85

Production costs are reported as follows6:

-

-

-

-

-

-

-

Paddy cost per bushel = ~Le 40,000

Paddy cost per kg = Le 1,600 Processing cost = ~ Le 4,000 per bushel

Kg Paddy required for 50kg bag milled rice = 83,3kg (~60% recovery rate) 50kg bag cost = Le 3,000

Paddy cost per 50kg bag = Le 133,280

Total Cost of white rice Ex-Works Mill = Le 136,280 (this translates into a white rice cost of at least 620$/mt).

**4.5. THE EXPORT RICE TRADE**

* + 1. ***The current informal rice export trade***

Rice is currently traded informally among the Mano River Union countries (Sierra Leone, Guinea, Liberia and Cote d’Ivoire). There is an apparent net flow of rice from Sierra Leone to the neighboring countries.

WFP7 reports that Kambia district of western Sierra Leone in the NGP, routinely exports parboiled local rice to nearby Conakry. Guinea’s Système d’Information sur les Produits Agricoles en Guinéee (SIPAG) estimated that on average, some 360 tons of local parboiled rice entered Guinea from Sierra Leone every month during the final quarter of 2009. WFP states that it is likely that these numbers are underestimated, as they only reflect quantities received through the border post at Pamélap. These volumes transit through Barmoi international market in Kambia.

The fact that the WFP estimate is likely to be an underestimate is confirmed by expert opinion obtained by EDS during its field survey in 2013. The Chairman of the Stores Owners Association in Barmoi, who owns 43 stores in the market and others, estimate that on a weekly basis an average of 7000 bags of 60 kg each (420 tons) of rice, is shipped from Bamoi to Guinea. An average of an additional 3000 bags (180 tons) is stored for a period of a week until the next Market weekend. These data are indicative of the order of magnitude of the trade that goes on in the periodic market. There is no data on margins earned by the Guinean traders who purchase and export rice from Kambia District. To obtain more accurate data for planning, data should be collected over a period of at least one year and analyzed.

* + 1. ***The prospects for expanding the rice export trade***

Periodically, when rice prices are high in Sierra Leone, particularly due to outside forces, there is the tendency for restrictions to be put on the exportation of rice by State authorities. It is clear that this measure has had very little, and if any, only temporary effects on rice prices. By contrast such measures have tended to undermine the long term effects of prices in stimulating production and development of regional trade. Furthermore, they are contrary to the ECOWAS treaty which provides for the free movement of people and goods across the borders of member countries.

There are good prospects for further expansion of exports to regional markets.8 Regional demand for rice is high and growing rapidly ([Figure 4:](#_bookmark66)): The 15 countries of the Economic Community of West

6 Personal communication from Mr. Emiliano Mroue, CEO, WARC

7 WFP, 2010; Cross border trade and food security: Liberia & Sierra Leone, May 2010

8 SLIEPA, Sierra Leone Investment Outreach Campaign, Opportunities for Investors in the Rice Sector, Update: September 2012

Page 38 of 85



African States (ECOWAS) annually import 4.7 million metric tons of rice valued at over US $1.2

billion; imports are projected to grow to over 6.5 million metric tons by 2020. The 5 countries in Southern Africa annually import 1 million tons of rice valued at over US$ 322 million; with imports likely to grow to over 1.5 million metrics tons by 2020.

Two factors are driving regional demand for imported rice :



Rising incomes and changing diets leading to increased consumption of rice – growth in per

capita rice consumption has increased from around 4% per year in the 1980s to over 6% in the current decade

**Figure 4:**

**Current and Projected Regional Rice Imports 1961 – 2020 (metric tons)**

Source: SLIEPA, 2012

* Expansion of domestic production is limited because of limited scope for expansion of rice acreage using current technologies; significant investment is move to more modern irrigated rice production technology

continued

needed to

Sierra Leone’s location is ideal for supplying regional rice markets ([Figure 5:](#_bookmark67)) Located at the far

Western end of Africa’s equatorial belt, Sierra Leone is closer to the main regional rice markets (1100 nautical miles to Nigeria & 3200 to South Africa) c/f the main rice exporters (4880 – 9500 nautical miles). With the Freetown Port now under private management, its natural advantages and location are likely to make it a major regional hub for shipping.

Producers in Sierra Leone have favored access to key markets:



**Informal export:** The current informal export trade is not formally taxed, although there are

informal taxes and other border transaction costs that could not be estimated within the scope of this study

Page 39 of 85

**Metric Tons**

8,000,000

7,000,000

6,000,000

5,000,000

4,000,000

3,000,000

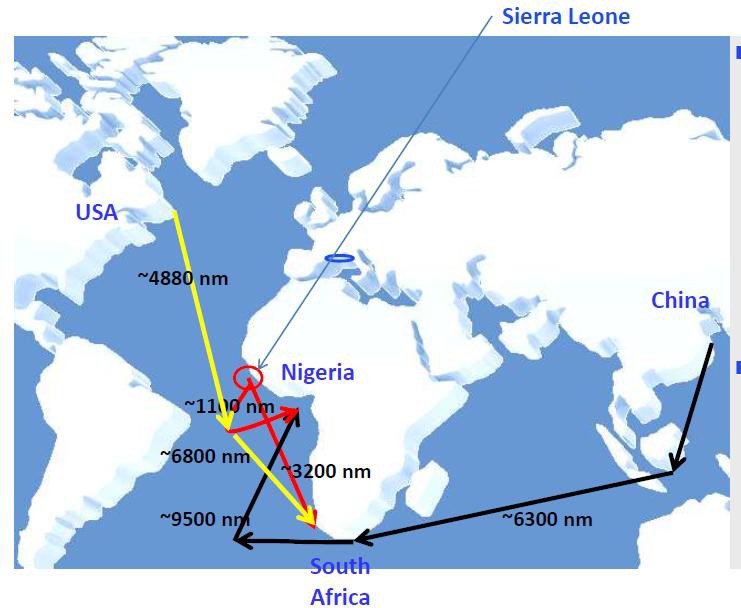
2,000,000

1,000,000

0

-1,000,000

West Africa (Current Tech) West Africa (No area expansion) Southern Africa (Current Tech)



**Figure 5:**

**Distances to major regional rice markets for Sierra Leone compared to other sources**

Source: SLIEPA, 2012



**African Union and ECOWAS trade protocols:** The ECOWAS trade Liberalization Scheme has

was established in 1979 as a first step towards the creation of a common market through the liberalization of trade by the abolition, among member states9, of customs duties on imports and exports and abolition of non-tariff barriers. AU and ECOWAS policies on the development of African rice trade are encapsulated in ECOWAP, which is building regional productive capacities and developing the region’s comparative advantage in rice production. The need to protect African smallholder producers from the challenges of the global market is central to this policy framework. At issue is what uniform tariff rate to apply across the region to compensate for subsidies that give foreign producers a price advantage over small African producers. The options are between Nigeria’s 110% and the 10% tariff band in

which rice

agreement protection

has been placed under the March 2013 joint ECOWAS/WAEMU Ministerial

on the Common External Tariff (CET), which some consider inadequate for smallholder African farmers. Other challenging issues relating to the

9 Benin, Burkina Faso, Cape Verde, Cote d’Ivoire, the Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Sierra Leone, Senegal and Togo

Page 40 of 85

development of ECOWAP include: possible WTO limitations on preferential procurement

arrangements for cereals produced by smallholder farmers; the design of regional trade defence mechanisms; the final market access offer to be made on food and agricultural products to the EU under the proposed West Africa–EU Economic Partnership Agreement (EPA).

**Mano River Union Trade Protocols:** The MRU was established in 1973 to foster economic co-operation among its member states: Sierra Leone, Liberia, Guinea and Cote d’Ivoire. The primary objective was to establish a Customs Union by creating a free trade area devoid of barriers to trade as a means of expanding the market available to its members with a view to expanding their productive capacities and growth potential. Achieving these objectives require harmonization of trade policies among the member states and developing their hard and soft infrastructures to collectively overcome challenges limiting trade within the bloc, the ECOWAS region and international markets. Trade within the union is therefore underpinned by a policy of free movement of peoples and goods across the existing borders, within framework of existing trade protocols. Rice is a strategic commodity historically traded among the member states of the union. At present the trade is largely informal but due to the importance of the cereal as the staple of the sub region, its trade needs to be formalized and regulated in the interest of safeguarding food security within the union.

**EU Market:** Sierra Leone is one of 49 LDCs covered by the EU’s Everything But Arms (EBA) agreement so producers in Sierra Leone are permitted to export all products (except arms) to the EU duty-free and quota-free.





**4.6. CONSUMER PREFERENCES**

***4.6.1. Quality of rice sold in retail markets***

The database of the National Revenue Authority (NRA) on quantities of rice imported into the country does not contain information on the quality of rice imported (whether raw milled or parboiled, or percentage broken, or even brand names which could be used to find information on quality). Neither were importers interviewed during field work able or willing to provide investigators with the quantities of different brands they imported. It was therefore necessary to undertake a small survey to collect data on brands of rice and the prices from retailers in markets in Bombali (Makeni), Kambia and Port Loko Districts (see Questionnaire in Annex 2). Using expert opinion on the quality of brands in terms of percentage broken and whether parboiled or raw milled, the data in [Table 20:](#_bookmark70) was obtained.

The data shows that over a third of the imported rice sold in Sierra Leone is of high quality (0-5% broken), with about the same proportion of 100% broken. So it would appear that the Sierra Leone market absorbs all qualities of rice in about equal proportions. Wholesale prices (sales by bag) are about 20% higher for the 5% broken than for the 100% broken, with retail prices about 15% higher. At the time of the survey, prices for local raw milled rice were about the same as the average for 5% broken imported rice although the percentage broken for local rice is higher (usually between 25- 100% broken. Local rice was therefore earning a premium in the market at the time of the GP survey, especially for parboiled rice.

Page 41 of 85

**Table 20:**

**Quality of rice in retail markets in Sierra Leone**

Notes: price are US$/Kg for wholesale (per bag) and retail (per butter cup)

Source: NGP Validation Survey, April 2014

Maren Peters (2014) provides the following description of consumer preferences in Sierra Leone by

market segments.

* + 1. ***Premium market***

More affluent local consumers and many expats living in Sierra Leone use to do groceries in one of the few supermarkets located in the urban centers. Most of them offer a wide array of varieties and different packaging sizes, ranging from 0.5kg to 25kg. Prices range from Le 3,000 to Le 88,000 per kg. Assortments usually include Basmati rice, Thai Jasmine rice, parboiled rice, local rice, fragrant rice, long grain rice, brown rice, instant rice and boil in bag rice, amongst others. The local rice offered in the supermarket are either produced by WARC or SLPMC. WARC offers rice in attractive plastic packaging of 5kg and 2kg, while SLPMC markets its rice in 5kg and 10kg bags. According to all supermarket managers, Thai Jasmine rice, offered in bags of 5kg, sells best, while sales for local rice are low. Retail prices in Supermarkets are higher than all other sales channels, since the supermarket owners retain a profit margin of about 20%.

High-class restaurants that can be found in the urban centers serve high-quality rice which is sourced either from supermarkets or from wholesalers. Most of the expensive restaurants serve specialty imported rice (basmati, Jasmine) because they believe that customers have a preference for these types. Local rice is said to be more ‘heavy’, which consumers do not like. The Radisson Blu, Sierra Leone’s most expensive restaurant, tries to create dishes with local rice, among. Most of the less expensive restaurants serve medium-quality imported rice (often 100% broken), because it is affordable, easy to prepare and believed to correspond to customers’ demand. Some of the Eco- tourism spots, serve local rice as part of their sustainability strategy and spend considerable amounts of time to clean it before preparation.

* + 1. ***Institutional buyers***

A lot of NGOs and governmental institutions try to source rice domestically as much as possible. They usually require large volumes of good-quality rice that meets international standards. With its P4P program, WFP introduced a whole project with the aim to source its requirements from local suppliers, which is very much adapted to the situation and capacity of producers. Other institutions, such as mining companies, require more reliable quality and supply.

Page 42 of 85

**Grade of rice**

0-5%

broken

25%

broken

100%

broken

All

**Imported (raw milled/parboiled)**

Sample size

35

24

35

94

Percent distribution

37.2

25.5

37.2

100

Wholesale price

0.71

0.61

0.59

Retail price

0.82

0.77

0.72

**Local – raw milled**

Wholesale price

0.70

Retail price

0.81

**Local - parboiled**

Wholesale price

0.77

Retail price

0.85

While specific requirements differ per buyer, generally, the product has to comply with national and

international food safety standards, which may be ensured through internal quality controls or, more commonly, quality controls by third parties. Since stable relationships are established with producers and traders, branding is not needed to enhance trust. Usually, the rice is cooked in large quantities as part of main dishes, thus homogenous, fast-cooking white rice is the preferred option and packaging in large bags are most convenient. Mining companies and WFP indicated a preference for a maximum of 25% broken rice.

* + 1. ***Middle income consumers***

Middle income consumers, usually found in the urban centers, commonly buy imported rice at daily or weekly markets or in wholesale and petty shops in larger quantities. Consumers with a middle income pay a lot of attention to quality and convenience. Out of this reason, many middle income consumers purchase imported rice, which does not require prior cleaning, and increasingly specialty rice for its taste. Consumers commonly develop preferences for certain brands of imported rice, which vary among regions.

In order for the local rice to compete in this segment, the product must comply with national food safety standards and credibly signal its compliance, ideally through branding and labeling. Branding and labeling also give consumers an indication for future buying decisions with regards to other product characteristics such as taste and texture: Once a consumer is convinced by a product, they look out for the same brand again and again. Since middle income consumers prefer to buy in large quantities, 25kg packaging are in high demand, next to sales made by cup on the daily markets.

