

**COMPARATIVE ANALYSIS OF MANUAL AND MECHANISED COSTS OF RICE
HARVESTING ON SMALL PRODUCERS. A CASE STUDY: PRODUCTS OF NICOADALA
AND CHÓKWE DISTRICTS ZAMBÉZIA AND GAZA PROVINCES (2008 -2012)**

PROF. DOUTOR ARMINDO TAMBO*
MESTRE: JOSE AMANDIO LOPES**

*Dean of Faculty of Social and Political Sciences, UCM

** Faculty of Social and Political Sciences, UCM

ABSTRACT

In agricultural production, effective management of the various costs associated with production is a crucial factor in determining the profitability of the business. For that, it is necessary to apply available technologies for both the expansion of production areas as well as for the reduction of physical effort made by the producers. This study was conducted to evaluate to find out to what extent manual or mechanized costs of rice harvesting affects the income of small producers and recommend the least costly method for the practitioners of this culture in the districts of Nicoadala and Chokwe, sites selected for the study. The recommendations will also apply to other regions of the country where, it should be noted that the government has drawn up plans and actions to improve the living conditions of citizens by increasing production and productivity in producing rice; however, there are still many producers who practise agriculture in a very rudimentary form. To obtain data for the present study, quantitative analysis was used of the universe of the population of small producers, where it was concluded that the use of manual harvesting techniques by rice producers in Nicoadala district, is not linked to the existence or availability of local manpower but the lack of machinery for the provision of services to the producers. It was also concluded that the size of the area cultivated by rice producers did not affect the use of machines because there is adequate machinery for both areas less than 1 hectare to over 100 hectares. Therefore, it is recommended to the government and local businesses to take advantage of the opportunities for exploitation of machines, managing a profitable business, in addition to the need to encourage producers to adopt mechanized harvesting systems in order to reduce the costs of production and maximize the profitability of their business. The widespread adoption of mechanized harvesting by producers would make the production of this cereal in Mozambique, more competitive, both national and / or in regional level.

KEYWORDS: Producers, Production Costs, Rice Harvest, Nicoadala and Chókwe

Background of the Study

Mozambique is located on the east coast of southern Africa and extends over an area of 799.38 million square kilometres (98% of land and 2% of inland waters), with a total estimated population of 20,854,000 inhabitants where 48.4 % are men and 51.6% women, population density is 26 inhabitants / square kilometre and the natural growth rate of population is 2.4%, a median age of the population of 18 years with 47 life expectancy 9 years. The Gross Domestic Product (GDP) in each capital is 480 USD and 68.2% of the Mozambican population live in rural areas (INE, 2008).

For agriculture, the cultivated area in 2008 was performed on 36 672 million hectares, of which 119,333 hectares corresponding to the rice crop, the surface covered with forests is estimated at 40 million hectares of which 22.5 million (56.2%) are forests dense and 16.4 million (40.9%) open forests (MOA, 2008).

In Mozambique agriculture is the basis of national development and the State is the guarantor and promoter of rural development in order to meet the diverse and growing needs of the people for economic and social progress of the country. It is for the family sector a key role to ensure the practice of agriculture and the state, the role of encouraging and supporting the production of this sector, by encouraging the associative movements of producers as well as individually, to adopt more advanced production technology, necessary condition for the achievement of social and economic well-being of citizens.

The Mozambican state recognizes the small-scale production of the contribution to the national economy and supports its development as a way to enhance the skills and creativity of the people. Both in the provinces of Zambézia and Gaza, the family sector contributes over 80% of the cultivated area in the production of cereals and other important crops for the diet of the population (FAO, 2010).

Statement of the Problem

The Mozambican government has designed plans and actions to improve the living conditions of citizens through increased production and productivity within the producers, however, still prevail producers who practice agriculture in very rudimentary manner, on the one hand, due to lack of knowledge, little use of available technology in the rice harvest process and on the other, due to both economic and / or social factors. It is assumed that the largest grain losses and the high _ production costs are related to the harvesting process.

However, other factors such as pests and diseases, seed quality, irrigation system, among others, has no effect on production and productivity of rice, however, this study focused on the analysis of the rice harvest. Thus, it attempts to assess to what extent manual or mechanized cost of rice harvesting affects the income of small farmers in the family sector.

Purpose of the study

This study aims to contribute to the reduction of rice production costs in the family sector through identification of alternative harvest and create basis for encouraging producers to consider the production of rice as a source of income generation, as a part of showing the cost/benefit of manual and mechanized costs of rice harvesting among the small farmers.

Hypotheses

For the study on comparative analysis of manual and mechanized costs of rice harvesting, within the small producers following assumptions have been raised:

- H0: The lack of awareness of the other rice harvest methods among the small producers influence to low production;
- H1: Weak purchasing power and accessibility of manpower determines the use of manual means to harvest rice in small producers;

For the verification of hypotheses, data were submitted to a quantitative and qualitative evaluation using statistical methods and was turned into discussion and conclusion, the hypothesis that most stressed and demonstrated consistency between many.

Research Methodology

Research type

To achieve the objectives and purposes of this study, quantitative and qualitative Research we carried out through collection and analysis of data to answer the research questions and hypotheses were tested as previously established. Numerical data were considered, from the count of the sample elements in the use of statistical calculations which establish precisely the behaviour patterns and correlation of the population. However, adjacent secondary information obtained from reliable sources, was analyzed carefully comparing it to another number statistically acquired. After obtaining this data, simple tables for grouping data and later obtaining the relativities, graphical were constructed. Qualitative research was used in as

a basis of instrument that includes document analysis to describe, explain and support the graph data or figures.

Reasons for Methodology Choice

This study aims to quantify the costs of production with a focus on the independent variant "rice harvest". Thus, according to Bowerman (2003) for the determination of statistical inference coefficients and ratios of elements of a given sample, the recommended method is a quantitative statistical method applied to a given sample in structured or semi-structured inquiries.

Data Collection Methodology and Instruments

Adjacent secondary data obtained from reliable sources was analysed carefully comparing it with other numerical and statistically data. After obtaining this data, simple tables were made in order to group information so that later relativities would be obtained for the data demonstration in graphics.

