

Original Research Article

An economic analysis of paddy production in Kanchanrup municipality, Saptari Nepal

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Abstract:

Rice falls under the grass family *Graminae*. Rice or paddy cultivation is the principal activity and source of income for millions of people worldwide. The purpose of this research was to better understand the rice production economics, socioeconomic position, potential, and challenges in Kanchanrup municipality, Saptari District. Using a basic random sampling procedure, 60 rice growers were sampled. A pre-tested interview approach was used to gather primary data, and a study of relevant literature was used to acquire secondary data. Further, descriptive statistics, SPSS, and MX Excel were used to analyze the data. Among 60 rice-growing farmers, the percentage of the male was 98.3% and females were 1.7% respectively. The average land under paddy cultivation per household was found to be 0.98 hectares. Production costs are estimated by adding variable and fixed costs, however, because rice is a short-lived crop, total fixed costs are not taken into account. Kanchanrup's average variable cost of rice production is NRs. 1114758.82. (Per hectare). Similarly, the total profit was NR 20978.68 and the total yield was NR 135737.5 (Per ha). Kanchanrup has a B: C ratio of 1.18, indicating that ~~rice~~ the paddy is the growing is economically viable in the Municipality. The business can provide returns of NPR 1.18 for every rupee invested, and the gross margin is positive, indicating that the investment is financially sustainable and the operation may proceed without any problems.

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Keywords: Paddy, Production, Kanchanrup, Cost of cultivation, Benefit- Cost ratio, ~~Crop~~

1 Introduction:

The cultivation of ~~rice or~~ paddy is the principal activity and source of income for millions of people worldwide. Several African and Asian nations rely significantly on rice as a source of government revenue and foreign exchange income (Kadiri & HenriUkoha A, 2014). Rice is one of the most essential basic meals for the world's more than 3.5 billion inhabitants (Fukagawa & Ziska, 2019). Rice is the principal staple meal of 17 Asian and Pacific countries, 8 African countries, and 9 American countries. Rice, wheat, and maize supply 20, 19, and 5 percent of the world's dietary energy respectively. Rice provides more energy than other staple food crops (Goyon & Mestres, 2017). Rice is the world's third biggest grain, according to Rice Trade 2021. It, like grain, defies regional, cultural, religious, national, and international barriers. Demand is high. India and China produce more than half of the world's rice. Two of his rice cultivars, *Oryza sativa* (Asian rice) and *Oryza glaberrima*, are commercially valuable (African rice). *Oryza glaberrima*, on the other hand, is exclusively cultivated in a restricted area in South Africa. The three subspecies of *Oryza sativa*, the principal commercial rice species, are Indica, Japonica, and Javanica, based on commercial production zones. Tropical and subtropical strains that flourish in

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South Asia, Southeast Asia, and southern China are referred to as subspecies indica. The Javanica type is cultivated in Indonesia, but the Japonica species is grown in Japan, China, Nepal, and South Korea (Gadal et al., 2019).

It is known that rice arrived in Nepal from mainland China around the ~~latter~~ later third millennium BC. However, it is thought that the commercial production of rice in Nepal began around 500 years ago. Despite being a small nation, Nepal makes a major contribution to the development of national economies even though it contributes little to global rice production and trade (N. Sapkota et al., 2021; Kolawole & Michael, 2021; Subedi, Ghimire, Kharel, Adhikari, et al., 2020). Being an agricultural nation, Nepal depends on the expansion of agriculture for its economic prosperity and growth. Furthermore, about 60.4% of the population works in agriculture. Rice (*Oryza sativa*) is the most important crop in Nepal, providing a significant source of livelihood and income for more than two-thirds of farmers and is deeply ingrained in the country's culture (B.K. Sapkota, Subedi, Tripathi, Dhakal, et al., 2021). Rice will provide more than 20% of AGDP and 7% of GDP in 2021, according to AICT, while agriculture and forestry account for around 27.08% of the country's GDP. More than half of the world's population consumes a lot of rice, and Asia accounts for more than 90% of worldwide rice production and consumption (Poudel et al., 2021).

The Terai region of Nepal is regarded as the nation's "granary," producing around 70% of the nation's rice production, compared to the hills' 26% and the mountains' 4%. Cereals, on the other hand, are Nepal's most significant staple food. Their output has decreased by 9% since the previous census. To fulfill the predicted world population's food demands in 2025, it has been calculated that global farmers will need to produce around 60% more rice than they do now (N. Sapkota et al., 2021). Paddy production is expected to grow by 7 percent in the Saptari district. As the area of paddy cultivation has increased, the production may improve by almost 7 percent in Saptari, according to Agriculture knowledge Centre in Saptari. A total of 81668 ha of land is arable, of which 71558 ha have been planted paddy this year. According to the center, a total of 71558 ha of land were used for paddy cultivation and the production stood at 248231 metric tons and productivity was 3.47Mt./Ha. (Agriculture Knowledge Center, Saptari 2019/20). The major percentage of employment, GDP, and raw materials supplied to active agro-based businesses comes from rice farming. However, these contributions have been falling over time. For example, the Central Bureau of Statistics of Nepal CBS reported that the area under paddy cultivation had shrunk by more than 129,000 ha in 2013, while reported that the proportion of households engaged in paddy cultivation had dropped from 76 percent in 1996 to 72.3 percent in 2011 (Devkotaa, 2020).

