

Value Chain Analysis of Areca Nut Subsector: A Case Study of Jhapa, Nepal

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Abstract

A study was done to analyze existing value chain of areca nut in two major pockets of Jhapa district in 2017 to identify value chain actors and their roles, analyze marketing channels, process of value addition and problems during different value chain functions. Data collection was done through household survey, processing industries and intermediaries. Key Informant Interview (KII) and Focal Group Discussion (FGD) were done to identify informal trade and SWOT (Strength Weakness Opportunities and Threat) analysis, respectively. The key micro actors were input suppliers, producers, tree contractors, processors, bulk traders, wholesalers, retailers and consumers. Sampled households produced 314.5 quintals of raw areca nut, all of which sold at farm-gate via contract marketing; 54.68% by processors and 45.32% by tree contractors working for larger processors. The processors processed 200 quintals of nuts in average of which 5% was non-boiled (WNT) and 95% were red boiled type (RBT). WNT nuts were for domestic trade directly for retailers, while RBT were sold either to domestic Gutkha industries of Nepal or exported to India. Per kilogram average marketing cost of areca nut was NRs.94.96 per kg of processed nuts. Excluding producers, highest percent of value was added by processors accounting 25%. The total gross margin (TGM) was 39.42%. The producers' share in consumers' price was 60.58% in case of domestic trade and 57.02% when exported to India. In contrast, nuts traded to India had 45.52% and 54.48% of TGM and producers' share respectively. In order to tackle key problems: competition with foreign product, seasonal price fluctuation, lack of research and technicians, disease and pests, traditional processing system, study suggested to establish processing industry of end product, research and productivity improvements.

Keywords: Boiled and Non-Boiled Type; Contract Market; Marketing Channel; Micro Actors; KII; Value Chain

Abbreviations

ADB: Agriculture Development Bank; AGDP: Agriculture Gross Domestic Product; BDS: Business Development Service; CAA: Commercial Agriculture Alliances; COO: Certificate of Origin; DADO: District Agricultural Development Office; FAO: Food and Agriculture Organization; FGD: Focal Group Discussion; FNCCI: Federation of Nepalese Chambers of Commerce and Industry; FYM: Farm Yard Manure; GGM: Gross Market Margin; GVC: Global Value Chain; KII: Key Informant Interview; MAC: Mechi Agriculture Cooperatives; NAFDC: Nepal Arecanut Farming Development Committee; NRs: Nepalese Rupees; PMAMP : Prime Minister Agriculture Modernization Project; RBT: Red Boiled Type; SFDB: Small Farmer Development Bank; TGM: Total Gross Margin; UMFADC: Uttari Morang Arecanut Farming Development Committee; VDC: Village Development Committee; WNT: White Non boiled Type

Introduction

Arecanut commonly known as betel nut or commercially as Supari, is the fruit of arecanut palm tree (*Areca catechu* L.) of Palmae family bearing green colored fruits turning orange when ripe [1]. It can grow under a variety of climate and soil conditions from almost sea level up to an altitude of 1000masl with well distributed rainfall of 1500mm to 3000mm [2]. The raw fruits and its value

added industrial products are used as masticatory agent; however, medicinal uses and manufacture of dyes has also been reported. The leaves of areca nut are also utilized in making biodegradable plates, bowls and similar items. Nepal shares 1.2% in the world arecanut production yielding 14,225 metric tons from 3905 hectares [3]. Same report also reported that the area of production in Asia is 958574 hectares with total production of 1213950 metric tons; the average productivity being 1.26 metric tons per hectare. Jhapa is considered as production hub and marketing hub of arecanut contributing 10068 metric tons of processed nuts in 2016, while, there also has been import of more than 81000 metric tons from Singapore in Nepal (DADO 2016).

Arecanut is considered as high value commodity in Nepal. Researchers felt poor literatures on value chain analysis study primarily on its inter-linked activities required to design and delivery of a product or service from input supply to consumption. Value is measured in terms of total revenue which is a reflection of the price commanded by the firm's product and the units it can sell [4]. According to Porter, the value of the product is determined by the linkage and relationship of nine value activities under primary and supportive activities. The downside of arecanut business is the gap between demand and production, as well as foreign import and ex-

port issues. Further issue reported is imported arecanut products are gaining high price in the market in comparison to the domestic product. Arecanut is considered as high value commodity. The exponential increase in price and the growing demand of value added product along with natural forms of arecanut, has not only promoted big entrepreneurs but also small business and shops. Thus, concentration of this research excavates the ground of value chain; seeks to conceptualize and map various chain functions of arecanut, assess the role of intermediaries in management of value chain, value addition by micro-actors in the chain and the performance of market. The alternative uses and its growth potential is also examined.