However, before the study was carried out, there were contacts with institutions of the agricultural sector (technicians, presidents of associations, community leaders, producers and other sources expert in the agricultural production process) to search for additional data which would help the research design. Then, an inquiry was designed with closed ended questions and administered to the target group identified by the sample questions.

After the data collection in the field, statistical analysis of all data was done through Excel and

Population

According to Levin (1987), the population consists of a set of individuals who share at least one common feature, either citizenship, membership in an association, ethnicity or workgroup.

According to the General Population Census published by the National Statistics Institute, Nicoadala district has 231,850 inhabitants and a population density of 68.35 inhabitants per square kilometer and Chókwe has 186,597 inhabitants and a density of 100.1 inhabitants per square kilometer, with a active population of 89.6% and 85% respectively. These two districts have rice as the most widely practised crop and the basis of food to the population (INE, 2007).

For the Nicoadala district but specifically in Mucelo region in contact with the sources and written documents consulted, it was possible to account 243 producers and in Massavasse region, 166 rice farmers in the family sector, summing up 409 producers in the target

population of this research . These two regions have typical characteristics and clay soils suitable for the cultivation of rice and they represent potential producing areas in the central and southern part of the country (MADER, 2008).

Sample and Sampling Procedure

Sample

After the identification of the target group, the extraction was followed by a population sample of 80 small producers of rice (40 Chókwe and 40 Nicoadala), with a sample population of 409 producers corresponding to 19.6% of this population of the two districts.

Sample size

To obtain this sample size was used Yamane formula for determining the sample size. Below is the calculation of sample size according to Yamane formula.

Where: N – Population size

n – Sample size

e – Expected error (10%)

$$n \geq \frac{N}{1 + N(e)^2}$$

Sample size calculation on the Yamane theory

$$n \geq N/1+N(e)^2 ;$$

$$n \geq 409/1+409*(1/10)^2 ;$$

$$n \geq 80,35;$$

n ≥ 80 Producers to be interviewed in the two districts.

With this random sample, and this margin of error estimated at 10%, we obtained a good representation considering the size and population identified universe, according to the theory of Yamane (1967) to determine the sample size.

SPSS statistical method, followed by the graphic interpretation description.

Findings

Basing on the total 80 small producers of interviewed respondents, representing the size of the sample measured, the Nicoadala district has on average younger practitioners of rice production activity compared to the Chokwe district, where on average producers are 50 years old, against the 40 of Nicoadala producers.

It was also seen that the differences in the distribution of tasks in human and in Mozambican societies, particularly in the southern region, the work of agricultural production and rice in

particular, is the responsibility of men while in the central region, particularly in Zambezia province, is undertaken by women, 85% versus 15% representing men.

The producers of the two districts have a long experience in the production of rice, all interviewed already practise the activity over 5 years on average and has a higher household basing on the national average - the average number of national household is set at 5 members (INE , 2008).

On average the producers of Nicoadala District practise 1 hectare area while in Chokwe, those charged areas are on average of 3.58 hectares. However, the use of mechanisation in the production process, it facilitates largely the different operations such as the Harvester case that can save more than 80% of the applied value when using the manual harvest, that is, as to mow an area one hectare in Chokwe District need to apply a value of two thousand meticaais (2.000,00Mts), in Nicoadala District to the same area, you pay a value of 12,550 meticaais. (Ibis)

By and Large, the rice harvest was always performed mechanically, and there was a change of this common practice with the stoppage of estatatais companies, which was followed by a moment of destabilization and destruction of agricultural infrastructure with the outbreak of civil war.

With the revitalization of rice production in Chokwe district, new private companies and individuals are into operation highlighting the company "MIA-Mocfood" with more than 5000 hectares concession for the production of rice and other cereal crops under directly or indirect way, that is, with a production performed by the company itself through the contracting of individual producers and creating all necessary conditions for the production, through allocation of inputs that guarantee strict compliance with the agricultural calendar. Thus producers have timely execution that guarantee their operations by the contracting themselves in companies. In addition, the use of machinery is indispensable by the company in order to ensure quality and fidelity in repayment of the credit received from the companies. On the other hand, the producers of Nicoadala district still continue practising farming through all own and with minimum employment or simply without the use of machinery in execution of their productive activities, resulting in a high operating cost and conversely low incomes.

For the area cultivated by each producer respondent, it was found that the majority of producers in Nicoadala district cultivate areas ranging from 0.5 to 1.5 hectares, 50% and 17.5% respectively. This statement shows that the producers still practice subsistence farming

and basically the output at this stage depends essentially on the adoption of improved production technologies and bringing comparative advantages, both in reducing production costs, increasing production and productivity, as well as the physical effort required for the practice of agricultural productive activity.

Small producers of Nicoadala District practise an area of 1 hectare, corresponding to 32.5% of respondents, most practising areas of 0.5 hectares (50%) of respondents.