Even though the Terai area of Nepal is known as the country's "food basket," because the Terai region of Nepal consists of 70% of cultivable land, the rising population has caused a severe challenge with food security due to the inadequate output and low productivity of rice. The Saptari's rice production is hampered by a lack of timely and appropriate supplies of quality seeds and fertilizers, insufficient drainage and irrigation, labor shortages, disease, and pests such as armyworm as well as inefficient marketing and pricing methods (Pandit et al., 2020; Pal et al., 2020; Wilson et al., 2017). The study will focus on calculating the benefit-cost ratio which will

be useful for upcoming rice farmers, where who should involve in rice cultivation, and also to the addressable scholars and researchers. The farmers of Kanchanrup Municipality are following old patterns for cultivation, so we want to suggest they use modern tools and technology so that the production of paddy will increase and the living standard of the farmer will uplift.

Table 1: Total area, Production, and Productivity of Paddy in a different district

Districts	In Hectares	Production (Metric tons)	Productivity (Mt/Ha)
Morang	86,634	367070	4.28
Jhapa	84,875	373732	4.40
Kapilvastu	66,495	233470	3.51
Kailali	71,700	306202	4.27
Rupandehi	63,882	264839	4.15
Dhanusha	57,401	228618	3.98
Bara	56,116	232179	4.14
Sunsari	53,350	212735	3.99
Saptari	49,519	176508	3.56
Siraha	47,707	167729	3.52

(Source: Ministry of Agriculture and Livestock Development 2019/2020)

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2 Methods and Methodology:

2.1 Selection of the study area

This study was carried out in Nepal's Eastern Terai. Kanchanrup Municipality in Saptari District was chosen for the research. This location was purposefully chosen for research since it was the district's primary hub of rice growing. To meet research aims, this study used primary data. A total of 60 rice-paddy-growing households were chosen ~~at random~~ randomly for the study because they represented the whole population of the study region, accounting for more than 5% of the overall population. A basic random sampling procedure was utilized with no replacement. We ~~have~~ used both primary and secondary data ~~for present study-~~

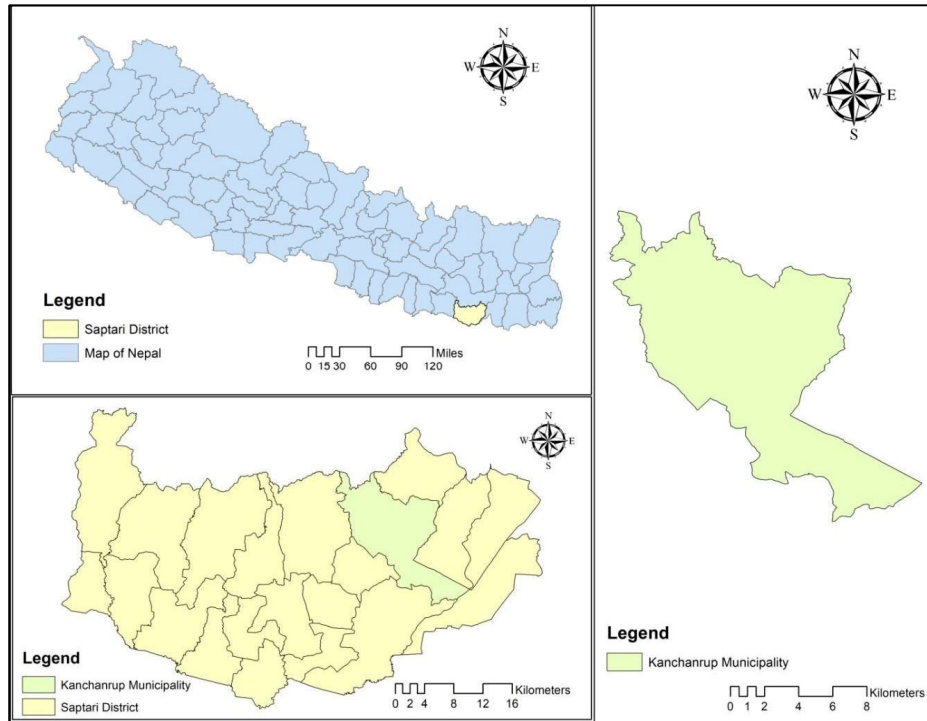


Fig1: Map of studying area showing research site

2.2 Data Collection and Analysis

An interview approach was used to acquire primary data from households. The collected raw data was coded and input into a computer. Regional measures were translated to standard units, and the final analysis was/were carried out using Microsoft Excel and social science statistical software (SPSS, 2009). The socioeconomic characteristics of farmers were examined using descriptive statistics such as mean, frequency, percentage, and standard deviation.