Research method

Researchers selected Mechinagar municipality and Buddha-shanti VDC of Jhapa district purposively as those areas were main hub for production, processing and trade. The geographical coordinates of Jhapa is 26°20' to 26°50'N and 87°39' to 88°12'E. Primary data was collected through survey of 30 households along with 5 processing industries, 10 collectors and other market intermediaries using snowball sampling. Further, researchers conducted two Focal Group Discussion (FGD) and ten Key Informant Interview (KII) in order to identify informal trades. Collected data and information were analyzed by using descriptive statistics such as frequency, mean and percentage on Microsoft Excel 2013.

Figure 1: Area (ha) and production (Mt) of arecanut; The DADO report, 2016 provided data of total cultivated area and total annual production of arecanut in Jhapa district in 4 fiscal years. Metric ton is the unit of values.

Researchers sketched Value chain map, being effective in tracing product flows, showing the physical value adding stages, qualitative and quantitative flow of product along the chain with identified key actors, their relationships with other actors in the chain, and measured distribution of their benefits. The quantity of product flow in the map represents the quantity covered by samples taken. Estimates of the marketing margins are the best tools to analyze performance of market.

$$TGM = \frac{\text{Final consumers' price} - \text{Producers' price}}{\text{Final consumers' price}} \times 100$$
$$GMM_p = 100\% - TGM$$

Where,
TGM is the total gross margin;
GMM_p is the gross market margin or total gross margin received by producer also called producer's share;

Similarly, the calculation was also done for other actors.

$$\text{Percent of value addition} = \frac{\text{selling price} - \text{cost price or production cost}}{\text{cost price}} \times 100$$

Results
Value chain functions
Input supply

Locally available seedlings are the basic input to grow an arecanut orchard. Seedlings generally costs in a range of NRs. 35-50. Existing farmers are unaware of the nutrient requirement of the plant, hence, they did not fertilize the soil, with some exceptional farmers who occasionally used FYM in the field to nourish the soil. Farmers depended on clouds for the irrigation since the area goes through a flooded monsoon every year and they believe no extra effort is required to provide moisture. The traditional method of farming has lowered the cost of production.

Raw arecanut production

The production and productivity was varied due to the spacing and intercropping. The inclining trend of cultivated area and total production was explicit but the rate of increment was not satisfying as shown in figure 1. The productivity, on the other hand, had not been noted with significant change. The average productivity of arecanut in Jhapa district was 3.7Mt/ha (DADO 2016) which was very high compared to the average productivity of world i.e., 1.24 Mt/ha and the most efficient producer i.e., China with 2.88 Mt/ha [5]. The Government of Nepal overlooked the production problems since there were poor provision of research and technicians, which was indeed necessary for amelioration of pest and diseases and various arising problems.

Fruit and leaf processing

In Nepal, both un-ripened fruits and ripened fruits were harvested to prepare two type of areca nut viz., red boiled type (RBT), commercially called as Lali and white nonboiled type (WNT), commercially called as Falti, respectively. Processing at the farmer level is shown in flow chart Figure 2 and Figure 3.

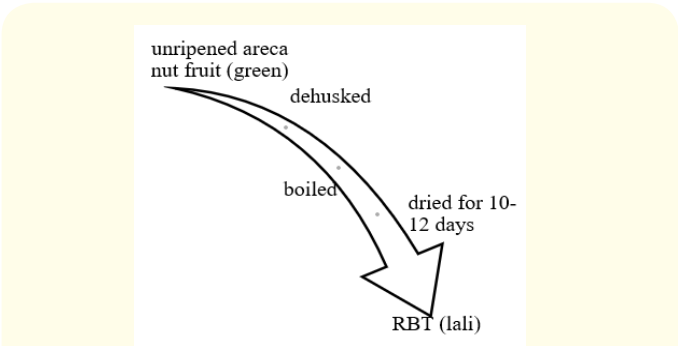


Figure 2: Preparation of boiled nuts (RBT); The flow chart is based on the process followed by local processors.

Figure 3: Preparation of non-boiled arecanuts (WNT); The flow chart is based on the process followed by local processors.

