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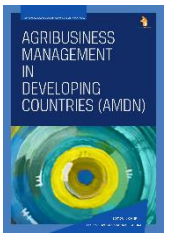

RESEARCH ARTICLE

ECONOMICS OF PRODUCTION AND MARKETING OF CUCUMBERS IN NAWALPARASI EAST, NEPAL

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ABSTRACT

Nawalparasi East district is one of the high cucumber growing areas in Nepal and is considered a pocket area for cucumbers. The study was conducted in two rural municipalities (Hupsekot and Madhyabindu) and two municipalities (Gaidakot and Kawasoti) in the district from February to July 2023 AD. The research aimed to study the production and marketing of cucumbers in the district by assessing the production cost, examining market price behavior and channels, and identifying cucumber cultivation's production and market-related problems. A questionnaire for producers and a different questionnaire for traders was designed. A sample of 120 farmers was selected from the list of cucumber farmers and 25 traders were selected from major markets. Socio-demographic and farm characteristics were identified through statistical means. Likewise, financial analysis like cost breakdown, gross revenue, BC ratio, and market analysis like price behavior were examined. Also, major problems faced by cucumber-growing farmers were ranked. SWOT analysis was also carried out through FDG (Focus Group Discussion) and KIIs (Key Informant Interviews). The cost of production was broken down into various parameters in which the land lease cost shared the highest percentage of cost i.e., 23.99% of the cost of cucumber production. The total cost of producing cucumber was observed to be NRs. 298087.62 per hectare. A good return with a BC ratio of 3.03 was also found. The study also revealed insect pests and diseases to be important production problems. Likewise, problems like price fluctuation, unawareness of farmers towards price, and middleman intervention were important marketing issues. 37.18% of producer's share and NRs. 59.43 of price spread showed a lag in the marketing of cucumbers that needs to be fixed to reach maximum profitability.

KEYWORDS

Cost, Benefit-Cost ratio, Problems, Price

1. INTRODUCTION

Cucumbers are field crops belonging to the family 'Cucurbitaceae'. The cucumber appears to have originated in Asia, where people have grown it for sustenance for around three thousand years (Mallick, 2022). In Nepal, cucumber is an important agricultural product. It is grown in almost every part of the country in an annual pattern. The total Cucumber cultivated area in Nepal is 10,309 ha with a productivity of 15.48 Mt./ha (Ministry of Agriculture and Livestock Development, 2023). However, 4264941 kgs of cucumbers and gherkins were imported into Nepal in fiscal year 2022/23 (Ministry of Finance, 2024).

Nawalparasi East or Nawalpur has a cucumber production area of 66 ha and 14.85 Mt./ha of productivity (Ministry of Agriculture and Livestock Development, 2023). Researchers has stated that the district has two major kinds of cucumber-growing farmers: farmers who grow for food and farmers who grow to sell. Varieties of cucumber grown in the Terai hills included Green Long, Bhaktapur Local F1, Raja F1, Karma F1, etc. (Khanal et al., 2020a).

As per the report published by PMAMP, chemical fertilizers, and pesticides were found to be expensive in the district. The prices of these inputs were different for farmers. These problems have prevented farmers from earning the benefits that could have been received from cucumbers. The study is necessary to commercialize cucumber farming profitably.

Cucumber is grown in large quantities in Nawalpur and marketed to Butwal, Kathmandu, and other districts. The main people involved are producers, traders, wholesalers, retailers, consumers, input suppliers, enablers, and facilitators. Large mart owners with numerous storage facilities are frequently the wholesalers. The retailers were typically street vendors who ran tiny markets (Khanal et al., 2020). The fresh vegetable market in Nepal lacks a well-functioning channel (Tha et al., 2021). Market channels for perishable agriculture commodities like cucumbers should also be studied to avoid any loss in the transportation of the products.

Production of cucumbers faces many problems which include many biotic and abiotic stresses. Cucumbers are produced in low quantities because of production issues like insect pests, lack of technical expertise, poor soil health, and inadequate irrigation (Krishna et al., 2022). Cucumber production is also reduced because of farmers' insufficient understanding of the market and value chain and their target to supply demands of only the local market (Khanal and Dhakal, 2020). Identifying these problems in Nawalparasi will help farmers ascertain the potential of cucumber farming in the district.

Farmers earn a good income from cucumber farming in Nawalparasi East district. Still, a large amount of profit is taken by intermediaries, preventing farmers from earning more profit and improving the production and productivity of the commodities. In Argakhanchi (a district near Nawalpur), the middlemen taking enormous margins is discovered

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to be the worst issue in marketing. The second key issue in marketing is the small market (Khanal and Dhakal, 2020). However, in a value chain analysis of cucumbers in Tanahun (an adjoining district to Nawalparasi East), the main marketing challenge is the low market price (Tiwari and Belbase, 2020).

