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A diagnostic analysis of role of middlemen in financing and marketing of agriculture business, its impact on the earnings of farmers and consumer price: A Case Study of Potato Farmers

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Executive Summary

Growing consumer demand and rising government attention to the development of horticultural crops has significantly contributed to the expansion of potato area and production in Pakistan. Expansion in the processing industry have also contributed to increasing consumption of potato products. Furthermore, potato is the cheapest source of carbohydrates, vitamins, minerals, and proteins. This study uses field survey data collected from Sahiwal, Okara and Depalpur (major potato producing areas in Punjab province, Pakistan) to quantify the roles of various stakeholders (Farmers, Commission Agents, Wholesalers, Retailers and Consumers) in potato value chain.

Study findings shows that majority of the farmers use their own savings to meet cost of production of potato crop and some also borrowed from Aarthi. Benefit-Cost Ratio for all the three varieties of potato crop is greater than one which indicates that farmers are making profit from investment on potato crop. Price fluctuation and exploitation by middleman are the major issues farmers facing while marketing their produce. Majority of commission agents had their personal investment in business, some also borrowed from informal (friends, relatives etc.) and formal sources such as banks. Most of the surveyed commission agents also provide finances to farmers. On ana average commission agent charges 4 percent commission from both sellers and buyers. Majority of wholesalers uses their personal capital in business, and some also borrowed formal banks as well. They earn reasonable profit from their business. Retailers use both personal capital and borrow money from banks for their business. Retailers earn Rs.5-10/kg from sale of potato crop to consumers.

At farm level, there is need to ensure good quality seed and other inputs. Subsidies is not reaching to farmers. Farmers are being exploited by market intermediaries. To save losses at sowing and harvesting time proper farm machinery is a major constraint. Market committee collects the fee but does not provide proper facilities at marketplace. There is need of electronic auction and mandi.

Table of Contents

1. Introduction

Potato is an important vegetable crop for growers and consumers as well in Pakistan. After wheat and rice, it is being widely consumed as staple food in various forms such as cooked, boiled, fries, chips and snacks (Majeed and Muhammad, 2018).[1] Overtime, per capita consumption of potatoes has risen to around 14.4 kg in Pakistan mainly due to dietary preferences for fast food (Government of Pakistan, 2018-19).[2] Rapid expansion in the processing industry with the entry of several firms have also contributed to increasing consumption of potato products. Furthermore, potato is the cheapest source of carbohydrates, vitamins, minerals, and proteins.

Growing consumer demand and rising government attention to the development of horticultural crops has significantly contributed to the expansion of potato area and productionin Pakistan. The domestic production of potatoes has increased from 1665.7 thousand tons in 2000-01 to 4539.0 thousand tons in 2018-19. This rise can be attributed the expansion in area under potato cultivation which nearly doubled from 101.5 to 193.1 thousand hectares and increase in yield from 16.4 to 22.5 tonnes per hectare (Government of Pakistan, 2018-19).[3] The increase in production has enabled Pakistan to export surplus potatoes mainly to Afghanistan,Bahrain, Sri-Lank, Oman, Russian Federation. Moreover, Pakistan's present export is about 10% of potato production in the country with the value of US$87.5 million (Government of Pakistan, 2018-19).

Domestically, potato is an important crop from production and consumption viewpoints. Its per capita consumption is over 15 Kg/annum which is up from around 10 Kg a decade earlier (Government of Pakistan, 2020-21).[4] In recent years, its production has experienced significant fluctuations mainly due to price changes and demand and supply imbalances. Pakistan has achieved significant improvement in potato yield. Yet, the yield per acre is much less as

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[1] Majeed, A. and Z. Muhammad. 2018. Potato production in Pakistan: challenges and prospective management strategies - a review. Pakistan Journal of Botany, *50*:2077-2084.

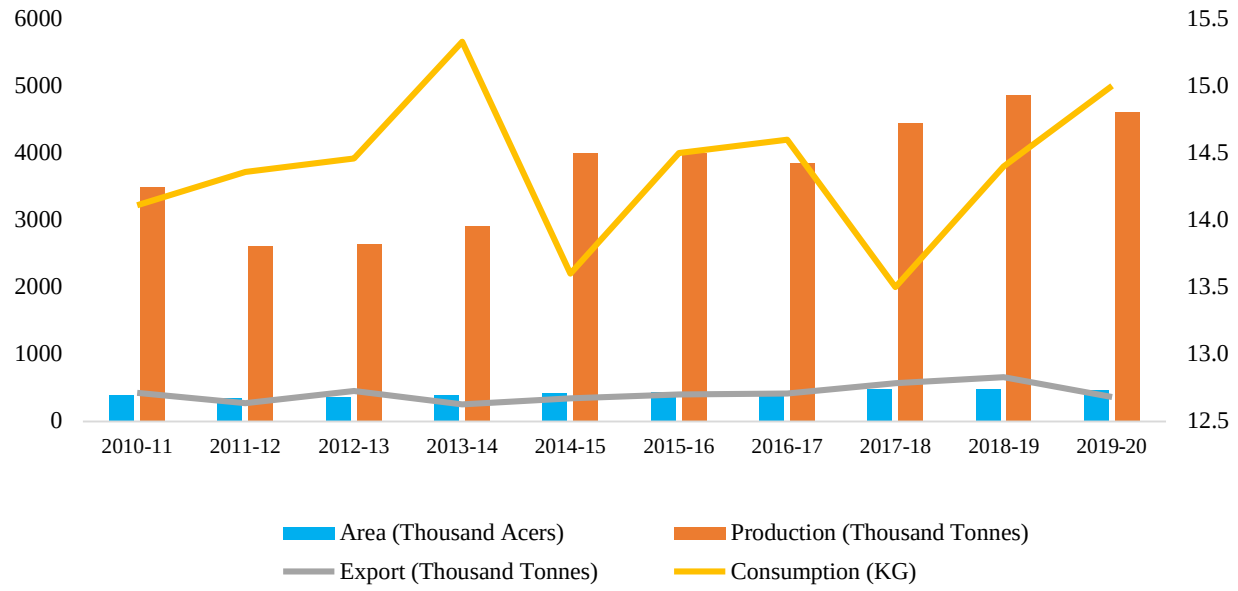
[2] Government of Pakistan. 2018-19. Fruit, Vegetables and Condiments Statistics of Pakistan. Economic Wing, Ministry of National Food Security and Research, Government of Pakistan, Islamabad.

[3] Government of Pakistan. 2018-19. *Agricultural statistics of Pakistan 2018-19*: Economic Wing, Ministry of National Food Security and Research, Government of Pakistan, Islamabad.

[4]Government of Pakistan. 2020-21. Economic survey of Pakistan. Retrieved from http://www.finance.gov.pk/survey_1920.html

compared to other potato producing countries (FAO, 2018).[5] The province of Punjab contributes 93.6% of the total national produce followed by Khyber Pakhtunkhwa (5.17%), Baluchistan (1%), and Sindh (0.33%). Pakistan also exported 364 million tonnes of potato in 2020-2021. Major potato export destinations include Afghanistan, Sri Lanka, Malaysia, Iran, UAE, and Russian Federation (Government of Pakistan, 2020-21).

Figure 1: Area, Production, Exports, and Per Capita Consumption of Potatoes in Pakistan



Source: (Govt. of Pakistan, 2020-21)

[5] Food and Agriculture Organization of the United Nations. 2018. Major Causes of Crop losses. www. fao.org/ docrep/008/a0185e/a01850c.htm. FAOSTAT statistical database. [Rome]: FAO.

2. Review of Literature

Ugonna *et al.,* (2013)[6] carried out study to examine the value chain analysis of Irish potato as an industrial raw material in Nigeria. Potatoes in Nigeria are cultivated mainly by small, rural farmers in marginal areas of the country. The research draws attention to the three sub-chains identified within the Nigerian potato value chain: namely the production of potato for immediate consumption, the manufacturing of traditional products, potato production for industrial processing and marketing of fresh potato and potato products. Whilst all the three sub-chains can be used to improve income, the first two contribute greatly towards the conservation of biological diversity and are suitable for small farmers. Further investigation revealed that there are good varieties of potatoes available in Nigeria, although their potency has been reduced due to several usages. However, only a few are suitable for industrial processing based on their requirements regarding quantity and quality. Despite the progress made in potato development in Nigeria, there are still some constraints which limit its production, processing, and marketing. These include inadequate supply of good quality seeds, inadequate storage facilities, poor diseases, and pests' management which affects the yield and value addition to potato crop. Potato farming for industrial use was identified to have gained momentum, opening the scope for the existence and prospective flakes, starch, flour, and chips makers to get the supply of raw materials to boost operations. To improve the value chain of potato the following suggestions were made; to use the value chain approach to fill the gaps through an efficient process technology and increased utilization of potato as an industrial raw materials; encourage more research work on the poor variety of seeds that is currently used by famers; the use of modern agricultural equipment to enhance the mass production of potato; to improve the storage facilities available and to encourage collaboration of relevant organizations to reverse the areas of weakness and boost awareness creation of the importance of potatoes as important energy source.

Akter *et al.,* (2016)[7] conducted study to assess the existing potato value chain and seasonal price variation in Bogra district of Bangladesh based on of primary and secondary data. Primary

[6] Ugonna, C., Jolaoso, M. and Onwualu, A. 2013. A technical appraisal of potato value chain in Nigeria, International Research Journal of Agricultural Science and Soil Science, 3(8): 291-301.

[7] Akter, T., M. M. Rahman and M. S. Miah. 2016. An Analysis of Potato Value Chain in Bogra District of Bangladesh. Asian Journal of Agricultural Extension, Economics & Sociology 9(4): 1-8.

data were collected from the potato growers of Kahaloo upazila under Bogra district and potatoretailers were selected from Bogra Sadar upazila by applying direct interview method during the month of February to April 2012. Different value chain actors were involved in productionand marketing system, such as Faria, Bepari, wholesaler, retailer and cold storage owner. In Kahaloo upaziala the whole value chain of potato was completed through five separate supply chains of potato from the hand of farmers to the ultimate consumers. Longest supply chain included farmer, Faria, Bepari, wholesaler, Distance wholesaler, Retailer and finally consumer.Highest sales price of potato was received by retailer and the lowest sales price was received by farmer. In value chain, highest value was added by wholesaler and lowest value was addedby Faria of the total value addition. Ratio to moving average method was applied to examine the price fluctuation of Bogra and Dhaka market with the help of secondary data. The price fluctuation of potato in Bogra and Dhaka market was relatively correlated.

Prakash *et al.,* (2017)[8] carried out study to analyse the existing sweet potato value chain in four selected districts of Odisha India. Purposive sampling technique was used to select the samples and primary data were collected through well structured questionnaire from different value chain actors. Simple descriptive statistics and econometric analysis were used to analysis the data. The value chain actors in sweet potato are Input suppliers, Producers, Aggregators, Wholesalers, Retailer and Consumers. There are no specialized traders or retailers of sweet potato found in the study area. They mostly sell their sweet potato along with vegetables. Even there is no processing unit for sweet potato was found in Odisha. It is through farmers producer organization (FPOs) and creation of value-added products will go a long way to raising farmers income and welfare.

Faris *et al.,* (2018)[9] identified potato value chain actors and their roles and analyse marketing margins in Dedo district of Jimma zone, Ethiopia. For this study 136 potato producers were randomly selected, 5 wholesalers, 8 collectors, 12 retailers and 6 small scale processors were purposively selected. Quantitative and qualitative data were collected from primary and secondary sources. Descriptive statistics was used to analyse data, chain mapping was

[8] Prakash, P., A. Kishore., D. Roy and D. Behura. 2017. Analysis of Sweet Potato Value Chain in India: An Assessment and Policy Implications. The 9th ASAE International Conference: Transformation in agricultural and food economy in Asia 11-13 January 2017 Bangkok, Thailand.

[9] Faris, A., Z. Shumeta. and M. Muche. (2018). Value chain analysis of Potato in Dedo district of Jimma zone, Ethiopia. International Journal of Business Management and Technology, 2 (6): 43-49.

implemented to identify actors and their supply linkage. Margin analysis was used to estimatevalue gained by each actor involved in potato value chain. The identified actors were input suppliers, producers, wholesalers, retailers, small scale processors and consumers. Supportingactors were office of agriculture, irrigation, micro finance, cooperatives, trade and market development, NGOs, and bank. The margin analysis revealed that 65.01%, 12.29%, 9.78%, 8.27%, 3.27% share of margin goes to small scale potato processors, potato producers, retailers,wholesalers, and collectors respectively. The major constraints were high price of seed, poor infrastructure, interferences of brokers, low storage facilities, weak linkage, disease, and pests.The opportunities were suitable Agro-ecology and government support. Strengthening the linkage among actors, providing training on storage construction and disease control, improving bargaining power of producers and initiate small scale processors were recommended to improve potato value chain.

Tadesse and Fayera (2018)[10] undertaken the Value Chain Analysis of Potato in Southwest Ethiopia with the objective of identifying potato value chain actors, assessing profitability of actors, marketing margin and extent of value addition in the study area. Information was gathered from 193 potato producers, 7local traders, 7 wholesalers, and 8 retailers. The survey result indicated that 27.94% of total farmland was allocated for potato production. The average yield of Potato in Sheka was 108qt/ ha. The major potato value chain actors were input suppliers, producers, commission agents, local traders, wholesalers, retailers and consumers. Potato producers in Masha district added 10.537%, Local traders were responsible for 25.603 % of value addition while wholesalers and Retailers add about 29.89 and 33.39 % of the value respectively. Creating sustainable value chain development by accessing new market centers and organizing cooperatives was vital for value chain producers in the study area.