Leaves of arecanut tree were the raw material for making plates, bowls, glass, spoons and other similar types of product. At first, the bark jointed with the base of leaves, so called Khapata, were dried in sun and stored at the end of the day. Next day it was soaked in water and in the mean time brushing was also done. The well cleaned bark was then ready for heating. Annealing was done by reducing the heat from 100°C to 60°C. Now hard and shiny leaf was given a perfect shape by pressing in machine. Each machine had a particular shape like plate, bowl and many more. After pressing the bark, it was left for 3-4 minutes to get hardened, compacted, and finally it gained a perfect shape. While a leaf is gaining its shape, the operator moves to next machine for another piece. The operator could press maximum of 3 pieces in a minute.

Arecanut supply chain

Study found that almost all raw arecanut growers were contracted at farm-get starting from May to the end of October on the basis of size of bearing fruit, time of year, size of farm and previous productivity. About 54.68% of the contract were done by processors themselves and rest were done by other market intermediaries. Holdings less than 20 arecanut trees were not contracted, who sold their fruit to local (bicycle) contractors after fruiting. As shown by figure 4, the price had been soared for both raw nuts and processed nuts; however, the rate of increment is higher for raw nuts i.e., 142.85% compared to processed nuts i.e., 55.31%. The immature raw nuts, green in color, were processed by boiling, dehusking, cutting and dried for 15-20 days turning red called Red Boiled Type (RBT/Lali) while matured yellow or orange colored raw nuts were dried for 50-60 days without boiling and stored for some days which was also dehusked and cut called White Non-boiled Type (WNT/ Falti). RBT are used in manufacture of value added products like Pan Masala, Gutkha and Meetha Supari while WNT nuts are either directly consumed or with betel leaf called Pan. Almost 99% of arecanut produced was sold by sampled household and rest 1% which was like 2-5 trees were kept for home consumption and raising seedlings which showed the commercial nature of production.

Arecanut marketing functions

Figure 5 illustrates the major marketing functions, major cost invested in labor, transportation and land rent. The collection func-

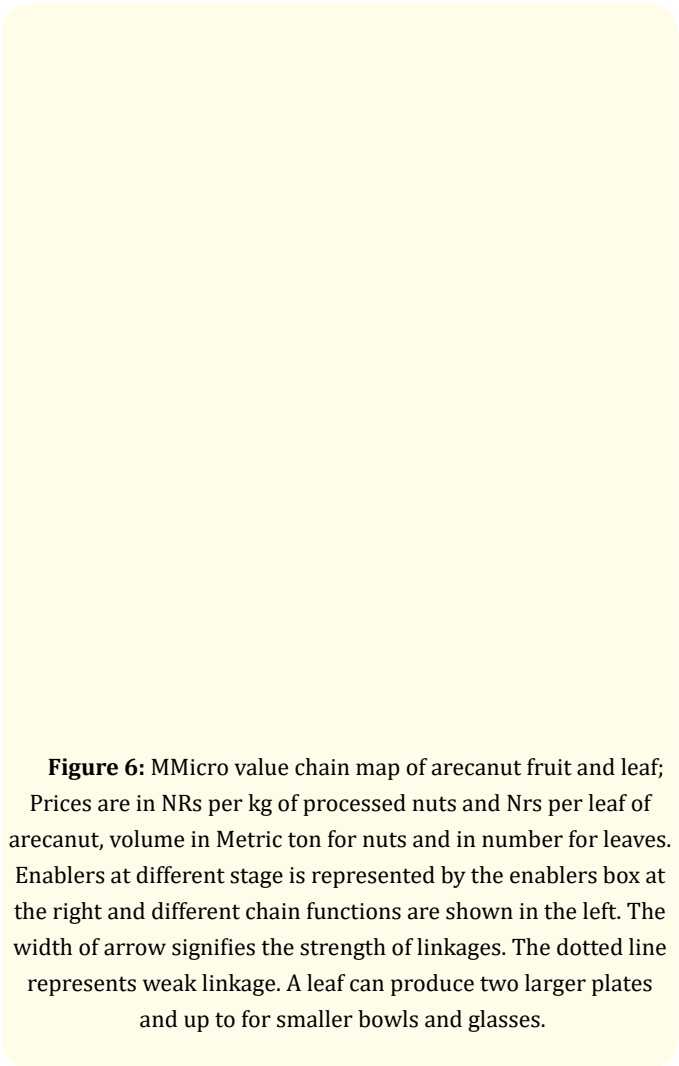
Figure 4: Price trend of unprocessed/processed nuts in 5 years; The values are in unit NRs/kg and the prices are compared in five-year duration according to the data obtained in field survey. The price report obtained from different sources during the survey was averaged and set in figure. To be noted, in average, it takes 9 kg of unprocessed nuts to get a kg of processed nuts.

