PRODUCTION, MARKETING AND PROCESSING OF FOXNUT: A CASE STUDY OF TULSI MAHILA SELF-HELP GROUP OF DHAMTARI DISTRICT OF CHHATTISHGARH

M.B.A (ABM) Thesis

by

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Thesis

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ANIL KUMAR

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CERTIFICATE-I

This is to certify that the thesis entitled **"PRODUCTION, MARKETING AND PROCESSING OF FOXNUT: A CASE STUDY OF TULSI MAHILA SELF-HELP GROUP OF DHAMTARI DISTRICT OF CHHATTISHGARH"** submitted in partial fulfillment of the requirements for the degree of **Master of Business Administration (Agri-business Management)** of the Indira Gandhi Krishi Vishwavidyalaya, Raipur, is a record of the bonafide research work carried out by **Anil Kumar** under my guidance and supervision. The subject of the thesis has been approved by the Student's Advisory Committee and the Director of Instructions.

No part of the thesis has been submitted for any other degree or diploma or has been published/published part has been fully acknowledged. All the assistance and help received during the course of the investigations have been duly acknowledged by his.

Date: 25.11.2020

(Chairman of the Advisory Committee)

THESIS APPROVED BY THE STUDENT'S ADVISORY COMMITTEE

Major Advisor (Dr. M.R. Chandrakar) .....

Member (Dr. A. K. Gauraha) .....

Member (Dr. Yaman Dewangan) .....

Member (Dr. R. R. Saxena) .....

CERTIFICATE-II

This is to certify that the Thesis entitled **"PRODUCTION, MARKETING AND PROCESSING OF FOXNUT: A CASE STUDY OF TULSI MAHILA SELF-HELP GROUP OF DHAMTARI DISTRICT OF CHHATTISHGARH"** submitted by **Anil Kumar** to the Indira Gandhi Krishi Vishwavidyalaya, Raipur, in partial fulfillment of the requirements for the degree of **Master of Business Administration (Agri-business Management)** in the Department of Agri-Business and Rural management has been approved by external examiner and Student's Advisory Committee after oral examination, under the chairmanship of head of the Department/Dean.

Signature of Head of the Department/ Dean

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Approved/Not approved _____

Director of Instructions _____

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LIST OF ABBREVIATION

%	:	Percent
@	:	At the rate of
&	:	And
et al.	:	And others people
ºC	:	Celsius
cm	:	Centimeter
CIPHET	:	Central Institute of Post-Harvest Engineering and Technology
etc.	:	For example, for instance
Fig.	:	Figure
Ha	:	Hectare
i.e.	:	That is
ICAR	:	Indian Council of Agricultural Research
Kg	:	Kilogram
M	:	Meter
MT	:	Metric Tones
NRC	:	National Research Centre
No.	:	Number
qtl	:	Quintal
Rs.	:	Rupee
S. No.	:	Serial Number
Viz.	:	Namely

THESIS ABSTRACT

a) Title of the Thesis : Production, Marketing and Processing of Foxnut : A Case Study of Tulsi Mahila Self Help Group of Dhamtari district of Chhattisgarh.

b) Name of the Student : Anil Kumar

c) Major Subject : Agri-Business And Rural Management

d) Name and Address of Major Advisor : Dr. M. R. Chandrakar, Professor, Department of Agricultural Economics, College of Agriculture, Raipur (C.G.)

e) Degree to be Awarded : Master of Business Administration (Agri-Business Management)

Signature of Student

Signature of Major Advisor

Date:

Signature of Head of Department

ABSTARCT

Fox nut is an aquatic plant belonging to the Nympheace family. Commonly known as Gorgon's nut or fox nut. Fox nut is grown in stagnating perennial water bodies such as wetlands, depressions of land, swamps and ditches. Since the last few years fox nut has also been grown by the pond method. In India fox nut is grown in the state of Bihar, parts of Assam, Chhattisgarh and Manipur. Over 85 percent fox nut is solely produced by Bihar. Fox nut cultivation is labor-intensive mainly fishermen 's and the poorest divisions of society invests in the field of fox nut. Fox nut is a non-cereal, organic food producing plants. A decent source of carbohydrates, proteins and minerals is present in fox nut. Due to rising demand from domestic and international

markets, fox nut prices have increased in recent years. The crop is recognized as a main crop in the state of Chhattisgarh and can mitigate the poverty by sectional cultivation of the crop. The research was carried out in Dhamatari District of Chhattisgarh. One SHG which is cultivated fox nut in pond system, 1 processor from the conventional system was chosen as a research sample.

The overall cost of cultivation of fox nut is Rs. 87820.56, the Gross return is Rs. 248000 per hectare. Yield of fox nut is 2480 kg per hectare and Net return is Rs. 175491.14. Fox nut seed care efficiency is 35 percent. The cost of processing per kg of the fox nut seed is Rs. 8.69 while the cost of processing fox nut pop is Rs. 26.07 per kg. In marketing of fox nut, transport and packing are major cost elements. Agriculture with no pond ownership is an significant restriction in fox nut production. The role of human labour in the manufacturing process is essential in the absence of processing machines. It is needed to boost manufacturing, value addition, grading, storage, warehousing and retail infrastructure on a major scale. Registration of geographical indication (GI) and the value added items for fox nut with sufficient publicity will increase demand for fox nut pop. Input output ratio of Fox nut is 1:2.83.

Lack of scientific knowledge cultivation, no ownership of pond, insufficient enhanced crop diversity, highly skilled operation, lack of credit facility, labour intensive cultivation fox nut. Constraints in processing of fox nut Issues related to the processing of fox nuts seeds were reported during the survey by processors are lack of equipment for manufacturing, lack of facility for credit, strong environment dependency for drying, health risk. High price volatility, lack of transport infrastructure, inadequate market services are major constraints in faced by fox nut cultivation.