2.2.1 Survey

The survey will be conducted through semi-structured interviews. For this purpose, the questionnaire will be prepared and pre-tested before the actual survey. Data regarding price and quantity of input supplies, production of paddy; collection amount; processing cost; marketing cost; retail price paid by the consumers. Demographic and socio-economic information will be collected.

2.2.2 Focus Group Discussion

A focus group discussion will be held in a group comprising all the major actors for Strength-Weakness-Opportunity and Threats (SWOT) analysis on paddy production and marketing to know the farmer's knowledge and to collect information regarding the cost of production, price, and quantity.

2.2.3 Key Informants Interview

The major key informants were farmers, stakeholders, Gyan Kendra, and the Zone officer. They were asked a series of questions about the production, marketing and constraints of paddy in Kanchanrup Municipality, Saptari district of Nepal.

2.2.4 Methods of Data Analysis

2.2.4.1 Quantitative Analysis

Analyzed primary data from field observations, focus group talks, key informant interviews, and household surveys quantitatively. For the descriptive study of output, pricing, costs, and margins, simple statistics such as sums, averages, relative frequencies, minimum and maximum values, and standard deviations are utilized.

2.2.4.2 Analytical Statistics

Depending on the study goals, several analytical tests are done. To determine the statistical significance of the difference in means of the dependent variable, Chi-square and t-tests are used. To detect links between variables, use correlation and regression analysis.

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2.2.4.3 Qualitative Analysis

Economic analysis of qualitative paddy data will be done by using various analysis tools of economic analysis approach and relevant economic & marketing research tools.

2.3 Cost of Production

By summing the costs of all variable inputs and the opportunity cost, the total cost of production was computed. Seed, farm manure (FYM), fertilizer, labor, machinery, and irrigation expenditures are elements of variable costs. Renting land or utilizing your equipment are examples of opportunity costs.

$$\text{Total cost} = \text{Total variable cost} + \text{Opportunity cost}$$

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2.4 Gross Return

Gross return is derived by combining grain and straw yields. At the time of harvest, rice grains and straw were evaluated at local market values.

$$\text{Gross return} = \text{grain return} + \text{straw return}$$

$$\text{Grain return} = \text{total grain produced (tons)} * \text{price per tons}$$

$$\text{Straw return} = \text{total straw produced (bundles)} * \text{price per bundle}$$

2.5 Gross Margin

Gross margin is the output of a firm computed by deducting total variable expenses from revenue.

$$\text{Gross margin} = \text{Gross return} - \text{Total variable cost}$$

Where,

Gross return = Price * total quantity marketed

Total variable cost = Summation of the cost incurred ~~in~~ on all the variable items

Similarly,

Gross Profit Ratio (GPR) = Gross Margin / Total Revenue (Bwala& John, 2018).

2.6 *Benefit-Cost Analysis*

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The goal of benefit-cost analysis is to guarantee that a resource investment yields an acceptable return on the resources used. The Benefit to Cost Ratio (BCR) is widely regarded as one of the simplest and quickest methods of evaluating a farm's economic performance. Profit per cost unit is compared using BCR. As a result, the following formula was used to do a cost-benefit analysis:

$$\text{B/C ratio} = \text{Gross return (NRs.)} / \text{Total cost (NRs.)}$$

2.6.1 Analysis based on B: C ratio

- If the B: C ratio < 1, the farm business is considered to be at loss.
- If the B: C ratio = 1, the farm business is recovering the cost of production.
- If the B: C ratio > 1, the farm business is considered to be profitable.

3 Results:

The data gathered from the research region was purposefully examined with relevant statistical tools such as MS Excel and SPSS, and the results are provided in this part.

3.1 Socioeconomic and demographic characterization of the rice farmer

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Here is a brief discussion of information gathered from the survey about socioeconomic and form factors, such as respondents' ages, sexes, occupations, educational levels, family sizes, and amounts of land owned ~~and cultivated for rice.~~

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3.1.1 Age of respondent

The age of the respondent was classified into three categories i.e. (i) less than 35 (*Young*), (ii) between 35-55 (*Adult*), and (iii) above 55 (*Old*). The study has revealed that the majority of the respondents in the study area were between the age group 35-55 years (76.7%) followed by those above 55 years (16.7%) and less than 35 (6.7%).

The respondents' ages were classified into three groups i.e., (i) under the age of 35, (ii) between the ages of 35 and 55, and (iii) older than 55. According to the poll, the majority of respondents in the examined region (76.7%) were between the ages of 35 and 55 followed by over the age of 55 (16.7%), and under the age of 35 (6.7%).