Badar *et al.,* (2020)[11] assessed consumer preferences for fresh potatoes in Punjab, Pakistan. Data was collected from Lahore and Faisalabad cities through a survey of 250 potato consumers belonging to different social strata. Collected data were analysed using descriptive statistical techniques and factor analysis in SPSS. Findings revealed that majority of consumers liked potato in cooked form and as fries due to its taste and health benefits. Consumers differed

[10] Tadesse B., and B. Fayera. 2018. Value Chain Analysis of Potato: The Case of Sheka Zone, Southwest Ethiopia. International Journal of Horticulture & Agriculture. 3(1): 1-10.

[11] Badar, H., Z. Mohsin., K. Mushtaq., B. Ahmad., M. Mehdi., Abdullah and A. Rasool. 2020. An Assessment of Consumer Preferences for Fresh Potatoes in Punjab, Pakistan. Pakistan Journal of Agricultural Sciences, 57(3): 773-778.

in their potato consumption and purchase preferences. Five factors identified as marketing, aesthetic, experience, genetic and appearance influenced their purchase decisions. Thesefindings can help in bridging the quality perception gap among value chain participants, policymakers, and consumers in Pakistan. The study suggested that the value chain participantsshould upgrade their practices for delivering desired value to consumers. Policy makers and related public sector institutions should provide necessary support services to them for increasing their profitability as well as satisfaction of potato consumers in Pakistan.

Farooq *et al.,* (2020)[12] Identified several performance gaps in the production, processing, and trading components of the potato value chain specifically with the technology, market structure and links. These includes the lack of R&D infrastructure and system to resolve the issue of stakeholders along the value chain, infrastructure, and training for the supply of certified potato seed, improved value chain and its management, farmers' organization to supply potato according to the market demands, poor links with international market and less than optimal size of the processing industry. In order to address multilevel challenges from production to product and market development proposed interventions are i) establishment of tissue culture labs and training of the staff to encourage local production of certified, disease-free and true-to-type seed, ii) training of farmers for on-farm production of improved seed which will decrease seed import, iii) provision of quality infrastructure which will enhance the quality of potato produce for export as well as in domestic market, iv) strengthening international potato links to enhance export, v) supply of varieties for processing, vi) encouraging the potato-based processing as cottage industry in potato growing areas, and vii) promoting international links to increase export-production ratio.

Khan *et al*., (2020)[13] This study identified and analyzed major determinants of potato yield in district Swat of Khyber Pakhtunkhwa, Pakistan. A three-stage random sampling technique was used to collect data from 100 respondents during 2018. A Cobb-Douglas type production function was used to approximate effect of determinants on potato yield. Major shares of the input cost per acre incurred in the study area were seed (Rs. 18720), followed by land rent (Rs.15890) and labors having an estimated cost of Rs. 14965 respectively. The analysis showed

[12] Farooq, Khalid., Ali Mubarik, and Yasin Aqsa, (2020) Potato Cluster Feasibility and Transformation Study. In Ali Mubarik, (ed.) (2020). *Cluster Development Based Agriculture Transformation Plan Vision-2025*. Project No. 131(434) PC/AGR/CDBAT-120/2018. Unpublished Report, Planning Commission of Pakistan, Islamabad, Pakistan, and Centre for Agriculture and Biosciences International (CABI), Rawalpindi, Pakistan.

[13] Khan, S., I. Ullah, S. Ali and Murtaza. 2020. Profitability and determinants of potato growers in district Swat of Khyber Pakhtunkhwa, Pakistan. Sarhad Journal of Agriculture, 36(3): 748-753.

that on average per acre yield of potato was recorded as 4,953.35 kg with net revenue of Rs. 28,261.89. The results of the Cobb-Douglas type production function revealed that the coefficients of seed, labor, tractor, urea and chemicals were positive and statistically significanthaving elasticities of 0.211, 0.110, 0.103, 0.073 and 0.064, respectively. The study recommends that government should subsidize the inputs and arrange trainings for potato growers regarding use of recommended chemical fertilizer and efficient utilization of seed, labor, and other inputs to accelerate potato production and thereby profit of farmers.

Hassan *et al.*, (2021)[14] in their study examined the opportunities for bringing more value to small farmers in an agricultural value chain. This study makes use of action research, studying the potato value chain, in a developing agricultural country Pakistan. The authors conducted an in-depth study of 37 farmers in four regions, each being a large potato growing ecosystem. The study examined the end-to-end decision-making processes, sources of input (both physical and information), cultivation and sales practices, cost structure, productivity, and profitability of the farmers in potato farming. Findings of study indicate that large variations exist in the crop yield, cost structure and profitability of farmers within each of and among the four regions due to differences in cultivation practices and approach to sales. There is a significant potential to lower costs, increase yield and enhance overall profitability by using the existing better processes. By addressing the issues faced by small farmers their profits can be potentially doubled.

Wubet *et al.*, (2022)[15] The main aim of this study was to evaluate the value chains of potatoes in the Farta district, Ethiopia. 123 sample potato farmers were chosen using a two-stage random sampling technique in four kebeles. Descriptive, inferential, value chain approach and econometrics analysis were employed. In addition, Heckman's two-stage selection econometrics model was employed to analyse the determinants of potato market participation and sales quantity. Producers, traders, chain supports, chain enablers, and final consumers were the main value chain actors for potato in the study area. Wholesalers control the potato value chain due to their finances advantage. Probit model estimation result provides that: distance to the nearby market, family size, oxen owned by farmers, market information, land size allocated

[14] Hassan, S.Z., M. S. S. Jagga; M. Asif and G. Foster. 2021. Bringing more value to small farmers: a study of potato farmers in Pakistan. Management Decision, 59(4): 829-857.

[15] Wubet, G.K., L. Zemedu and B. Tegegne. 2022. Value chain analysis of potato in Farta District of South Gondar Zone, Amhara National Regional State of Ethiopia. Heliyon, 8(3): e09142.

for potato production, and quantity of inorganic fertilizer were the significant variablesaffecting the decision to market participation positively except family size. The OLS estimationresult provides that: the education level of the farmers, farming experience, the number of extension contact, the land size allocated for potatoes, and the quantity of inorganic fertilizer is the significant variables influencing the amount of potato market supply positively. The mainconstraints for potato production and commercialization in study area were: Shortage of improved seed, lack of capacity building training to the post-harvest management approach, price fluctuation, shortage of market information, absence of policy framework in price-setting strategy was produced and marketing constraints of potatoes. Therefore, the study suggests that; increasing access to farm inputs, introducing new and improved crop varieties, establishing suitable post-harvest management facilities. In addition, follow up misconduct practice for price-setting strategies, strengthening market information service, facilitating conditions that can promote the smallholder farmers for participating in the market and minimize those constraints which impede the complete value chain in potato production and development.

Based on the literature reviewed following stakeholders were identified in potato value chain.

Table 1: Summary of potato value chain actors and their respective roles along chain

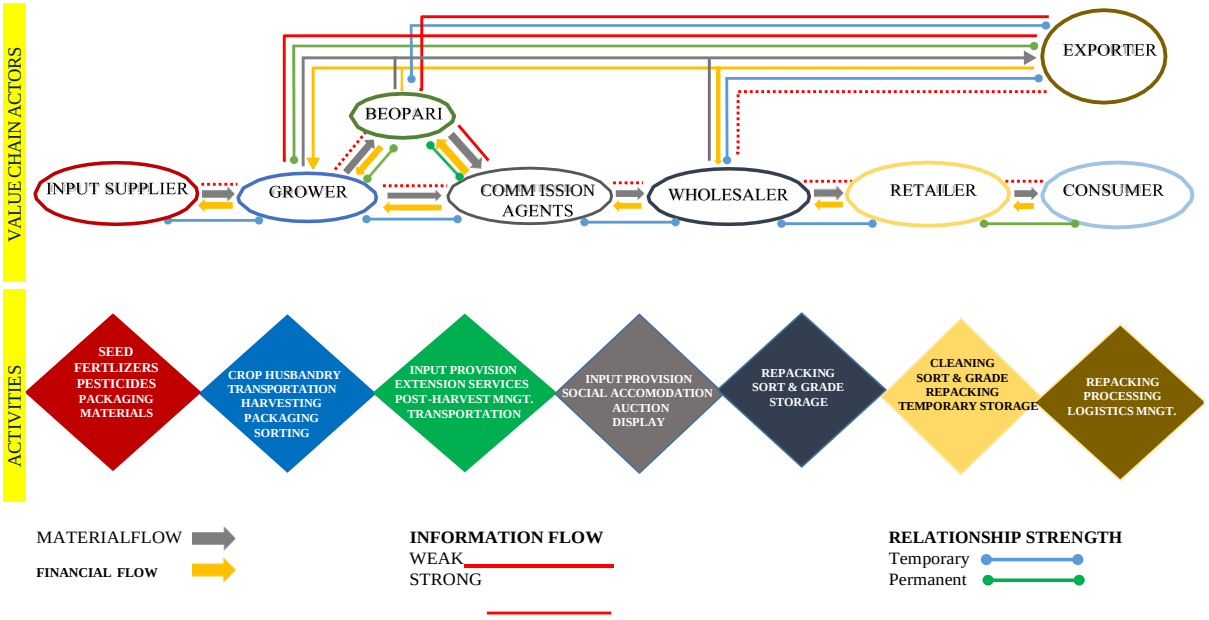
Stage	Roles along the chain
Input suppliers	Provide improved and local potato seeds, fertilizers, pesticides, herbicide chemicals, farm implements and labor.
Farmers	Land preparation, growing/planting/, fertilization, irrigating, protecting from weed, pest/disease, harvesting and post-harvest handling and marketing.
Beoparies/local collectors	Collect potato crop from farmers in village markets and farm gate for the purpose of reselling it to wholesalers and consumers.
Aarthi/Commission Agents	Facilitate transaction by convincing farmers to sale his crop and facilitating the process of searching good quality and quantity potato to wholesalers. Sometimes go beyond facilitation of transaction and set prices and make extra benefits from the process.
Wholesalers / Pharia	Mostly buy potato from farmers through Aarthi and supply it to retailers and consumers.
Processors	Buy raw potato from producers, wholesalers, or retailers and sell processed potato products to consumers.
Retailers	They buy potato either from farmers or wholesalers and sell to urban consumers.
Consumers	Purchase potato product from producers, wholesalers, and retailers.

3. Study Methodology

3.1. Conceptualizing Potato Value Chain

Several stakeholders are involved in potato value chain, which are presented in Figure 1. It shows various activities and relationship between different stakeholders which are essential to bring a product from the early stage of input-supply, production, marketing, and to its final consumers. It also shows the material, finance and information flow among value chain actors and the strength of relationship.

Figure 1: Potato Value Chain



3.2. Study Area and Sample Size

As Table 1 below shows that both districts (Okara & Sahiwal) in Potato Cluster in Punjab made up of nearly 60 percent of production and area. Major crops grown in these two districts are Wheat, Maize, and Potato. Wheat directly competes with potato for area as both crops are sown during rabi (winter) season. Wheat and Maize are both cereal cash crops and Potato is vegetable cash crop. From these districts, three tehsils i.e., Sahiwal, Okara and Depalpur were selected keeping in view their share in potato production. From these tehsils 45 farmers, 12 each commission agents (Aarthi), wholesalers (Pharia), retailers and 30 consumers were selected randomly.

Table 1: Potato Punjab Cluster, 2019-20[16]

Districts	Production (tonnes)	% Share in cluster production	Area (Ha)	% Share in cluster area
Okara	1460663	41	54239	40
Sahiwal	678285	19	25033	18
Pakpattan	622857	17	23991	18
Kasur	461227	13	18858	14
Khanewal	191643	5	7885	6
Vehari	114343	3	3964	3
Multan	73331	2	2630	2
Total	3602349	100	136600	100

3.3. Development of Survey Questionnaire

Questionnaire was developed keeping in view the objectives of study. Both open ended and close ended questionnaire were employed to get information from respondents. Questionnaire was pretested from few respondents. Following sets of questionnaires were developed:

1. Potato Farmers
2. Commission Agents (Aarthi)
3. Wholesalers (Pharia)
4. Retailers
5. Consumers

3.4. Data Collection

Personal interviews, focus group discussion, key informant interviews etc. were the major tools used to get information from selected respondents. Data cleaning and entry in the Excel sheet was done by enumerators.

[16] Government of Punjab (2019-20). Crop Reporting Service, Agriculture Department Punjab, Government of Punjab.

4. Study Findings

4.1. Farmers Case

Table 1: Summary Statistics of Farmer's Socioeconomic Characteristics

Variables	Description/Group	Frequency	%age
Education	Illiterate	4	9
	Primary	5	11
	Middle	2	4
	Matric	8	18
	Intermediate	17	38
	Graduate	9	20
	Overall	**45**	**100**
Farming Experience	1 to 10	11	23
	11 to 20	14	31
	21 to 30	10	22
	Above 31	10	22
	Overall	**45**	**100**
Experience as Potato Grower	1 to 10	12	26
	11 to 20	17	38
	21 to 30	10	22
	Above 31	6	12
	Overall	**45**	**100**
Potato Farm	Sole proprietor	38	84
	Partnership	7	16
	Overall	**45**	**100**
Have you obtained any certification for your farm?	Yes	0	0
	No	45	100
	Overall	**45**	**100**
Irrigation Technology	Traditional (Flooding)	42	93
	Mechanized (drip/sprinkling etc.)	3	7

	Overall	**45**	**100**
Record keeping of Farm	Yes	18	40
	No	27	60
	Overall	**45**	**100**
Distance to local wholesale market (KM)	1 to 5	13	29
	6 to 10	12	27
	11 to 15	7	16
	16 to 20	5	10
	Above 21	8	18
	Overall	**45**	**100**
Distance to City (KM)	1 to 5	16	37
	6 to 10	9	20
	11 to 15	8	18
	16 to 20	4	9
	Above 21	8	18
	Overall	**45**	**100**

Figure 1 show that out of 45 interviewed potato growers, majority that is 38 percent had intermediate degree, while 20 percent were graduate, and 9 percent were illiterate.