क)**शोध ग्रंथ** का शीर्षक	**मखाना का उत्पादन, विपणन और प्रसंस्करण तुलसी महिला स्वयं सहायता समूह धमतरी का केस स्टडी छत्तीसगढ़ का जिला।**
ख)छात्र का नाम	**अनिल कुमार**
ग) प्रमुख विषय	**कृषि व्यवसाय और ग्रामीण प्रबंधन**
घ)प्रमुख सलाहकार का नाम और पता	**डॉ. एम. आर. चंद्राकर प्रमुख सलाहकार प्राध्यापक कृषि अर्थशास्त्र विभाग कृषि महाविद्यालय रायपुर (छ.ग.(**
इ)प्रदान की जाने वाली उपाधि	व्यवसाय प्रबंधन में स्नातकोत्तर की उपाधि (कृषि व्यवसाय-प्रबंधन)

छात्र का हस्ताक्षर

प्रमुख सलाहकार का हस्ताक्षर

विभागाध्यक्ष का हस्ताक्षर

दिनांक

शोध ग्रंथ सारांश

मखाना एक जलीय पौधा है जो निम्फस परिवार से संबंधित है। आर्द्रभूमि जैसे स्थिर जल निकायों में भूमि दलदल और खाई के अवसाद में मखाना उगाया जाता है। पिछले कुछ वर्षों से मखाना को भी तालाब प्रणाली में उगाया गया है। इस विधि में मखाना की खेती कृषि क्षेत्रों में 1 से 2 फुट की गहराई पर की जाती है। भारत में जहाँ मुख्य रूप से बिहार और असम और छत्तीसगढ़ और मणिपुर के कुछ हिस्सों में मखाना

फसल उगाई जाती है। देश में उत्पादित मखाना बिहार में 85% से अधिक है। मखाना संस्कृति के लिए गहन श्रम-गहन, बोझिल खेती और मानव परिश्रम की आवश्यकता होती है। समाज के सबसे गरीब तबकों के साथ मछुआरों की संस्कृति मुख्य रूप से मखाना के नट के क्षेत्र में निवेश करती है। मखाना एक गैर अनाज जैविक खाद्य उत्पादक खाद्य है। कार्बोहाइड्रेट प्रोटीन और खनिजों का एक अच्छा स्रोत मखाना है। घरेलू और अंतर्राष्ट्रीय बाजारों से बढ़ती मांग के कारण हाल के वर्षों में मखाना की कीमतों में वृद्धि हुई है। फसल के अनुभागीय खेती में गरीबी को कम कर सकता है। छत्तीसगढ़ धमतरी जिले में यह शोध किया गया। 1 एसएचजी पारंपरिक प्रणाली से 1 प्रोसेसर को अनुसंधान के नमूने के रूप में चुना गया था।

कुल मिलाकर तालाब प्रणाली की लागत 87820.56 रुपये, 248000 रुपये सकल रिटर्न प्रति हेक्टेयर और बीज उत्पादन 2480 किलो ग्राम प्रति हेक्टेयर, 175491.14 रुपये शुद्ध आय है। मखाना बीज की देखभाल दक्षता 35 प्रतिशत है। मखाना बीज की प्रति किलो की प्रसंस्करण लागत 8.69 रुपये है, जबकि मखाना पॉप प्रसंस्करण की लागत 26.07 रुपये प्रति किलो ग्राम है। मखाना को बेचने में परिवहन और पैकिंग प्रमुख लागत तत्व है, तालाब का स्वामित्व नहीं रखने वाले किसान मखाना के उत्पादन के लिए एक प्रमुख बाधा हैं। प्रसंस्करण मशीनरी की कमी प्रसंस्करण प्रक्रिया में मानव श्रम की महत्वपूर्ण भूमिका निभाती है। प्रसंस्करण, मूल्य संवर्धन, ग्रेडिंग, पैकेजिंग, भंडारण और बाजार के बुनियादी ढांचे में बड़े पैमाने पर सुधार की आवश्यकता है। भौगोलिक संकेत जीआई पंजीकरण मखाना पॉप की उचित ब्रांडिंग और उपयुक्त विज्ञापन के साथ मखाना के मूल्य वर्धित उत्पादों मखाना पॉप और इसके मूल्य वर्धित उत्पादों की मांग में सुधार

होगा। फॉक्स नट का इनपुट आउटपुट अनुपात 1:2.83 है। मखाना की खेती में मखाना में किसानों को निम्नलिखित बाधाओं का सामना करना पड़ रहा है। वैज्ञानिक ज्ञान की खेती में कमी, तालाब का स्वामित्व ना होना , अपर्याप्त उन्नत फसल विविधता, अत्यधिक कुशल संचालन, ऋण सुविधा की कमी, श्रम गहन खेती। मखाना के बीज के प्रसंस्करण से संबंधित समस्याएं बताई गई थीं । विनिर्माण के लिए उपकरणों की कमी, ऋण के लिए सुविधा की कमी, सुखाने के लिए मजबूत पर्यावरण निर्भरता, स्वास्थ्य जोखिम। छत्तीसगढ़ के धमतरी जिले में मखाना के विपणन में अड़चनें आ रही हैं। उच्च मूल्य अस्थिरता, परिवहन बुनियादी ढांचे की कमी, अपर्याप्त बाजार सेवाएं मखाना की खेती से करने में प्रमुख बाधाएँ हैं।

CHAPTER-I
INTRODUCTION

A self-help group (SHG) is a financial intermediary committee normally consisting of between 10 and 40 local women or individuals. SHG is a holistic programme of micro-enterprises covering all aspects of self employment, organization of the rural poor into self help group and their capacity building, planning of activity clusters, infrastructure build up, technology, credit and marketing. It lays emphasis on activity clusters based on the resources and the occupational skills of the people and availability of markets.

Credit has not only been viewed as one of the fundamental agricultural inputs, but is also an effective means for developing any kind of activity. "Credit is a sort of base, passport to pursue an individual's ability," said Professor Muhammad Yunus of the Chittagong University in Bangladesh. Credit was the real lack of connection and potential between people. SHG should in order to give them a better opportunity. In 1975, Bangladesh Grameen Bank was set up to provide micro finance to SHG members. Microfinance has been established in Bangladesh as a most effective method for tackling poverty. Sufficient amount of credit leads significantly to economic prosperity at the right moment. Rural credit must therefore play an important role in our country's socio-economic development.

Anyone, anywhere and for any social or economic purpose can start a self-help group. It's clear to the creator, and no formal registration is needed. Creator can talk to people about their problems and he visited a poor family. Then group members discuss similar problems with families and persuade to meet and talk about the solutions. The whole aim of SHG is to improve the functional potential of the weak and excluded in order to eradicate specific problems. However, somebody will have to step in and only educated people can pursue the outsider to solve their problems. The SHG members are responsible for their future as efforts for mutual trust and mutual support are made. Members are also responsible for any group decision, which is why the group works only if each group member is dedicated to the community.