* + 1. ***Low income consumers***

Consumers with a low income buy small quantities in cups on weekly and daily markets. They cannot afford high quality and are happy if they can purchase lower quality for a cheaper price, according to most market women interviewed. In urban areas, these consumers tend to buy the cheaper imported rice, while in circumstances in which local rice is cheaper, they will go for the one of lower quality. Price is the main determinant for buying decisions and all other product attributes are of less importance.

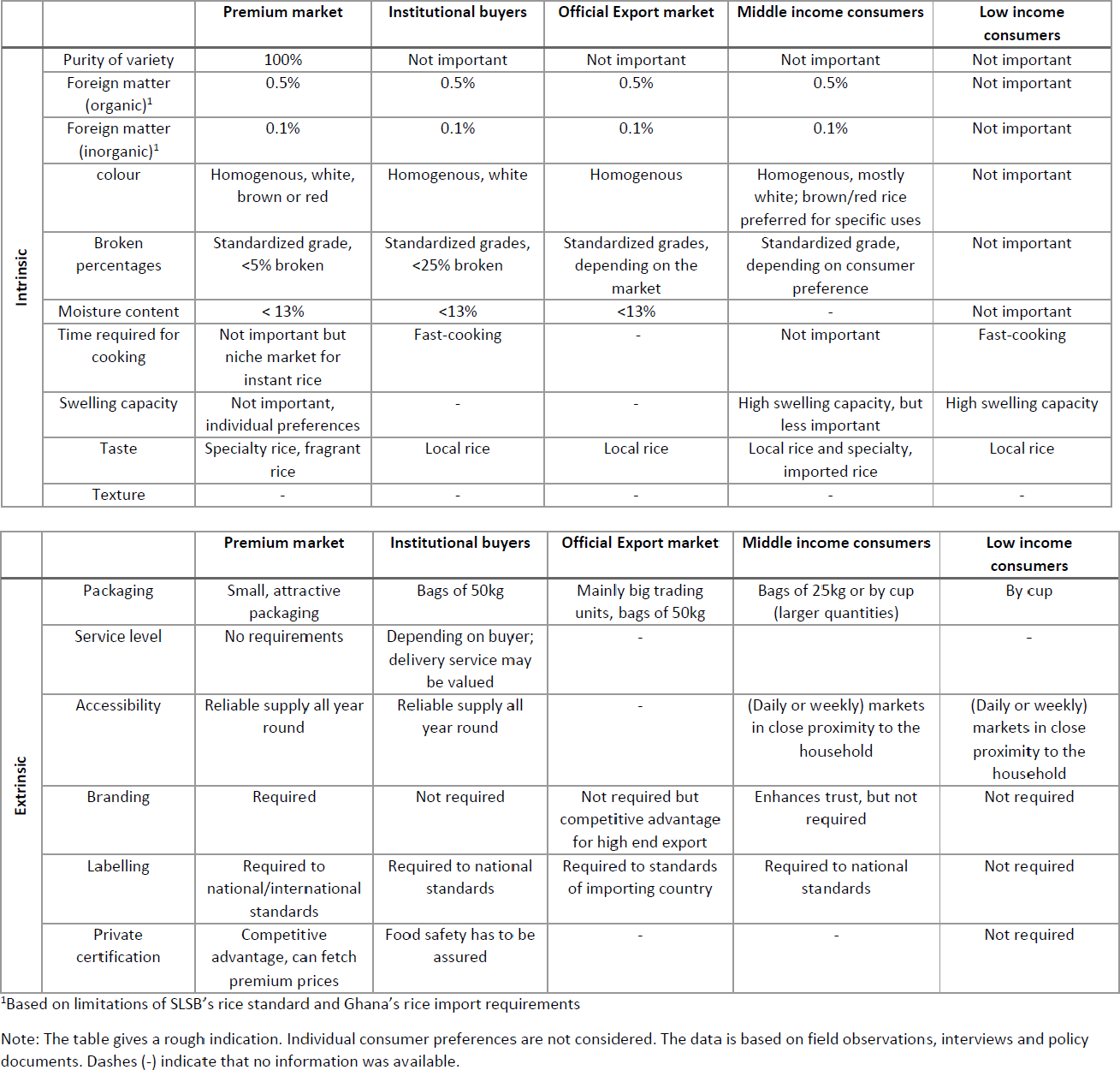
Based on field observations, interviews and policy documents, [Table 21:](#_bookmark75) gives a rough indication of the anticipated requirements and preferences of the different market segments from a consumer

perspective. While those requirements are far from official, and currently mainly only met

imported rice, they indicate attributes to work towards to strengthen the position of local rice.

by

Page 43 of 85



**Table 21:**

**Anticipated requirements and preferences for rice in Sierra Leone by segment**

**from an end buyer perspective**

Source: Peters (2014), Table 7.9

44

**CHAPTER 5.**

**COMPETITION BETWEEN**

**DOMESTICALLY PRODUCED RICE AND IMPORTED**

**RICE**

**5.1. RICE IMPORTS /COSTS**

***5.1.1 Import quantities***

[Table 22:](#_bookmark78) shows that the quantity and value of rice imports have increased substantially in the last five years indicating that claimed increases in domestic rice production have had minimal effect on imports. [Figure 6:](#_bookmark79) also shows that the six (6) largest importers of rice in Sierra Leone accounted for over 80% of all rice imports in the last two years. The situation has therefore not changed much in the last 30 years in terms of the number of importers dominating the trade, although their relative importance change from time to time10.

**Table 22:**

**Rice imports into Sierra Leone**

Source: EDS, 2014 using data from FAOSTATS, 2013 (2000-2010); NRA Database (2012-2013)

10 Four firms (Bazzy, Halloway, Hedjazi and Saad) handled all rice imports in 1996 (Spencer et al., 2007;

45

**Year**

**Import Quantity**

**Import Value**

**2000**

100,000

48,000

**2001**

125,000

60,000

**2002**

367,818

90,005

**2003**

141,204

66,141

**2004**

17,973

5,355

**2005**

80,693

21,399

**2006**

112,364

30,562

**2007**

112,257

33,875

**2008**

196,151

85,295

**2009**

106,273

45,169

**2010**

103,498

43,950

**2011**

**2012**

196,389

122,712

**2013**

237,367

134,539

**Figure 6:**

**Proportion of rice imports accounted for by the largest importers in Sierra Leone**

Source: EDS (2014) using data from NRA database

***5.1.2 Distribution of imports***

As reported by EDS (2014), apart from one11importer, all of the major rice importers are located in Freetown and do not have branches in any of the provinces. They make sales from their stores in the Western Area to wholesalers who transport consignments of rice to market centers in the Freetown and the provinces. The importers do not keep records of the destination of their sales, so it is not possible to accurately determine that proportion of imports distributed to the NGP.

Based on personal communication with some of the major rice importers, EDS provides estimates based on their knowledge where wholesalers normally carry on their business. From their estimates, approximately 40% of importers sales are made to Western Area rice traders. Provincial traders account for approximately 60% the trade in imported rice, led by the Bombali District traders who take approximately 20% of imported rice. Kenema Districts accounts for approximately 15% followed by Bo and Kono Districts which consume approximately 10% each ([Figure 7:](#_bookmark80)).

The other districts account for relatively very little (5%) consumption of imported rice. This could be explained by a variety of reasons. For example; Port Loko and Kambia Districts are surplus producers and net exporters of domestic rice to other provinces and neighboring countries. Bonthe is a combined low demand and surplus rice producing district. Kailahun has cross border trade with the Republic of Guinea, which influence the supply and demand situation in the district, etc.

11 Moussa Mroue is located on Hanga Road in Kenema.

46

**Percent of Annual Imports**

CTC

GITEX

MOHSEN

SAAD

SAMCO

CTC

GITEX

MOHSEN

MTI

SAAD

SAFCO

50.0

45.0

40.0

35.0

30.0

25.0

20.0

15.0

10.0

5.0

0.0

2012 2013

**Figure 7:**

**Proportion of Rice Imports Received by Districts**

Source: Spencer et. al., 2014, based on personal communications from major rice importers

***5.1.3 Cost of importation***

Importers claim that imported rice prices are determined by the world market prices for rice. Because it is a staple commodity, rice is imported duty free but is subject to certain taxes. These include an ECOWAS tax of 0.25%, pre-shipment inspection tax of 0.25% and a domestic sales tax of 3%. A port charge of $4 per ton is also imposed by the Ports Authority on imported rice. [Table 23:](#_bookmark81) shows the estimated disaggregation of the cost of imported rice from the CIF cost in Freetown to Makeni in the heart of the NGP using data collected in the summer of 2013 in the summer of 2013. The markup between the CIF price and the retail price in Makeni is about 60% with retailers margin (30%) accounting for the greatest proportion.

**Table 23:**

**Disaggregation of imported rice price in Makeni (25% broken, July 2-13, US$/mt**

**unless otherwise indicated)**

1. Source: NRA database
2. Source: NGP Field survey, 2014
3. Source: EDS - RPSDP rice market survey, 2013

47

**CIF Freetown (a)**

491.00

**0.25% ECOWAS tax**

0.12

**3.0% Sales Tax**

14.73

**SLPA Port Charge**

4.00

**Importers margin (%)**

14.86

**Wholesale price (ex Freetown)**

582.81

**Transport to Makeni (b)**

26.15

**Wholesalers Purchase price (Makeni) (c)**

556.66

**Wholesalers margin (%)**

8.33

**Wholesale price (Makeni) (c)**

603.05

**Retailers margin (%)**

29.95

**Retail price (Makeni) (c)**

783.67

Others 5%

Kono 10%

Western

Bo Dist Area

10% 40%

Kenema Dist 15%

Bombali

Dist 20%

**5.2 BENCHMARKING RICE VALUE CHAINS IN THE NGP**

Benchmarking is a management tool that enables organizations to examine their performance critically, in order to adopt better practices from organizations held to be market leaders. It is a systematic method by which an organization can measure itself against best practice. Armed with an appraisal of its comparative performance and strengths and weaknesses, the organization can then implement changes that confer a competitive advantage. The primary advantage of benchmarking is that is gives a clear understanding of the organization’s own processes, and measurement of those processes allows for planned improvements. But benchmarking is also a relative appraisal; it allows the comparison to market leaders and the adaptation of practices from competitors in place of in- house invention, thereby saving time and money. In that it can be multi-dimensional, benchmarking allows the comparison of many different performance measures.

In the West African rice value chain, imports dominate local production. Despite the costs of trading, freight, and duty, imported rice still outcompetes locally grown rice in Ghana, Senegal and Sierra Leone. If local rice is not competing, it would seem that benchmarking Ghanaian, Sierra Leonean and Senegalese rice against an industry leader might point to efficiencies and adaptations that could make West African rice better able to compete.

[Table 24:](#_bookmark83) presents the results of bench marking NGP rice production against the major exported, Thailand and the other two West African countries. On a yield basis, it seems that production costs in Senegal are comparable with those in Thailand for the varieties that might be exported to Africa. Rice cultivation in the Senegal River Valley is partly mechanized, and yields in the range of 5–6 tons per hectare are comparable to Thai output. Ghana, however, has substantially higher production costs that reflect the raised costs of cultivation and the lower yields. The costs in the NGP are in between those of Ghana and Thailand/Senegal The higher costs in the NGP are due mainly to high land preparations costs whether manual (mangrove) or partially mechanized (Boli), as well as to the high crop establishment costs due to high seed costs and high costs of the little amounts of fertilizers used. The data clearly point to the need to reduce mechanization, seed and fertilizer costs at farm level to enhance the competiveness of NGP rice production systems.

When it comes to off-farm processing and marketing, the data in [Table 24:](#_bookmark83) shows that the Sierra Leone value chain loses its competiveness. While processing costs are similar, marketing costs (wholesaling and retailing margins) are substantially higher than in the comparator countries. This indicates that private sector rice marketing in Sierra Leone is a high cost operation relative to comparator countries, indicating a possible point of intervention to enhance competiveness of the rice value chain.