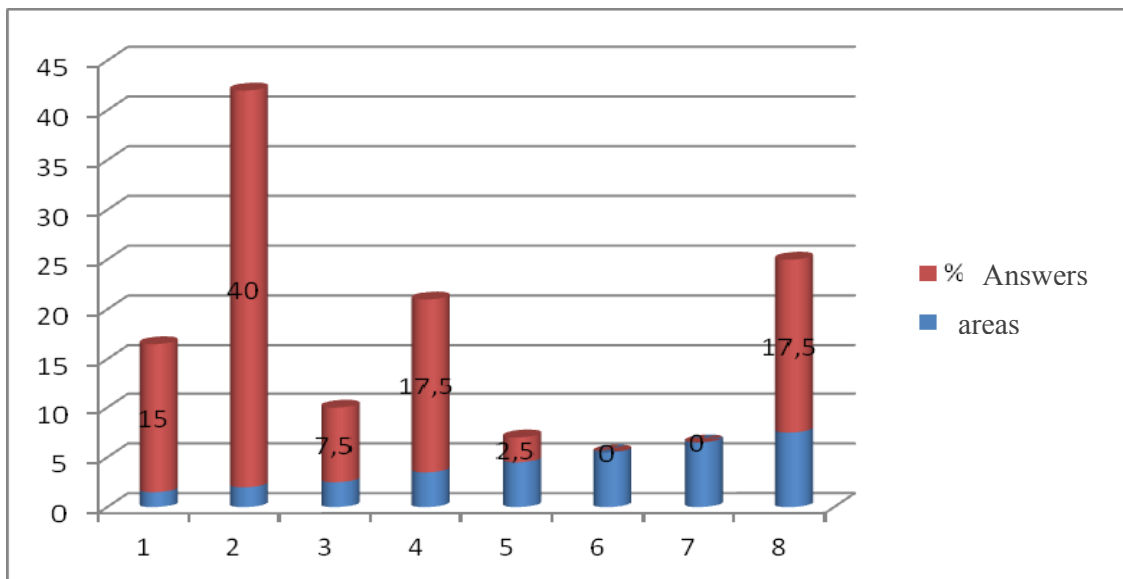
In the same study, it was clear that none of the small producers in Nicoadala district produces in an area above 2 hectares, a situation that keeps the small producers constantly vulnerable to food shortages and consequently vulnerable to hunger because they cannot produce enough to guarantee food and have surplus to sell in order to buy other goods for their own use.

Discussion

Areas practiced by small producers in the District of Chókwe

For the District of Chokwe, the situation of small producers is rather different because 40% of respondents explore areas of 2 hectares and 17.5% above areas have 7 acres, this finding shows the flexibility with which they can explore an area and expand to larger increasingly depending on the costs and benefits that can be drawn with the various employment practices of technologies that facilitate certain operations as in the case of the harvest which is the higher costs in rice cultivation.

Figure 1. Cultivated areas by producers of Chókwe District



Source: Author, 2013

In this district, it was possible to have the perception that there is a mentality of a production oriented to the market, because during the interviews it was possible to notice the presentation of the issue linked to the price to be charged in excess of the marketing act throughout this campaign 2012/2013 . Many producers are keen on increasing their cultivation areas depending on the price offered in the market. See Figure 6 above.

Table 1: Comparative costs of manual and mechanised costs of rice harvesting in Chokwe district

Operations	manual harvesting	harvesting mechanized
Harvest	8.000,00	2.000,00
threshing	1.500,00	-----
sacking	550,00	550,00
Transport	2.500,00	2.500,00
Total	12.550,00	5.050,00

Source: Author, 2013

Making a comparative analysis, we found that mowing an area of one (1) hectare, with all conditions created, that is, with low humidity field rice grain and 16 to 17% moisture, is harvested in two (2) hours on average, with a cost estimated at (2.000,00Mts), a statement taken from 37 small producers corresponding to 92.5%. Only three producers (7.5%) stated that the machine took 3-4 hours to mow their area of one hectare, however, later it was found that this delay was due to the poor condition of the land where the machine had to constantly interrupt mowing operation due to excess humidity - moist soils do not allow good movement of machinery faults leading to constant and often the larger grain losses resulting from fermentation and subsequent decomposition of the grain in contact with moisture.

Also in Chokwe district , 40 small farmers producing rice using autocombinadas in harvest were interviewed, 37 responded positively on the use of these machines, with the many advantages that they offer from reducing the time required to reap as well as reduced post-harvest losses, since the machine combines the two operations (cutting and threshing) - to evaluate the production costs, was used to drive one hectare as standard.

Table 2: Number of people employed to harvest rice, District of Nicoadala

Designation	Number of people of needed people to harvest rice				Average
Respondents producers	14	20	3	3	10
Employed People (Jornas)	2	5	10	15	9
% Correspond. respondents	35	50	7,5	7,5	21,90

Source: Author, 2013

Compared to manual harvesting process, 1 hectare requires employment of 20-25 people for a period of 4 to 5 days at a cost estimated at more than 60 meticaïs per person per day, the equivalent of 8,000 meticaïs of the cost that should be included in the costs of threshing and sacking (for threshing and bagging, they pay 50 meticaïs per person per day) with a total assessed value in 12,550 meticaïs.

Also in this analysis, 50% (20 small producers) of the respondents in Nicoadala district said they employ more than 5 people to support the rice harvest, upon payment of 50 meticaïs per person per journeyman (work) performed also incurring large costs considering that after cutting the rice should stay on the field to complete drying, only then to be held threshing.

However, hiring people for holding activities in the manual harvesting process carries many uncertainties as there is the risk of not getting people in perfect time to perform the operation and / or require high values for the provision of service, thereby creating mode, a normal schedule non-compliance required to remove the grain in the field, resulting in large losses of grain. According to technical standards of the MOA of the (2008), the grain must remain in the field until a physiological maturity with humidity that should be between 16-17%, if moisture reduce until and unless these indicators can start desgrane process, representing unchievably losses.

Commonly producers of Nicoadala district reap rice with very low levels of humidity (12-13%), resulting in large losses because when they come into contact with very dry panicle desgrane may occur with direct effect on reducing income end, first and second, the grain significantly lower their organoleptic qualities.