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Table 2: Age of Respondent

	Frequency	Percent
less than_35	4	6.7
between 35 -55	46	76.7

above 55	10	16.7
Total	60	100.0

Source: Field survey 2022

3.1.2 Religious Religion of respondents

The study revealed that the majority of the respondents in the study area were Hindu 91.7% followed by Muslim 8.3%.

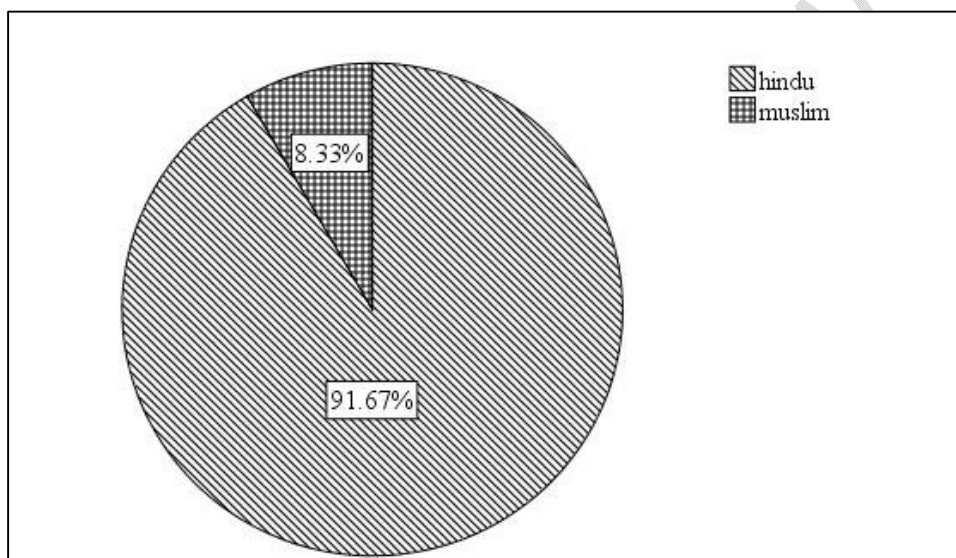


Figure 2 Religious Religion of respondent

Source: Field survey 2022

3.1.3 Education status of the respondents

Education is one of the most essential variables in societal socioeconomic and cultural transformation. This is one of the variables that contribute to the acceptance of technology. The highest level on the table of education was a college which accommodates about 13.3% of respondents followed by SLC 38.3%, literate 26.7%, and illiterate 21.7%.

Table 3: Education status of the respondent

	Frequency	Percent
Illiterate	13	21.7
Literate	16	26.7

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SLC	23	38.3
College	8	13.3
Total	60	100.0

Source: Field survey 2022

3.1.4 Caste or ethnicity of the respondent

We discovered that respondents in the survey region belonged to many castes, including Brahmins, Chhetris, Madhesi, Janjatis, and Dalits. With a frequency of 32, the majority of responders were Madhesi and the percentage is 53.3% followed by janjati having a frequency number ~~15~~ and a percentage is ~~25~~%, Brahmin with 7 frequency percentage is 11.7%, Dalit having a frequency of 4 and percentage is 6.7% and last, is Chhetri having frequency 1 and accommodate

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1.17%.

Table 4: Cast and Ethnicity of Respondent

	Frequency	Percentage
Brahmin	7	11.7
Chhetri	1	1.7
Janjati	16	26.7
Madhesi	32	53.3
Dalit	4	6.7
Total	60	100.0

Source: field survey 2022

3.1.5 Occupation of Respondent

The majority of respondents (95%), according to the poll, work in agriculture, followed by 3.3% in business, and at least 1.7% in the service industry as their primary ~~career~~ occupation. We also discovered that all respondents worked in agriculture.

Table 5: Occupation of Respondent

	Frequency	Percent
Agriculture	57	95.0

Service	1	1.7
private business	2	3.3
Total	60	100.0

Source: field survey 2022

3.1.6 Landholding

It was found that total land holding between 20-40 kattha is 60%, less than 20 kattha is about 26.7% and more than 40 kattha is 13.3%. It was found that 60% of the respondents had their area under rice in area 20-40 kattha and the remaining 26.7% of the respondents had less than 20 kattha and 13.3% had more than 40 kattha as their area under rice cultivation.

Table 6: Landholding

	Frequency	Percent
less than 20 kattha	16	26.7
between 20-40 kattha	36	60.0
more than 40 kattha	8	13.3
Total	60	100.0

Source: Field survey 2022

3.1.7 Variety cultivated

In Kanchanrup Municipality mostly cultivated variety by the respondent was Hardinath which accommodate about 36.67% followed by Mansuli (33.33%), Radha-12 (15%), Sabitri (8.33%), and Radha-11 (6.67%).