With the current financial costs of rice production in the NGP being in the range of costs of production of the benchmarked countries, including one of the major exporting countries to Sierra Leone as discussed above, it is interesting to see whether rice production for supply of domestics and regional export markets is socially profitable, i.e. whether the NGP of Sierra Leone has a comparative advantage in producing rice for the main domestic market and for export to the main regional markets using existing technology. This is examined in the next section

48

**Table 24:**

**Benchmarking calculations for production of rice in Sierra Leone, Thailand, Senegal and Ghana**

49

**Rice Type**

**Sierra Leone**

**Thailand (b)**

**Senegal (b)**

**Ghana (b)**

**Boliland**

**Mangrove**

**Northeast**

**Central**

**Senegal River Valley**

**Volta**

**White**

**White**

**Khao Hom Mali**

**Chainat 1**

**White**

**White**

**(rain - partial mech)**

**(rain- manual)**

**(rain)**

**(irrig’d)**

**(irrig’d)**

**(irrig’d)**

**COST OF PRODUCTION (US$/MT OF PADDY) (A)**

**Land Clearing**

2.88

6.59

0

0

0

0

**Seasonal Land Prep - Mech**

81.56

0.12

8.89

8.33

12.93

32.95

**Seasonal Land Prep - Hand**

5.13

79.77

**Crop Establishment (Seed +Fert+Chems)**

61.53

45.27

12.07

7.78

17.84

28.89

**Crop Care (Weeding + Bird Scare)**

23.54

4

95.7

75.88

57.03

65.89

**Harvest + Post Harvest**

55.47

44.76

45.78

15.37

54.35

124.61

**Fixed Cost (Land rent + Family Lab)**

18.24

42.34

52.71

46.22

47.07

14.36

**Financing Cost**

5.07

5.38

5.22

16.67

**TOTAL COST OF PRODUCTION**

**248.36**

**222.85**

**220.22**

**158.95**

**194.44**

**283.37**

**USD/MT OF MILLED RICE (C)**

**Milling Yield**

60%

60%

62%

62%

65%

55%

**TOTAL COST OF PRODUCTION**

**413.93**

**371.42**

**355.2**

**256.37**

**299.14**

**515.22**

**Farm Gate Price**

582

582

752.69

376.34

444.44

548.34

**Assembler/Trader**

0

0

15.05

7.53

0

0

**Transport to Mill**

2

2

5.38

19.35

15.81

40.4

**Drying Loss**

0

0

37.63

37.63

0

0

**Milling**

63.17

63.17

28.47

28.47

47.01

57.72

**Milling Margins**

13.4

13.4

20.85

11.73

0

0

**TOTAL COST OF MILLING**

**78.57**

**78.57**

**107.38**

**104.71**

**62.82**

**98.12**

50

**Rice Type**

**Sierra Leone**

**Thailand (b)**

**Senegal (b)**

**Ghana (b)**

**Boliland**

**Mangrove**

**Northeast**

**Central**

**Senegal River Valley**

**Volta**

**White**

**White**

**Khao Hom Mali**

**Chainat 1**

**White**

**White**

**(rain - partial mech)**

**(rain- manual)**

**(rain)**

**(irrig’d)**

**(irrig’d)**

**(irrig’d)**

**Value of rice at mill site**

660.57

660.57

1055.24

550.33

507.26

646.46

**Brokers**

0

0

7.37

3.58

0

12.93

**Collection/Transport to Market**

20.5

19.3

20

6.67

15.56

80

**Wholesaling**

172

172

38.89

14.79

**Retailing**

168

168

28.89

22.63

**Marketing cost of milled rice**

360.5

359.3

27.37

10.25

83.34

130.35

**Calculated value at retail**

1021.07

1019.87

590.6

776.81

**Retail Market prices**

565.33

743.33

Source: (a) NGP Survey, April, 2014 (b) University of Greenwich (nd), World Bank (2013); (c) Spencer et. al. (2014)

**5.3 COMPARATIVE ADVANTAGE OF NGP RICE**

A robust measure of comparative advantage, is obtained by comparing local economic costs of production with international reference prices, and can be summarized neatly in one indicator, known as the Domestic Resource Cost (DRC) coefficient12. The DRC, measures the ratio of domestic factors used to produce one unit of a commodity (e.g. labor and capital invested in the production) to the added value generated by this unit of the commodity (i.e. the value of the production minus all the investment costs, e.g. seed, fertilizer, energy, etc). The DRC is estimated using social prices,

i.e. prices that would prevail in the absence of government intervention on input and output markets (e.g. subsidies on fertilizer sales price and mechanization cost, duty on exports) or market failure (monopoly). If the ratio is greater than one, more domestic resources are invested in producing the commodity than the added value generated by the production activity—there is no comparative advantage in producing the commodity and the domestic resources would be more efficiently utilized if allocated to another productive activity. Conversely, if the ratio is below one, the commodity is produced using less domestic resources than the added value generated— producers of the commodity do have a comparative advantage.

In the rest of this section an assessment of financial or "private" profitability is conducted for designated rice production-processing-distribution channels. Each channel refers to a particular combination of technology, starting from the traditional and including improved systems. Production, processing, and marketing budgets are constructed for each stage of the value chain, using market prices to assess costs of inputs as well as gross returns to production.

Analysis of economic opportunity costs for products and inputs is then used to determine social profitability for the same selection of production and marketing activities. The economic value, or efficiency price, of tradable inputs, as well as the rice product, are evaluated using world prices adjusted to Abidjan which is the point of comparison for all systems. Economic values of non- tradable inputs are broken down into their tradable and non-tradable factor components.

***5.3.1 Input – Output Coefficients***

The NGP survey conducted in April 2014 provides input-output data on the two most important commercial rice farming systems in the NGP region. [Table 25:](#_bookmark86) and [Table 26:](#_bookmark87) show the capital costs and input-output coefficients used to model the two rice production systems.

12

Practical guides for estimation of DRCs are found in Pearson, Stryker, and Humphreys (1981); Tsakok,

Isabelle. (1990) *Agricultural Price Policy: A Practitioner's Guide to Partial Equilibrium Analysis.* Ithaca: Cornell

University Press; and Sadoulet, Elisabeth and Alain de Janvry (1995), *Quantitative Development Policy Analysis.*

Baltimore: Johns Hopkins University Press.

51

**Table 25:**

**Capital investments in commercial rice production systems in the NGP of Sierra**

**Leone (weighted average per farm)**

Source: NGP survey, 2014, n = 35 for each system

**Table 26:**

**Input–Output parameters per crop cycle in commercial rice production systems in**

**the NGP of Sierra Leone (weighted average per sampled field)**

Source: NGP Survey, 2014 and estimates by the author based on key informant interviews

13 World Bank Commodity Price Data (Pink Sheet), March 2014)

52

**Mangrove Rice - Manual**

**Boliland Rice – Partial Mech.**

**Quant**

**US$**

**Quant**

**US$**

**CROPPING SYSTEM**

**Crops per year**

1

1

**Rice Farm size (ha)**

8.21

33.80

**Sampled field size (ha)**

5.08

27.89

**INPUTS/CROPPING CYCLE**

Family Labor (person days)

98.6

124.7

Hired Labor

1104.90

1979.17

**Seed**

164.43

912.74

**Fertilizer**

167.42

421.35

**Pesticides**

38.36

66.44

**Land Rent**

166.54

80.26

**Mechanical cultivation**

0.99

1856.60

**OUTPUT**

**Paddy yield (mt/ha)**

1.56

0.86

**Paddy price (US$/mt)**

349.25

349.25

**PROCESSING & MARKETING**

**Paddy milling cost per mt**

41.50

41.50

**Milling conversion rate**

0.62

0.62

**Transport: Production Zone to Freetown per mt**

19.30

20.50

**Transport: Bangkok to Freetown per mt**

115.00

115.00

**Transport: Freetown – Lagos per mt**

50.00

50.00

**Freetown - Wholesale price per mt**

581.00

581.00

**Freetown - Retail price per mt**

853.00

853.00

**Thailand – FOB price (2013 average for 25%**

473.00

473.00

**Mangrove Rice**

**Boli Rice**

**ITEM**

**LIFE (YRS)**

**Total COST (US $)**

**RESIDUAL VALUE (US$)**

**Total COST (US $)**

**RESIDUAL VALUE (US$)**

Cutlasses

3

20.36

0

43.68

0

Axes

3

4.66

0

19.06

0

Hoes

3

71.41

0

100.29

0

Sacks

2

86.50

0

459.04

0

Drying Tarpaulins

2

30.46

0

89.97

0

Wheel barrows

5

3.27

0

20.80

0

Chain Saws

5

16.61

0

214.88

0

Power tillers

5

451.83

0

1674.42

0

Harvest knives

3

9.54

0

35.46

0

***5.3.2 Competiveness under current conditions***

[Table 27:](#_bookmark89) presents the results for the rice production systems for supply of the largest rice consumption center in the NGP, the capital city Freetown, as well as for regional export to the largest rice importing country in Sub Saharan Africa – Nigeria. The estimated DRC show that the commercial rice production systems in the NGP have a comparative advantage in supplying the major domestic market in Sierra Leone. The results show that, as indicated in earlier studies14, domestic rice production in Sierra Leone is economically justified.

Moving to an export price regime implies a decline in social profitability for the rice cropping systems, as shown by the DRCs under the export parity regime in the Table. However, Sierra Leone in this case the NGP, still maintains a comparative advantage, implying that it should be able to export rice if the necessary structures and systems are put in place.

**Table 27:**

**Estimated competiveness of commercial rice production systems in the NGP of**

**Sierra Leone**

Note:

PP SP PCR DRC SCR T NPC NPC EPC

=

=

=

=

=

=

=

=

=

(Private Revenue - Overall Costs @ market prices)

(Social Revenue - Overall Costs @ social prices)

(Non-Tradable Costs) / (Revenue - Tradable Costs) @ market prices (Non-Tradable Costs) / (Revenue - Tradable Costs) @ social prices (Tradable Costs + Non-Tradable Costs)/ Revenue @ social prices Net Benefits @ market prices – net benefits @ social prices

(Private Revenue @ market prices) / (Social Revenue @ social prices) (Tradable Costs @ market prices) / (Tradable Costs @ social prices)

(Private Revenue - Tradable Costs @ market prices) / (Soc Rev - Trad Costs @ social prices)

Transfers / Revenue @ social prices Transfers / Revenue @ market prices

PSS

PFS

=

=

14 See Dunstan Spencer & Associates (1997), Spencer et. al (2004)

53

**Import Parity Supply to Freetown**

**Export Parity Supply to Lagos**

**Mangrove - Manual**

**Boli - Mechanized**

**Mangrove - Manual**

**Boli - Mechanized**

1. Private Profit (US$/ha) (PP)

803.35

433.90

803.35

433.90

2. Private Cost-Benefit Ratio (PCR)

0.080

0.023

0.080

0.023

3. Social Profit (US$/ha) (SP)

44.50

5.90

18.50

1.15

**4. Domestic Resource Cost Ratio (DRC)**

**0.607**

**0.633**

**0.789**

**0.899**

5.Social Cost-Benefit Ration (SCR)

0.663

0.755

0.826

0.941

6. Transfers (T)

3,854

11,936

3,987

12,069

7. Nominal Protection Coefficient (NPC)

6.763

18.817

8.430

23.456

8. Effective Protection Coefficient (EPC)

6.763

18.817

8.430

23.456

9. Profit Ratio (PR)

7.711

27.649

10.023

39.273

10. Producers Social Subsidy Rate (PSS)

18.041

73.604

43.623

381.065

11. Producers Financial Subsidy Rate (PFS)

5.747

17.798

7.411

22.433

**CHAPTER 6.**

**SUMMARY AND CONCLUSIONS : THE**

**WAY FORWARD**

Based on the diagnostic in Chapter 1 – 7 some scenarios for stimulating growth of the private sector

in the rice value chain in the NGP are summarized below.

**6.1. REDUCING THE COST OF LAND PREPARATION (MECHANICAL CULTIVATION SERVICES)**

As shown in Section 5.2, land preparation costs are currently the most important cost item in NGP rice production systems and they are above the cost of similar activities in benchmarked countries. One important way of reducing the cost of commercial rice production, it is therefore to introduce more efficient and cost cutting technology.

In the mangrove swamps power tillers have been successfully tested. Agyen-Sampong et al (nd) report that a 8 hp single axed power tiller has been successfully utilized for cultivating the swamps in Sierra Leone and Guinea (WARDA 1983b). In on-farm trials comparing mechanical cultivation to the farmers traditional method of land cultivation using a long wooden handled hoe or ‘mattock’, mechanical cultivation gave superior grain yields (WARDA 1982-84). This result was probably due to greater mineralization of organic matter and better suppression of weeds with mechanical cultivation. However, plowing below 15 cm in some areas can expose potentially acid sulphate sub- soil. Systems that would allow mangrove farmers to either own or have access to services provided by private sector mechanical cultivation service providers need to be explored.15

Unlike the mangrove swamps the data in Section 5.2 show that private sector providers of mechanical cultivation services already exist in the Bolilands. The numbers need to greatly expanded and productivity needs to increase in order that the relative cost of services provided will decline. Measures to be considered include support to distributors or robust/appropriate machinery to set up distribution and service centers in the NGP and support to the private sector to invest and operate the machinery using credit facilities and provision of technical assistance such as for training of operators, etc..

There is a lot of empirical evidence showing that agricultural mechanization is important for achievement of food self-sufficiency in the developing world, e.g. Hossain (2009) shows that food production in Bangladesh increased from 11.0 million tons in 1971 to about 30 million tons in 2007 due to irrigation development and partial mechanization of other agricultural operations. Studies in West Africa have clearly shown that to increase agricultural productivity in a sustainable way, the best option is to increase production per unit of land as well as cropping intensity. For this, faster development of agricultural mechanization as well as variety development is needed. In addition, the task of increasing food security would be made much easier if post harvest losses could be significantly decreased. This is again an area where improved mechanical technologies, including improved storage and handling systems are required

However many studies have also pointed to the conclusion that the degradation of soil resources is a major risk of motorized tillage particularly in forest zones in which most of Sierra Leone’s agricultural area falls. In methods currently practiced, motorization damages the natural resources to the extent

15

This author is aware that the European Union funded North-West Integrated Agricultural Development

projects attempted to introduce power tillers to the mangrove swamps in the 1970s/1980s with minimal

success. The reasons for the failure, apparently included the use of inappropriate power tillers. The archives should be searched and experience gained used in designing any new interventions in the mangrove swamps.

54

that there are irreversible environmental effects and, eventually, a negative impact on food

production, food security and food self-sufficiency, (Gert van der Meijden, 1998).

There is need to provide scientific arguments either in support of the decisions successive governments in Sierra Leone have made for the promotion of pre and post harvest agricultural mechanization technologies considering use of all associated technologies such as improved crop varieties, increased fertilizer use, improved credit schemes, etc., or provide enough empirical evidence to reconsider the position on this, while providing recommendations for more appropriate sustainable mechanization approaches or more efficient ways of achieving food security objectives.