Figure 1: Education of Respondents

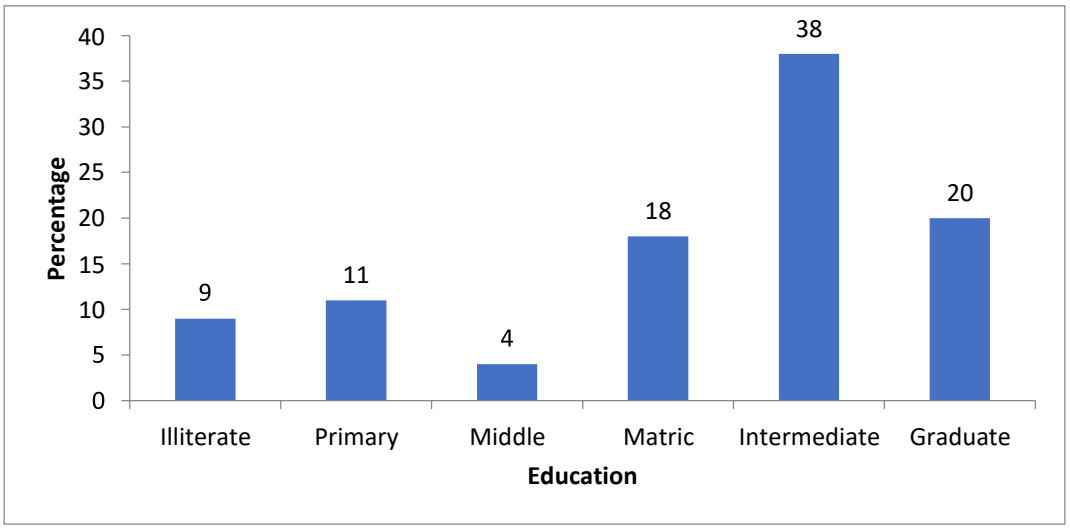


Figure 2 shows the farming experience of respondents, 31 percent of farmers had experiencedof farming ranged from 11 to 20 years, 23 percent had experienced of 1 to 10 years and 22 percent had experienced of above 31 years.

Figure 2: Farming Experience

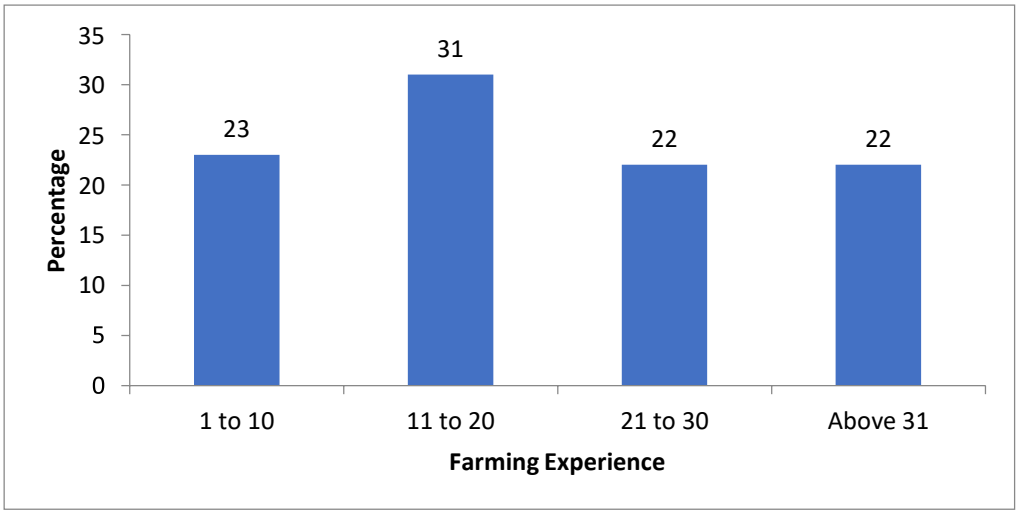


Figure 3 depicts the experience of respondents as potato growers, 38 percent of respondents had experienced of potato growing ranged from 11 to 20 years, 22 percent of respondents had experience ranged from 21 to 30 years and 12 percent of respondents had experience of above 31 years.

Figure 3: Experience as Potato Grower

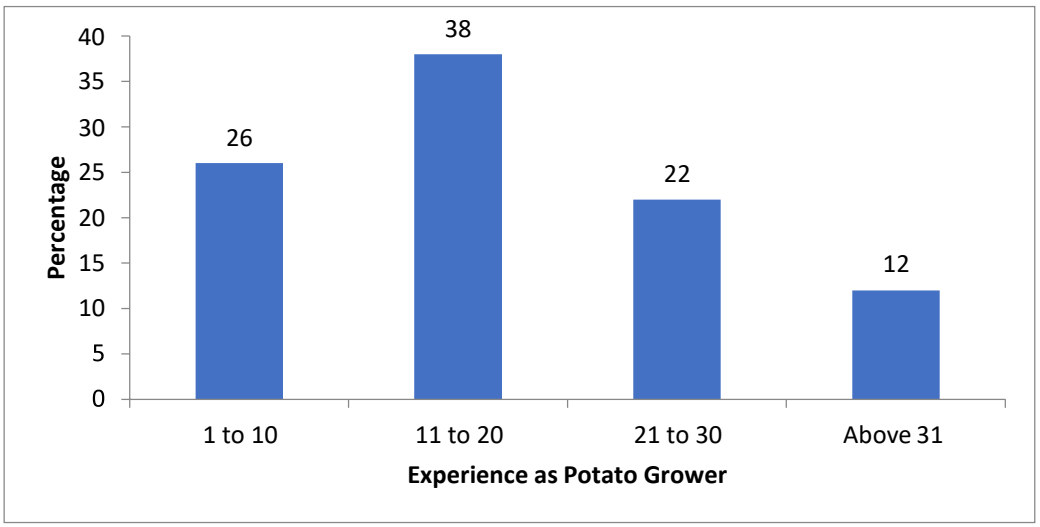


Figure 4 shows that 84 percent of respondents had sole proprietors type of business farms and16 percent of respondents had partnerships type of business farms.

Figure 4: Potato Farm

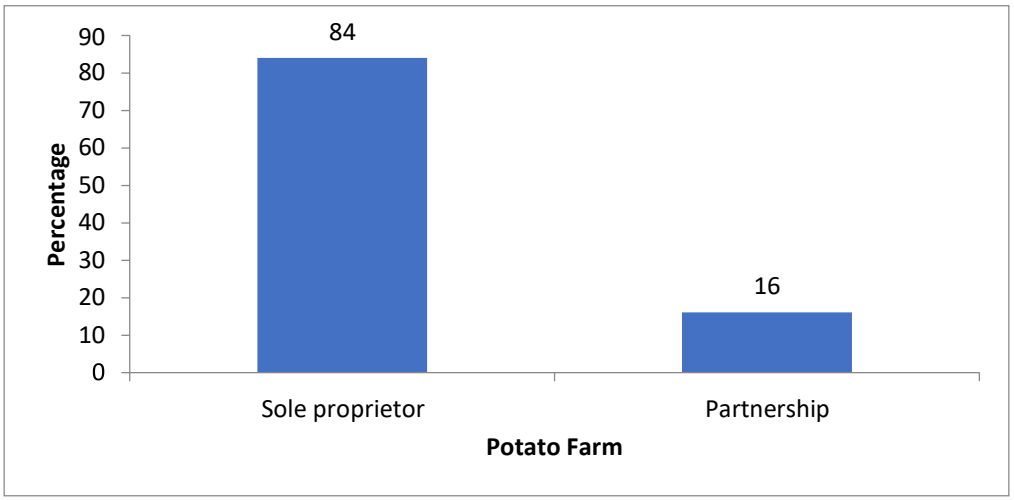


Figure 5 shows the irrigation technology used by potato growers for growing potato, 93 percent of growers used traditional method of irrigation which was flooding and only 7 percent of growers used mechanized method of irrigation which was drip or sprinkling.

Figure 5: Irrigation Technology

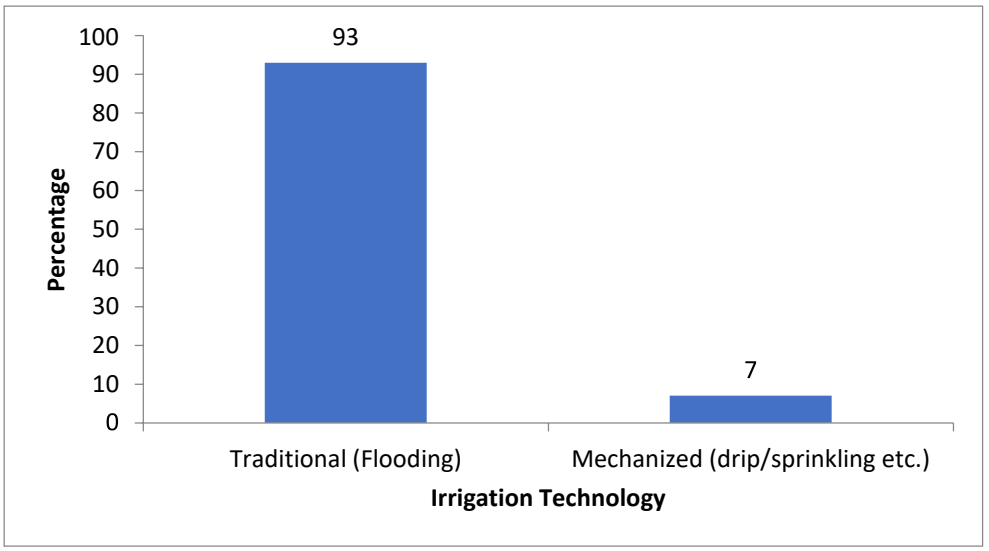


Figure 6 shows the Record keeping status of farm, 60 percent of growers did not keep the record of their farms and 40 percent of growers did keep the record of farms.

Figure 6: Record keeping of Farm

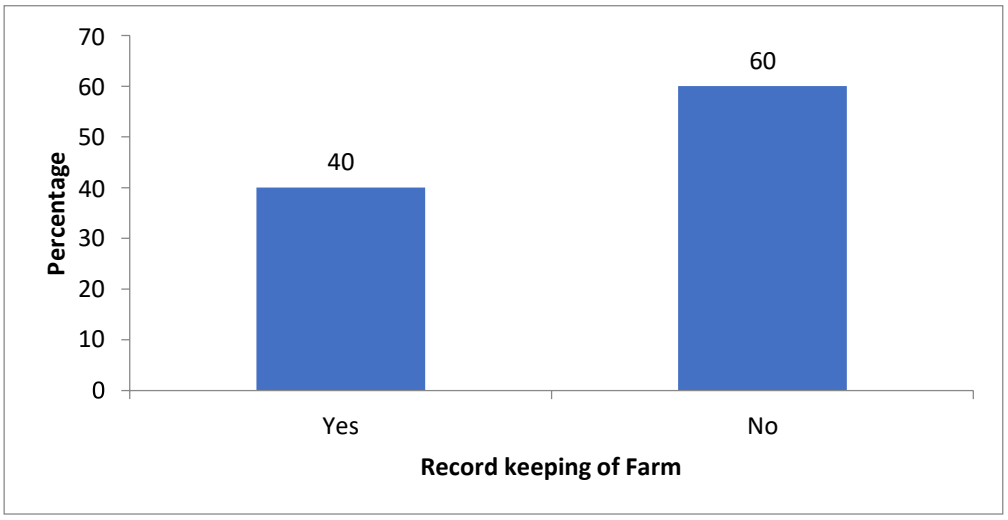


Figure 7 shows the distance to local wholesale market (Km), 56 percent of potato growers had distance to wholesale market ranged from 1 to 10-kilometer, 16 percent had distance ranged from 11 to 15 kilometer and 10 percent had distance ranged from 16 to 20 kilometer.

Figure 7: Distance to local wholesale market (Km)

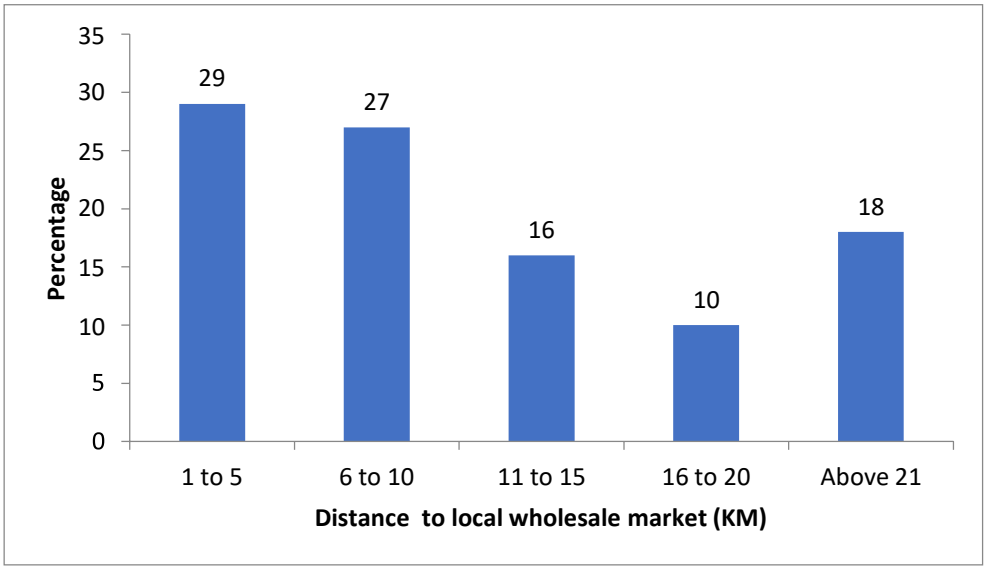


Figure 8 shows the distance to City (Km**),** 37 percent of potato growers had distance to city ranged from 1 to 5-kilometer, 20 percent had distance ranged from 6 to 10 kilometer and 18 percent had distance ranged above 21 kilometers.