Fox nut is a native of South East Asia and China but is spread to almost every region of the world. Fox nut is a big source of nutrition. Their presence is usually less in South East Asia, though it is considered to occur in Japan, Korea, Russia, North America, Nepal, Bangladesh, as well as parts of India. This commodity is sold in India in Bengal, Bihar, Mainpr, Tripura, Assam, Jammu & Kashmir and Eastern Odisha. The major districts producing Fox nut is the state of Bihar include Darbhanga, Sitamarhi, Madhubani, Saharsa, Supaul, Araria, Kishanganj, Purnia and Katihar districts. Around 80 percent of total processed Fox nut output comes from the districts of Darbangha, Madhubani, Purnia and Katihar. In view of its economic value, the fox nut area was 13,000 ha. In the Darbangha district of Bihar, an ICAR Research Complex for the Eastern Region was established to pursue research into the various aspects of fox nut. There are about 100 seeds in a single Fox nut plant and about ten thousand plants per hectare. Fox nut seed yields approximately 1.8-2.0 t/ha of the pond area. Fox nut's edible portion contains 12.8 percent moisture, 9.7 percent protein, 0.1 percent fat, 0.5 percent mineral, 76.9 percent carbohydrates and 1.4 mg/100 g carotene. Raw Fox nut has 328 kcal/100 grammes and popped Makhana has 362 kcal/100 gm of calorific value. Therefore, Fox nut's calorific value is well associated with staple foods such as wheat, rice etc. In sugar, protein and ascorbic acid and phenol content, Fox nut is considered superior to dry fruits such as almonds, walnut, cocoa and cashew. The medicinal properties of Fox nut are also well known at least in China, where it has been made a compulsory ingredient in baby foods.

The seed of fox nut is low in cholesterol, sodium and saturated fat. Manganese, calcium, magnesium, thiamine, phosphate and phosphorus are particularly strong sources of them. The remaining consists of water, sodium, potassium, phosphorus and calcium to keep the excretory tract in order. It helps to remove all of the spleen from the body, and it maintains the removal of excess cholesterol. The potassium level is an significant aid to the heart as the chance of hypertension and heat stroke is minimized. The extra water and salt from the body is good for flushing out. It helps if muscle contractions will lead to cramps. The presence of thiamine in lotus seeds helps the good cognitive control of

nerves. The ingestion of lotus seed aids in generating a neuro transmission function of the acetylcholine.

Apart from the nutritional health benefits provided by the lotus seed there are other uses as well. It has been used as an inducing agent in cosmetic products so that the product can promote anti-aging. Additionally, lotus seeds are a common snacking item as it is low in carbohydrates, fat and sugar, which mean binging on it between the meal times, will surely not promote weight gain. Also, it is in demand due to its excellent content of nutrients and phytonutrients. It is extensively exported from China to the world. It compensates the loss of primary nutrients required for functioning of your body. Other popular dishes include 'Makhane ki kheer' which is prepared in the 'Mithila culture' which belongs to the state of Bihar in India.

Objectives:

1. To work out the cost and returns of Fox nut.
2. To workout the cost of processing of Fox nut.
3. To find out the constraints in production, marketing and processing of Fox nut and suggest some suitable measures to overcome them.

Limitation of the Study

The present investigation suffered from the limitations of inadequacy of, Lockdown, money, time, other physical facilities needed for the research and resources usually faced by investigator. Covid-19 has set up a barrier for probing into more dimensions of the research. The study area was restricted to only Dhamtari district of Chhattisgarh. The research relied primarily on the answers of the leaders of the SHGs. They were also unable to provide reliable information on most important subjects, but they had a good relationship with them.

Setup of the Study

Including this chapter which includes the initiation and goals of the research, this project report is divided into five chapters. In Chapter II various related literature is reviewed, Chapter III, has tools and processes. The results and

discussion are critical discussed in Chapter IV and Chapter V provides a summary, conclusions and recommendations for future research work.

CHAPTER-II
REVIEW AND LITERATURE

A review of past research helps in identifying the conceptual and methodological issues relevant to the present study. Keeping in view the objectives of the study, the reviews are presented.

I. Rahumathunza and K. V. Krishnakutty (1999) identified operational questions in the operations of SHG, with strategies for the reconstruction of SHGs that were identified between 1999 and 2007. The teaching of SHGs in socioeconomic empowerment has been found to benefit women in rural areas. However, businessmen continue to struggle to maintain their prospects. The findings have also been verified by the SWOT and TOWS analyzes. It is proposed that similar groups should have common centers of facilities. The monetary stimulus for SHGs must be related to the quality of the company.

Suguna (1994) stated that most respondents were young, medium-sized landowners. In addition, 38.33 percent of women had a medium level of behavior. Approximately 32.50 and 29.17 percent had high and low information search behavior.

Ramesh (1998) revealed that nearly half of women were moderately informed (46.48 percent), and that the same proportion (26.66 percent) were low and high informational behavior. It can be concluded that women had a strong interest in sharing knowledge regarding agricultural and off-farm activities to other participants, such as friends and family members, educated farmers and neighbours.

Mayuri (1998) found that the television is a powerful means of mobilizing opinions on many women's groups. She also suggested the programs, which usually sheltered not only people, but also women, from issues, debate and dilemmas of groups of women.

Jain *et al.*, (2010) studied on the economics of fox nut (*Euryale ferox*) cultivation. They mentioned that fox nut is an annual aquatic vegetable

cash crop of Manipur. Both leaf petiole and fruits after removing the spiny cover are eaten raw or cooked. The fox nut fruits are sold in the local markets of Manipur during June-October with an estimated quantity of 43.4 tonnes which fetch around Rs. 3.8 lakh annually in Imphal market alone. The agro-practice and estimation of economics of fox nut has been carried out. Around 2500 plants with plant to plant spacing of 2x2 m^2 can be cultivated in one ha of land with an annual production of 75,000 fruits which is on an average yield of 30 fruits per plant annually. The market cost of fox nut fruit varies from Rs. 2-8 per fruit depending upon the size of the fruit, availability and season. Under scientific cultivation of fox nut, a total income of Rs. 2.25 lakh can be generated annually per ha of land where Rs. 2.09 lakh is net income.

Verma (2008) studied on cultivation, processing and economic importance of fox nut (*Euryale ferox*). In his research, he found that fox nut, a particular fruit commodity of Bihar, India, has the ability to minimise state poverty. The seed (with the white periphery inside) is the main edible component of the crop, often in the popping process, and is incredibly nutritious. He described the cultivation (sowing, germination, leaf production, flowering, fruiting and harvesting), processing (drying, storage, size grading, heat treatment, roasting and popping) and economic importance (nutritional aspects, recipes, medicinal value and export potential) of fox nut in Bihar.