Such as study should focus on the following areas:



The short term and long term effects of mechanization on the predominant ecologies in

Sierra Leone;

Associated technologies and interventions that could be combined with mechanization

How successes of mechanization achieved in other countries can be replicated with appropriate modifications;

The effect of mechanization on labor, specifically if on balance, the loss of income from displaced workers would compensate for the income made from the creation of a cadre of highly skilled labor, as the value chains of rice and root & tubers are enhanced;

The effect on household income, given that women are the greater contributors and that mechanization could disadvantage them, if the new highly skilled labor force does not include them;

The types of subsidies associated with farm mechanization, and how these could be redesigned to be more effective.

GoSL support to private sector mechanization – the FIB Hire purchase scheme













**6.2 REDUCING THE COST OF CROP ESTABLISHMENT AND GROWTH**

The benchmarking exercise also shows that the costs of crop establishments are high in the NGP. As indicated earlier, farmers do use any fertilizers or use them in suboptimal doses because the fertilizers are either not available in local markets or are too expensive.

***6.2.1 Establishing an effective and efficient agro dealer network***

As indicated earlier, the situation calls for corrective action by the development of private agro dealers networks to serve the farming communities. EDS is in the process of developing a program for agro dealer strengthening new program at the request of AGRA. It is expected that the project would train and certify up to 200 Agrodealers nationwide over a 3 year period. While this can be seen as a pilot project that would serve the interests of farmers in the NGP, it would need to be scaled up significantly to have a discernible impact on inputs supply to rice farmers in the NGP. As an example the AGRA supported program in Ghana has trained and certified over 28,000 agrodealers over the last 5 years.

***6.2.2. Increasing the use of improved rice varieties***

Although as shown earlier, the situation with regard to use of improved rice varieties is not as bad as for other inputs, there is still room for improvement.

Over the past three years, PASS, with support from Howard Buffet Foundation, has been implementing a seed supply strategy that will ensure the availability of good quality seeds and planting materials of locally adapted crop varieties in a timely and affordable manner in both countries. In Sierra Leone, Brac an agricultural NGO and Abazar and Yeava, agricultural companies have been training local farmers in seed multiplication

55

As recommended by the MAFFS Yield Gap Task Force (MAFFS, 2013), SLARI should be empowered to

expand on Breeder and Foundation Seed production through hybridization and accessing appropriate exotic and local germplasm from the sub-region and international centers. The Tissue Culture and Biotechnology laboratories at Rokupr Agricultural Research Centre should be made fully functional by providing stable electricity, provision of laboratory reagents and continued support for training of staff at the technician and scientific levels.

In order to facilitate the rapid multiplication of Breeder and Foundation Seeds, the National Seed Board, The National Seed Board should be established as a matter of urgency as that body would have the mandate to regulate activities of the seed industry.

Seed companies and Master Farmers should embark on Certified Seed production to increase the quantities of seeds of high yielding rice varieties in circulation.

Seed Quality Control Laboratory should be constituted an independent entity to ensure its functionality and enhance quality control in the production and marketing of all categories of seeds. MAFFS, agricultural projects and NGOs could facilitate seed replacement scheme nationwide every 5 years for a start, with the aim of reducing the period to three years as is recommended by the International Seed Testing Association (ISTA). MAFFS extension should

Ensure that farmers adopt timely husbandry practice: timely seeding with optimum seeding density, timely weeding and fertilizer application, timely harvesting and post harvest reduction practices to realize the varietal yield potential.

***6.2.3. Need to critically examine the use of input subsidies***

This is a very controversial issue that needs to be examined in the context of the desire to get farmers to use increased levels of fertilizers in Sierra Leone. As Dorward (2009) points out a subsidy can only generate a positive net economic return to a country if there is some market failure, as appears to be the case with the input supply system in Sierra Leone, which means that the downward shift in the supply curve is greater than the cost of subsidizing production, including the costs of subsidy administration. This may occur where farmers’ perceived private cost of inputs is higher than the true social or economic cost, and/or the farmers’ perceptions of private benefits from increased input use are lower than the actual social or economic benefits. Such situations can arise where (a) farmers’ private costs of working capital for input purchase are greater than the social cost of capital, (b) farmers’ lack of knowledge about the benefits of inputs means that their expectation of the production benefits from input use are less than the benefits that they will gain,

(c) there are learning costs with input use such that initial farmer returns are low but these will increase with experience, and (d) farmers’ risk assessment and aversion in investing working capital in input purchase and use is higher than society’s risk assessment and aversion. These divergences between farmers’ and society’s perceptions should decline as farmers gain experience with input use, with increasing knowledge of the benefits and risks of input use, increasing knowledge of how to use inputs, and consequent increasing efficiency in their use.

Morris et al. (2007) describe 10 features of smart subsidies: ‘promoting fertilizer as part of a wider strategy’, ‘favoring market based solutions’ in input supply, ‘promoting competition’ in input supply, ‘paying attention to demand’, ‘insisting on economic efficiency’, ‘empowering farmers’, ‘involving an exit strategy’, ‘pursuing regional integration’, ‘ensuring sustainability’, and ‘promoting pro-poor economic growth.’ They recognize that ‘in exceptional circumstances, poverty reduction or food security objectives may even be given precedence over efficiency and sustainability goals’. Instruments proposed for implementing smart subsidies include demonstration packs, vouchers, matching grants and loan guarantees. For all of these the details of instrument design and implementation are critical to their success.

As Elbehri and Sarris (2009) point out input subsidies are often not enough by themselves. To be effective, they require large complementary investments in output market development policies and

56

institutional support. If successful, input subsidies could help develop a functioning input market and

improved supply systems, build farmers know-how, and induce dynamic and spillover effects on rural economies and other agricultural activities beside the targeted commodities.

A note of caution in considering the use of smart input subsidies in Sierra Leone is required considering that a review of several fertilizer subsidy programs in Africa by Dorward (2009) shows that often these input subsidy programs tend to over emphasize setting specific production targets without due consideration to consumer interests or to wider pro-poor economic growth. As a result, input subsidies programs as currently implemented in many African countries are rarely implemented with necessary complementary investments in input market infrastructures and other market instruments (such as institutional support to farmers organizations) needed to ensure effective implementation of such programs in the long run.

In the face of these institutional and endemic implementation difficulties in developing countries, the question is whether input subsidy is the best way to encourage higher input use in Sierra Leone. Are there alternatives to input subsidies or if justified, how can input subsidies be made part of broader strategies encompassing other critical market failure remedies that can also result in more optimal use of inputs in agricultural production?

A channel to enhanced input use is better access to credit. Credit access is considered a prerequisite to input use in most farming situations. One alternative to direct input subsidy is to provide subsidized credit to farmers to finance input purchases. This form of support would overcome one of the most endemic causes of underutilization of inputs among small farmers. In fact, in many cases past state interventions on stimulating input use involved subsidized credit. Such an approach has the advantage of avoiding the input-overuse possibility from subsidy and would also allow optimal decisions by farmers on the mix of inputs to use.

However, this approach too has limitations. Even with subsidized and accessible credit, the price of unsubsidized inputs may still too high relative to product prices, and hence remain out of reach for small farmers who would need it the most. Also, misuse of agricultural credit programs in the past led to financial losses, and credits were often applied regressively (loans to well-connected and wealthy borrowers). In fact the demise of the farm credit programs in many developing countries allowing farmers to purchase inputs, is one of the justification for opting for significant subsidies to inputs as the only option that will significantly incite small poor farmers to access and use inputs such as fertilizer.

There is an urgent need to study the possibility of improving the level of use of fertilizers by rice and other food crop farmers in Sierra Leone. This could be by a combination of expansion of the private sector input distribution network (Agrodealers) and the use of “smart subsidies” as necessary.

**6.3. IMPROVING THE PROSPECTS FOR GROWTH OF THE COMMERCIAL RICE PROCESSING AND STORAGE INDUSTRY**

As reported earlier. the World Bank financed EDS rice marketing study (Spencer et. al., 2014) shows that Sierra Leone has sufficient installed rice milling capacity at the national level***.*** Even with the highest estimates of production and marketable surplus, the mills installed and assessed as “operational” have enough capacity to mill all the marketed rice in Sierra Leone operating only one shift of 8 hours per day, 24 days a month and 9 months a year. The recent investments by the Government and donor partners in increasing the rice milling capacity of the country through the ABCs and RPSDP (World bank funded) as well as private sector investments have provided the country with sufficient milling capacity to serve its needs over the next five to ten years. But the distribution across Districts is not optimal, with substantial excess capacity in Kailahun, Koinadugu, Kenema, Kono, Moyamba and Pujehun Districts. The largest deficits are in Tonkolili and Port Loko Districts, both in the NGP. The case for investment in additional milling capacity at the national level in Sierra Leone is therefore quite weak. However, there is a strong case for additional investments in

57

some NGP districts, and a very strong case for greatly increased, and more efficient use of the

installed capacity.

The existing problems can be solved mainly in the following ways:



Modernization of existing Small, Medium and Large Scale Processing Centres in major rice

production zones of the country, to equip them with the full complement of milling equipment. This should include provision of improved mechanical parboiling systems.

Provision of appropriate storage facilities- warehouses and Silos. The Sierra Leone Produce Marketing Company should be capacitated to erect and manage public warehouses and silos in the major rice producing districts, in association with the private mills.

Training should be provided in improved modern rice processing technology especially on threshing, parboiling, drying and milling, including in the organization and management of paddy supply systems for:

* Extension officers in all the Districts who will go to the communities to train the farmers
* Small and Medium Scale Processing groups who will directly apply them in their mills

Full privatisation of all institution mills (ABC, RPSDP, etc.). This analysis has clearly shown that institution operated mills are inefficient compared to the privately owned and operated mills. However, there are social issues associated with this recommendation which will have to be addressed in the privatisation process since the mills were provided as public goods by the financing institutions.







**6.4 IMPROVING THE PROSPECTS FOR THE RICE EXPORT MARKET**

As shown earlier commercial rice production in the NGP not only has a comparative advantage in supplying domestic market, including Freetown, the largest rice consumption center in the country, it also has a comparative advantage in supplying regional rice markets. The prospects of accessing the market are good because of Sierra Leone’s proximity to the main regional demand centers relative to other international suppliers, and it’s favored access status – member of ECOWAS etc.

To exploit its potential Sierra Leone needs to invest in measures to facilitate the export trade including, but not limited to the following:

a)

Formalizing the export trade in local rice through trade negotiations with the importing

countries

Investing in domestic value addition to maximize export revenues from the commodity Establishing an export processing zone in an appropriate location, with appropriate infrastructure, services and amenities to function at international standards for such facilities.

b)

c)

Formalizing informal rice export activities would provide more reliable revenue streams for the state

and enhanced security for traders through improved knowledge and enforcement of rights and responsibilities of all stakeholders at the border. In order to bring informal trading activities into formality and expand the tax base, a number of steps need to be taken to simplify business registration, harmonize and simplify import and export procedures, eliminate harassment, extortion and other corrupt practices at the borders, and provide targeted support to small firms that register formally (World Bank, 2013).

58

**REFERENCES**

Agyen-Sampong, M., Prakah-Asante, K. and Fomba, S. N. (nd ?), Rice improvement in the mangrove

swamps of West Africa. WARDA Regional Mangrove Swamp Rice Research Station, Freetown, Sierra Leone. <http://edepot.wur.nl/184146>

CARD (Coalition for African Rice Development) (2009) National Rice Development Strategy: Sierra Leone

Dorward, A. (2009), Rethinking Agricultural Input Subsidy Programs in a Changing World. Paper prepared for the Trade and Markets Division of FAO. Center for Development, Environment and Policy, School of Oriental and African Studies, University of London, UK

Elbehri, A., and A. Sarris (2009) Farm Support Policies that Minimize Global Distortionary Effect. Paper presented to the FAO Expert Meeting on “How to feed the World in 2050”, FAO, Rome, Italy, June 24-26, 2009

Gert van der Meijden (1998) Motorized Soil Tillage In West-Africa: A survey on the current use and consequences of tillage done with engine-driven machinery; Food and Agriculture Organization of the United Nations, FAO Regional Office for Africa, Accra, Ghana

Hossain, M. S. (2009). Food Security Situation in Bangladesh with Focus on the Impact of High Food Prices. The Guardian. A national Monthly, published by editor from 794/KA, South Shajahanpur, Dhaka-1217, Bangladesh

MAFFS (Ministry of Agriculture, Forestry and Food security), Ministry of Fisheries and Marine Resources (2003) Sierra Leone Agricultural Sector Review, , FAO, IFAD, UNDP, World Bank. February 2004. 230pp. <http://siteresources.worldbank.org/INTSIERRALEONE/Resources/oftn_oct_05.pdf>

MAFFS (Ministry of Agriculture forestry and food security) (2011) Abdul Latif Jameel Poverty Action Lab (J-PAL/ Innovation for Poverty Action (IPA), Agricultural Tracking Survey, Final Report

MAFFS (2013). Task Force Report On Rice Yield-Gap: Contribution from: The Members of the Task Force Rice Yield-Gap SLARI/MAFFS Seminar

Morris, M., V. A. Kelly, R. Kopicki and D. Byerlee (2007). Fertilizer use in African agriculture.

Washington D.C., World Bank.