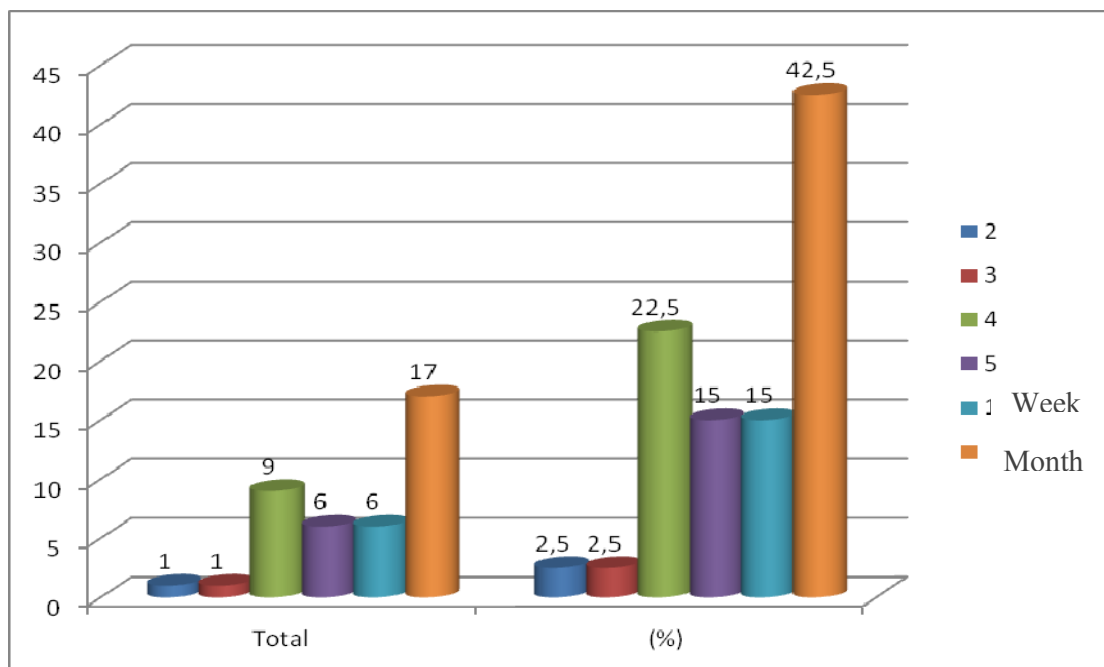
Table 3: Required time to harvest one hectare in Nicoadala District

harvest Duration (days)	2	3	4	5	7	30
Number of respondents	1	1	9	6	6	17
(%)	2,5	2,5	22,5	15	15	42,5

Source: Author, 2013

The manual cutting process, threshing, rice drying in the field, carries losses of grain on the one hand due to desgrane and the other due to pests field such as mouse offield. - The Rat-of-field is a very important pest and can cause damage to more than 5% of total production (MOA in the 2011).

Figure 2. Required time to harvest one hectare in Nicoadala District



Source: Author, 2013

The above figure 2 shows the grouping of the required time to harvest one hectare in Nicoadala District and the percentage from which we conclude that 42.5% of the interviewed areas are generally for one month to complete the harvest. Only 2.5% (1) respondent producer said that the harvest of your hard field two to three days.

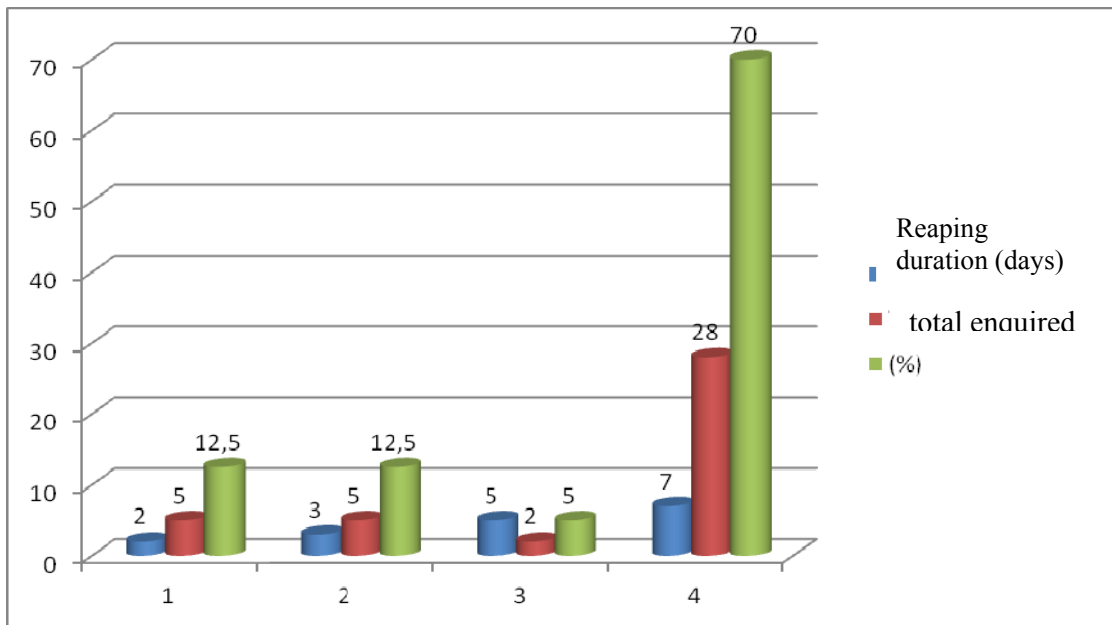
Table 4: Threshing process Time in Nicoadala District

Threshing time (days)	2	3	5	7
Total respondents	5	5	2	28
(%) Respondents	12,5	12,5	5	70

Source: Author, 2013

After the cutting operation, rice is placed in stacks to allow the drying one side and other, until they create conditions for realization of corn. From the undertaken study, 12.5% of respondents (5 producers) and 70% (28 producers) said the threshing takes place on an average over 4 days period after the cut depending on the amount or existence of manpower for that purpose through the payment of a value that can be agreed between the parties, ranging from 30 to 70 meticais per activity.

Figure 3. Rice permanency period in the field until the threshing



Source: Author, 2013

Making a general evaluation, we concluded that most producers can not withdraw their production from the fields after cutting, awaiting an opportunity for threshing and later transport to their homes, which will result in costs, both conservation and payment of staff. See figure 3 above.

An organised production process led by organisations with an interest in the development of activity where everyone can get dividends this is held and each party concerned gives its contribution to flexible production, because according to information obtained from key informants and with extensive experience in production in farming there has always been subsidized and placed as a priority for the private sector that operates the processing plants, because it depends on the existence of the necessary raw material industries.

The Government should create basic conditions so tha there is a favorable business environment through opening private operators providing service to producers through agreements or contracts between them. Thus, tillage operationsin harvesting and transportation of grain to the homes or warehouses of the companies that buy the product, it is the responsibility of the operators reflecting only the final costs arising therefrom, and minimise the cost of the weight that the mere producer must pay, reducing significantly the total production costs.