Prakash and Choudhary (1994) studied on marketing costs and returns with respect to fox nut (Euryale ferox) in Bihar state, India, drawing on data collected from 200 Fox nut growers (100 each from Darbhanga and Madhubani districts) in 1992-93. Marketable and marketed surplus was sold directly to wholesalers or retailers. Delhi and Kanpur are the most important consuming centers. The producer's share of the consumer price was 53 percent, with remainder absorbed in marketing cost.

Jha *et al.*, (1991) Fox nut (*Euryale ferox Salisb)* *is a very important* annual plant of Nymphaeaceae family. The popped seeds are the main edible part of this aquatic plant and are sold as one of the premium dry fruits in the local market. In addition to high nutritional value, fox nut has a number of medicinal

properties**.** Integrated Farming System Model by integration of fish and water chestnut with fox nut was developed in 50 ha of land in Darbhanga district. The net benefit from the system was recorded at Rs. 68545 (126505-57960) as compared to traditional system i.e. fox nut production alone. Field based system of fox nut cultivation was standardized with other crops like fish, rice and water chestnut in cropping system mode The gross return from fox nut-fish, fox nut-rice and fox nut-water chestnut was obtained as Rs. 282810-273840 and 354340 per ha, respectively while a gross return of Rs. 132552 was obtained from fox nut cultivation alone. The highest benefit cost ratio was recorded with fox nut-water chestnut combination (1.79) followed by fox nut-fish combination in field system of fox nut cultivation under integrated farming system model.

Jha and Prasad (2003) reveled that process is highly skilled, tedious, time consuming and pains taking. Most of the experts of this technology belong to the women population of a specific community of 'Mallah' of north Bihar. In general, the postharvest technology involves sun drying, size grading, preheating & tempering, roasting & popping, polishing, and grading & packaging. Perhaps this is the only reason, that the processing of fox nut is restricted to Bihar. Popped fox nut are used in the preparation of a number of delicious and rich sweet dishes like fox nut kheer, fox nut vermicelli and fox nut halva etc.

Jha *et al*., (2011) found that it is used in pudding and milk based sweets. Dal makhani and vegetable curries become delicious when fox nut is mixed for taste and thickening object. Fox nut raita is also tastie and digestive in nature. The medicinal properties of fox nut are well documented in Indian and Chinese ancient literature.

Kadian and Kumar (2000) reported that the maximum information on scientific dairy farming had been obtained from local leaders, progressive farmers, friends, veterinarian officers, ADO and VLW sources etc.

Rangi *et al*., (2002) found that 70 percent of SHG members have been trained and the remainder has been illiterates. Of the qualified grades, the majority of respondents earned education up to the 5^{th} and middle level, with a total of about

57 percent. Even the educated respondents' groups were not therefore highly skilled. In addition, 56 percent of the respondents had up to five family members, while 44 percent had six to 10 family members. The respondents' following groups were representatives of the joint families.

Sudharani (2002) stated that as far as the head of the. Houses were involved, of them 54 percent were non-agricultural employees, 18 percent were farm laborers, 8 percent were dairy farm workers, and public/ private/ co-operative staff respectively. The remaining 12 percent is self-employed, primarily in the food industry. Of fifty interviewees, 44 also had subordinate jobs. Of the 44.75 percent recorded doing milk as a subsidiary, accompanied by tailoring (around 11percent), 9 percent reported serving as angel waders, while the remaining 5 percent reported educating rural women in stitching.

Drushti (2003) found that 10.59 percent, 11.76 percent had primary school and 57.65 percent had high school, 4.71 percent were literate, 4.71 percent had high school, and 4.71 percent had high education. The housewives who are living in a Kash house is 37.65 percent, the Pukkh house is 43.53 percent. The house is 14.12 percent, the 11.76 percent, in Chawl 1.18 percent, in Wada its 2.35 percent, in huts 28.24 percent were housewives doing jobs around 9.41 percent, having their own business-20 percent working as a labor in a construction firm or anywhere else.

Verma (2004) noted that 23.37 percent were agriculture-dependent their income source was in animal husbandry 20.77 percent, while farming alone accounted for 5.19 percent. Among the 16 percent respondents, bidi production was found. The majority were Muslim, their land held in bissa and bigha. Their land belonged.

Anjugam *et al.*, (2007) found that socially backward, landless and marginalized farms are more involved in the self-aid program. The group membership was noticed to prevent the ownership of livestock and consumer goods by the individual households.

Kumar *et al.*, (2011) studied on constraints and drudgery involved in fox nut cultivation in Madhubani and Katihar district of Bihar. They found that the lack of possession of the pond or property in both districts was a significant restriction. The majority of fox nut farmers cultivate fox nuts in leased government or private ponds or property. As a result, fox nut farmers have no guarantee of benefit. Lack of scientific knowledge of fox nut cultivation and highly skilled operations are the other major constraints that can be mitigated by adopting proper package of practices. Harvesting was realized as most drudgerious operation in fox nut cultivation that can be overcome by inventing suitable harvesting techniques and equipments.

CHAPTER-III
MATERIALS AND METHOD

In this chapter the materials and research methodology adopted are presented with respect to the selection of the study, selection of SHG member collection of the data and analytical tools.

3.1 Selection of district

Chhattisgarh state consist 28 districts, out of which only one district i.e. Dhamtari was selected purposively for the present study.

3.1.1 Selection of Site

For the Sampling methodology of the present study, only one SHG was selected purposively from the Dhamtari district on the basis of their willingness of participating in the study and the convenience of the study.

3.1.2 Selection of respondents

Twelve members of a SHG were selected as respondents for the present study.

3.2 Method of Enquiry and Collection of data

In this study the data related to expenditure, income, marketing pattern, processing, details and constraints in fox nut production were collected from selected self-help group (SHG). The interviewed, by well structured questionnaires were used for data collection.

3.3 Tools of Analysis

Simple average and percentages statistical techniques were used for analysed the data.

3.3.1 Input-output ratio

Input-output ratio expressed as the ratio of total output to total input. The ratio was calculated as

$$\text{Input-output ratio} = \frac{\text{Total output}}{\text{Total input}}$$

3.3.2 Total input

Value of purchasing raw materials such as fox nut seed and fox nut pop etc., packaging materials, labour cost, and other cost (electricity cost and other maintenance cost) were counted as inputs.