Ngaujah, Aiah S. and Dunstan S. C. Spencer (2010). Characteristics of rice varieties in Northern Sierra Leone, Report for CARE. EDS, October 13, 2010 [http://www.eds-](http://www.eds-sl.com/docs/DescriptionofRiceVarietiesinNorthernSierraLeone.pdf) [sl.com/docs/DescriptionofRiceVarietiesinNorthernSierraLeone.pdf](http://www.eds-sl.com/docs/DescriptionofRiceVarietiesinNorthernSierraLeone.pdf)

Njoku, Athanasius Onwusaka (1971) Labor utilization in traditional agriculture: the case of Sierra Leone **rice** farms. 194pp. Ph.D. Thesis, University of Champaign, Champaign-Urbana, USA.

Odell, R. T., Dijkerman,J.C., Van Vuure, W., Melsted,S. W., Beavers, A. H.. Sutton, P.M Kurtz, L.T. , and. Miedema,R. (1974). Characteristics, Classification, and Adaptation of Soils in selected areas in Sierra Leone West Africa. Bulletin 748. Agric. Expt. Station. College of Agric.

University of Illinois at Urbana Champaign Bulletin 4. Njala University College (USL) 194p.

Peters, Maren (2014). Market driven strategies for rice value chain development in Sierra Leone, GIZ, Hogeschool VHL, University of Applied Sciences, Germany.

59

Spencer, D. S. C., and Byerlee, D. (1976). "Technical Change, Labor Use and Small Farmer

Development: Evidence from Sierra Leone", *American Journal Of Agricultural Economics,*

Vol. 58, No. 5, December.

Spencer, Dunstan & Associates (1997). "Rice Trade and Price Policy Study" Prepared for the Ministry of Agriculture and Natural Resources and the World Bank, Freetown, Sierra Leone. <http://www.eds-sl.com/docs/SierraLeone-RicePolicyStudyFinal-Jan1997.pdf>

Spencer, Dunstan (2010b); Farmers assessment of rice varieties in Northern Sierra Leone. Report of a survey for CARE. <http://www.edssl.com/docs/FarmersAssessmentofRiceVarietiesinNorthernSierraLeone.pdf>

Spencer, Dunstan S. C., Sanusi Deen and Chrispin Wilson (2009): Soros Economic Development Fund (SEDF), Sierra Leone Rice Enterprise Development Project, Project Report, Enterprise Development Services Ltd (EDS), June 25, 2009; [www.edssl.com/docs/EDS%2020Economics%20of%20Rice%20Prodn%20in%20Sierra%20Leo](http://www.edssl.com/docs/EDS%2020Economics%20of%20Rice%20Prodn%20in%20Sierra%20Leone%20-%20June%202009.pdf) [ne%20-%20June%202009.pdf](http://www.edssl.com/docs/EDS%2020Economics%20of%20Rice%20Prodn%20in%20Sierra%20Leone%20-%20June%202009.pdf)

Spencer, Dunstan (2012). Issues in food security and cash crop production in Sierra Leone <http://www.eds-sl.com/docs/IssuesInFoodSecurityInSierraLeone.pdf>

Spencer, Dunstan S. C., Sanusi Deen, Agidi Gbagbo, Chrispin Wilson, with Pious Sesay (2014); Study of Rice Processing, Marketing and Distribution in Sierra Leone; Rural and Private Sector Development Project (RPSDP); Enterprises Development Services, Freetown, Sierra Leone.

UNDP/FAO (United Nations Development Programme/Food and Agriculture Organisation of the United Nations) (1979). Land in Sierra Leone: A Reconnaissance Survey and Evaluation fpr Agriculture. Land Resources Survey, Sierra Leone. AG:DP/SIL/73/002. Technical Report.

University of Greenwich (nd); Natural Resources Institute: Contrasting Rice Value Chains – A Benchmarking Study of Rice in Ghana, Senegal and Thailand. Report prepared for the World Bank,

Whittaker, Victor Augustus (1971) The economics of mechanical cultivation of rice lands in Sierra Leone. 135pp. Ph.D. Thesis, University of Illinois, Champaign-Urbana, USA.

World Bank (2013) The Rice Value Chain in “Growing Africa: Unlocking the Potential of Agribusiness”, Annex 1.

World Bank (2013) Sierra Leone Diagnostic Trade Integration Study (DTIS) Update June 2013, Report Number: 78309-SL

World Food Program (2008). Sierra Leone: Household Food Security Survey in Rural Areas, World Food Program, Vulnerability Analysis and Mapping Branch (ODAV), November, 2008

World Food Program (2012) P4P Purchase for Progress • A Primer, A P4P Coordination Unit Publication, WFP, Rome Italy

World Food Program (2014). Purchase for Progress - P4P, Sierra Leone, Update, August, 2014

60

**ANNEXES**

61

**ANNEX 1: CHARACTERISTICS OF RICE ECOSYSTEMS IN SIERRA LEONE**

**Uplands**

The upland areas have a mixed vegetation which comprise mostly of closed and secondary forests, forest re-growth, Savanna woodlands and grasslands, mixed tree Savanna , *Lophira* Savanna, upland and montane grasslands. The dominant vegetation type is forest re-growth which comprises mainly of trees, shrubs and grasses at different stages of re-growth. Based on LWDD estimates arable upland (areas suitable for sustained cultivation of crops) is 4.3 million ha. The upland rice ecology is very extensive and ranges from flat to gently rolling land to hills. The depth of the top soil in the uplands varies from 0 to 9 cm especially when there is maintenance of fallow and subsoil consist of fairly drained laterites. Upland soils are low in organic matter content (0.6%) and soluble phosphorus. The pH of the soils are low (4.0-5.0) and they have high aluminum content which makes them low in inherent soil fertility.

The rotational bush fallow system of cultivation with mixed cropping dominated by rice is still the farming system in upland areas. Upland cultivation operation includes brushing, clearing, staking and burning, sowing, weeding, bird scaring, rodent fencing, harvesting and storage.

**Inland Valley Swamps (IVS)**

The vegetation in inland valley swamps is generally a mixture of aquatic shrubs and grasses with raphia palm. Uncultivated areas support a thicket vegetation dominated by raphia. After cultivation, grasses, aquatic shrubs, herbs and low shrubs take over the swamp. Inland valley swamp rice is grown in valleys along streams and minor flood plains which are widely dispersed over the country.

**Bolilands**

The dominant vegetation type in bolilands is grass. The type of grass depend on the frequency and depth of flooding. Bolilands (drainage depressions) are large saucer shaped basins with little or no drainage which are flooded during the wet season. The soils of Bolilands consist of a grey, dusty sand-silt ferralitic subsoil. The pH is about 4.0 and organic matter content and cation exchange capacity are very low. They are extremely deficient in phosphorus and during floods, high levels of aluminium come into solution which reduces crop yields. The soils are deficient in nitrogen, phosphorus and zinc.

**Mangrove**

The dominant vegetation types in mangrove areas are mangrove forest and thickets composed of *Rhizophora* and *Avicennia*. Mangrove swamps are found along the banks of rivers that are subject to sea water tidal flooding. There are four types of mangrove swamps which are distinguished based on the depth of flooding. These are (i) river edge (ii) deep flooded area (iii) tidal limit area and (iv) seepage area. River edge and deep flooded mangrove are termed tidal mangrove and the tidal limit and seepage areas are termed associated mangroves.

Mangrove soils are hydromorphic with a heavy deposit of silt accumulating on the soil due to defloculation at the salt/fresh water interface. Mostly between December and April cultivation is impossible because of the heavy salt content of the soil and water. Cultivation of rice normally starts in May/June.

**Riverine Grasslands**

Aquatic grass is the dominant vegetation in Riverine areas and these grass species vary according to the depth and length of the flooding period. Riverine grasslands (major flood plains) have an arable area of approximately 100,000 ha but only about 20,000 ha. Mechanical rice cultivation started in these areas in 1949. These grasslands consist of clay loams or sandy clay loams and are acidic with pH between 4.0 and 4.5. They have a deep profile, a good cation exchange capacity and no iron toxicity problems. The nitrogen content of the top soil is high due to a thick, dark humus layer.

62

**ANNEX 2: RICE FARM SURVEY QUESTIONNAIRE**

SECTION 1: IDENTIFICATION

Date

Questionnaire N° | | | |

63

VARIABLES

RESPONSE OPTIONS

CODE

District

1 = Bombali; 2 =Tonkolili; 3 = Koinadugu; 4 = Kambia; 5 = Port Loko

| |

Chiefdom

Name Chiefdom

| | |

Class of Farmer: 1= Large; 2 =Medium, 3 =Small

| |

Village/Site

Name Village/Site:

| | |

Distance to C/dom Hdqts (Miles)

| | | |●| | |

Farmer

Name of Farmer:

Sex of Farmer 1 = Male; 2 = Female

| |

Age of Farmer (estimated years)

| || |

Years of Schooling

| || |

Project Activity: 0=None; 1=FFS; 2= Other

| |

Dwelling walls

1 = wood; 2 = corrugated iron; 3 = mud;

4 = cement blocks; 5 = other (specify)

| |

Dwelling roof

1 = thatch; 2 = corrugated iron; 3 = aluminium

4 = other (specify)

| |

Rice Type (Boli/Mangrove)

Rice Area actually planted in 2013 (Acres)

Rice Field 1

| | | |●| | |

Other Rice Fields

| | | |●| | |

Other Rice Fields

| | | |●| | |

SECTION 2: Farm equipment (Owned):

64

Item

Year Purchased (Average)

Quantity

Cost/Unit (Le)

Cutlasses/Machetes

Axes

Hoes

Jute/Nylon bags

Tarpaulins

Raffia drying mats

Wheelbarrow

Chainsaw

Knapsack sprayer

Irrigation pump

Power tillers

Small Tractors (< 35 HP)

Large Tractors (> 35HP)

Other (specify)

Other (specify)

Other (specify)

Other (specify)

Other (specify)

Other (specify)

SECTION 3: Rice Processing Equipment (Owned)

SECTION 4: INPUTS

65

RICE FIELD 1:

Inputs:

Units (Name)

Units (Code)

Cost/Unit (Leones)

Quantity

Seed :

Fertiliser

Pesticides

Land rent

Mech Cult - plow

Mech Cult - harrow

Mech Cult – seed harrow

Combine Hire

Equipment

Brand name

Date installed (month and year)

Rated capacity Kg/day

Value

Rice mill

Engine

Generator

Pre cleaner

De-stoner

Par boiler

Dryer

Colour sorter

Grader

Bricketing Machine

Bagging Machine

Others assets

1

2

3

Walls of Mill Building

1 = wood; 2 = corrugated iron; 3 = mud; 4 = cement blocks; 5 = None;

6 = other (specify)

Floor Space of Mill Building (Estimate by pacing)

ft ft

**BY**

( Sq ft)

Floor Space of Drying Floor (Estimate by pacing)

ft ft

**BY**

( Sq ft)

SECTION 4: OUTPUT:

66

Output:

Units (Name)

Units (Code)

Quantity

Field 1 (for which inputs recorded)

Other Fields

All other fields

Inputs:

Units (Name)

Units (Code)

Cost/Unit (Leones)

Quantity

Hired Labour

Land Clearing

Person days

Nursery work

Person days

Plow

Person days

Puddle

Person days

Plant/Transplant

Person days

Weed

Person days

Bird scare/ guarding

Person days

Harvest

Person days

Threshing

Person days

Transport to store

Person days

Family Labour

Land Clearing

Person days

Nursery work

Person days

Plow

Person days

Puddle

Person days

Plant/Transplant

Person days

Weed

Person days

Bird scare/ guarding

Person days

Harvest

Person days

Threshing

Person days

Transport to store

Person days

SECTION 5: CONSUMPTION AND SALES (All Rice Produced during last 12 months = 10)

SECTION 4: PROCESSING (All rice produced during last 12 months)

SECTION 5: MARKETING

67

Where do you sell your rice?

Location

Rice Type

Unit (Name)

Unit (Code)

Transport Cost

*(Leones/Unit)*

Price Sold (Leones/unit)

Farm Gate

Husk

Clean

Village

Husk

Clean

C/Dom Hdqts

Husk

Clean

Lumor Mkt

Husk

Clean

Makeni

Husk

Clean

Freetown

Husk

Clean

Who do you Sell to?

1 = Another farmer; 2 = Trader; 3 = Govt

| || || |

How many times did you sell last year?