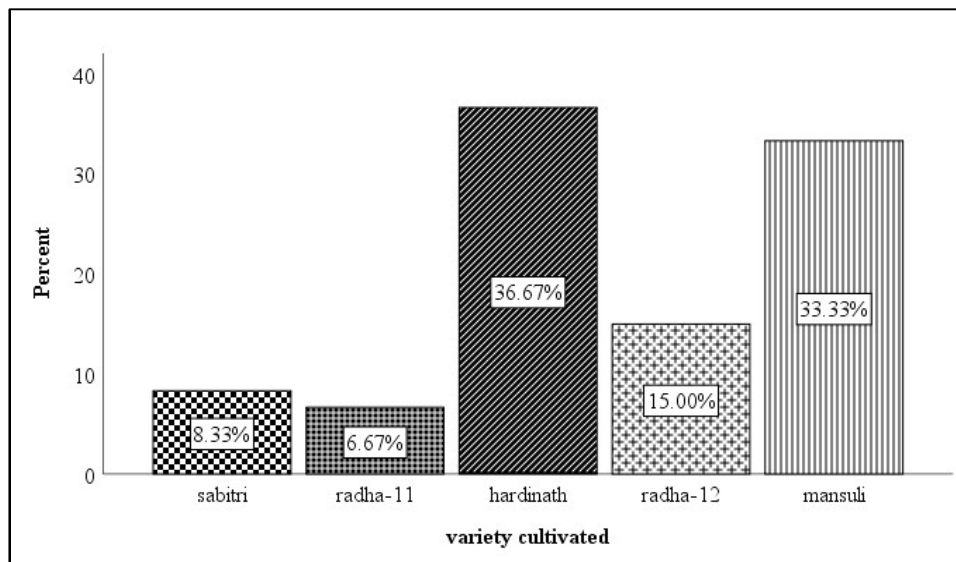


Figure 3: Variety cultivated by respondents

Source: Field survey 2022

3.1.8 Insect Pest Problem

From the table, we found that 18.3% of respondents had severe problems with insect pests in their field, whereas 68.3% of respondents had a moderate problem and 13.3% of respondents have no problem with insect pests in their paddy field.

Table 7: Insect Pest Problem

	Frequency	Percent
No problem	8	13.3
Moderate	41	68.3
Severe	11	18.3
Total	60	100.0

Source: Field survey 2022

3.1.9 Disease Problem

From the figure, we found that 14% of respondents had severe problems of disease in their field, whereas 40% of respondents had a moderate problem of disease and only 6% of respondents had no problem of disease in their paddy field.

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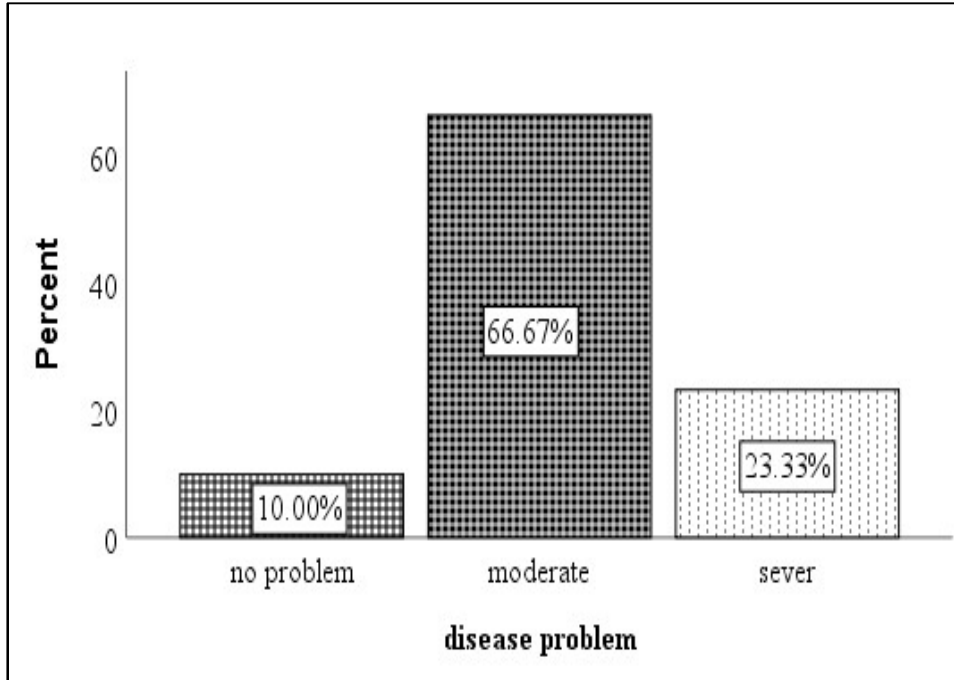


Figure 4: Disease problem

Source: Field survey 2022

3.1.10 Fertilizer problem

From the study of economic analysis of paddy production in Kanchanrup Municipality, we found that 35% percent of the respondent had severe problems with fertilizer whereas 38.3% of respondents had moderate problems and only 26.7% of respondents had no problem with fertilizer.