2. Materials and Methods

2.1 Experimental site

This research was conducted in the Nawalparasi East district of Gandaki province between February and June 2023. The site is located at latitude 27°37′09.84″ North and longitude 84°01′12.00″ East. It was selected because they have a high prospect of cucumber farming.

2.2 Sources of data and population sampling

The primary data was collected from the farmers, traders, key informants, and FGD through a designed questionnaire. Mostly objective and some subjective questions were prepared for primary data collection. The secondary data sources include the PMAMP and AKC's annual reports and various journals.

Using a purposive sampling technique, 120 producers and 25 traders (wholesalers and retailers) are selected from four municipalities (Hupsekot, Kawasoti, Gaidakot, and Madhyabindu) and major markets (Butwal, Chitwan, and Kathmandu) respectively.

2.3 Data analysis

The data collected were entered and analyzed with the help of Microsoft Excel 2019, Statistical Package for Social Sciences (IBM SPSS 25.0 V), and Microsoft Word 2019.

2.4 Socio-demographic characteristics

Socioeconomic and farm characteristics were analyzed using descriptive statistics like frequency, percentage, mean, and standard deviation.

2.5 Product cost analysis

This portion includes variables used in the production of cucumber. The cost of production was calculated by summing up all the costs of those variables.

$$TC_{cucumber}=C_{seed}+C_{seedliing}+C_{lease}+C_{landprep}+C_{labor}+C_{manure}+C_{fertilizer}+C_{transport}+C_{pesticide}+C_{packaging}$$

Where, $TC_{cucumber}$= Total cost of production, C_{seed}= Cost of seed, $C_{seedliing}$ = Cost of seedling preparation, C_{lease}= Cost of leased land, $C_{landprep}$= Cost of preparing land, C_{labor}= Cost of labor, C_{manure}= Cost of organic manure, $C_{fertilizer}$= Cost of fertilizer, $C_{transport}$= Cost of transportation, $C_{pesticide}$= Cost of pesticide, $C_{packaging}$= Cost of packaging

2.6 Benefit-Cost analysis

The benefit-cost ratio is a ratio that indicates the relationship between the benefit gained and the cost incurred by any enterprise. It is a relative measure. It is used to estimate the benefit per unit cost. Applying the given formula, the BC ratio was computed (Bam et al., 2023).

$$\text{Benefit-Cost Analysis} = \frac{GR}{TC}$$

Where,

GR= Gross Revenue

TC= Total Cost of production

Gross revenue was estimated using the following formula (Shrestha et al., 2018).

$$\text{Gross revenue} = P*Q$$

Where,

P=Price per kg weight of cucumber

Q=Quantity of cucumber produced (kg)

2.7 Indexing

Indexing is a ranking method where different factors based on index value or weight are assigned to various ranks. Farmers were given to rank five production and market-related problems each based on severity (1 being the most severe and 5 being the least severe). Then, an index value was assigned to each rank (1=1, 2=0.8, 3=0.6, 4=0.4, 5=0.2). The average of the values was calculated for each problem. The issues were ranked based on the average values (the highest value being the most severe). A similar approach was used by (Gurung et al., 2021).

2.8 Marketing analysis

The producer's share was computed to estimate the producer's gain per the market price of cucumber by employing the following formula (Ghimire & Shah, 2023).

$$P_S = P_P / P_E * 100\%$$

Where,

P_S= Producer's share

P_P= Sale price of the producer

P_E= Sale price of the retailer

The price spread is the difference between the price paid by the consumer and the price received by the farmer. The price spread was computed to understand the efficiency of the cucumber market between the producer's and consumer's levels. The following formula determines the price spread (Maharatha et al., 2019).

$$\text{Price spread} = P_E - P_p$$

Where,

P_P = Sale price of the producer

P_E = Sale price of the retailer

2.9 SWOT analysis

The SWOT (Strengths, Weaknesses, Opportunities, and Threats) of cucumber production and marketing in the study site were analyzed through focus group discussion, key informant survey, and literature review.

3. Results and Discussion

3.1 Socio-demographic and farm characteristics

The study revealed that among 120 respondents in the study sites, 60% (i.e., 72) were male and the rest 40% (48) were female. 70% of respondents were Jana-Jati who were (i.e., 84 respondents). 20.8% (25) were Brahmin, 6.7% (8) were Chhetri and 2.5% (3) were Dalits. Family members were categorized into three age groups. This study found that 51.20% of the population belonged to the economically active age group i.e., 15 to 59 years of age. 28.16% were found to be below the age of 15 years and 20.64% were found to be above the age of 59 years.