1 = Once only; 2 = 2-5 time;

3 = more than 5 times

| |

Processing (after threshing)

For Home Consumption

For Sale

Parboil

| | out of 10

| | out of 10

Hand Pounding Using Family Labour

| | out of 10

| | out of 10

Hand Pounding Using Hired Labour

| | out of 10

| | out of 10

Machine Milling

| | out of 10

| | out of 10

Husk

| | out of 10

Consumed

Gifts + Seed

Sold

| | out of 10

| | out of 10

| | out of 10

**ANNEX 3: RICE PRICE DATA SHEET**

Date:

Questionnaire No: | | | |

Town:

District:

Name of Market:

Rice Prices:

Transport Costs:

Custom Milling Costs:

68

**Type**

**Cost per bushel**

**Cost per bag**

Parboiled

Raw milled

**Unit**

**Cost per unit (Le)**

Transport to/from Freetown - Land

Bag

Truck Load ( Bags)

Transport to/from Freetown - Sea

Bag

Boat Load ( Bags)

Transport to/from Makeni - Land

Bag

Truck Load ( Bags)

**Type**

**Unit**

**Price per unit**

Local – parboiled – Husk

bushel

bag

Local – parboiled – Milled

bag

cup

Local – Raw – Husk

bushel

bag

Local – Raw – Milled (rough rice)

bag

cup

Imported – Raw – Brand

bag

cup

Imported – Raw – Brand

bag

cup

Imported – Parboiled - Brand

cup

bag

Imported – Parboiled - Brand

bag

cup

**ANNEX 4: BUSINESS PLANS FOR PROFITABLE RICE MILLING**

**(From Spencer et al. 2014)**

***1. Large Scale Mill***

**Figure A3-3: Factory Layout for a model large scale rice processing facility in Sierra Leone**

-- - -

-

1,5 000. 0 **-**

l

**- - --->I**

(

Of

Pb

6,000.0

I

4,000.0

l

**r-**

**,**

**'.!C**

-

c

[:]

8,400.0I

I

St

1, 00.0

Br

r

T

1,200.0

-

1

3,600.0

*l*

/'

r

Of

T

T

1,200.0

*l*

.,

**14---** 3,000.0

- - - -

**14-----** 2,000.0

27,000.0- - - - - -

**14-----** 2,000.0

--

--

-

-

-

,8 000. 0

- - -

- -

-

-

- - -

-

-

-

- - - -----­

**FIG. 5 FACTORY LAYOUT PLAN (LARGE SCALE)**

r

**3 ,000 .0**

***l***

I*,.,!.,*

I

[I]

[I]

□ □

**5,000.0**

I

**3,000 .0**

j

***/ll1///*** '-. ,

***/ll1///*** *,*

**/llWA**

***iW***

***'-***

FIG. 6 FRONT VIEW (LARGE SCALE)

69

TITLE LARGE SCALE RICE PROCESSING PLANT

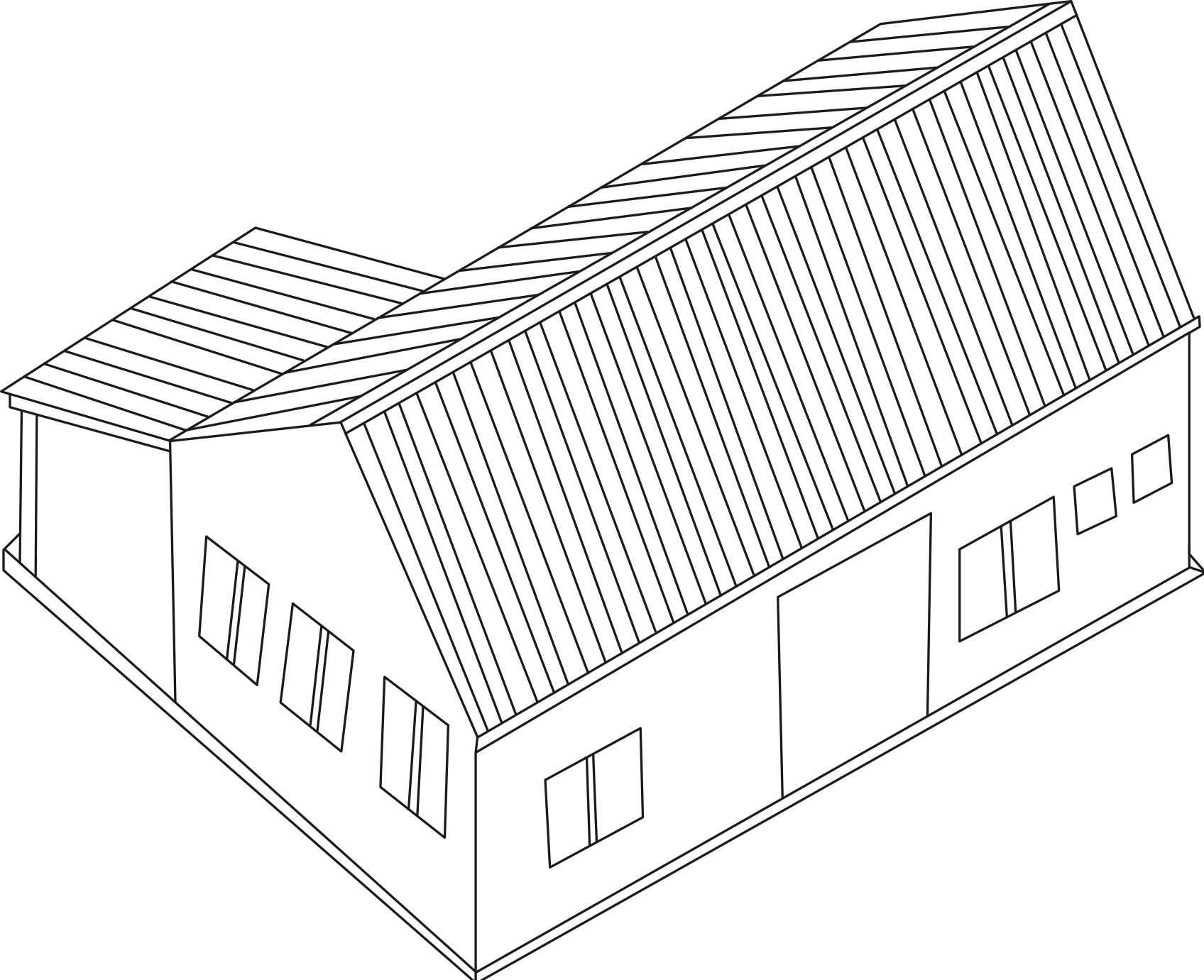
**DESIGNED BY ENGR DR AGIDI GBABO**

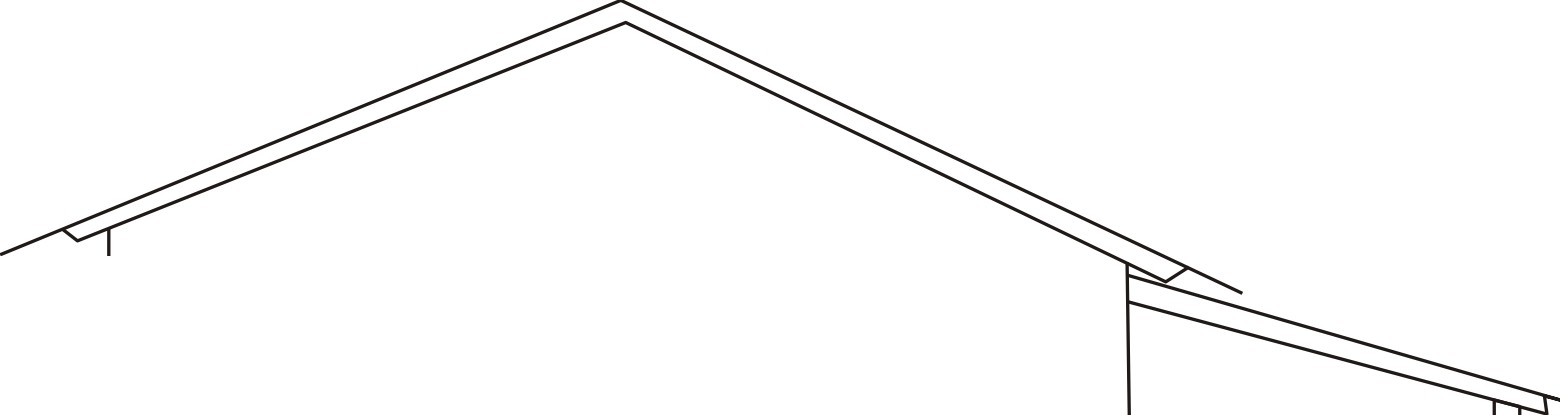
**DRAWN BY**

**ENGR. DR. AGIDI GBABO**

**DATE**

**6/9/2013**





I7,500.0

DD

....,

.

.\_.\_,, , **j**

- ►I

\_

\_

\_

\_

\_

\_

\_

\_

12,000.\_0 \_ \_ \_ \_ \_ \_ \_

\_ \_

\_

,6 000. 0 -

**FIG. 7 RIGHT HAND VIEW (LARGE SCALE)**

**FIG. 8 ISOMETRIC VIEW (LARGE SCALE)**

70





The Business Plan (BP) is prepared for a model large scale establishment with a design indicated

above. The projected performance of the Company is shown in Table A3-1, showing that the business should be a profitable one if operated along the lines of the projected BP.

**Table A3-1: Summary of projected performance of large scale model rice mill establishment**

The Headquarters of the model Company will be located in Makeni in Bombali District, which is

approximately 120 miles from Freetown. Its main business will be to purchase enough paddy rice in bulk during the buying season that normally lasts from November to March for milling during the rest of the year. Sufficient storage capacity is provided to enable the Company to store enough paddy to keep a forty ton per day mill busy for 280 working days. The rice will be marketed through different channels. The Company will be a Private Limited Liability Company. It will have an authorized Share Capital of 2,000 ordinary shares valued at $1,000 per share. The Company will start up with fixed assets totaling $2,022,500 as shown in A3-2 below.

In addition a provision of $53,000 will be made to pay for goods and services that will be needed to meet initial expenses relating to: Legal & Secretarial Services, Stationery & Office Expenses, Per Diem, Communication/IT, Publicity/Hospitality and Consultancy Fees. A total provision of $125,000 is made for consultancy service. This amount is to cover the period during the construction of various buildings and installation of machinery. This will give flexibility to the Promoters to hire the right people on short term basis to start the process of getting the Mill ready before the first year of trading. Those who prove to be effective can be absorbed into the workforce.

**Marketing Strategy:** The Company will develop a brand that will be easily identifiable, because of its strict adherence to quality. In addition, it will ensure clear and accurate labeling on its products and will sell at competitive prices. The production of parboiled rice, which is more nutritious than imported raw milled rice should give the company's product an edge.

**Sales Strategy:** The Company will have a small but highly trained and experienced sales and marketing staff. Clean parboiled rice from the Mill will be sold to Institutions, the government, UN Agencies and wholesalers in the main Provincial Towns with the bulk of the production targeted at the Western Area which is the Country's largest consumption centre. Rice will be sold ex-factory. The Mill will produce high quality rice, which will meet with customers' satisfaction. The mill will operate at full capacity in the first and second years and at one and a half capacity in the next three years with the possibilities of increasing the capacity to two full shifts. During the initial period before milling starts, the Company will engage essential staff on short term basis to oversee the installation

71

of the machines, construction of the stores and staff houses and recruitment of staff. The advantage

of hiring staff initially on short term basis will enable the Company to get rid of staff that are found unsuitable. This period will also be used to train essential staff. It is estimated that this period will run for a period of nine months.

**Table A3-2: Cost of Capital Investment for Model Large Scale Rice Milling Enterprise**

72

**Item**

**Output Capacity**

**Materials specification**

**Source of power**

**Qty**

**Unit Cost**

**Amount US Dollars**

Rice aspiration/paddy cleaner

40tons/day

2mm mild steel sheets & angle iron

5 HP electric motor

1

100,000

100,000

Parboiling equipment

40tons/day

2mm galv. Sheet & 4mm thick mild steel plate

Rice husk briquette as heat source

1

220,000

220,000

Continuous flow dryer

40 tons/day

2mm & 3mm mild steel sheets

Rice husk briquette as heat source

1

150,000

150,000

Dehusker

20tons/day

Rubber roller models

30 HP

electric motor each

2

150,000

300,000

Cleaner/Destoner

40tons/day each

2mm mild steel sheets & angle iron

5HP electric motor

1

80,000

80,000

Polishers

20tons/day

Rotary cylinders within indented disc

25 HP

2

100,000

200,000

Grader

40 tons/day

-

5HP diesel engine

1

85,000

85,000

Auto-bagging weighing and bagging machine

300kg capacity

1

100,000

100,000

Auto-Polythene Sealer

Big size

1

20,000

20,000

Drying floor

30m (length) x30m (width)X0.45m(height)

1

4,500

4,500

Borehole with overhead water storage

7.5HP submersible pump

1

45,000

45,000

Generator

100,000

Double Cab Vehicle x 2

90,000

Water Tank

6,000

Mill House

127,000

Dwelling Houses

250,000

Rice Stores

125,000

Office Equipment

20,000

Total Assets

2,022,500

**Sales Forecast** (Table A3-3): The proposed mill capacity is 40 tons per day and perform at 85%

efficiency at continuous operations; recovery of rate of paddy rice to milled rice is assumed to be 70%; the mill will operate for 280 days a year; the cost of paddy rice is assumed at $336 per ton and sales price at $670 per ton; in years 3, 4 & 5 the mill will operate one and a half shifts per day milling 14,280 tons of paddy and producing 9,996 tons of milled rice.

The direct cost of sales shown in Table A3-3, is divided into three parts. The first part deals with the cost of purchasing paddy, the second deals with the purchase of jute bags for paddy rice, and the third part deals with the purchase of polythene bags for clean rice. The cost of the jute bags will be recovered from farmers at cost plus 20%.

**Table A3-3: Forecasted sales and cost of sales for large scale model rice mill**

Sales

Sales

Jute Bags

$4,464,880

$258,999

$4,464,880

$258,999

$6,697,320

$388,500

$6,697,320

$388,500

$6,697,320

$388,500

Total Sales

$4,723,879

$4,723,879

$7,085,820

$7,085,820

$7,085,820

Direct Cost of Sales

Paddy Rice

Jute Bags Polythene Bags

$3,198,720

$216,000

$210,000

$3,198,720

$216,000

$210,000

$4,798,080

$324,000

$315,000

$4,798,080

$324,000

$315,000

$4,798,080

$324,000

$315,000

Total Direct Cost of Sales

$3,624,720

$3,624,720

$5,437,080

$5,437,080

$5,437,080

**Projected Profit and Loss:** The net

projected profit for the first five

years will be

$494,805, $546,815, $1,062,519, $1,060,343 and $1,078,509 (Table A3-4). The sales to net profit

ratio is projected to increase from 11.53% in year one, rising to 15.93% in year five. The three most important costs in the Projected Profit and Loss Account are fuel, personnel, and depreciation. It is assumed that the company will have to generate some of its own electricity from two generators rated at 150KVA and 50KVA respectively. Apart from the initial cost of acquiring the generators, the running costs are high. The yearly depreciation is projected to be $203,250 based on the straight line method. The Mill and all accessories will depreciate over a 10 year period, generators, motor vehicles, and office equipment will be depreciated over a period of 5 years while landed property will be depreciated over 20 years.