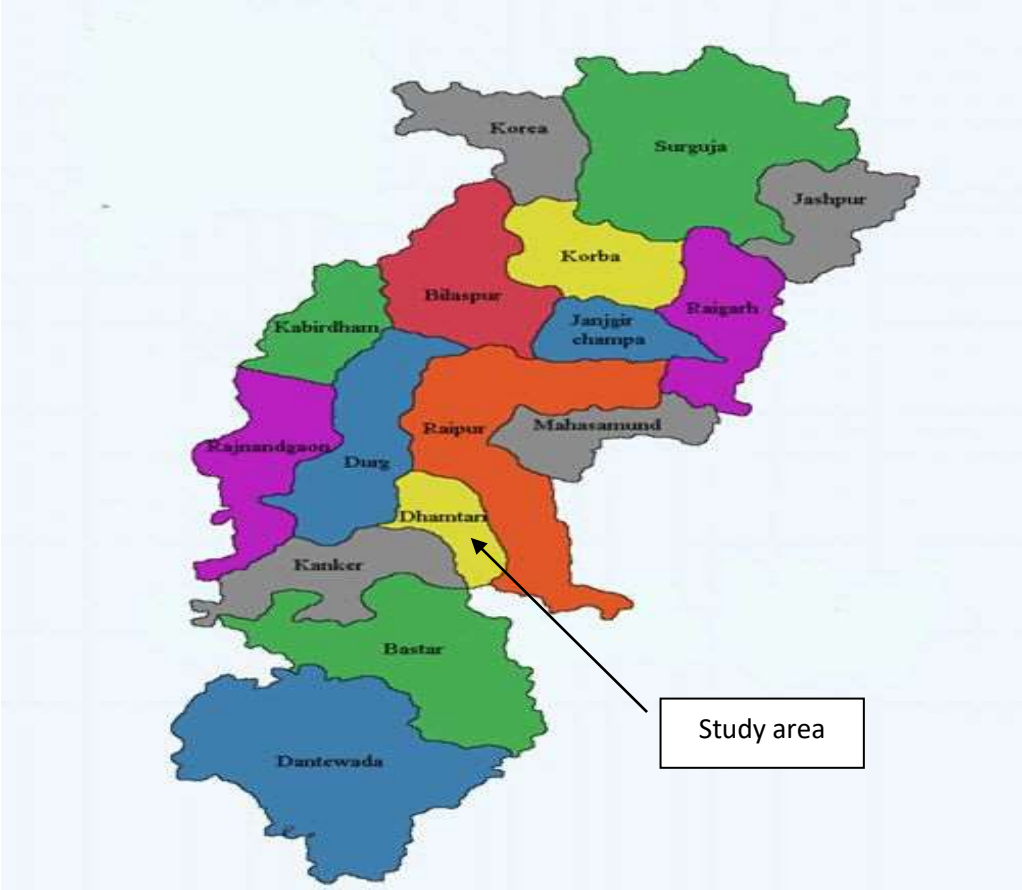
3.3.3 Total output

The quantity of fox nut seed and fox nut pop product sold by SHGs was treated as the output values.

3.4. Profile of the study area

3.4.1 Chhattisgarh

"The districts of the central plains are Dhamtari, Raipur, Mahasamund, Durg, Rajnandgaon, Kabirdham, Bilaspur, Gariyaband, Balod, Korba, Mungeli, Bametara, Baloda Bazar, Janjgir and part of the Kanker district (Narharpur&Kanker block) and part of the Raigarh district. This area includes the plains of Hasdo-Mand, the plains of Bilaspur, the plains of Shivnath-Pairi, the plains of Mahanadi-Shivnath Doab and Mahanadi. The average height of this plain is 220 m, rising towards the highlands. "Map of Chhattisgarh shown on the map. 3.4.1.



3.4.2 Dhamtari District

This District is situated between 20°42' N Latitude and 81°33' E Longtitude. The boundaries of the Raipur district is converted into the districts e.z. Raipur, Mahasamund and Dhamtari. Dhamtari, Kurud and Nagari are included in Dhamtari district as Tehsils and Dhamtari, Kurud, Nagari and Magarlod are included as blocks. The total area of the district is 2029 Sq.Km. The District is surrounded by District Raipur in North and District Kanker as well as Bastar in South, part of Orissa state in East and District Durg and Kanker in West. Mahanadi is the principal river of this district.

The fertility of lands of Dhamtari district can be attributed to the presence of the rivers Pairy, Sondur, kharun and Shivnath. The chief crop of this region is Paddy. However gram,til and arhar also grown in the district. Average annual rainfall of the district is about 1485mm.The district is situated in the plains of Chhattisgarh. Average height of the land is about 305 Meters above sea level. Total number of villages in the district is 651 and the total number of gram panchayat is 333. According to the 2011 census; Dhamtari district has a population of 799781.

About 80% rainfalls during the month of June to September. Unique feature of Dhamtari district is the total number of rice mills that is more than 106.

CHAPTER-IV
RESULTS AND DISCUSSION

This section concerns with the analysis and explanation of the findings of the study in accordance with the research objectives. This chapter is defined in the following subheadings:

4.1 To workout the cost and returns of fox nut.

4.2 To workout the cost of processing of fox nut.

4.3 To find out the constraints in production, marketing and processing of fox nut and suggest some suitable measures to overcome them.

4.1.1 Literacy level

The findings on literacy level of the respondents is presented in Table 4.1. It was observed that 8.33 percent of respondents were illiterate, 25 percent of respondents had completed their primary schooling, 25 percent respondents have done their middle schooling, 25 percent respondents have completed secondary education, 25 percent respondents have completed higher secondary education and only 16.66 percent respondents were graduated. It was found that the majority of the respondents have done their middle schooling.

Table 4.1: Educational status of SHG members

S. No.	Educational status	(SHG) Members	Percent (%)
1	Illiterates	1	8.33
2	Primary	3	25.00
3	High School	3	25.00
4	Higher Secondary	3	25.00
5	Degree	2	16.66
	Total	**12**	**100**

4.1.2 Age

Table 4.2 represents the distribution of respondents according to their age group. From the field survey it was observed that 16.66 percent of the members belonged to the age group of 18-30 years, 41.66 percent of the members belonged to the age group 31-40 years, 33.33 percent members belonged to the age group 41-50 years and 8.33 percent members belonged to the age group 51-60 years. It

was found that the majority of the respondents in the study area belonged to the age between 31 to 40 years**.**

Table 4.2: Age status of SHG members

S. No.	Age	(SHG) Members	Percent (%)
1	18-30	2	16.66
2	31-40	5	41.66
3	41-50	4	33.33
4	51-60	1	8.33
	Total	**12**	**100**

4.1.3 Marital status

Table 4.3 represents the distribution of respondents according to their marital status. From the study it was observed that 83.33 percent of respondents were married, 8.33 percent of respondents were unmarried, 8.33 percent of respondents were widowed. It was found that the majority of the respondents were married (83.33 percent).