Figure 8: Distance to City (Km)

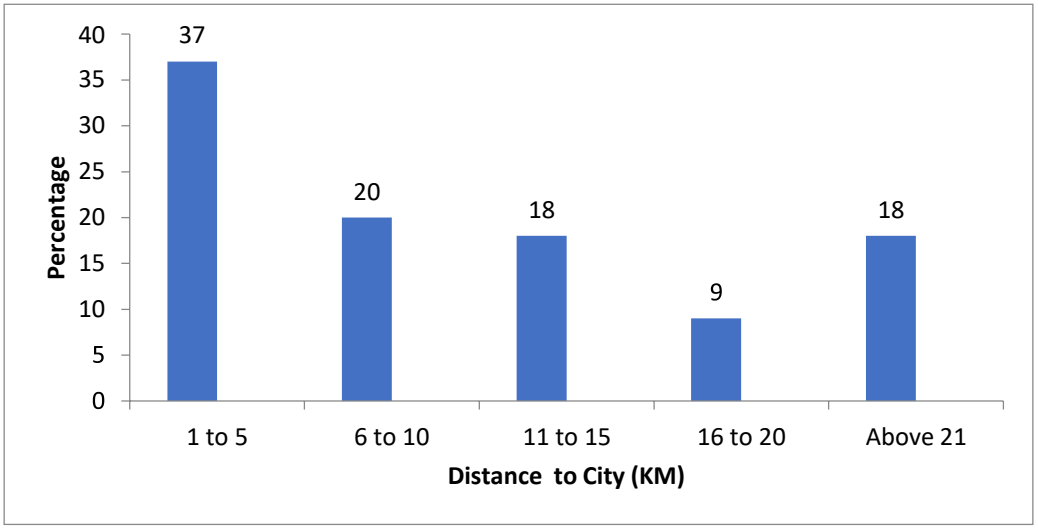


Table 2: Summary Statistics of Farm Area (Acres)

Variables	Description/Group	Frequency	%age	Mean
Land Holding (Acres)	Small (up to 5)	15	33	**21.4**
	Medium (6 to 12.5)	6	13	
	Large (above 12.5)	24	54	
	Overall	**45**	**100**	
Area under potato farm (Acres)	Small (up to 5)	19	41	**46.6**
	Medium (6 to 12.5)	5	11	
	Large (above 12.5)	21	45	
	Overall	**45**	**100**	

Figure 9 shows the Land Holding (Acres) of respondents, 54 percent of respondents were large farmers, 13 percent were medium farmers and 33 percent were small farmers.

Figure 9: Land Holding (Acres)

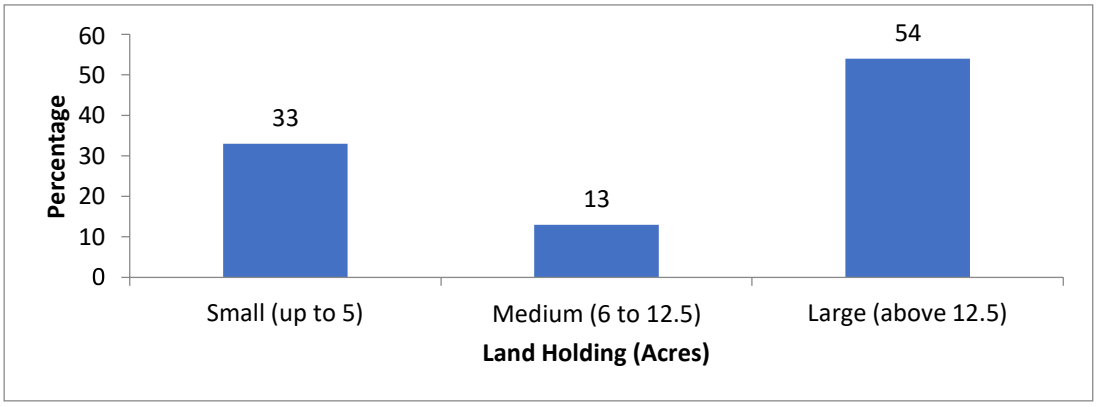


Figure 10 shows the area under potato farm (acres), 45 percent of respondents having area above 12.5 acres for potato, 41 percent of respondents having area up to 5 acres and 11 percentof respondents having area 6 to 12.5 acres under potato cultivation.

Figure 10: Area under potato farm (Acres)

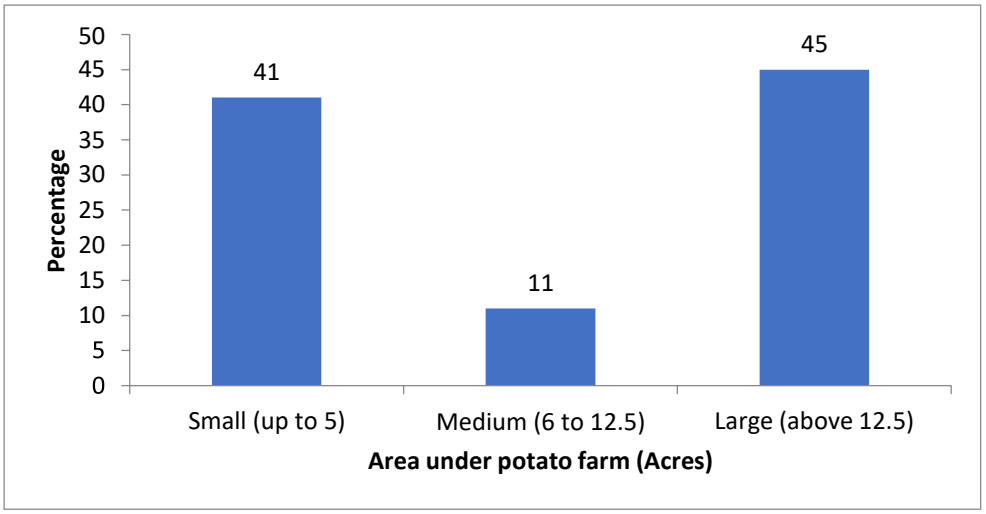


Table 3: Production Statistics

Potato Variety	Area (acre)	Average Production (Mounds) Bags/acre	Seasonal Selling Price/Unit in Rupees			
			Early	Mid	Late	Average
Croda	20.8	106.2	3290.4	2607.5	2355.3	2752.2
Austrax	8.62	98	2693.7	3216.6	3310	3041.6
Santy	16.68	104.3	2691.3	2152.1	2320.4	2378.6
Mozika	23.4	119.4	2355	2403.8	2319.2	2319.0

Table 4: Summary Statistics of Farm Supplies

Variables	Description/Group	Frequency	%age
Seed / Nursery	Raise own	28	63
	Fellow farmers	13	29
	Private nursery	2	4
	Imported	2	4
	Overall	**45**	**100**
Fertilizers	Company outlet	12	27
	Nearby dealer	24	53
	Aarthi	4	9
	Beopari	5	11
	Overall	**45**	**100**
Pesticides	Company outlet	9	20
	Nearby dealer	25	55
	Aarthi	**7**	16
	Beopari	4	9
	Overall	**45**	**100**
Irrigation	Canal	0	0
	Tube well	9	20
	Both	36	80
	Overall	**45**	**100**
Labor (Nos)			**Mean**
	Family		**2**
	DPL		**4**
	Permanent labor		**5**
	Wage Rate/day (Rs.)		**626.7**
Finance	Owned	36	80
	Borrowed (From Aarthi)	9	20
	Overall	**45**	**100**
Farm Machinery	Own	31	69
	Rented	14	31
	Overall	**45**	**100**

Figure 11 shows that 63 percent of respondents raised their own nursery for potato seed, 29 percent bought from fellow farmers and 4 percent used imported seed for their potato farms.

Figure 11: Seed Source for Potato Crop

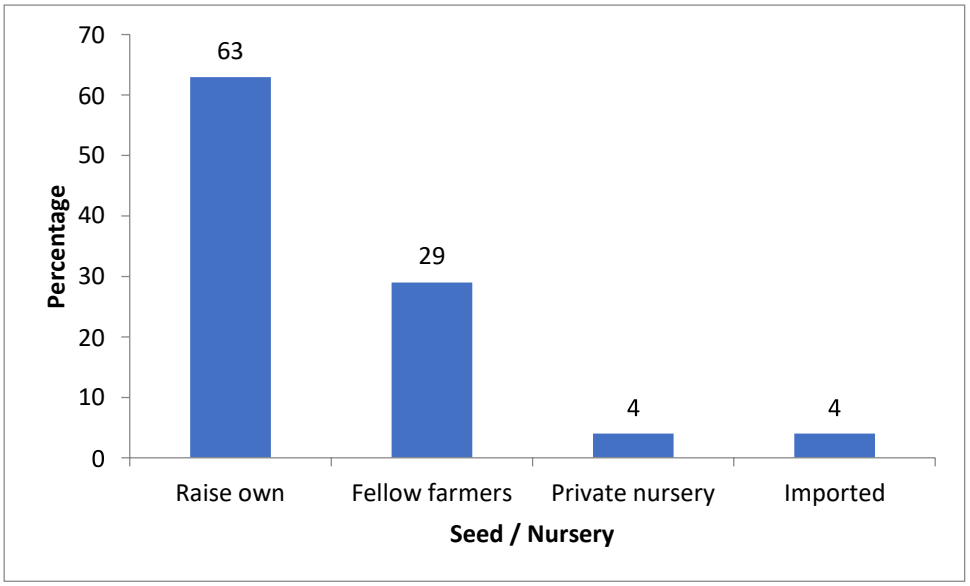


Figure 12 shows the fertilizers supplies to farmers, 53 percent of potato growers purchased fertilizers from nearby dealer, and 27 percent purchased from company outlet, 11 percent purchased from beopari, and 9 percent purchased from Aarthi.

Figure 12: Fertilizers Supplies

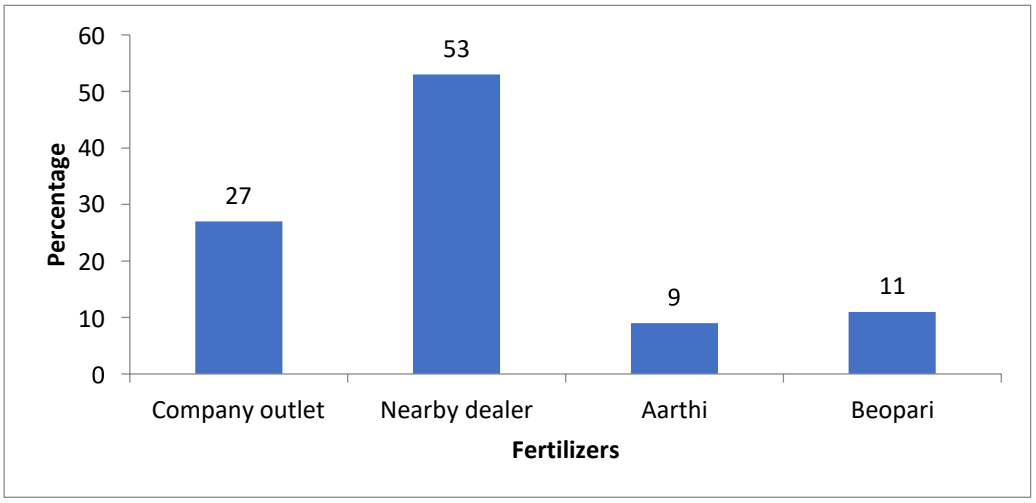


Figure 13 shows the pesticides supplies to farmers, 55 percent of potato growers purchased pesticides from nearby dealer, and 20 percent purchased from company outlet, 16 percent purchased from Aarthi and 9 percent purchased from beopari

Figure 13: Pesticides Supplies

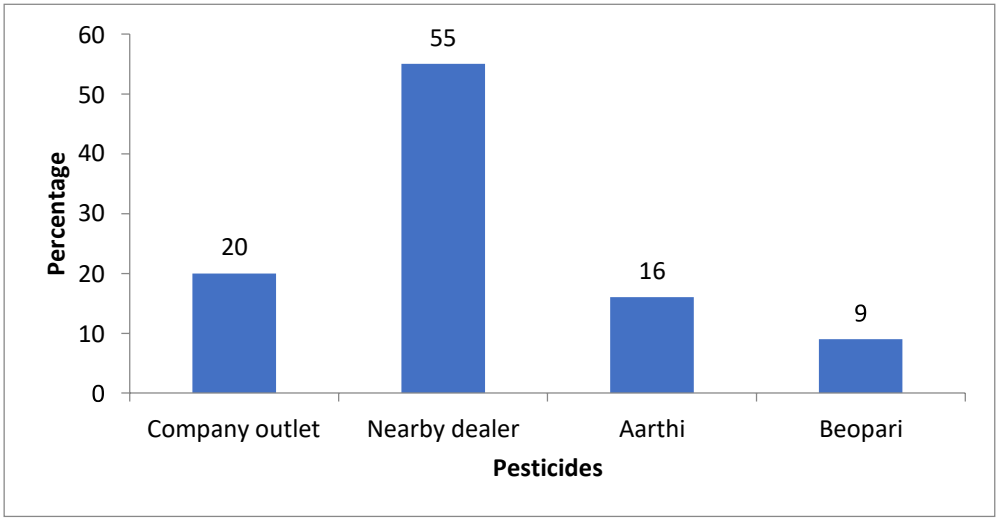


Figure 14 shows the source of irrigation for the potato farms, 80 percent of growers used both canal and tube well water to irrigate their potato crop and 20 percent only used tube well source of irrigation.