The study indicated that the average land used for farming in a household was 0.43 ha. The average area for cultivation of cucumber in a household was 0.27 ha. This study also indicated that most farmers grew Bhaktapur local variety of cucumber. 66.7% of the respondents grew Bhaktapur local variety, 27.5% grew Karma variety, 30% grew Kamini variety, 12.5% grew Pusa long green, 40.8% grew Malini and 37.5% grew other varieties of cucumber. The varieties of cucumbers are shown in the following figure.

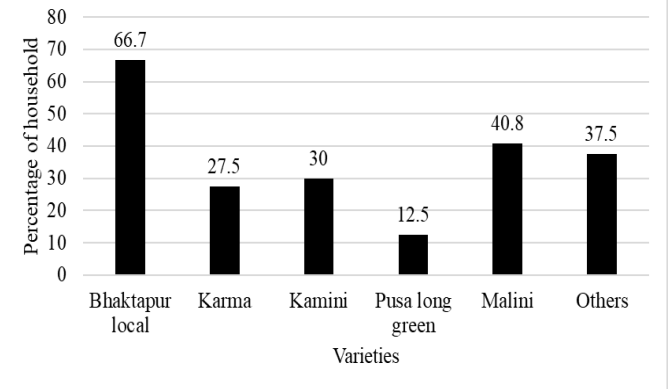

Figure 1: Varieties of cucumbers grown in Nawalparasi East, Nepal

3.2 Cost of production

Farmers of the study sites used seed, organic manure, fertilizers, pesticides, and packaging materials as input. Along with the cost of inputs, the cost of preparing seedlings, transport costs, cost of hired tractors for land preparation, and labor costs were also included. Labor cost had the highest share of the total cost i.e., 23.99% followed by land lease cost (22.60%) and fertilizers (18.58%). Other costs include the cost of organic manure (11.61%), cost of seed (9.00%), cost of land preparation (4.62%), cost of pesticide (4.43%), cost of seedling preparation (3.85%), and packaging (1.30%). The average cost incurred in cucumber production in 1 ha of land was NRs. 298087.62. The table below shows the detailed breakdown of costs incurred in cucumber production.

Table 1: Cost of production of cucumber in the study area in 1-hectare land in Nawalparasi East, Nepal

Variables cost (NRs.)	Mean	Standard deviation	Percentage of total cost
Seed	21825.06	19007.03	9.00
Seedling Preparation	9347.12	7845.91	3.86
Lease land	54788.98	18219.24	22.60
Land preparation	11203.08	3651.02	4.62
Labor	58159.98	27863.02	23.99
Organic manure	45045.95	10031.38	18.58
Fertilizers	28151.36	18799.26	11.61
Pesticides	10748.87	3891.13	4.43
Packaging	3166.13	2451.81	1.31

3.3 Profitability analysis

The total return from cucumbers in the study area was NRs. 739292.28 (1 NRs= USD). The benefit-cost ratio of the enterprise was 3.03. Other studies conducted in Nawalparasi East and Chitwan (a nearby district) also showed a BC ratio higher than 3 (Gautam et al., 2021; Khanal et al., 2020a). Nawalparasi East is the pocket area of cucumbers in Nepal and cucumber farming is profitable there. Table 2 displays the profitability of farms in four study areas.

Table 2: Profitability analysis of cucumber production in four local levels in the study area in 1 ha land in Nawalparasi East, Nepal

Variable	Gaidakot	Hupsekot	Kawasoti	Madhyabindu	Overall	F-value
Total cost	298087.62± 101796.36	227124.56± 47351.66	204044.18± 39873.25	240489.73± 29324.23	242436.52± 69865.26	12.778***(0.000)
Gross revenue	789595.63± 529757.66	872435.90± 389139.41	703952.13± 306568.64	591185.47± 142500.15	739292.28± 379603.97	3.180** (0.027)
Net revenue	491508.02± 431648.96	645311.34± 350605.19	499907.95± 286811.44	350695.74± 130617.25	496855.76± 332442.20	4.253*** (0.007)
BC ratio	2.48±0.64	3.75±1.12	3.42±1.18	2.46±0.48	3.03±1.06	15.712*** (0.000)

Notes: ***indicates significant at 1% level and **significant at 5% level. Value after ± indicates standard deviation.