Table 4.3: Marital status of SHG members

S. No.	Marital Status	SHG Members	Percent (%)
1	Married	10	83.33
2	Unmarried	1	8.33
3	Widow	1	8.33
	Total	**12**	**100**

4.1.4 Cost structure of fox nut

Traditionally, the fisherman group cultivates fox nuts under the pond method. It takes approximately 7-8 months for the crop to be fit for harvesting. Main expenses cover labour cost, seedling cost, fertilizer and irrigation cost. The operating cost share is Rs 57202.44 per ha. which is 78.86 percent of the total.

The share of fixed cost was Rs 15306.56 per ha. which was 21.10 percent of the total cost. Cultivation of fox nuts is labor-intensive. Human labour cost accounted to be Rs. 37578.2 per ha. which accounted for 51.82 percent of total cost. The family labour cost was Rs. 7627.24 and the hired labour cost employed was Rs. 29950.96 per ha. 51.82 percent of the total labour cost wich was 10.51 and 41.30 percent respectively.

The share of material cost was Rs. 10507.76 per ha. which is 14.49 percent of the total cost. Material cost consists of seeds, seedlings, insecticides and manures. The cost of seedlings was Rs. 6200 per ha. which was 8.55 percent of the total cost. Insecticides were typically applied one or two times to combat aphids. Insecticides widely used were 0.3 percent aqueous. Insecticide expense contributes 1.83 percent (Rs. 1331.76) per ha. of the total cost.

Due to the abundance of organic matter, in the ponds significant quantities of manures were not required. Manures typically used prior to germination of seeds. The cost of the applied manure was found Rs.2976 per ha. which was 4.10 percent of the total cost. In the course of the season, the water volume in the pool may decrease to allow irrigation, its cost was Rs. 2356 per ha. from which irrigation cost was 3.24 percent to the total cost.

Miscellaneous cost was Rs. 2230.76 per ha, which contribute 3.07 percent of the total cost. Interest on working capital found to be Rs. 4529.72 which accounted 6.24 percent to the total expenses, as an account the share of gross operating cost was Rs. 57202.44 per ha. and contributes 78.86 percent to the overall expenses.

The total yield of fox nut seed was 2480 kg per hectare and price of per kg seed is Rs.100 so the value of total output was Rs. 248000 per hectare. The input output ratio of fox nut was found to be 1:2.83. Net return of fox nut was noticed Rs. 175491.14 per hectare, form the above it was reveals that in fox nut cultivation the average cost was found to be 87820.56 and the net returns was 175491.14 hence the input output ratio was 1:2.83. It was clearly shows that the cultivation of fox nut is a profitable business for Tulsi Mahila Self -Help Group (SHG) members.

Table 4.4: Cost of cultivation of fox nut on operational cost

Operational cost			
S. No.	**Cost items**	**Cost per hectare**	**Percentage of total cost**
	Human labour		
	a) Owned	7627.24	10.51
	b) Hired	29950.96	41.30
	Total human labour cost	**37578.2**	**51.82**
	Material cost		
	a) Seedling	6200	8.55
	b) Insecticide/ pesticide	1331.76	1.83
	c) Manure	2976	4.10
	Total material cost	**10507.76**	**14.49**
	Irrigation	2356	3.24
	Miscellaneous cost	2230.76	3.07
	Interest on working capital	4529.72	6.24
	Total operational cost	**57202.44**	**78.86**
Fixed cost			
	Pond revenue	116.6	0.15
	Rent for leased /owned pond	13772.68	18.99
	Depreciation	252.96	0.34
	Interest on fixed capital	1169.32	1.61
	Total of fixed cost	15306.56	21.10
	Total cost	**87820.56**	**100**
Returns			
	Yield(in kg)	2480	
	Gross returns(in Rs)	248000	
	Net returns (in Rs)	175491.14	
	Input output ratio	1:2.83	

4.1.5 Disposable pattern of fox nut

All the fox nut seed produced by the SHG was sold to KVK Dhamtari, @ Rs. 100 per kg.

4.2.1 Procedure to processing of fox nut

Following are the processes that are followed by the processors after harvesting the fox nut seed.

4.2.1.1 Sun dryer and seed storage:

Sun-dried fox nut seeds are spread out for 2-3 hours in the heavy sunshine on a matt or concrete yard to be burned. Roughly 31 percent moisture was found in temporary storage fox nut seed.

4.2.1.2 Size classification:

Sun-dry seeds are then classified by means of a series of strings into 5 to 7 divisions according to their size. Fox nut seed gradation allows for uniform heating and increased processing performance of any nut during roasting.

4.2.1.3 Pre-heating:

Sun-dried nuts are typically cooked in earthen buckets or in cast iron pans. Placing them over the fires and spinning them all the time. Soil temperature of the pan ranges from 250 to 300 °C and the time required is approximately 5 to 6 minutes at full pan size.

4.2.1.4 Tempering:

Storage of pre-heated seed for 48-72 hours in atmospheric conditions is known as seed tempering. Seeds are purposely tempered to release kernels in a dense seed coat.

4.2.1.5 Roasting and popping:

The pre-heated and template nuts are roasted on the 290 °C to 340 °C in a cast iron pot with a single sheet. Stirring at constant velocity, the sound of cracking is heard after about 1.5 to 2.2 min. Five to seven roasted seeds are scooped by hand quickly and held on a rough surface and quickly pounded into them. When the hard shell splits, the kernel breaks. It occurs as a form of fox nut pop or statute, an unusual form. The yield of fox nuts varies by weight of the raw commodity, based on the consistency of the raw content.

4.2.1.6 Grading:

Popped fox nut lawa was typically graded into two grades on basis of size.

4.2.1.7 Packaging:

Standard gunny bags and gunny polythene bags were used for packing the fox nut pop.

4.2.2 Tools and equipments used of fox nut

Khonghli or Deli: A tiny cylindrically shaped bamboo stick bucket. It is used for the preservation of raw, popped and polished seeds. Sieve the sieves are made of wooden foundation sheets of iron. In the classifications of raw fox nut oil, seven to ten sieves of varying mesh sizes are widely used.

Mats: Mats are used before roasting to dry raw fox nut seeds. Iron pan a frying tray that is used to preheat and to roast the fox nut. Hollow apparatuses made of hardwood are mostly shisum or mango, Aphara, Batna and Thaapi. It is a platform where a flat wooden hammer called Thaapi strikes roasted seeds.

Chula's (Earthen Pans) to roast the seeds. Sticks of Bamboo used to roast fox'nut nuts.