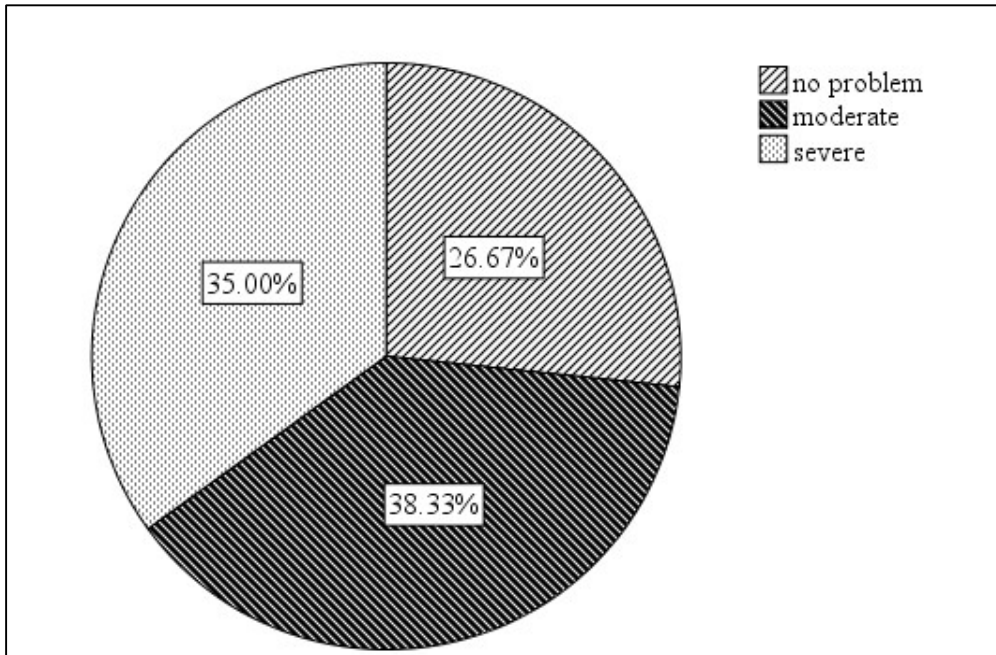


Figure 5: Fertilizer problem

Source: Field survey 2022

3.1.11 Buyer

In Kanchanrup Municipality mainly wholesaler buys 61.67% of respondent paddy. The local trader buys 20% of respondent paddy and the retailer buys only 18.33% of respondent paddy.

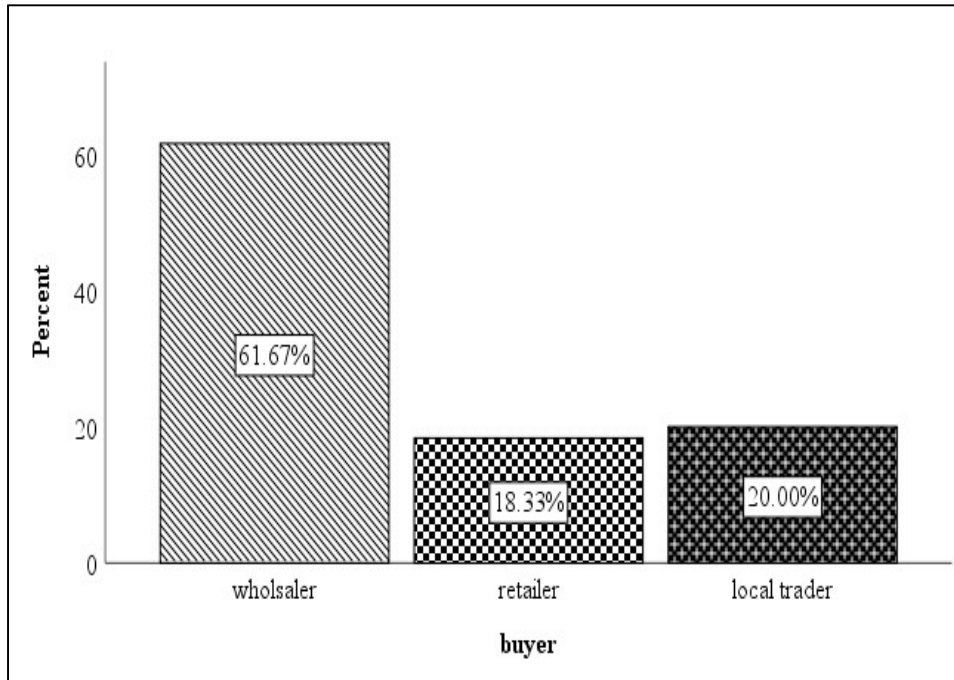


Figure 6: Buyer

Source: Field survey 2022

3.1.12 Market

The market is one of the most important factors for the economic analysis of paddy production. Here in Kanchanrup Municipality, 45% of respondents use Baluwa as a marketing center whereas 30% of respondent use Kanchanpur, 15% Beriyar, and 10% as Barmajhia respectively.