Similar actions made private operators seek to work alongside producers of the family sector by encouraging them to produce and market the surplus products are ongoing and positive effects, for example in Chokwe District two companies that exploit the processing market rice (paddy company of Palms, located in Manhica district Mia-Mocfer company, located in Chokwe district, promoting campaigns in support of producer associations allocating inputs needed to rice production and end of each year, each producer puts part of the production it intends to market the availability of the promoting companies that at the end of the marketing process, discounting the costs of the credit received.

This experience can be capitalised with the operation input of the two processing plants in Nicoadala Namacurra district that would make the producer of the family sector that continues to practise subsistence agriculture with short cable use and exploring areas too reduced, taking advantages from the benefit from subsidies in the preparation of land, good quality seed allocation and ease of use machinery to harvest their rice and finally in product transport for both plants as well for their homes, relieving therefore, certain production costs that would be only in charge of undercapitalised producers.

Tabela 5: Rice threshing cost Nicoadala district

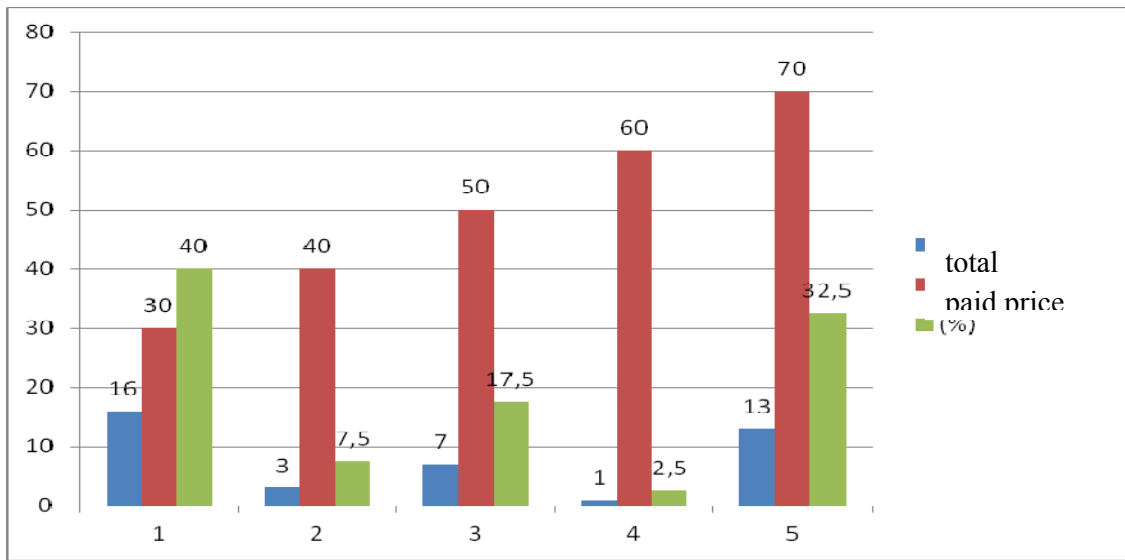
Designation	Price variation on the threshing process					Avarage
Aplied Price (Mts)	30	40	50	60	70	50
Interviewed Respondents	16	3	7	1	13	8
(%) Respondents	40	7,5	17,5	2,5	32,5	20%

Source: Author, 2013

The graphical demonstration below illustrates the different prices in the payment of manpower to carry out the threshing, where it can be concluded that on average 20% of respondents practise a price of 50 meticaís per activity held daily. This payment represents a huge burden for rice production costs, given that the production is not primarily intended for sale but for family consumption thereby forcing the producer to refer to other sources to meet the need of production that are proposed to overcome this situation presupposes a change in attitude behavior within the associations of producers.

Below the the graphic representation of Table 8, given the extreme and critical values observed in the inquiry conducted on rice threshing process, see Figure 9 below.

Figure 4: Illustrates the different prices for threshing rice.



Source: Author, 2013

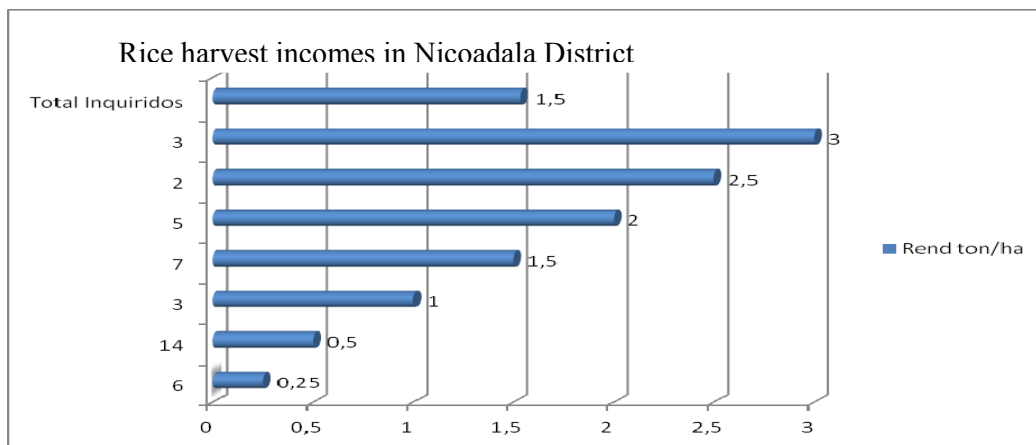
Tabela 6: Income achieved in tonnes per hectare (District of Nicoadala)

Designation	Sacks (50kg) obtained by each producer							Avarage
Quantity of sacks	5	10	20	30	40	50	60	-----
Total respondents	6	14	3	7	5	2	3	-----
Income (ton/ha)	0,25	0,5	1,0	1,5	2	2,5	3	1,5
(%) Corresp/espondents	15	35	7,5	17,5	12,5	5	7,5	-----

Source: Author, 2013

On average the producers of Nicoadala district can achieve average yield of 1.5 tons per hectare that could be higher if post-harvest losses were avoided or reduced using different sustainable production technologies and apply to communities (FAO _ 2010).