**The Balance Sheet**: The Projected Balance Sheet shows that the net worth of the Company will be $6,089,991 at the end of the fifth year (Table A3-5[0](#_bookmark105)). Retained earnings is projected at

$3,211,482 together with the earning at the end of the fifth year means that total retained earnings will be ($3,011,482 + $1,078,509 = $4,089,991). Returns on Equity are 21.13%, 18.93%, 26.89%,21.16%, and 17.71% in each of the five years, a very respectable return to the

prospective investor.

73

Year 1 Year 2 Year 3 Year 4 Year 5

**Table A3-4: Projected profit and loss for large scale rice milling company**

Sales

$4,723,879

$4,723,879

$7,085,820

$7,085,820

$7,085,820

Direct Cost of Sales

Operations Payroll

$3,624,720

$49,008

$3,624,720

$49,421

$5,437,080

$62,769

$5,437,080

$63,480

$5,437,080

$64,926

Total Cost of Sales

$3,673,728

$3,674,141

$5,499,849

$5,500,560

$5,502,006

Gross Margin

Gross Margin %

$1,050,151

22.23%

$1,049,738

22.22%

$1,585,971

22.38%

$1,585,260

22.37%

$1,583,814

22.35%

**Operating Expenses**

Sales and Marketing Expenses

Sales and Marketing Payroll

Advertising/Promotion

$17,304

$4,850

$17,424

$4,850

$5,500

$25,672

$5,093

$5,775

$25,986

$5,093

$5,775

$26,307

$5,347

$6,064

Other Sales and Marketing Expenses $5,550

Total Sales and Marketing Expenses $27,704

$27,774

0.59%

$36,540

0.52%

$36,854

0.52%

$37,718

0.53%

Sales and Marketing %

0.59%

Finance and Administration Expenses

Finance and Administration Payroll

Depreciation Rent Utilities Insurance NASSIT

Fuel Hospitality Stationery

Communications/IT

Other Administrative Expenses

$31,008

$203,250

$6,000

$7,150

$6,600

$12,403

$6,743

$5,500

$6,000

$7,576

$6,000

$31,383

$203,250

$6,000

$7,865

$6,600

$12,539

$7,417

$5,500

$6,600

$8,334

$6,000

$41,968

$203,250

$6,000

$8,651

$6,600

$17,242

$8,159

$5,500

$6,600

$8,334

$6,600

$42,362

$203,250

$6,600

$9,517

$6,600

$17,460

$8,974

$5,500

$7,260

$9,166

$6,600

$43,276

$203,250

$6,600

$10,468

$6,600

$17,804

$9,872

$5,500

$7,260

$9,166

$7,260

Total Finance and Administration

Expenses

Finance and Administration %

$298,230

6.31%

$301,488

6.38%

$318,904

4.50%

$323,289

4.56%

$327,056

4.62%

Engineering Expenses:

Engineering Payroll

Fuel for Generators Repairs & Maintenance

Other Engineering Expenses

$26,712

$30,000

$6,000

$4,200

$27,161

$45,000

$8,000

$6,000

$42,008

$49,500

$8,000

$6,000

$42,774

$67,000

$10,000

$7,500

$43,531

$67,000

$10,000

$7,500

Total Engineering Expenses

Engineering %

$66,912

1.42%

$86,161

1.82%

$105,508

1.49%

$127,274

1.80%

$128,031

1.81%

Total Operating Expenses

$392,846

$415,423

$460,952

$487,417

$492,805

Profit Before Interest and Taxes

EBITDA1

Interest Expense

$657,305

$860,555

$162,500

$634,315

$837,565

$87,500

$1,125,019

$1,328,269

$62,500

$1,097,843

$1,301,093

$37,500

$1,091,009

$1,294,259

$12,500

Net Profit

$494,805

$546,815

$1,062,519

$1,060,343

$1,078,509

Net Profit/Sales

10.47%

11.58%

15.00%

14.96%

15.22%

1 Earnings before interest, taxation, depreciation and amortization

74

Year 1 Year 2 Year 3 Year 4 Year 5

**Table A3-5: Projected Balance Sheet for model large scale rice mill in Sierra Leone**

Assets

Total Current Assets

Fixed Assets

Accumulated Depreciation

$1,535,882

$2,022,500

$203,250

$2,338,929

$2,022,500

$406,500

$3,502,578

$2,022,500

$609,750

$4,516,170

$2,022,500

$813,000

$5,546,154

$2,022,500

$1,016,250

Total Assets

$3,355,132

$3,954,929

$4,915,328

$5,725,670

$6,552,404

Liabilities and Capital

Accounts Payable

Fixed Liabilities

$13,327

$1,000,000

$316,309

$750,000

$464,189

$500,000

$464,188

$250,000

$462,413

$0

Total Liabilities

$1,013,327

$1,066,309

$964,189

$714,188

$462,413

Paid-in Capital

Retained Earnings Earnings

$2,000,000

($153,000)

$494,805

$2,000,000

$341,805

$546,815

$2,000,000

$888,620

$1,062,519

$2,000,000

$1,951,139

$1,060,343

$2,000,000

$3,011,482

$1,078,509

Total Capital

$2,341,805

$2,888,620

$3,951,139

$5,011,482

$6,089,991

Total Liabilities and Capital

$3,355,132

$3,954,929

$4,915,328

$5,725,670

$6,552,404

Net Worth

$2,341,805

$2,888,620

$3,951,139

$5,011,482

$6,089,991

75

Year 1 Year 2 Year 3 Year 4 Year 5



***2: Medium Sized Mill***

**Figure A3-2: Factory Layout for a model medium scale rice processing facility in Sierra Leone**

3,600.0

1,200.0

1,200.0

T 1

T 2

1,800.0

1,200.0

Kt

Kt

3,600.0

of

11,400.0

Wc

4,800.0

So

Mr

Ba

Ba

12,000.0

3,600.0

2,400.0

1,000.0

19,000.0

FIG. 4 FACTORY LAYOUT PLAN (MEDIUM SCALE)

**LEGEND**

Bp - Boiler for parboiler Bd - Boiler for Dryer

St - Soaking /Steaming Tanks Kt - Steaming kettles

Wc - Wet Cleaner /Winnower Dr - Rotary Dryers

Mr - Rice Mill

Ba - Bagging Area Ta - Tempering Area of - Office

St- Store

T1 & T2 - Toilets

76

Ta

Dr

Dr

St

St

Bd

Bp





The Business Plan (BP) is prepared for a model medium sized establishment with a design indicated

above. The projected performance of a medium sized rice milling establishment is summarized in Table A3-6, showing clearly that the business should be profitable.

The Headquarters of the model Company will be located in Makeni in Bombali District, which is approximately 120 miles from Freetown. Its main business will be to purchase enough paddy rice in bulk during the buying season that normally lasts from November to March for milling during the rest of the year. Sufficient storage capacity is provided to enable the Company to store enough paddy to keep a ten ton per day mill busy for 280 working days. The rice will be marketed through different channels. The Company will be a Private Limited Liability Company. It will have an Authorized Share Capital of 250 ordinary shares valued at $1,000 per share.

**Table A3-6: Summary of projected performance of medium sized model rice mill establishment**

The Company will start up with fixed assets totaling $332,500 as shown in Table A3-7 below. In

addition a provision of $21,500 is made to pay for goods and services that will be needed to meet initial expenses relating to: Legal & Secretarial Services, Stationery & Office Expenses, Per Diem, Communication/IT, Publicity/Hospitality and Consultancy Fees. A total provision of $21,500 is also made for consultancy service. This amount is to cover the period during the construction of various buildings and installation of machinery. This will give flexibility to the Promoters to hire the right people on short term basis to start the process of getting the Mill ready before the first year of trading. Those who prove to be effective can be absorbed into the workforce.

**Sales Forecast** (Table A3-8): Rice will be sold ex-factory. The Mill will produce high quality rice, which will meet with customers' satisfaction. The mill will operate at full capacity in the first and second years and at one and a half capacity in the next three years with the possibilities of increasing the capacity to two full shifts.

The proposed mill capacity is 10 tons per day and perform at 85% efficiency at continuous operations; recovery of rate of paddy rice to milled rice is assumed to be 70%; the mill will operate for 280 days a year; the cost of paddy rice is assumed at $336 per ton and sales price at $670 per ton; in years 3, 4 & 5 the mill will operate one and a half shifts per day milling 2,380mt of paddy and producing 1,116mt of milled rice.

The direct cost of sales shown in Table a3-8, is divided into three parts. The first part deals with the cost of purchasing paddy, the second deals with the purchase of jute bags for paddy rice, and the

77

third part deals with the purchase of polythene bags for clean rice. The cost of the jute bags will be

recovered from farmers at cost plus 20%.

**Table A3-7: Cost of Capital Investment for Model Medium Sized Rice Milling Enterprise**

78

Items

Output Capacity

Materials specification

Source of power

Qty

Unit Cost (US$)

Amount US$

Rice winnower

10 tons/day

-1.5mm mild steel sheet

-500mm X 500mmX 2mm for frame

7.5 HP diesel engine

1

2,500

2,500

Automated Wet cleaner

10 tons/day

2mm galv. sheet

10 HP diesel engine

1

2,000

2,000

Rice Parboiler

5 tons/day each

-3mm plate for boiler

-2mm galv. Sheet for soaking/ steaming tanks

Firewood, husk (briquette) or gas

2

15,000

30,000

Steam heated Rotary dryer

2.5tons/day

-3mm plate for boiler

-2mm sheet for drying platform

Firewood, husk (briquette) or gas

2

20,000

40,000

Rice Mill

10tons/day each

1.5mm mild steel sheet and 50mm x 50mm x 2mm angle iron frame

20 HP water cool engine with radiator

1

3,400

3,400

De-stoner

1tons/day

1.5mm mild steel sheet

5 HP diesel engine

1

3,250

3,250

Grader/Cleaner

10 tons/day

1.5 mm mild steel sheet

5HP diesel engine

1

3,000

3,000

Platform weighing scale

200kg capacity

1

900

900

Mini weighing scale

10kg capacity

1

50

50

Polythene Sealers

Medium

2

50

50

Hand held bag sewing machine

1

300

300

Drying floor

30m (length) x 40m (width) x0.45m (height)

1

3,000

3,000

Borehole with overhead water storage

3HP submersible pump

1

3,650

3,650

Double Cab

4x4

1

45,000

45,000

Generator

50 KVA

1

50,000

50,000

Office Equip

2,900

2,900

Water Tank

5,000 ltr.

1

2,500

2,500

Mill House

1

50,000

50,000

Store

1

40,000

40,000

Dwelling House

1

50,000

50,000

Total

332,500

**Table A3-8: Forecasted sales and cost of sales for Medium Sized model rice mill**

Sales

Sales of Clean Rice

Sale of Jute Bags

$1,116,220

$51,840

$1,116,220

$51,840

$1,674,330

$93,312

$1,674,330

$93,312

$1,674,330

$93,312

Total Sales

$1,168,060

$1,168,060

$1,767,642

$1,767,642

$1,767,642

Direct Cost of Sales

Cost of Sales - Rice

Cost of Polythene Bags Cost of Jute Bags

$799,680

$49,980

$51,840

$799,680

$49,980

$51,840

$1,195,520

$74,970

$62,208

$1,195,520

$74,970

$62,208

$1,195,520

$74,970

$62,208

Total Direct Cost of Sales

$901,500

$901,500

$1,332,698

$1,332,698

$1,332,698

**Projected Profit and Loss:** The net projected profit for the first five years will be $148,670, $150,285,

$308,424, $312,312 and $301,460 respectively (Table A3-9). The sales to net profit ratio is projected to increase from 12.73% in year one, rising to 17.05% in year five. The three most important costs in the Projected Profit and Loss Account are fuel, personnel, and depreciation. It is assumed that the company will have to generate some of its own electricity from two generators rated at 150KVA and 50KVA respectively. Apart from the initial cost of acquiring the generators, the running costs are high. The yearly depreciation is projected to be $31,000 based on the straight line method. The Mill and all accessories will depreciate over a 10 year period, generators, motor vehicles, and office equipment will be depreciated over a period of 5 years while landed property will be depreciated over 15 years.