tion maximized the marketing cost mainly due to labor and transportation. Producers, in contrast, spent highest cost in operation rather than marketing, particularly on land rent. The total operating and marketing cost was NRs.94.96 per kg of processed nuts. The producers incurred low cost for production but received attractive remuneration from the market channel. They had low contribution in marketing but gained three times greater profit margin than that of processors i.e., NRs.27 per kg. The total gross margin (TGM) was 39.42 for WNT nuts. Study reported even 60% producers' share when they sold in the domestic market. The final price per kilogram of RBT nuts was highest when exported to India which came to be around NRs.556 compared to domestic price of NRs.480. Producers contributed highest in value addition with 330.92% followed by processor with 25%.

Figure 5: Marketing cost per kilogram of processed nuts; Various marketing functions were carried out by various actors thereby adding value to the product which also added the marketing cost at different levels. The cost was derived for 9 kg of raw nuts or 1 kg of processed nuts.

Value chain mapping

Among the total volume of processed nuts, 5% was WNT sold directly to packagers who supplied local retailers; and rest 95% was RBT among which 65% were sold to domestic Gutkha industries and 30% exported to India. Factory price of areca leaf was NRs. 3 at leaf processor’s gate which on average delivered two pieces of product per leaf, the final value at consumer level reaching Rs.14. Figure 6 represents the micro level value chain map derived from the study.



The micro-actors were input suppliers, raw fruit producers, fruit and leaf processors, traders, wholesalers and consumers, who acted in vertical integration and had business to business relationships. Their lateral expansion promoted volume increase, coordination and bargaining power. The chain enablers or supporters were financial institutions, research centers, government’s extension offices, etc. which only supported the chain. Study reported two types of support function at producers’ level: support of seedling and credit. Nepal Arecanut Farming Development Corporation (NAFDC) under Federation of Nepal Chambers of Commerce (FNCCI), not only supplied seedlings but was also responsible for implementation and execution of the trade and business of arecanut in Jhapa district. Discussion with traders revealed limited or no direct and indirect trade of Nepal’s arecanut to India but KII and a cooperative reported informal trade of huge amount of arecanut produced in this country.

Supply chain of arecanut fruit and leaf

For ease of market chain analysis, it was viewed and represented at two levels, i.e., up to processors and post-processors type.

Up to processor

This part showed the flow of 314.5 quintals of raw fruit which was produced by sampled household.

Channel I: Producers → Processors

In case of raw fruit, this channel constituted 54.68% of total production of sampled household. Field study revealed that small processors did their contract themselves and bought directly from the producers. Leaf plate factories collected areca leaf directly from the growers.

Channel II: Producers → Trees contractors/collectors → Processors

Our study reported trees contractor accounted 45.32%. Leaf collectors were working in group of 5 to 6 peoples, which were around 50 in number in whole collection.

Post processor

The sampled processors processed about 1000 quintals of arecanut which used different channels before reaching the final consumers.

Channel I: Processors → Packaging wholesalers → Retailers → Consumer

Processors sold about 5% of total processed nuts to wholesalers who distributed the product to different retailers like Kirana Pasal, Pan Pasal, etc. Around 50% of the leaf plate manufacturer followed this channel for market and rest were taken by local consumers for immediate events.

Channel II: Processors → Bulk traders → Gutkha industries → Wholesalers → Retailers → Consumers

This was the largest channel in the arecanut value chain which constituted 65% of the total processed nuts. Among 950 quintals of processed nuts gained by bulk traders, they sold about 650 quintals to the Gutkha industries for manufacture of Pan Masala, Gutkha and Meetha Supari.

Channel III: Processors → traders → India

According to the traders, there was no trade of locally processed nuts to India but KII and a cooperative reported the illegal trade of huge amount of arecanut produced in this country which accounted about 30% of processed nuts.

Marketing profits and marketing margins

The total gross margin came to be 39.42%. Similarly, the producers’ share in consumers’ price was 60.58% when sold to domestic market and it was 57.02% when exported to India.

Table 2 further indicates that both types of profit were higher for producers which was greater than many times of all other actors. The producers requiring very low cost for production and getting highest share in the channel made them best profitable unit.