Figure 14: Irrigation Source

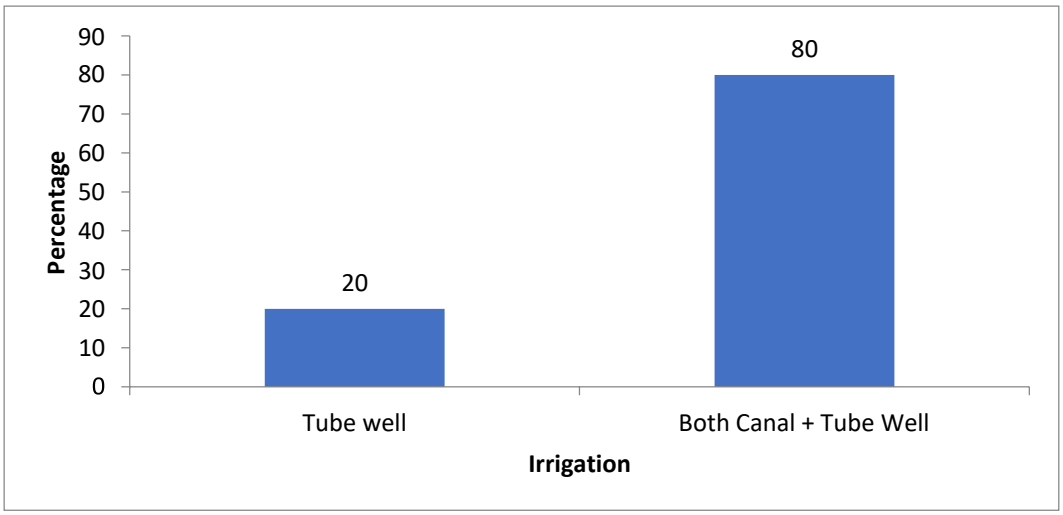


Figure 15 shows the average number of labors used for growing potato by respondents, on an average 5 persons of permanent labor was hired for potato crop, 4 persons hired as daily paid labor (DPL) and 2 family members working on potato farm.

Figure 15: Labor Demand (No's)

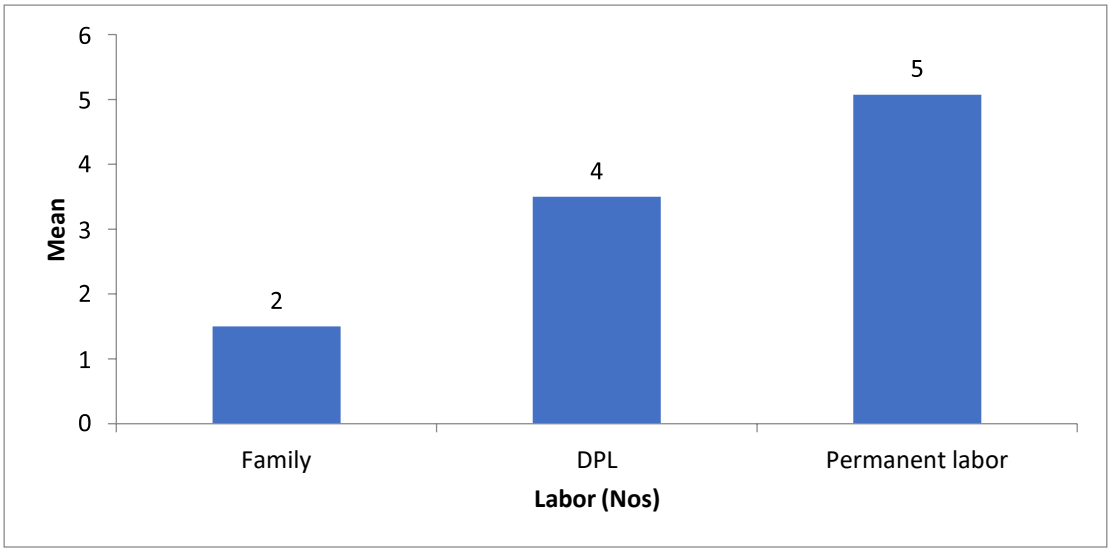


Figure 16 shows the source of finance for potato crop, 80 percent of respondents had their owned finance and 20 percent had borrowed from Aarthi to finance potato production cost.

Figure 16: Sources of Finance

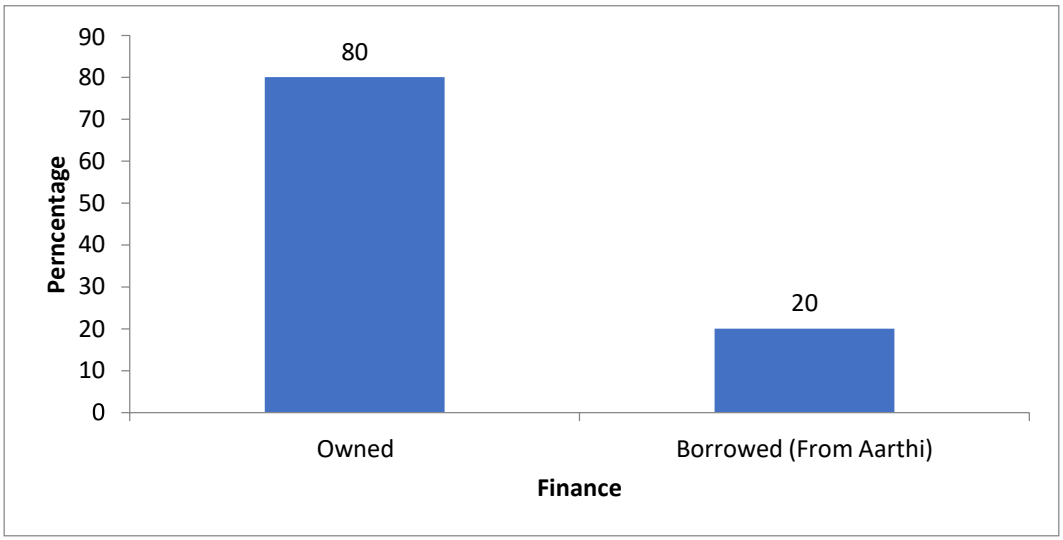


Figure 17 shows that 69 percent of potato growers had their owned farm machinery and 31percent rented farm machinery to do potato operations.

Figure 17: Source of Farm Machinery

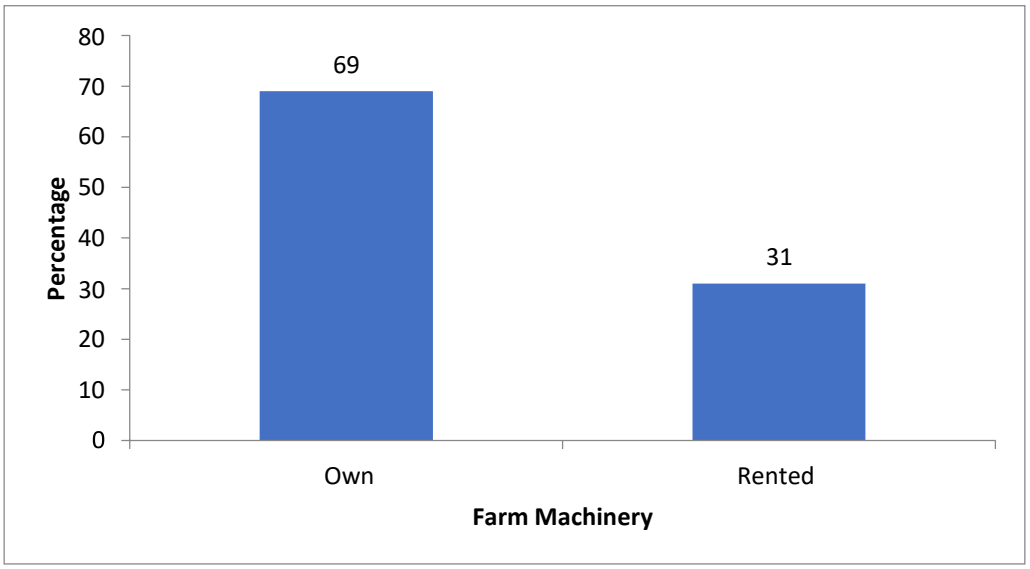


Table 5 shows per acre production cost of potato crop in the study area for cropping season 2021. Major items contributed towards the total cost are seed, fertilizer, and land rent.

Table 5: Potato Production Costs

Sr. No.	Operations/Inputs	Cost/Acre (Rs.)
1	Cost of Land Preparations	8439.7
2	Cost of Seed & Sowing	31060
3	Cost of Water (Tube well & Canal)	6355.5
4	Cost of Fertilizer	28731.1
5	Cost of Dung / FYM	5257.1
6	Cost of Pesticides	6884.4
7	Cost of Weedicides	1595.4
8	Cost of Harvesting	10957.8
9	Full / Half Yearly Land Rent (Rs. / acre)	36133.3
10	Cost of Labor (Permanent+Seasonal Hired)	8788.8
11	Cost of Transport	5500
12	Bardana Cost	16062.2
13	Marketing Cost	3953.3
14	Other miscellaneous costs	1000
	Total Cost	170719.6

Table 6 shows total cost, total revenue, Aarthi commission, profit, and benefit cost ratio of Croda Potato. Average production of croda potato was estimated of 107 bags[17] per acre and

[17] I bag = 100-110 Kg

price per unit (bag) was found as Rs. 2752. The farmers generated total revenue of Rs. 293743from one acre of croda potato. Aarthi Commission was calculated by multiplying total revenuewith 0.065. The farmer earned per acre net profit of Rs. 103930, using a simple calculation ofsubtracting total cost and Aarthi commission from total revenue. BCR was calculated as 1.72,showed the economic viability of croda potato.

Table 6: Total Revenue, Aarthi commission, Profit and Benefit-Cost Ratio of Croda Potato

Sr. No	Total Cost, Total Revenue, Aarthi Commission, Profit and Benefit Cost Ratio	
1	Total Cost (Rs.)	170719
2	Total Revenue (Rs.)	293743
3	Aarthi Commission (Total Revenue * 0.065)	19093
4	Profit = Total Revenue – (Aarthi Commission + Total Cost)	103930
5	BCR = (TR/TC)	1.72

Table 7 shows total cost, total revenue, Aarthi commission, profit and benefit cost ratio of Austrax Potato. Average production of austrax potato was estimated of 98 bags per acre and price per unit (bag) was found as Rs. 3041. The farmers generated total revenue of Rs. 298083 from one acre of austrax potato. Aarthi Commission was calculated by multiplying total revenue with 0.065. The farmer earned per acre net profit of Rs. 107988, using a simple calculation of subtracting total cost and Aarthi commission from total revenue. BCR was calculated as 1.74, showed the economic viability of austrax potato.

Table 7: Total Revenue, Aarthi commission, Profit, and benefit cost ratio of Austrax Potato

Sr. No	Total Cost, Total Revenue, Aarthi Commission, Profit and Benefit Cost Ratio	
1	Total Cost (Rs.)	170719
2	Total Revenue (Rs.)	298083
3	Aarthi Commission (Total Revenue * 0.065)	19375
4	Profit = Total Revenue – (Aarthi Commission + Total Cost)	107988
5	BCR = (TR/TC)	1.74

Table 8 shows total cost, total revenue, Aarthi commission, profit, and benefit cost ratio of Santy Potato. Average production of santy potato was estimated of 104 bags per acre and price per unit (bag) was found as Rs. 2378. The farmers generated total revenue of Rs. 248237 from one acre of santy potato. Aarthi Commission was calculated by multiplying total revenue with 0.065. The farmer earned per acre net profit of Rs. 61382, using a simple calculation of subtracting total cost and Aarthi commission from total revenue. BCR was calculated as 1.45, showed the economic viability of santy potato.

Table 8: Total Revenue, Aarthi commission, Profit and benefit cost ratio of Santy Potato

Sr. No	Total Cost, Total Revenue, Aarthi Commission, Profit and Benefit Cost Ratio	
1	Total Cost (Rs.)	170719
2	Total Revenue (Rs.)	248237
3	Aarthi Commission (Total Revenue * 0.065)	16135
4	Profit= Total Revenue –(Aarthi Commission + Total Cost)	61382
5	BCR = (TR/TC)	1.45

Table 9 shows total cost, total revenue, Aarthi commission, profit and benefit cost ratio of Mozika Potato. Average production of mozika potato was estimated of 119 bags per acre and price per unit (bag) was found as Rs. 2319. The farmers generated total revenue of Rs. 276976 from one acre of mozika potato. Aarthi Commission was calculated by multiplying total revenue with 0.065. The farmer earned per acre net profit of Rs. 88253, using a simple calculation of subtracting total cost and Aarthi commission from total revenue. BCR was calculated as 1.62, showed the economic viability of mozika potato.