3.4 Production problem

The study revealed that the production problem of insect pests was the most important problem followed by the problem of disease incident. The main obstacles to cucumber production are pests and diseases, which require labor and other expensive effort for management (Subedi et al., 2021). Other problems included hailstone, lack of irrigation facilities, and post-harvest loss. The following table (Table 3) presents cucumber production problems.

Table 3: Ranks of production problems with index value

Problem	Index value	Rank
Insect pest	0.87	I
Disease	0.86	II
Hailstone	0.78	III
Irrigation problem	0.72	IV
Post-harvest loss	0.57	V

3.5 Marketing problem

The major problem was market price fluctuation followed by unawareness of price information and middlemen intervention. Cucumber shows a significant shift in demand throughout the year and because of this, there is a notable price fluctuation in cucumbers (Giri, 2023). High transport costs and lack of transportation were also the issues. Market-related problems are presented in Table 4.

Table 4: Ranks of market-related problems with index value

Problem	Index value	Rank
Market price fluctuation	0.758	I
Unawareness of price information	0.753	II
Middlemen intervention	0.727	III
High transport cost	0.432	IV
Lack of transportation	0.330	V

3.6 Market channel and share

Most of the farmers sold their cucumbers to the wholesaler. Many farmers also sold their cucumbers directly to the retailers at the nearby market. The major market channels were;

Producer → Wholesaler→ Retailer→ Consumer

Producer→ Retailer→ Consumer

The sales price of cucumber was different for various actors involved in the marketing of cucumber. The average sales price of cucumber for producers was found to be Rs. 35.17 while for retailers, it was found to be Rs. 94.60. Thus, the price spread was found to be Rs. 59.43. Lastly, the producer share was estimated to be 37.18%. A similar result was obtained in a study conducted in Tanahun about the value chain of cucumber where the producer's share was 36% (Tiwari & Belbase, 2020).

3.7 SWOT analysis

The SWOT analysis explored the positive and negative factors in the production of cucumbers in the study area. The positive factor can be broadly divided into strengths and opportunities for cucumber farming and the negative factor includes the weaknesses of the enterprise and threats to the farms. Kartika et al. (2024) say that SWOT analysis is important for improving agricultural MSMEs (Micro, Small, and Medium Enterprises), especially in the food crop subsector. It identifies internal and external factors that impact competitiveness and helps design comprehensive plans for adopting technical developments (Kartika et al., 2024).

The area was suitable for growing different cucumber varieties, especially improved and hybrid ones throughout the year. However, the incidence of pests, middlemen's intervention, and lack of storage facilities were some of the major weaknesses that needed to be addressed. Cucumber business in the area has the potential to supply the commodity to the Indian market and industries by increasing the commercial farms in the area. The opportunity for increasing the production and productivity of cucumber farming should be utilized while avoiding threats like price fluctuation,

labor shortage due to brain drain, and production issues like hailstone, and secondary resurgence due to pesticide usage.

Table 5: SWOT analysis of cucumber production in Nawalparasi East, Nepal

Positive Factors	Negative Factors
Strength	Weakness
Climatic suitability	No facility for storage
Different varieties for growing at different times and in different areas	Middlemen's intervention in the market
Presence of experienced cucumber farmers	Incidence of diseases and pests
Presence of hybrid improved varieties	Variable rate of inputs available in agro-vets for different farmers
Access to market in different districts	Weak adoption of the improved farming practices
Opportunities	Threats
Scope for the export in the Indian market	Price fluctuation
Scope to produce value-added products like pickle	Secondary resurgence due to pesticide
Potential for increase in area, production, and productivity	Problem of hailstone
Potential for organic farming	Decrease in labor availability due to brain drain
Potential for an increase in the number of commercial farms	Lack of information for the farmers

4. Conclusion

The study of cucumber production cost, market channel, price behavior, and problems related to production and marketing provided a required analysis of cucumber farming in one of the pocket areas of Nepal for cucumbers. The study first emphasized the cost breakdown of the production. An excellent BC ratio was observed with an even bigger potential for returns. A small producer's share and a broad price spread suggested the farmer's inability to secure the price of their farm produce. Major production problems that needed to be managed were insects and diseases. Price behavior was a problem for the farmer with the major marketing problems being price fluctuation, unawareness of price, and middlemen's intervention. Overall, the study can be used to acknowledge the problems faced by cucumber farmers in the area so that local bodies can provide essential help for managing production problems and implementing the necessary policies to solve problems related to pricing to increase profitability.

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Conflict of Interest

The authors have no conflict of interest regarding the publication.

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