Channel	Producer’s Price	Consumer’s Price	TGGM	GMM _p	GMM _{pc}	GMM _{bt}	GMM _w	GMM _r
I	302.94	500	39.42%	60.58%	20%	6.25%	6.25%	4%
III	302.94	556.1	45.52%	54.48%	20%	15.28%	-	-

Table 1: Marketing margin% of WNT nuts.

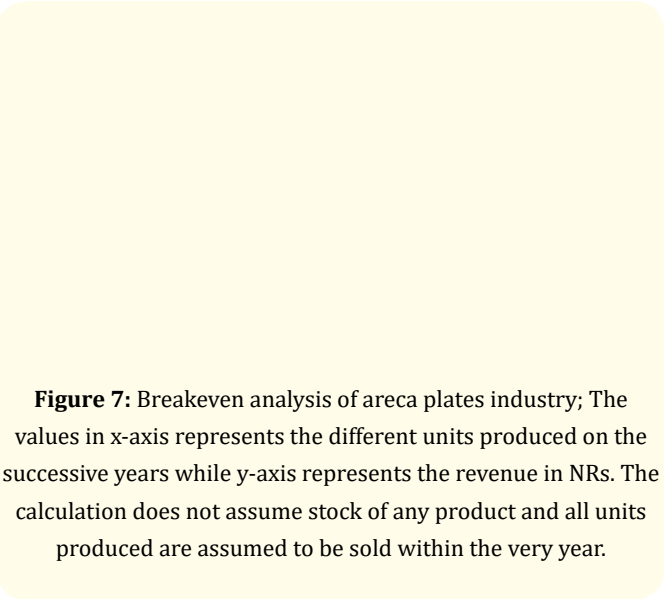
Particulars	Producers	Trees contrac-tor	Processors	Traders		Packager/Wholesalers	Retailers
				To Gutkha	To India		
Production/ Buying cost	70.3	302.94	360	450	450	450	480
Marketing/ operational Cost	0	28.16	18.25	8.15	8.15	4	4.15
Total cost	70.3	331.1	378.25	458.15	458.15	454	484.15
Selling price	302.94	360	450	480	531.2	480	500
Profit Margin	232.64	28.9	71.75	21.85	73.05	26	15.85
Profit in terms of sales price (%)	76.79%	8.02%	15.94%	4.55%	13.75%	5.41%	3.17%
Profit in terms of cost price (%)	330.92%	8.72%	19.93%	4.85%	15.94%	5.72%	3.27%
Percent of value addition (%)	330.92%	18.83%	25%	6.66%	18.04%	6.66%	4.16%

Table 2: Profit and market margin of per kg processed nuts.

Foreign product and trade of arecanut

The Federation of Nepalese Chambers of Commerce and Industry (FNCCI) issued the certificate of origin (COO) to two exporters: NAFDC and Uttari Morang Arecanut Farming Development Committee (UMAFDC) with allocated export quota of 9717 tons and 2854 tons, respectively for 2014-2015 (The Kantipur 2014). The body was formed to improve the channel and functions but the intermediaries complained about the commission broking of NAFDC. While the producers were propped up by them, yet, the traders and intermediaries are not favored by their action. Earlier, the government had boosted the import duty on arecanuts to check its growing re-exports. India has levied a 113 percent import duty on arecanut imports from other countries, but it was only 13% when imported from Nepal. Nepal imported arecanut from Singapore which again had come from third countries like Indonesia, Thailand, Malaysia, etc. Kulli were used to cross the border or sensitive area whenever illegal trades fell out.

Cost benefit analysis of areca plate industry



To substitute the increasing demand of emerging areca plate firms in Jhapa district, study estimated investment, revenue and breakeven analysis as shown in figure 7. The visited factories were capable to produce 1200 pieces of product in a day. Calculated average price of various plate products found to be Rs.6.33.

Type	Amount in rupees (312 days)
Total variable cost	1544400
Total Return	2369952
Profit	825552
Tax (13%)	107321.76
Annual net gain	718230.24

Table 3: Annual cost benefit analysis of areca plate industry.

The breakeven point was calculated to be 1179138; which implies, to cover the initial fixed cost industry should sell the given unit of product.