Table 9: Total Revenue, Aarthi commission, Profit, and benefit cost ratio of Mozika Potato

Sr. No	Total Cost, Total Revenue, Aarthi Commission, Profit and Benefit Cost Ratio	
1	Total Cost (Rs.)	170719
2	Total Revenue (Rs.)	276976
3	Aarthi Commission (Total Revenue * 0.065)	18003
4	Profit= Total Revenue –(Aarthi Commission + Total Cost)	88253
5	BCR = (TR/TC)	1.62

Table 10: Summary Statistics of Selling Practices

Variables	Description/Group	Frequency	%age
To whom do you sale your farm produce	At Local Mandi	32	71
	Beopari	10	22
	Wholesaler	3	7
	Overall	**45**	**100**
What are the reasons to sell your farm produce to a particular chain actor?	Cash Payments	15	34
	Lack of Time	6	13
	Transportation Problem	9	20
	Avoid Market malpractices	4	9
	Avoid Risk	8	17

	Avoid Processing (sorting/grading/packaging)	3	7
	Overall	**45**	**100**
Do you sell your farm produce through contractual arrangements?	Yes	12	27
	No	33	73
	Overall	**45**	**100**
Buyer's mode of Payment	Advance	3	7
	Installments	13	29
	At Spot	29	64
	Overall	**45**	**100**
What type of agreement do you prefer?	Written (legal/plain paper)	38	84
	Verbal	7	16
	Overall	**45**	**100**
Problem during Marketing	High commission of Aarthi	**18**	**40**
	Exploitation from Middleman	**13**	**29**
	Price Fluctuation	**5**	**11**
	Prices not fixed by Govt. each year	**9**	**20**
	Overall	**45**	**100**

Figure 18 shows to whom farmer sell their farm produce; 71 percent of potato growers sold atlocal mandi, 22 percent sold to beopari, and 7 percent of growers sold to wholesaler.

Figure 18: To whom farmer sale their farm produce

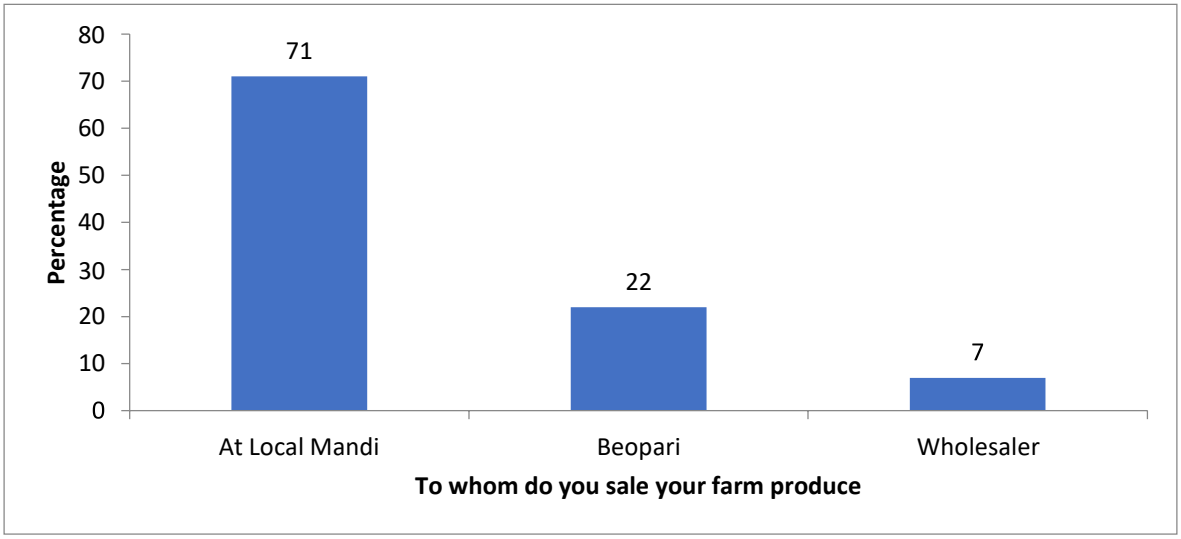


Figure 19 shows the reasons to sale farm produce to a particular chain actor; 34 percent of respondents sold to a particular chain actor for cash payments, 20 percent of respondents sold to a particular chain actor due to transportation problem, 9 & 17 percent of respondents sold to avoid market malpractices and risk respectively and 7 percent of respondents sold to avoid processing (sorting/grading/ packaging).

Figure 19: What are the reasons to sell farm produce to a particular chain actor?

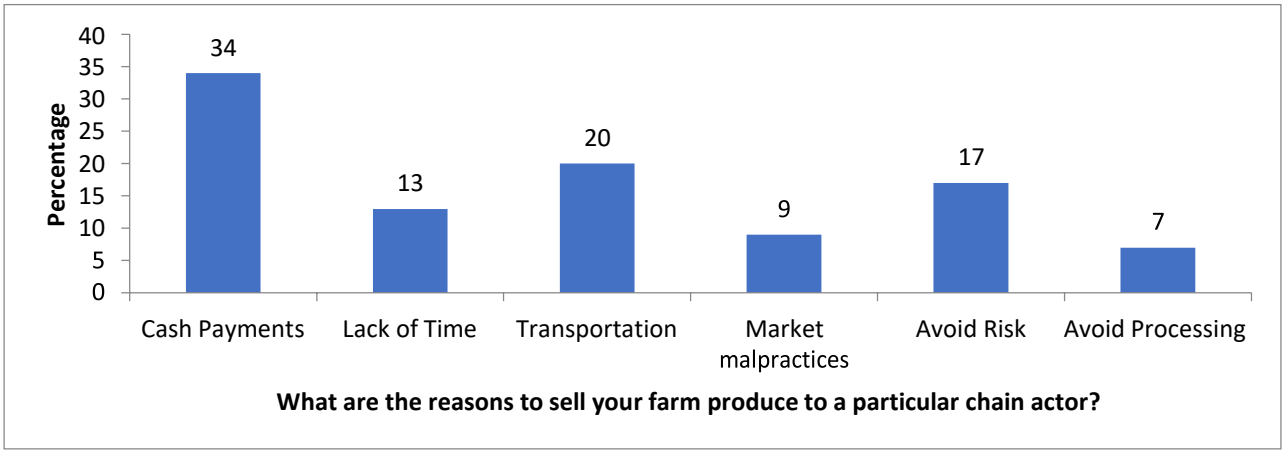


Figure 20 depicts the sale of farm produce through contractual arrangements; 73 percent of respondents did not sell farm produce through contractual arrangements and 27 percent of respondents sold their farm produce through contractual arrangements.

Figure 20: Farm produce through contractual arrangements?

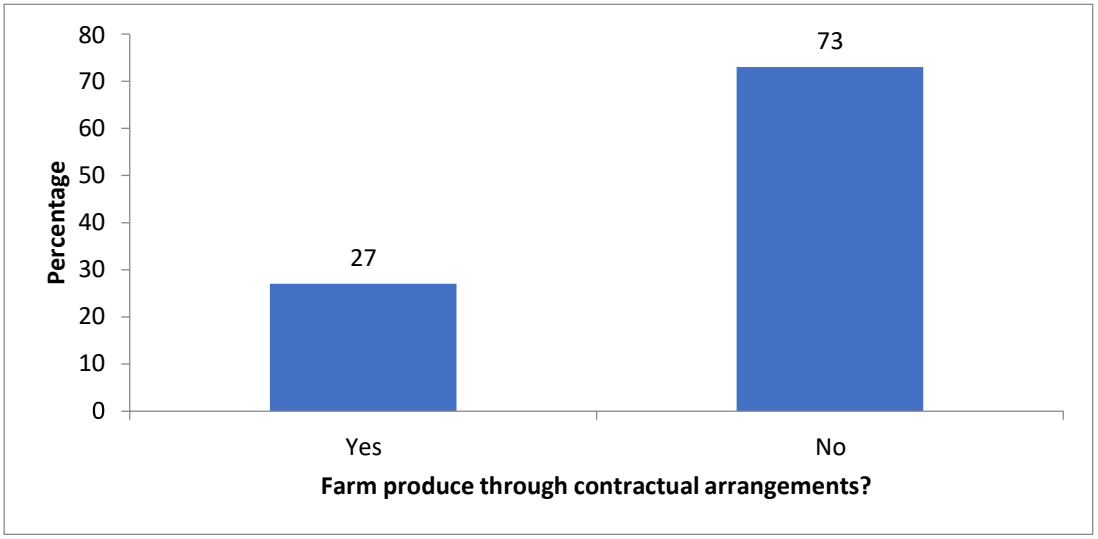


Figure 21 shows the Buyer's mode of Payment to farmers; 64 percent of potato growers received payments at spot, 29 percent received payments in installments and only 7 percent received advance payments for their produce.

Figure 21: Buyer's mode of Payment

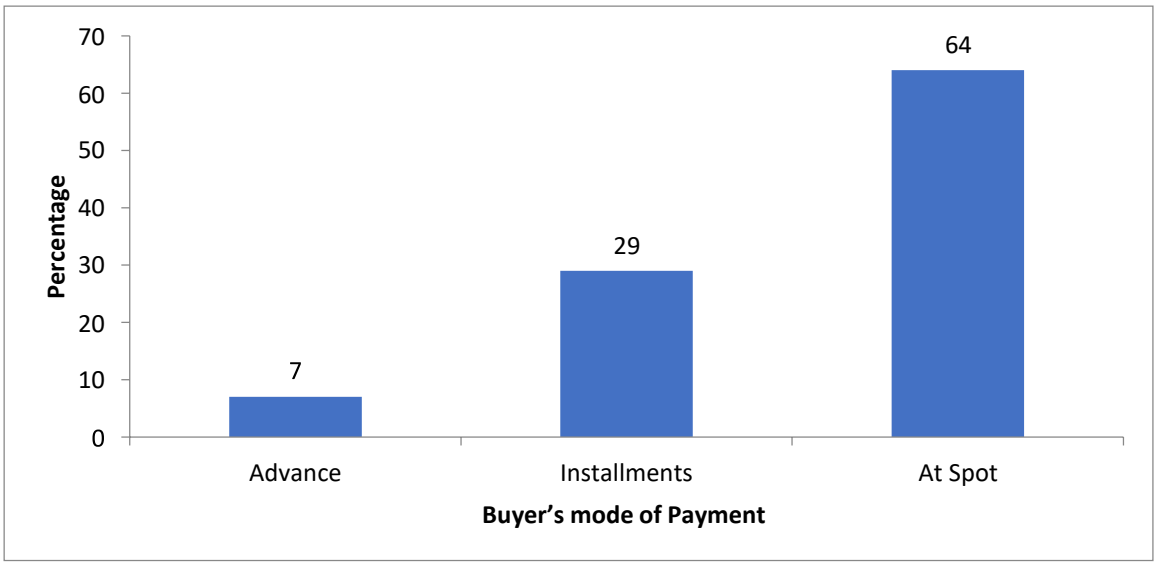


Figure 22 shows the types of agreement farmer prefer; 84 percent of farmers preferred written (legal/plain paper) agreement and 16 percent preferred verbal agreement.

Figure 22: Type of agreement do prefer?

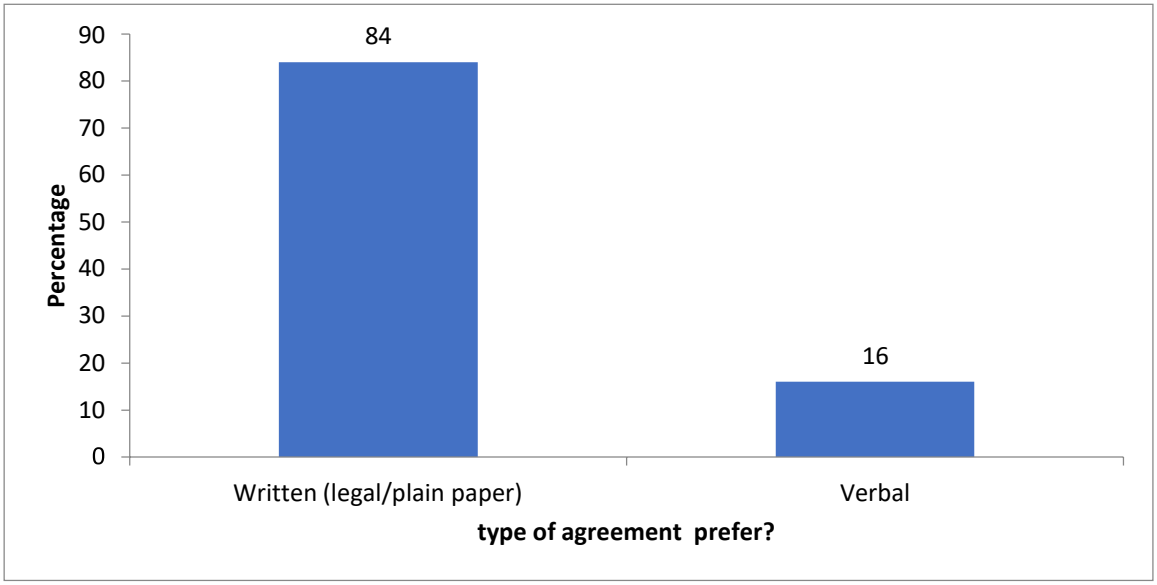


Figure 23 depicts the problem being faced by potato growers during marketing of their produce; 40 percent of respondents faced high commission of Aarthi, 29 percent faced exploitation from middleman, 20 percent complained that prices not fixed by government each year and 11 percent faced the problem of price fluctuation.