Figure 5. Fluctuations in income obtained by the producers of the District of Nicoadala.



Source: Author, 2013

Figure 5 illustrates the fluctuation of the proceeds obtained by the producers of Nicoadala District when carrying out their production activities.

Howeve, good leadership within organisations of producers can improve the perception of the production process among the members and change current income to higher levels, and however necessary leadership because according to (Kottler, 1992), one leader should be able to confront changes, developing a future vision engaging people _ informing them that vision _ inspiring them to overcome obstacles.

The leaders of the different groups of producers_ with their skills can build capacity and influence groups to achieve new goals by adopting new production technologies through exchange of experiences with different exsistentes productive sectors in the country with certain capacity renowned in the field of agricultural production.

In the study, the results show that the producers in general have experience of over 5 years in the production of this cereal, however, the theory that "Experience is what counts," is not valid for all cases because according to (Robbins:2005), in his book entitled "organizational Behavior" the situation where the experience was obtained is hardly comparable to the new situation faced at present, the work is different, the resources allocated are different, organisational culture are different, the characteristics of led is different and out there on, in addition to the situations faced by leaders and the requirements of the quality of the results is not static, it changes over time thus requiring the practice increasing the activities of day-to-day.

Commonly, into work with producers aiming to introduce a new technology or technique that change some form of work different from the previous, there has been resistance states turned into change claiming to have long-time experiences situations that slow development transforming societies partly because the lack of technology and on the other for fear of bringing innovation. However, we must take a good strategy which according Miztberg (2001) neutralizes threats explores the opportunities to reduce weaknesses and capitalizes on the strengths to achieve the objective of the organization. Only in this way, it can become the producer of livelihood for a commercial producer with gains in increasing production productivity as well as improving social condition thereof.

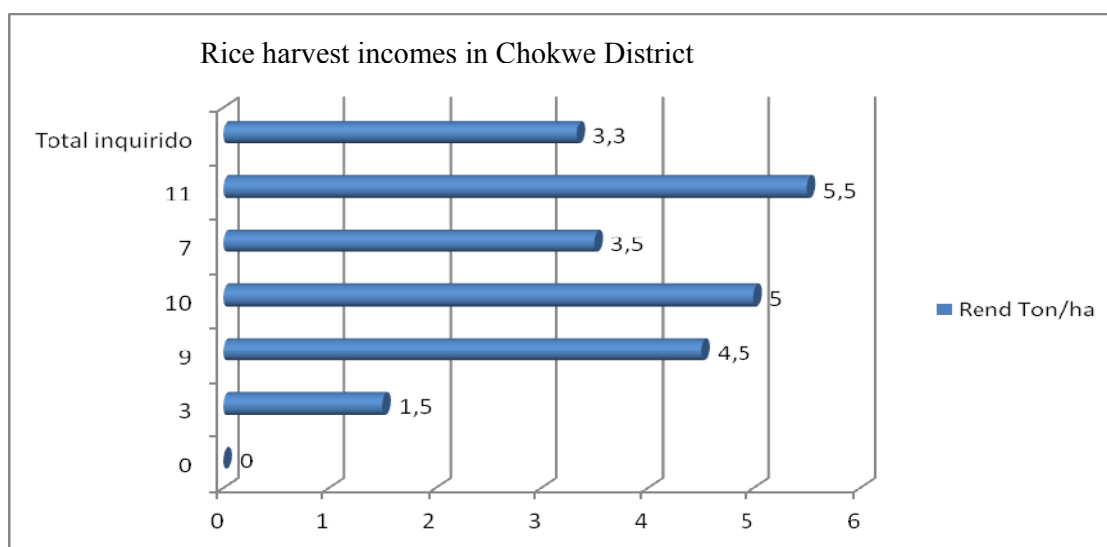
Tabela 7: Income achieved in tonnes per hectare (t / ha)_ District of Chókwe

Designation	Sacks (50kg) obtained per producer						Média
	20	40	60	80	100	120	
Quantity of sacks	20	40	60	80	100	120	-----
Total respondents	0	3	9	10	7	11	-----
Income (ton/ha)	0	1,5	4,5	5	3,5	5,5	3,3
(%) Corresp/Respondents	0	7,5	22,5	25	17,5	27,5	-----

Source: Author, 2013

Compared to Nicoadala district, small producers of Chokwe can reach an average of 3.3 tons per hectare yields, that is, double of the income earned in Nicoadala. See table 10 above.

Figura 6. Incomes got by the producers in Chókwe.



Source: Author, 2013

In Figure 6, making an analysis of the results obtained regarding to the income from rice cultivation, we can reach the conclusion that the various technologies of harvest combined with good water drainage practices in the fields for good mechanisation of farming operations, reduces the time required for the start of the harvest respecting the physiological parameters required for the beginning of harvest (16-17% moisture) contribute to the guarantee of positive results in terms of final yields obtained per hectare.