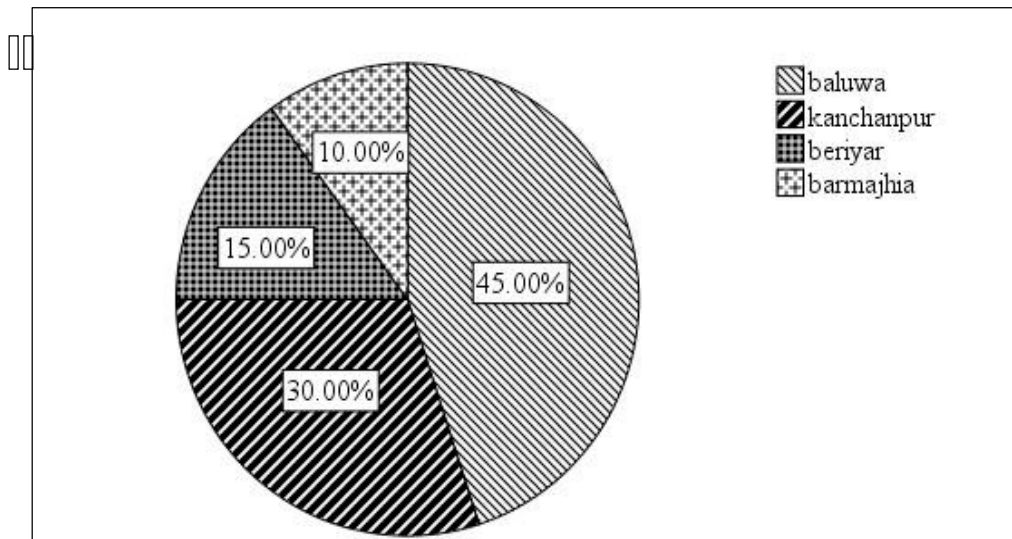


Figure 7: Market of respondent

Source: Field survey 2022

3.2 Total average cost of paddy production (NRs)

Table 8: Cost of production/cultivation

Particulars	Average cost per hectare per season (NRs)	Percentage Share
Land renovation cost (Labour)	758.44	0.66
Tractor cost (Land preparation)	13804.78	12.029
Nursery preparation cost (Labour)	655.60	0.57
Seed sowing cost (Labour)	648.12	0.56
Manuring and fertilizer cost (Labour)	635.34	0.55
Seedling transplanting cost (Labour)	29865.59	26.02
Weeding and hoeing cost (Labour)	12000.25	10.45
Harvesting cost (Labour)	11284.40	9.83

Threshing cost	3851.03	3.35
Seed cost	3196.88	2.78
FYM cost	12346.12	10.75
DAP cost	9028.31	7.86
Urea cost	2403.89	2.09
Potash cost	3278.99	2.85
Pesticides and insecticides cost	2000.44	1.74
Land cost	9000	7.84
Average cost of production of deepaddy cultivation (per hectare)	Rs 1114758.82	100

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3.2.1 Costs of production

The sum of all fixed costs and variable costs is the total cost of production. It was calculated in the following way as

Total cost = Sum of all variable cost + fixed cost

= cost of land renovation + cost of tractor (land preparation) + cost of nursery preparation (labour cost) + cost of seed sowing (labour cost) + cost of manuring and fertilizer (labour cost) + cost of seedling transplanting (labour cost) + cost of weeding and hoeing (labour cost) + cost of harvesting (labour cost) + cost of threshing + cost of seed + cost of FYM + cost of DAP + cost of urea + cost of potash + cost of pesticides + land cost.

Here in the table, the average cost of production of 60 farmers of Kanchanrup Municipality per hectare per season was found to be NRs 114758.82 in the land renovation cost was NRs 758.44 which is about 0.66%. Similarly, tractor cost for land preparation was NRs 13804.78 (12.02%), nursery preparation cost (labor cost) was NRs 655.60 (0.57%), seed sowing cost (labor cost) was NRs 648.12 (0.56%), manuring and fertilizer cost (labor cost) was NRs 635.34 (0.55%), seedling transplanting cost (labor cost) was NRs 29865.59 (26.024%), weeding and hoeing cost (labor cost) was NRs 13108.25 (10.45%), harvesting cost was (labor cost) NRs 11284.40 (9.83%), threshing was NRs 3851.03 (3.35%), seed cost was NRs 3196.88 (2.78%), FYM cost was NRs 12346.12 (10.75%), DAP cost was NRs 9028.31 (7.86%), urea cost was NRs 2403.89 (2.09%), potash cost was NRs 3278.99 (2.85%), pesticides cost was NRs 2000.44 (1.74%), the land cost was NRs9000 (7.84%). The highest average cost of production was in seedling transplanting, which accommodates about 26.29% and the lowest average cost was in manuring and fertilizer which contain about 0.55%.