Figure 23: Problem during Marketing

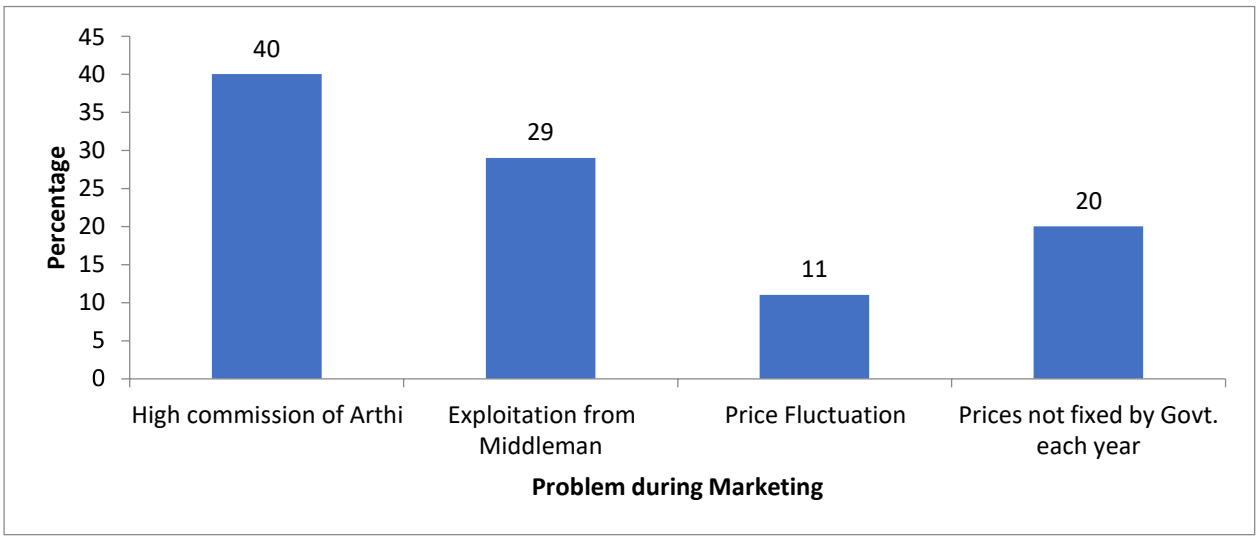


Table 11: Summary Statistics of Harvesting Practices

Variables	Description/Group	Frequency	%age
How do you harvest?	Manually	27	60
	Mechanized	18	40
	Overall	**45**	**100**
Does it affect the quality of your produce?	Yes	17	38
	No	28	62
	Overall	**45**	**100**
What is theamount of (bags) loss per acre?	**1.9 bags**		
Reasons of loss/damage?	Over ripened	10	22
	Unskilled labor	18	40
	Lack of access to Mechanization	17	38
	Overall	**45**	**100**
Problems	Lack of skilled labor	20	44
	Lack of equipment	18	40
	Lack of Extension Services	7	16
	Overall	**45**	**100**

Figure 24 shows the harvesting practices by the potato growers; 60 percent of potato growers harvested their produce manually and 40 percent harvested mechanically.

Figure 24: Harvesting Practices

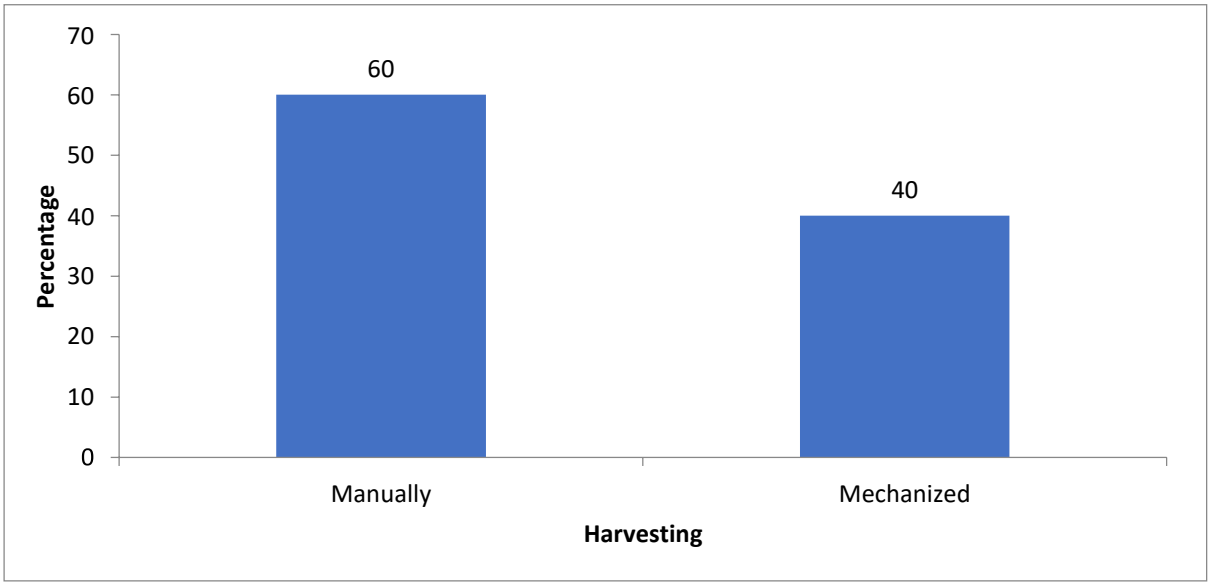


Figure 25 shows harvesting practices affect the quality of produce; 62 percent of respondents said that harvesting did not affect the quality of produce and 38 percent of respondents said that harvesting affected the quality of produce.

Figure 25: Does harvesting practices affect the quality of produce?

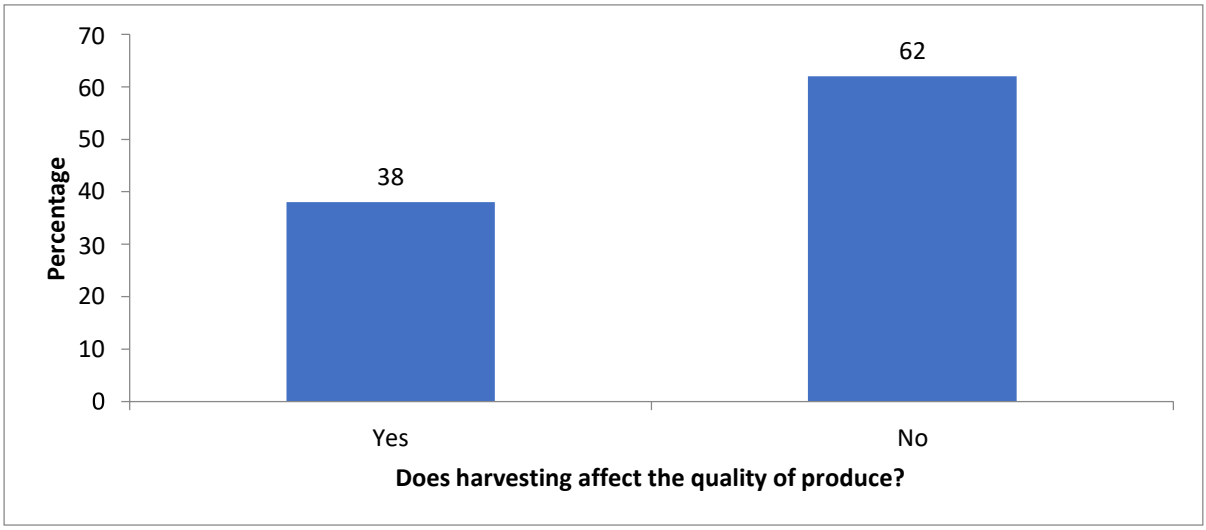


Figure 26 depicts the reasons of loss during harvesting of potato, 40 percent of respondents said that unskilled labor was the main reason of loss during harvesting, 38 percent said lack of access to mechanization and 22 percent said over ripened potato was major reason of loss during harvesting.

Figure 26: Reasons of loss/damage

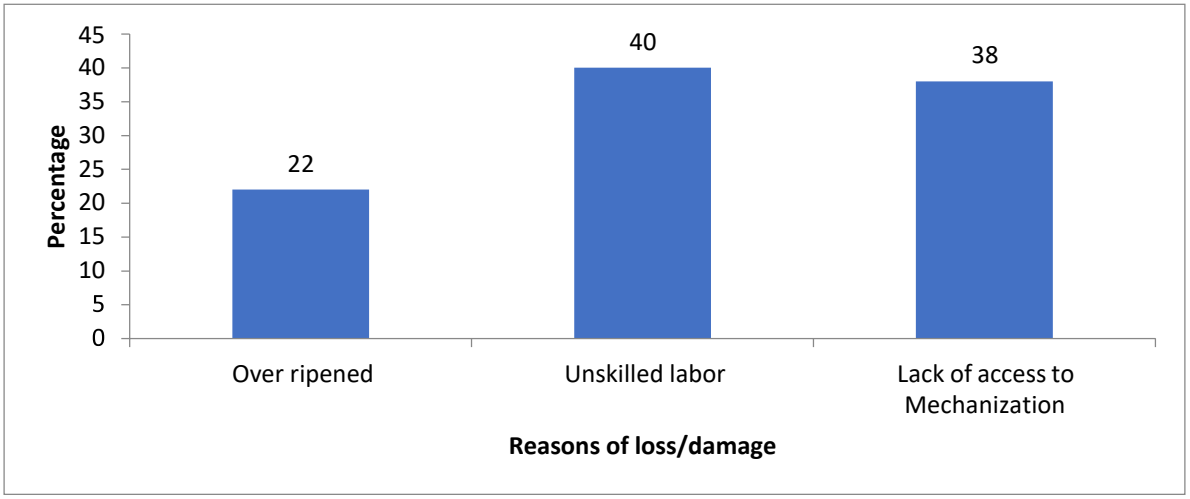


Figure 27 shows that problems being faced by growers during harvesting of potato crop; 44 percent of respondents faced the lack of skilled labor availability at the time of harvesting, 40 percent faced lack of equipment issue and 16 percent observed lack of extension services about harvesting techniques and procedures.

Figure 27: Problems in harvesting of potato

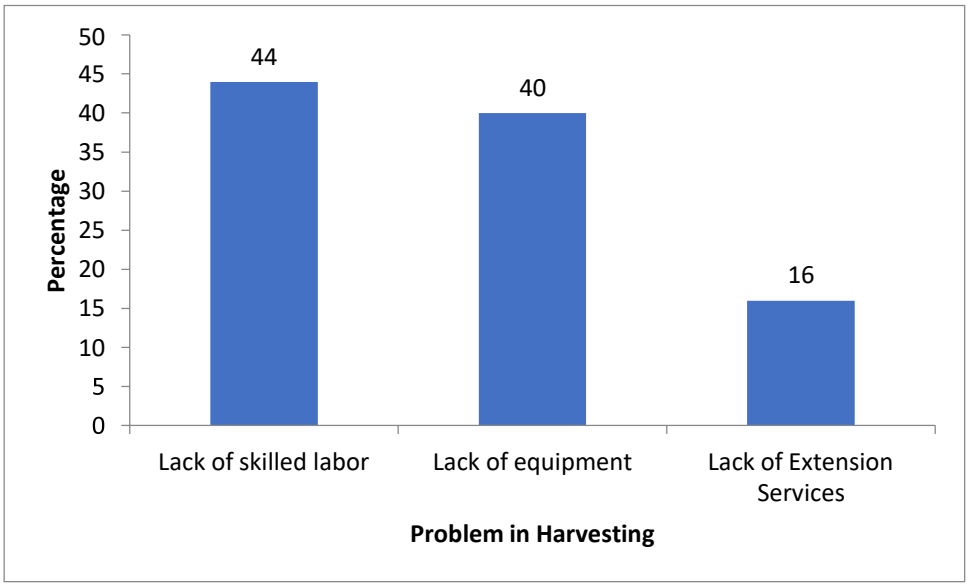


Table 12: Summary Statistics of Sorting and Grading

Variables	Description/Group	Frequency	%age
Do you perform sorting and grading?	Yes	36	80
	No	9	20
	Overall	**45**	**100**
Method of sorting and grading	Manual	42	93
	Mechanized	3	7
	Overall	**45**	**100**
Is there any loss during sorting and grading?	Yes	20	44
	No	25	56
	Overall	**45**	**100**
What is theamount of (bags) loss per acre?	1.2 Bags		
How you perform grading?	Size	25	56
	Color	7	15
	Variety	4	9
	Shape	9	20
	Overall	**45**	**100**
Why do you use these grading criteria?	Market Demand	39	87
	Traditional Way	6	13
	Overall	**45**	**100**
Problems in sorting and grading	Lack of skilled labor	17	38
	High skilled labor cost	22	49
	Both (Lack of skilled labor and High skilled labor cost)	4	9
	Lack of extension services	2	4
	Overall	**45**	**100**

Figure 28 shows the sorting and grading by the potato growers; 80 percent of the potato growersperformed sorting and grading and 20 percent did not perform sorting and grading for their produce.