Table 4.5: Requirements of equipments on fox nut

S. No.	Equipments	Cost/in Rs.	Average No. of units required	Total cost In Rs.
1	Khonghli	324	2	648
2	Sieves for seed	190	8	1520
3	Sieves for pop	878	2	1756
4	Mats	80	14	1120
5	Iron pan	450	2	900
6	Aphra, Batna,Thapi	55	2	110
7	Bamboo sticks	15	4	60
	Total			**6114**

4.2.3 Processing cost of fox nut

For fox nut, in order to get the final delicious consumable good, care is an essential process. It's incredibly skilful. This is a really cheap and self-made activity.

Table 4.6: Processing cost of per 1 quintal of fox nut seed (36 kg of fox nut pop) (In Rs.)

S. No	Items of cost	Amount	Percentage to total processing cost
1	Human labour	410	50.80
2	Fuel (wood)	188.45	23.35
3	Packing	177.35	21.97
4	Equipment	31.51	3.88
5	Total processing cost per 100 kg of fox nut seed	806.95	100
6	Total processing cost per 1 kg of fox nut seed	8.069	
7	Total processing cost per 1 kg of fox nut pop	26.07	

Cost of total human labour for 100 kg of fox nut seed was found Rs. 410. Total fuel cost of 100 kg of fox nut seed processer number was found to be Rs.188.45. Total equipment cost for 100 kg of fox nut seed Rs.31.51. Total packing cost of 100 kg fox nut seed Rs.177.35. Total processing cost 100 kg of fox nut seed Rs. 806.95. Total processing cost 1kg of fox nut seed Rs.8.069. Total processing cost 1 kg of fox nut pop Rs. 26.07. Producing of 1 kg pop requirement 3.2 -3.5 kg fox nut seed.

Processing cost of fox nut seeds set out in Table 4.6. The table reveals that the gross processing costs per 100 kg of fox nut seed was found Rs. 806.26. Human labour cost was accounted for 50.80 percent of the total processing cost. As a result, the expenses levied on labour were highest. The average cost of fuel was Rs. 188.45, which accounted for 23.35 percent of total processing cost.

4.3 CONSTRAINTS IN PRODUCTION, PROCESSING AND MARKETING OF FOX NUT

Farmers and processors encountered several difficulties in production, processing and marketing of fox nut. These shortcomings have been enlisted by the survey.

4.3.1 Constraints in production of fox nut

In fox nut cultivation farmers are facing following constraints

1. Lack of scientific knowledge of cultivation
2. No ownership of pond
3. Insufficient enhanced crop diversity
4. Highly skilled operation
5. Labour intensive cultivation

4.3.2 Constraints in processing of fox nut

Issues related to the processing of fox nuts seeds were reported during the survey by processors are:

1. Lack of equipment for manufacturing
2. Non availability of credit facility
3. Strong environment dependency for drying
4. Health risk

The shortage of machinery and equipment was expressed as a concern by most of the processors. The processing of fox nut seed was carried out according to old traditional procedures. Fox nut seed processing is a laborious, time-consuming procedure that induces irritation or burns and injury to the hands of processors as it involves manually handling hot toasted nuts. The processing machine developed by CIPHET and NRC was not efficient due to reduced performance.

4.3.3 Constraints in marketing of fox nut

Constraints in marketing of fox nut in Dhamtari district of Chhattisgarh are:

1. High price volatility
2. Lack of transport infrastructure
3. Inadequate market services

Majority of respondents found the high price swings of fox nut to be a significant restriction. At the time of the festivals, such as Dashara, Deepawali, Eid, the price of popped fox nuts rise dramatically and the price dropped during the off-season.

Second problem faced by respondents was lack of transport facilities. As fox nut is bulky in nature per unit transport cost was high. Logistics was a significant limitation on the availability of fox nuts to remote markets.

There is an unorganized and insufficient demand for the marketing of fox nut. The unavailability of retail facilities and market knowledge was a restriction on the marketing of fox nut pop.

CHAPTER –V
SUMMARY CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH WORK

The key goal of this chapter is to synthesise the findings of the final analysis and to suggest their consequences for potential actions based on the study.

Self-help groups can be defined as encouraging education groups and generally as mutual aid groups that respond to life problems or common conditions for all participants. The goal could be political, social or both. Collective experience and social control was utilized by the participants of the Community to insure that credit is correctly accounted for and repayable in due time.

Fox nut is an aquatic crop that comes from the Nympheace family. Fox nut is developed in persistent saline waters such as wetlands, depressions of land, swamps and ditches. Fox nut is also grown in the field method from the past few years. Fox nut is grown on agriculture at water levels of one to two feet in this method. India is the only country where Fox nut is grown as a crop, primarily in Bihar and some areas of Assam and Manipur. Bihar represents more than 85% of the country's Fox nut. In the northern part of Bihar, constituted by the districts of Madhubani, Darbhanga, Katihar and Purnia, it is highly adapted for the cultivation. In specific the fox nut industry is a group of fishermen who are in the poorer parts of society. Fox Nut is a non-cereal, organic, nutritious, edible plant. A decent source of carbon, protein and minerals is present in fox nut. Owing to the rise in demand in domestic and international markets, prices of fox nut have risen in recent years. In this context, the present study was formulated to investigate the various dimensions related to Women Self-Help Groups in Dhamtari, Districts of Chhattisgarh plains Women Self Help Groups. The personal interview method was adopted for collection of primary data on well-designed questionnaire. Secondary data was collected from Reference reports, journals and internet.

With regard to the question listed above in view, the following basic objectives have been formulated in the present study:

1. To work out the cost and returns of Fox nut.
2. To workout the cost of processing of Fox nut.
3. To find out the constraints in production, marketing and processing of fox nut and suggest some suitable measures to overcome them.

For fulfillment of objectives Tulsi mahila self-help group in Dhamtari district was purposively selected.