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3.2.2 Gross return

The total yield is the sum of the yields gained from grain and byproducts (such as straw). The formula was used to calculate it:

Gross return = (the market price of rice paddy * total amount of rice output) + (the price of rice paddy byproduct * total amount of byproduct)

Gross Return = NRs 135737.5

3.2.3 Gross margin

The total yield is computed by subtracting total growing expenses from the total yield. Gross profit is not the same as total yield. Gross Margin Analysis allows for quick and easy judgments when analyzing any firm. The formula was used to compute it:

Gross margin = Gross return (per hectare) - Total cost (per hectare) Gross margin = Gross return - Total variable cost

= 135737.5 - 114758.82 (per hectare)

= 20978.68 (per hectare)

3.2.4 Benefit - Cost Ratio

The benefit-cost ratio is a quick and straightforward indication of any business's economic success, including the agriculture industry. This is the total revenue to total cost ratio. The following formula was used to compute BCR,

Benefit cost ratio = gross return / total variable cost B/C ratio = Gross return (NRs.) / Total cost (NRs.)

= 135737.5/114758.82

= 1.18

Rice farming had a benefit-to-cost ratio that was somewhat higher than one, i.e., 1:18, which portrays rice production in Kanchanrup Municipality as economically feasible. The business can provide returns of NPR 1.18 for every rupee invested, and the gross margin is positive, indicating that the investment is financially sustainable and the operation may proceed without any problems.

3.3 Production problems of rice grower

Farmers in the study region encountered a variety of production-related issues. Farmers' perceptions of production concerns were used to rate the issues. According to the data, the main problems of rice production in Kanchanrup Municipality are crop damage caused by pests, diseases, and wildlife (0.84), a lack of access to improved seeds, fertilizers, and pesticides (0.74), a lack of technical knowledge and support (0.62), a labor shortage and the high cost of mechanized tools (0.56), and land fragmentation (0.42).

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Table 9: Problem with the rice production in the study area

	INDEX	RANK
Damage to crops by pests, disease, and wild animals	0.84	I
Poor access to improved seed, fertilizer, and agrochemical	0.74	II
Lack of technical knowledge and support	0.62	III
Labour shortage and high cost of mechanization tools	0.56	IV
Land fragmentation	0.42	V

Source: Field survey 2022

4 Discussion:

The majority of the respondents of paddy growers were male, middle-aged group i.e., 35-55 years, belonged to Madhesi ethnic group, had medium-sized family, had medium farm size, most of the respondent had education status up to SLC level and agriculture was the primary source of income. A similar result was reported in the study made by N. Sapkota, (2021). The average land holding size of the overall sampled household was 0.98 hectares (29.4 kattha). This is greater than the national average land holding (Central Bureau of Statistics (CBS), 2019). The average operating cost of paddy cultivation per hectare was estimated to be NRs. 114758.82 which is greater than the finding of N. Sapkota, (2021). The gross margin is positive, with a cost-benefit ratio (BCR) of 1.18 anticipated. This is more than one, which means that if you invest H. 1 rupee, you will receive a return of 1.18 rupees from trading. This demonstrates that the investment is financially viable and that the firm can operate smoothly and a similar result was reported in the study made by N. Sapkota, (2021). Lack of good cultivation skills, diseases, and pests, untimely availability of fertilizer, rapid price increases for inputs including labor, and seeds, as well as labor migration had severe inflame on rice output, and lack of timely and adequate supplies of high-quality seeds are the major constraints in paddy production and a similar result was found in N. Sapkota (2021). The result showed that the paddy growing farmers need training about the scientific way of paddy cultivation, provision for credit, market facility and timely availability of inputs to solve the production and marketing problems.

5 Conclusion:

The primary source of income for the vast majority of households i.e., agriculture is the primary profession for the vast majority of them. Most of the respondents have their major occupation of agriculture (95%). The benefit-cost ratio was calculated as greater than 1 i.e., 1.18 which indicates the economic feasibility of paddy farming in the study area. The calculated gross margin indicated that paddy cultivation is one of the profitable options for the farmers of the Kanchanrup Municipality. Due to the high cost of labor and the lack of farm machinery, vast amounts of manpower are needed for agronomic operations, which drives up the cost of cultivation. As a result, strategies and regulations must emphasize farm mechanization while taking geographic constraints into account. According to the study, training and extension initiatives centered on scientific production technology are required. This aids in advancing

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farming practices away from the conventional model. Based on the study conducted as an economic analysis of paddy production in Kanchanrup Municipality Saptari Nepal some conclusion was made. The climatic condition of Kanchanrup Municipality is favorable for paddy cultivation and it is also the pocket area under PMAMP. The production and productivity are high in this study area and all farmers are highly motivated to cultivate the paddy. Besides this there is also some problem, farmers are found to face problem with marketing and production. The major problem is a disease, insect pests, lack of technical knowledge high prices of the input, and low prices offered by a wholesaler, and retailers.

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