**Table A3-9: Projected profit and loss for Medium Sized rice milling company**

**Sales**

**$1,168,060**

**$1,168,060**

**$1,767,642**

**$1,767,642**

**$1,767,642**

Direct Cost of Sales

Other Costs of Sales

$901,500

$0

$901,500

$0

$1,332,698

$0

$1,332,698

$0

$1,332,698

$0

**Total Cost of Sales**

Gross Margin

**Gross Margin %**

**$901,500**

$266,560

**22.82%**

**$901,500**

$266,560

**22.82%**

**$1,332,698**

$434,944

**24.61%**

**$1,332,698**

$434,944

**24.61%**

**$1,332,698**

$434,944

**24.61%**

**Expenses**

Payroll

Depreciation Rent Utilities Insurance NASSIT

Fuel Hospitality Stationery

Communications/IT Repairs & Maintenance Marketing & Promotions

Other Administrative Expenses Total Operating Expenses

$33,900

$31,300

$1,500

$1,500

$1,500

$3,390

$12,000

$1,200

$1,200

$1,500

$1,500

$1,200

$1,200

$92,890

$33,900

$31,300

$1,500

$1,575

$1,500

$3,390

$12,600

$1,200

$1,200

$1,500

$1,650

$1,200

$1,260

$93,775

$46,595

$31,300

$1,650

$1,653

$1,500

$4,660

$13,230

$1,200

$1,260

$1,575

$1,815

$1,260

$1,323

$109,021

$46,595

$31,300

$1,650

$1,736

$1,500

$4,660

$13,892

$1,320

$1,260

$1,575

$1,996

$1,260

$1,389

$110,133

$48,925

$31,300

$1,815

$1,822

$1,500

$4,893

$14,586

$1,320

$1,323

$1,654

$2,196

$13,123

$1,528

$125,985

Profit Before Interest and Taxes

EBITDA1

Interest Expense Net Profit

$173,670

$204,970

$25,000

$148,670

$172,785

$204,085

$22,500

$150,285

$325,924

$357,224

$17,500

$308,424

$324,812

$356,112

$12,500

$312,312

$308,960

$340,260

$7,500

$301,460

**Net Profit/Sales**

**12.73%**

**12.87%**

**17.45%**

**17.67%**

**17.05%**

1 Earnings before interest, taxation, depreciation and amortization

79

Year 1 Year 2 Year 3 Year 4 Year 5

Year 1 Year 2 Year 3 Year 4 Year 5

**Balance Sheet** (Table A3-10[0](#_bookmark107)): The Projected Balance Sheet shows that the net worth of the

Company will be about $1.5millionat the end of the fifth year, a substantial increase from the

$0.4million at the end of the first year. Retained earnings are projected to increase from a negative

$0.02million in the first year to $0.9million in the fifth year. With annual Returns on Equity of 39.42%, 28.49%, 36.90%, 27.20% and 20.80% in Year one to five respectively, the business is projected to be very profitable.

**Table A3-10: Projected Balance Sheet for model medium sized rice milling enterprise**

Assets

Total Current Assets

Fixed Assets

Accumulated Depreciation

$325,970

$332,500

$31,300

$457,555

$332,500

$62,600

$747,279

$332,500

$93,900

$1,040,890

$332,500

$125,200

$1,323,650

$332,500

$156,500

Total Assets

$627,170

$727,455

$985,879

$1,248,190

$1,499,650

Liabilities and Capital

Fixed Liabilities

Paid-in Capital Retained Earnings Earnings

$250,000

$250,000 ($21,500)

$148,670

$200,000

$250,000

$127,170

$150,285

$150,000

$250,000

$277,455

$308,424

$100,000

$250,000

$585,879

$312,312

$50,000

$250,000

$898,190

$301,460

Total Capital

$377,170

$527,455

$835,879

$1,148,190

$1,449,650

Total Liabilities and Capital

$627,170

$727,455

$985,879

$1,248,190

$1,499,650

Net Worth

$377,170

$527,455

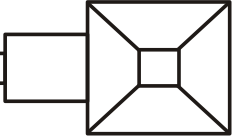
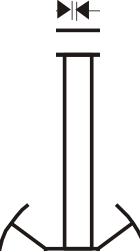
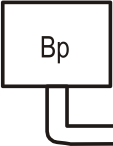
$835,879

$1,148,190

$1,449,650

80

Year 1 Year 2 Year 3 Year 4 Year 5



***3. Small Scale Mill***

**Design**

**Figure A3-1: Factory Layout for a model small scale rice processing facility in Sierra Leone**

,.

6,000.0 -

-

-

-

-----

'T

I

I

T

T

St

St

1,200.0

1,200.0

I

**(Bw,**

10,200.0

of

3,600.0

Mr

3,600.0

So

I

Ba

I 2,400.0

--

- -

-

-

-

-

-

-

10,000.0-

-

-

- - - - ,.

3,600.0 - -

---

,

14---

-

-

-

- - -

- - - -

17,000.0 - -

-

-

-

-

-

-

-

-

-

**FIG. 1 FACTORY LAYOUT PLAN (SMALL SCALE)**

r

**2,400.0**

*l*

I

I

[I]

[I]

[I]

**3,600**

**1,200.0**

I

I

81

'

*¥# '*

**/AWA**

***/A1/// '-.***

***/A1///***

*'-.*

**FIG. 2 FRONT VIEW (SMALL SCALE)**

Dp

Dp Dp

Ta

**TITLE**

**SMALL SCALE RICE PROCESSING PLANT**

**DESIGNED BY**

**ENGR. DR. AGIDI GBABO**

**DRAWN BY**

**ENGR. DR. AGIDI GBABO**

**DATE**

**6/9/2013**





The projected performance of a medium sized rice milling establishment is summarized in Table A3-

11, showing, as in the case of the large and medium sized mills, that the business should be profitable.

**Table A3-11: Summary of projected performance of small scale model rice mill establishment**

As for the other model mills, the assumption is that the Headquarters of the Company will be

located in Makeni in Bombali District, which is approximately 120 miles from Freetown. Its main business will be to purchase enough paddy rice in bulk during the buying season that normally lasts from November to March for milling during the rest of the year. Sufficient storage capacity is provided to enable the Company to store enough paddy to keep a ten ton per day mill busy for 280 working days. The rice will be marketed through different channels. The Company will be a Private Limited Liability Company. It will have an Authorized Share Capital of 150 ordinary shares valued at

$1,000 per share.

The Company will start up with fixed assets totaling $230,900 as shown in Table A3-12 below. In addition a provision of $10,250 is made available to pay for goods and services that will be needed to meet initial expenses relating to: Legal & Secretarial Services, Stationery & Office Expenses, Per Diem, Communication/IT, Publicity/Hospitality and Consultancy Fees. A total provision of $10,250 is also made for consultancy service. This amount is to cover the period during the construction of various buildings and installation of machinery. This will give flexibility to the Promoters to hire the right people on short term basis to start the process of getting the Mill ready before the first year of trading. Those who prove to be effective can be absorbed into the workforce.

**Sales Forecast** (Table A3-13): Rice will be sold ex-factory. The Mill will produce high quality rice, which will meet with customers' satisfaction. The mill will operate at full capacity in the first and second years and at one and a half capacity in the next three years with the possibilities of increasing the capacity to two full shifts.

The proposed mill capacity is 5 tons per day and perform at 85% efficiency at continuous operations; recovery of rate of paddy rice to milled rice is assumed to be 70%; the mill will operate for 280 days a year; the cost of paddy rice is assumed at $336 per ton and sales price at $670 per ton; in years 3, 4 & 5 the mill will operate one and a half shifts per day milling 1,190mt of paddy and producing 833mt of milled rice.

82

**Table A3-12:**

**Cost of Capital Investment for Model Small Scale Rice Milling Enterprise**

The direct cost of sales shown in Table a3-13, is divided into three parts. The first part deals with the

cost of purchasing paddy, the second deals with the purchase of jute bags for paddy rice, and the third part deals with the purchase of polythene bags for clean rice. The cost of the jute bags will be recovered from farmers at cost plus 20%.

83

Machines/ Equipment

Output Capacity

Materials specification

Source of power

Qty

Unit Cost($)

Amount

Rice winnower

3tons/day

1.5mm mild steel sheet

3.5 HP diesel engine

1

2,300

2,300

Wet cleaner

3 tons/day

2mm galv. sheet

N/A

1

350

350

Rice Parboiler

2 tons/day

-3mm plate for boiler

-2mm galv. Sheet for soaking/ steaming tanks

Firewood, husk (briquette) or gas

1

12,000

12,000

Steam heated platform dryer

2tons/day

-3mm plate for boiler

-2mm sheet for drying platform

Firewood, husk (briquette) or gas

1

15,000

15,000

Rice Mill

3tons/day each

Engle-berge mill

15 HP water cool engine with radiator

1

2,800

2,800

De-stoner

3tons/day

1.5mm mild steel sheet

2 HP diesel engine

1

10,200

10,000

Grader/Cleaner

3 tons/day

1.5 mm mild steel sheet

3.5HP diesel engine

1

2,300

2,300

Platform weighing scale

150kg capacity

1

750

750

Polythene Sealers

Medium size

1

50

50

Mini weighing scale

10kg capacity

1

50

50

Hand held bag sewing machine

1

300

300

Drying floor

20m (length) x20m(width) X0.45m(height

1

2,000

2,000

Borehole

2HP

submersible pump

1

3,500

3,500

Double Cab

4x4

1

45,000

45,000

Generator

35 KVA

1

35,000

35000

Office Equip

2,500

2,500

Water Tank

1

2,000

2,000

Mill House

1

25,000

25,000

Store

1

30,000

30,000

Dwelling

1

40,000

40,000

Total

230,900

**Table A3-13: Forecasted sales and cost of sales for small scale model rice mill**

Sales

Sale of Clean Rice

Sale of Jute Bags

$558,110

$25,920

$558,110

$25,920

$837,165

$38,880

$837,165

$38,880

$837,165

$38,880

Total Sales

$584,030

$584,030

$876,045

$876,045

$876,045

Direct Cost of Sales

Cost of Paddy Rice

Cost of Jute Bags

Cost of Polythene Bags

$399,840

$25,920

$24,990

$399,840

$25,920

$24,990

$599,760

$38,880

$37,485

$599,760

$38,880

$37,485

$599,760

$38,880

$37,485

Total Direct Cost of Sales

$450,750

$450,750

$676,125

$676,125

$676,125

**Projected Profit and Loss:** The net projected profit for the first five years will be $47,000,

$48,266,

$103,947, $106,849 and $106,939 respectively (Table A3-14). The sales to net profit ratio is

projected to increase from 8.05% in year one, rising to 12.21% in year five. The three most important costs in the Projected Profit and Loss Account are fuel, personnel, and depreciation. It is assumed that the company will have to generate some of its own electricity from a generators rated at 35KVA. Apart from the initial cost of acquiring the generators, the running costs are high. The yearly depreciation is projected to be $23,000 based on the straight line method. The Mill and all accessories will depreciate over a 10 year period, generators, motor vehicles, and office equipment will be depreciated over a period of 5 years while landed property will be depreciated over 15 years.

**Table A3-14:**

**Projected profit and loss for small scale rice milling company**

Sales

$584,030

$584,030

$876,045

$876,045

$876,045

Direct Cost of Sales

$450,750

$450,750

$676,125

$676,125

$676,125

Gross Margin

Gross Margin %

$133,280

22.82%

$133,280

22.82%

$199,920

22.82%

$199,920

22.82%

$199,920

22.82%

Expenses

Payroll

Marketing/Promotion Depreciation

Rent Utilities Insurance NASSIT

Fuel Hospitality Stationery

Communications/IT Repairs & Maintenance

Other Administrative Expenses

$27,900

$1,500

$23,000

$1,000

$1,200

$2,000

$2,790

$7,500

$750

$600

$1,000

$1,140

$900

$27,900

$1,500

$23,000

$1,000

$1,200

$2,000

$2,790

$7,500

$750

$630

$1,000

$1,254

$990

$34,955

$2,000

$23,000

$1,200

$1,890

$2,000

$3,496

$11,250

$825

$788

$1,100

$1,881

$1,089

$34,945

$2,000

$23,000

$1,200

$1,890

$2,000

$3,495

$11,250

$825

$788

$1,100

$1,881

$1,198

$35,655

$2,250

$23,000

$1,200

$2,268

$2,000

$3,566

$12,375

$825

$866

$1,210

$2,069

$1,198

Total Operating Expenses

$71,280

$71,514

$85,474

$85,572

$88,482

84

Year 1 Year 2 Year 3 Year 4 Year 5

Year 1 Year 2 Year 3 Year 4 Year 5

Profit Before Interest and Taxes

EBITDA

Interest Expense

$62,000

$85,000

$15,000

$61,766

$84,766

$13,500

$114,447

$137,447

$10,500

$114,349

$137,349

$7,500

$111,439

$134,439

$4,500

Net Profit

$47,000

$48,266

$103,947

$106,849

$106,939

Net Profit/Sales

8.05%

8.26%

11.87%

12.20%

12.21%

**Balance Sheet** (Table A3-15): The Projected Balance Sheet shows that the net worth of the Company

will be about $634,000 at the end of the fifth year, a substantial increase from the $267,000 at the end of the first year. Retained earnings are projected to increase from a negative $10,250 in the first year to $295,811 in the fifth year. With annual Returns on Equity of 17.62%, 15.32%, 24.81%, 20.32% and 16.90% in Year one to five respectively, the business is projected to be very profitable, although not as profitable as the larger sized mill establishment examined earlier.

**Table A3-15: Projected Balance Sheet for model small scale rice milling enterprise**

Assets

Cash

Fixed Assets

Accumulated Depreciation

$209,750

$230,000

$23,000

$251,016

$230,000

$46,000

$347,963

$230,000

$69,000

$447,811

$230,000

$92,000

$547,750

$230,000

$115,000

Total Assets

$416,750

$435,016

$508,963

$585,811

$662,750

Liabilities and Capital

Fixed Liabilities

Paid-in Capital Retained Earnings Earnings

$150,000

$230,000 ($10,250)

$47,000

$120,000

$230,000

$36,750

$48,266

$90,000

$230,000

$85,016

$103,947

$60,000

$230,000

$188,963

$106,849

$30,000

$230,000

$295,811

$106,939

Total Capital

$266,750

$315,016

$418,963

$525,811

$632,750

Total Liabilities and Capital

$416,750

$435,016

$508,963

$585,811

$662,750

Net Worth

$266,750

$315,016

$418,963

$525,811

$632,750

85

Year 1 Year 2 Year 3 Year 4 Year 5