5.1 Conclusions:

- It was found that literacy rate of selected member was 41.66 percent, majority of the respondents in the study area belonged to the age between 31 to 40 years and majority of the respondents were married (83.33 percent).
- Total human labour cost Rs. 37578.2 (51.82 percent), human labour owned 7627.24 (10.51 percent) and hired labour 29950.96 (41.30 percent).
- Total material cost Rs. 10507.76 (14.49 percent), seedling Rs. 6200.00 (8.55 percent), insecticide/pesticide Rs. 1331.76 (1.83 percent), manure Rs. 2976.00 (4.10 percent).
- Total operational cost is Rs. 57202.44 (78.86 percent), irrigation Rs. 2356.00 (3.24 percent), miscellaneous cost Rs. 2230.76 (3.07 percent), interest on working capital Rs. 4529.72 (6.24 percent).
- Total cost of cultivation of fox nut per hectare in Rs. 87820.56.
- The average yield per hectare is 2480 kg of fox seed.
- All the fox nut seed produced by the SHG is sold to KVK Dhamtari @Rs.100 per kg.
- Processing cost per 100 kg of fox nut seed Rs.806.95.
- Total processing cost per 1 kg of fox nut seed Rs. 8.069.
- Total processing cost per 1 kg of fox nut pop Rs. 26.07.
- Producing of 1 kg pop required 3.2 -3.5 kg fox nut seed.
- Gross return in Rs. 24800.00.
- Input output ratio of fox nut is 1:2.83.

- Constraints in production of fox nut were lack of scientific knowledge cultivation, no ownership of pond, insufficient enhanced crop diversity, highly skilled operation, lack of credit facility, labour intensive cultivation.
- Constraints in processing of fox nut seeds were reported during the survey by processors are following constraints. Lack of equipment for manufacturing, lack of facility for credit, strong environment dependency for drying, health risk.
- Constraints in marketing of fox nut in Dhamtari district of Chhattisgarh were high price volatility, lack of transport infrastructure, inadequate market services. The unavailability of retail facilities and market knowledge.

5.2 Suggestion

- Emphasis should be given to high profit yielding crops like fox nut.
- It is suggested to join up with nearby supermarkets and e-commerce space in order to improve shelf presence and to set up a self-service kiosk in the colonies of the garden porch.
- Enhance packaging and grading standards to make products attractive to consumers.
- For improved consumer access, the smartphone app may provide a forum for buyers and sellers.
- Training support will be given through demonstration.
- Fox nut crop will include to Agriculture subjects to enhance knowledge among students.
- The marketing contact strategy and Chhattisgarh advocate the use of social media to increase sales in e-commerce space as well as FM radio events to advertise goods in Dhamtari region.
- They should involve intermediaries to reach a wide range of consumers. This will solve their narrow coverage problem.

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APPENDIX-A

Questionnaire/Schedule

Appendix-A

1. Name of the Respondent:
2. District Name:
3. Village Name:
4. Name of the SHGs:
5. Date of SHGs Formation:
6. Age: (1)18-30 years ( ) (2) 30-40 years ( )

   (3) 40-50 years ( ) (4) 50-60 years ( )
7. Are you literate? (1) Yes ( ) (2). No ( )
8. What is your level of literacy?

(1) Illiterate ( ) (2) Primary ( )

(3) High School ( ) (4) Higher Secondary ( )

(5) Degree and above ( )

9. What is your marital status?

(1) Married ( ) (2) Unmarried ( )

10. Name the organization, which promoted the SHG

1) Bank/any other financial Institution ( )

2) NGO ( )

3) Govt. Department ( )

4) Cooperative Society ( )

5) Self ( )

6)Any other (specify) ( )

11. What is the size of members in your SHG?

1)10-14 ( )

2) 15-18 ( )

3) 18 & Above ( )

12. List out the items produced in your SHGs:

1)

2)

3)

4)

5)

13. Have you set up an annual budget? Amount (general range) _____

14. What is annual income of the SHGs members?

Less than Rs.5000 ( )

Rs.5000-Rs.10, 000 ( )

More than Rs.10, 000 ( )

15. What is the annual turnover of your SHGs? (In Rs.)

1) Below 25000 ( )

2) 25,000-35,000 ( )

3) 35,000-45,000 ( )

4) 45.000-55,000 ( )

5) 55000 & above ( )

16. What is the annual earnings of the group (in Rs.)

1) Below 20,000 ( )

2) 20,001-30,000 ( )

3)30,001-40,000 ( )

4) 40,001 -50,000 ( )

5) 50,000-60,000 & above ( )

17. Is there any readymade market available for your product / selected activity at –

1) Local level

2) Regional level

3) National level

18. How do you market your produces?

1) Direct

2) Through middle men

3) Through agencies

19. What quantity do you produce? .....

20. What quantity do you sell? .....

21. What type of marketing strategies you sell your produces?

1) Price strategy

2) Place strategy

3) Promotion strategy

4) Personal strategy

22. Is marketing of the product produced SHG difficult?

1) Yes

2) No

23. Are all your products sold all round the year or is it seasonal product?

1) All round the year

2) Seasonal

3) Both

24. Do you focus on any specified target group or do you market to a general target audience?

1) Specific Target Group

2) General Audience

3) Mixed Group

25. Do you have target in marketing your product?

1) Yes

2) No

26. What are the reasons for joining SHG?

1) For income

2) Recognition

3) Government subsidies

4) Others

27. Do you require any special training to market these products?

1) Yes

2) No

28. Have you ever done a comparative study on different marketing strategies used?

1) Yes

2) NO

3) Sometimes

29. Where you able to find purchasers of your product easily in your local market?

1) Yes

2) No

30. Did you ever seek the help of other NGO'S or other Govt. organizations to market your products?

1) Yes

2) No

31. What is the marketing Constraints in your SHGs?

(Rate on 5 point scale, 1=least consideration, 5=high consideration)

Lack of marketing skills	1	2	3	4	5
Lack of quality	1	2	3	4	5
Lack of adequate price	1	2	3	4	5

Lack of consumer support	1	2	3	4	5
Un-organized marketing	1	2	3	4	5
High packaging cost	1	2	3	4	5
Lack of advertisement	1	2	3	4	5
High quality control	1	2	3	4	5
Lack of government support	1	2	3	4	5
High marketing cost	1	2	3	4	5
Middlemen not providing Remunerative price	1	2	3	4	5
Lack of marketing infrastructure	1	2	3	4	5
Long distance market	1	2	3	4	5
Competition among fellow SHGs	1	2	3	4	5
Lack market information	1	2	3	4	5
Transportation cost	1	2	3	4	5

32. What do you suggest to overcome those problems?

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APPENDIX-B

Sl. No.	Particulars Product Name Cost (RS)	Product Name1 Cost RS)	Product Name Cost (RS)	Product Name3 Cost (RS)
1	Raw Materials Cost			
2	Packaging Materials Cost			
3	Labour Cost			
4	Other Cost			
5	Total Cost			
6	MRP			
7	Sale Price (Total Returns)			
8	Net Returns(TR- TC)			
9	Input- Output Ratio			

Plates 1: Processing of Fox nut poping

Plates 2: Packaging of Fox nut pop

RESUME

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