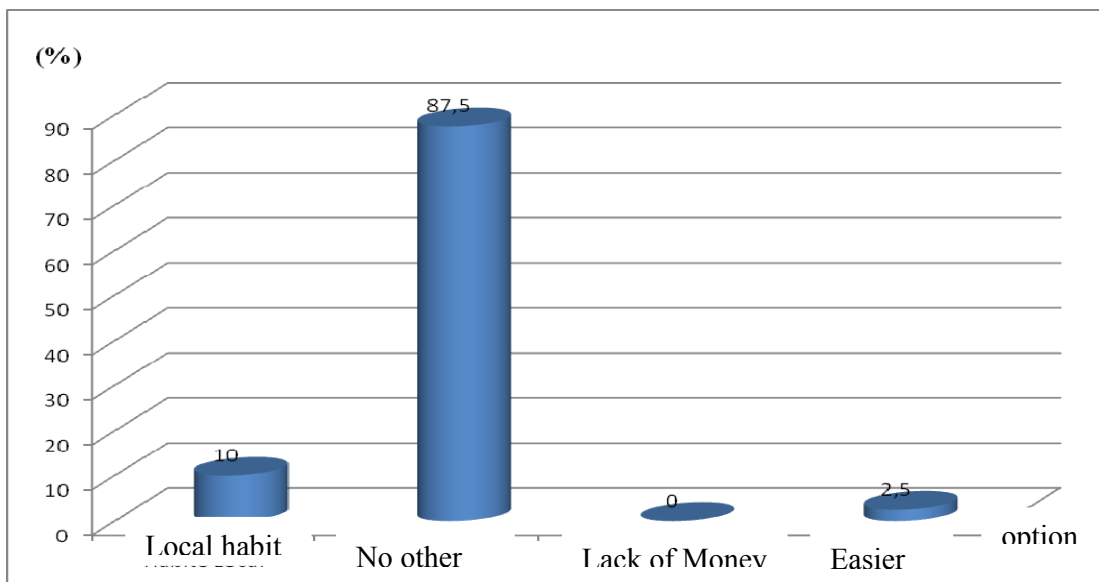
Tabela 8: Justification for the selection of different options for harvest in Niocoadala district

Made options	local custom	No other existing	Lack of money	More easier
Total (Respondents)	4	35	0	1
(%) Respondents	10	87,5	0	2,5

Source: Author, 2013

Making an analysis of the choice of method to use in the harvesting process, all producers of Nicoadala district claimed using the manual harvest due to lack of an alternative and more sustainable method. In the total of 40 interviewed producers (87.5%) claim using other harvesting method and only 10% said that practice manual harvesting due to local custom. With this statement it was found that there are no other alternatives in harvest process among the producers of Nicoadala district.

Figure 7. Nicoadala district Rationale for selection of harvesting options in producing.



Source: Author, 2013

Figure 7 above clearly shows that the option of lack of money was discarded by all (0%) as they apply money to undergo this work even if the alternative is deemed more expensive with all negative consequences that this is traditional practice is.

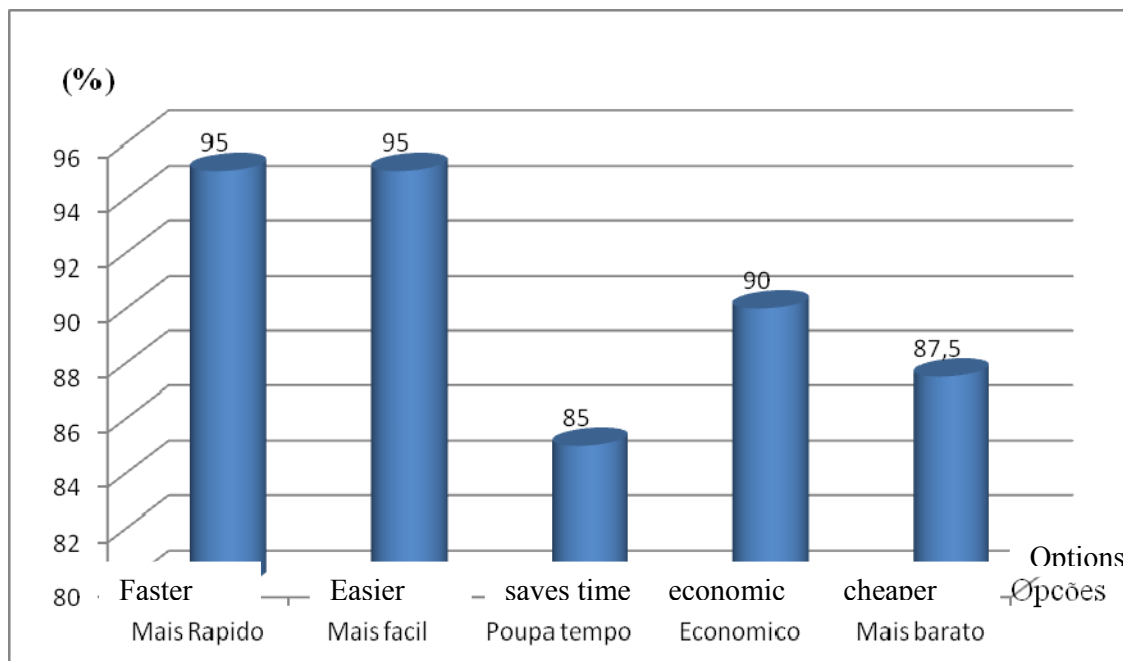
Table 9: Rationale for the choice of the different harvesting options_ Chokwe district

Options	Fast	Faster	Less time	Económic	Cheaper	Total
Inquiridos	38	38	34	36	35	40
(%) Respondents	95	95	85	90	87,5	-----

Source: Author, 2013

For producers in the Chokwe district, the use of mechanisation in harvesting process, it can be thought as the only condition for the practice of this activity and motivating factor for the expansion and revitalization of rice production among the producers. During the field work it was notorious and there was of conditioning of the existence of machinery for continued exploration of more areas that guarantee the success of the campaign.

Figura8. The reasons for the mechanical method for harvest in Chokwe district.



Source: Author, 2013

The above Figure 8 indicates that 95% of respondents claimed that the use of agricultural machinery on the rice harvesting process is faster and it facilitates the work, as well as save the time required for this operation also it ensure the economy of the producer reserves. In the same study, the producers claimed that they pay a value of 2000 meticaais to mow an area of 1 hectare and this takes only two hours.

Limitations

In developing any activity is common to find some factors that have an influence on the performance of the work or obtain data. So for this study following limitations were found:

Technique - The lack of information on the mechanised costs of rice harvest in the family sector in Nicoadala district, hence there was a need to conduct the study on the Chokwe district.

Cultural - Ignorance of the local language (Chuabo) which limits the very direct contact with the target group, having been privileged extension workers for the translation on the survey.

Financial - Lack of resources to during the survey as well as other activities related to this study, however, the rural extension workers in each district were privileged and made a relief to total study costs.