Discussion and Recommendation

According to the book “Arecanut cultivation in India” by K.K. Nambiar [6], the fungal diseases found in arecanut are Koleroga (*Phytophthora arecae*), Foot rot (*Genoderma lucidum*) and stem breaking disease. Similarly, Stem bleeding diseases caused by *Thielaviopsis paradoxa* and Bud rot are also common in arecanut. The major pests were *Oryctes rhinoceros*, leaf eating caterpillar (*Nephantis serinop*), White ants, Rats, Squirrels and Monkeys. The major problems detected in the case study of Ramappa [7] was Yellow Leaf Disease (YLD) and Root grub. In aggregate, the percent economic loss due to all kinds was estimated to 13.90; loss was in the form of Koleroga, 6 percent from YLD and 7 percent from Root grub. The Yellow Leaf Disease (YLD) remains today as the most serious malady affecting the crop. The malady does not kill the palm but is only debilitating in nature. The study also reported negative

price trend for all types of arecanut opposite to our case. The price has been soaring for all types of arecanut in Jhapa district. On a opinion survey conducted by Hassan [8] the farmers claimed the poor yielding cultivar to be the main production problem followed by inadequacy of institutional credit. Price fluctuation followed by lack of machineries were the major marketing problems reported. The similar issues were found concerning the key chain actors in our study areas. In addition both research found the problems of pest and diseases. Hassan 2010 also found that the total production cost per quintal was NRs. 7214.47 and the net return was NRs. 5235.52 (converted @ 1.66). Compared to our study, the average production cost was NRs. 7030 and the net return was NRs. 23264 per quintal of processed nut. This showed that with the similar production cost the profit margin was too high for arecanut producers of Jhapa district. Ramappa and Manjunatha [9] found out the major problem to be the investment capital followed by irrigation and pests and diseases. Kammardi [10] revealed the fact that in 2009-10, India imported huge quantity of split nut from Indonesia with 58% share followed by Nepal with 28% share. The total import from Nepal in 2009-10 valued IRs. 1574520000 with total quantity of 48,615 quintals. The same study also reported that in Karnataka, the raw arecanut was processed to RBT and WNT in roughly equal amount but it was 5% (WNT) and RBT (95%) in Jhapa district; the price and market being good for RBT nuts in Jhapa. Devi [11] reported the alternative uses of arecanut in Meghalaya, apart from leaf products, the wasted nuts could be dried to make craft products such as arecanut carvings, dolls, hair bands, garlands, bracelet, curtain dangler, etc.

This study emphasized following recommendations for the development of smooth and progressive value chain of areca nut

- Researchers suggest arrangement of arecanut specialist with the establishment of scientific research center in the study area
- FNCCI and Jhapa Chamber of Commerce and Industry are suggested to establish end product processing plant in Birtamod to upgrade the quality of end products, promote export of WNT nuts and upgrade RBT trade to domestic industries
- The Department of Custom Duty is suggested to control informal trade especially illegal export of foreign-imported arecanut which helps to flourish domestic product and associated actors
- COO providing authorized body are suggested to facilitate fair trade by including the small traders and intermediaries in the channel
- Ministry of Commerce and Supplies Nepal is suggested to ban Styrofoam plates in order to promote areca plates manufacturing entrepreneurs.

Conclusion

Arecanut, a prioritized subsector of Prime Minister Agricultural Modernization Project (PMAMP) in Nepal has eminent price and demand, within and beyond the nation. Additionally, it's production was restricted to few districts, where Jhapa contributes more than three-fourth of national production. However, it is imperative

to meet the gap between production and demand. Among the identified chain functions, the production was found highly efficient despite the low input they applied. In contrast, the function of processing being quite inefficient, had much to improve by introducing available modern technologies, which had already been commenced in the district and requires further dissemination. Weak linkage was found in channel involving small traders/collectors of processed nut because of dominance of bulk traders in the local market, Kakarvitta. Highest percent of value was added by producers, investing highest cost and also gaining highest profit. At present, the demand of arecanut is estimated to be more than ten times the present production so that imported product from India and Singapore, which was higher in quality and price compared to domestic product, could fulfill partial demand. Highest producers' share was found in domestic trade of WNT nuts, while the highest valued channel was observed to be within the export of RBT nuts to India.

Business was well incubated by bulk traders and Indian importers invested huge amount in contracts. The deviance of macro-actors from their role has somehow weakened the chain functions, resulting failure in meeting the production demand, foreign imports and informal trades. The effective market performance has though strengthened the value chain of arecanut. The plate industry of arecanut, possessing attractive quality and price, high growth potential and ecofriendly nature, clearly defines its prominence.

Declarations

Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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