Conclusion

After analysing the data obtained on the different forms of rice harvest in small producers of Nicoadala and Chokwe districts, it was concluded that the use of different manual instruments to harvest rice by Nicoadala producers is reflected into costs that are much high and that do not allow profit-making activity that they can develop. This is because the manual harvesting cost is more than 52.18% of the total costs involved in rice production process. However, the use of combined self system reduces significantly the cost to the levels below 8.36% of the total cost of the operation. This means that the first hypothesis is valid and the other invalid.

On the other hand, all respondents have knowledge of the existence of other more viable ways to harvest, that is, self-combination to harvest rice, only the absence of such machinery to provide this service particularly to Nicoadala producers and Zambézia province in general. It is limiting the requiring of the use of other alternative means to carry out its operations that results in a cost of (6) times more expensive than reaping the same area in Chokwe district.

From the study conducted, it was possible to conclude that for mechanised harvesting in a area of (1) hectare, with all created conditions, that is, low humid field and a grain of 16% a 17% o of humudity, it is possible to collect in 2 hours in average, with a cost of about 5.050,00Mts, statements corresponding 92,5%, in contradiction to the charged amount of 12.550,00Mts for the same area undertaken manually in Nicoadala distrit. Basing on the above findings, it can be noticed that the producers of Nicoladala distrit spend higher costs and gain low profit comparing to those from Chokwe distrit who explore more extended areas with a need of the expansion of production area so that they may achieve standard use of the invested resources.

Recommendation

For Centro de Promoção de Agricultura Comercial (CEPAGRI), Fundo de Desenvolvimento Agrário (FDA), among other institutions of Ministry of Agriculture or private companies exististing oportunities, must be taken for granted in order to create machine park so that profibely business can be undertaken through the placement of self combination to the service of the productors with dimessions and capacities that are adequated to harvest rice among producers for the whole country more specifically zambezia Pronvice, bearing in mind that the country and the pronvice lacks this important equipamnet for the production.

The Ministry of Agriculture and the producers should adopt the use mechanised harvesting system, for instance through the self combination in way of reducing high costs resulting from manual harvesting, allowing the production more productively and competitive among local and national farms what will create the increment of production and productively so that exportation taxes for rice would be reduced.

The Ministry of Agriculture in coordination with Direcção Provincial de Agricultura de Zambézia (DPAZ), should introduce agricultural mechanisation system focusing on self combination, so that the producers expand their production areas reducing in this way the costs with direct effect in obtaining significant part in commercial production resulting in the better family income and well being as well as social balance.

References

1. Aguiar, A. B. M. G. A. (2004). Tipologia das estruturas organizacionais. São Paulo.
2. Alonço, (2005). Origem da Orizicultura. *Teorias e factos*, Brasil.
3. Alves, V. O. (1957). Responsabilidades Sociais do Homem de Negócios, Brasil.
4. Banco Mundial (2001). “Relatório sobre o Desenvolvimento Mundial 2000/2001: Luta Contra a Pobreza”, Banco Mundial. Recuperado em 11 de Maio de 2013 de www.worldbank.org/poverty/portuguese/wdr/index.htm.
5. Banco Mundial (2003). Relatório de Desenvolvimento Humano. 2003– Dinâmica de Desenvolvimento Mundial Sustentável, *Banco Mundial, Washington, D.C.*
6. Bowerman, R. (2003). Estatística Moderna (4ª edição). Lisboa
7. Canastra, F. H. F. V. M. (2012). Manual de Investigação da UCM. (1ª ed). Beira;
8. Chiavenato, I. (2004). Teoria Geral da Administração, São Paulo.
9. *Conceito de Amostra e População*. Recuperado a 15 de Dezembro de 2012, de <http://pt.shoong.com/exact-ciencia/statistics-1653987>.
10. Conselho, M. H. M. (2003). *Conflitos entre accionistas e gestores*. ISCAP, Lisboa.
11. Das Neves, J. C. (2006). Análise Financeira. *Técnicas Fundamentais*. Textos Editores, Lda.
12. DPAZ (2012). Relatório balanço da campanha 2008/2009. Quelimane.
13. DPAZ (2013). Fórum de arroz. Quelimane, Junho 2013.
14. Enriquez, E. (1997). O Desafio Ético nas Organizações Modernas. Revista de Administração de empresas. São Paulo, Brasil.
15. FAO (2009). *Segurança Alimentar e Nutricional*. Moçambique, Maputo. SIMA.
16. FMI (2003). Relatório sobre Desenvolvimento Humano, *Washington, D.C.*
17. G19 (2013). Conferência Nacional sobre Investimento do Programa Nacional do Sector Agrário, Maputo.
18. Gil, A. C. (2001). Gestão de Pessoas: Enfoque nos Papéis Profissionais. São Paulo: Atlas.
19. Kotler, P. & Roberto, E. L (1992). Marketing Social: Estratégia para alterar o comportamento público. Brasil.
20. Levin, J. (1987). *Estatística Aplicada a Ciências Humanas* (2ª. Ed). São Paulo.
21. MADER. *Sistema de Informação de Mercados Agrícolas em Moçambique* (2008). Recuperado a 15 de Dezembro, 2012, de <http://www.sima.minag.org.mz/>.
22. Martins, E. (2008). Contabilidade de Custos. São Paulo.
23. MINAG (2011). Norma Moçambicana de Arroz com Casca. Instituto Nacional de Normalização de Qualidade. Maputo.
24. Mintzberg, (1973). *The Nature of Managerial Work*. New York.
25. Mosca, J. (2005). Economia de Moçambique. Lisboa. Paulo: Editora Harbra Brasil.
26. MPF, Relatório sobre a avaliação do grau de implementação da agenda 21 em Moçambique, (1990). Recuperado a 04 de Junho de 2013, de <http://www.imigrantes.no.sapo.pt/page2mocGeo.html>.
27. NEPAD (2001). “A Nova Parceria para o Desenvolvimento da África”, Abuja, Nigéria.
28. PEDSA (2011-2012). Conferência Nacional sobre Investimento do Programa Nacional do Sector Agrário, Maputo.