Figure 28: Sorting and Grading

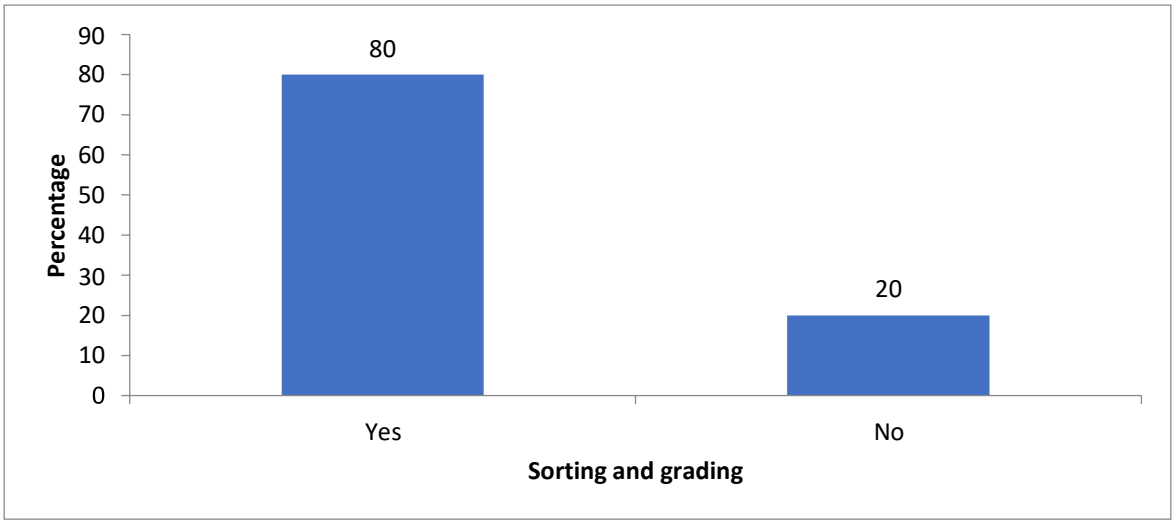


Figure 29 shows the method of sorting and grading by growers, 93 percent of potato growers did manually sorting and grading and only 7 percent did sorting and grading by mechanically.

Figure 29: Method of sorting and grading

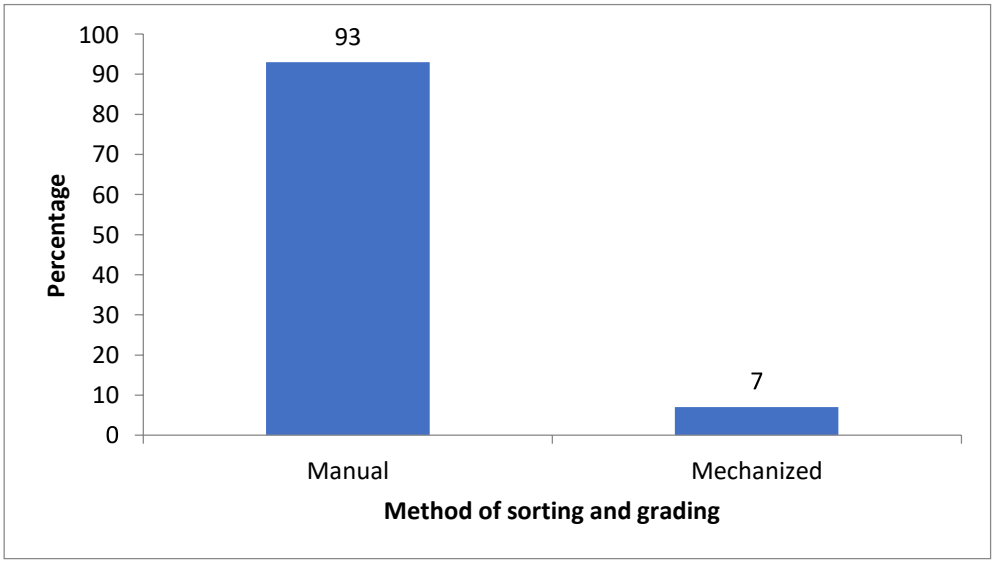


Figure 30 shows loss during sorting and grading; 56 percent of growers said that there were nolosses during sorting and grading and 44 percent said that there were losses during sorting andgrading.

Figure 30: Loss during sorting and grading

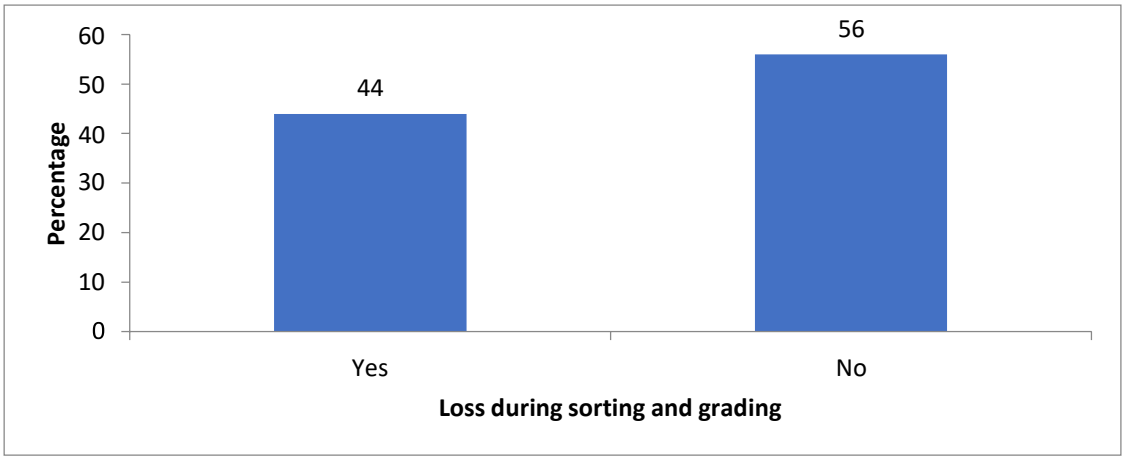


Figure 31 shows the Criteria for Sorting and Grading by the potato growers; 56 percent of potato growers did sorting and grading on the basis of size of potato, 20 percent did on the basis of shape of potato, 15 percent did on the basis of color and 9 percent did sorting and grading on the basis of variety of potato.

Figure 31: Criteria for Sorting and Grading

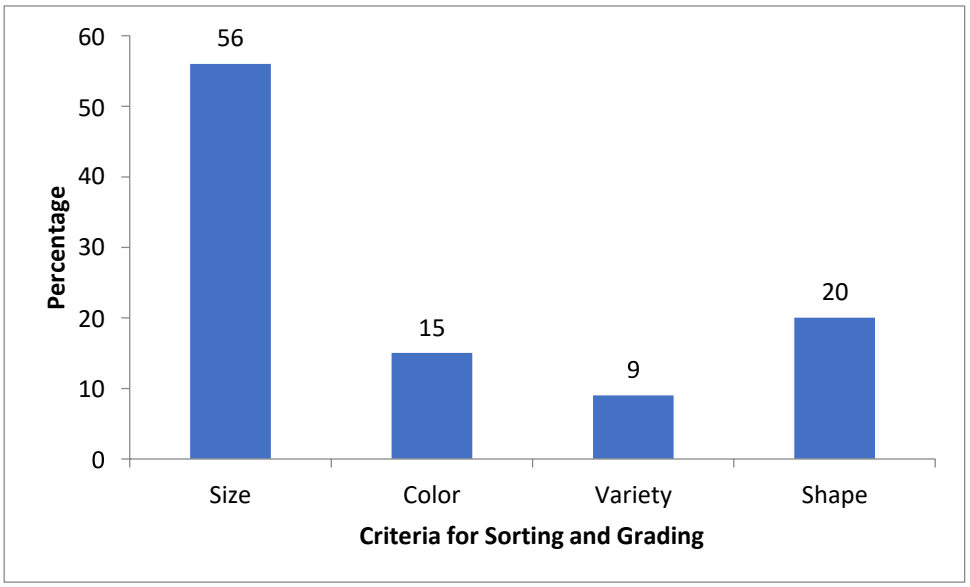


Figure 32 shows the reasons for sorting and grading; 87 percent of potato growers performed sorting and grading due to market demand and 13 percent of potato growers performed sorting and grading due to tradition.

Figure 32: Reasons for Sorting and Grading

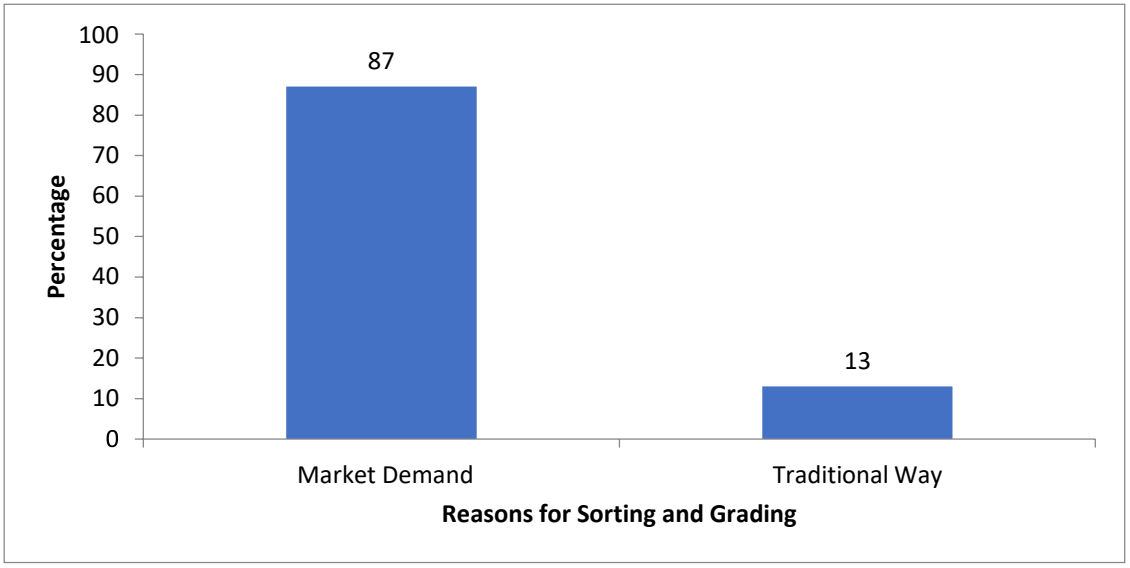


Figure 33 shows the problems in sorting and grading faced by potato growers; 49 percent of potato growers faced high skilled labor cost, 38 percent faced lack of access to skilled labor, 9 percent faced both (Lack of skilled labor and high skilled labor cost) and 4 percent faced lack of extension services.

Figure 33: Problems in sorting and grading

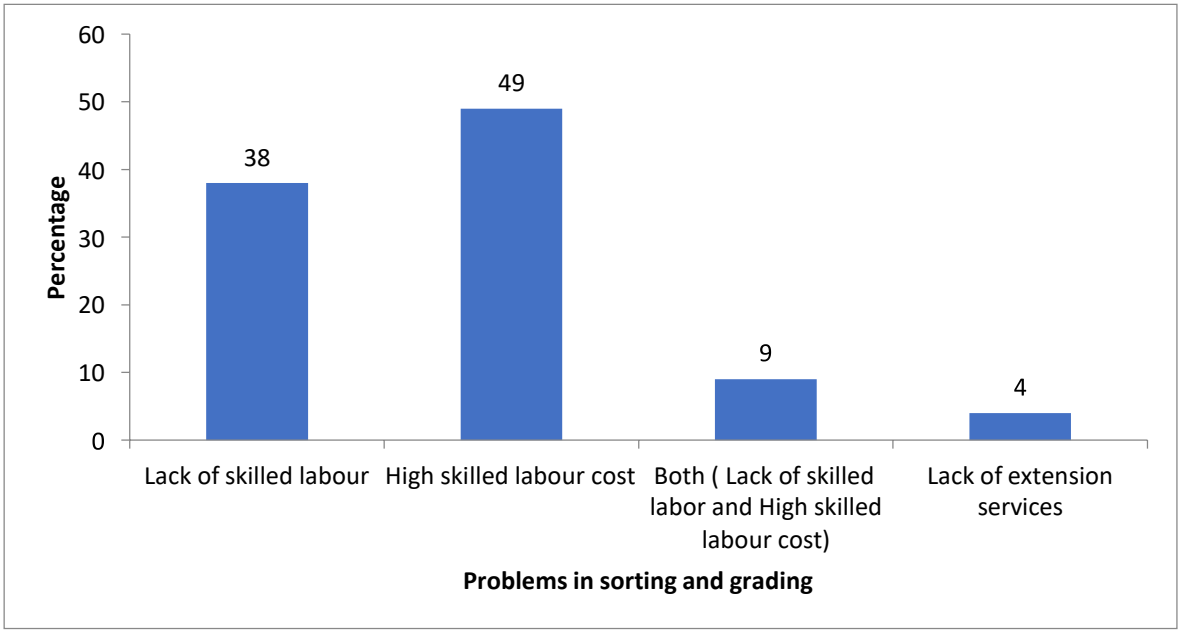


Table 13: Summary Statistics of Packaging

Variables	Description/Group	Frequency	%age
Do you perform packaging?	Yes	41	91
	No	4	9
	Overall	**45**	**100**
Average weight per packaging unit (kg/bag)	115.5 Kg		
Method of packaging the produce	Manual	42	93
	Mechanized	3	7
	Overall	**45**	**100**
Packing material and labor Cost per bag	Rs 225.6		
How do you label/brand?	Packaging	26	58
	Marka	12	27
	No	7	15
	Overall	**45**	**100**
Problems are you facing in packaging?	Lack of skilled labor	4	9
	Shortage of Packaging materials	16	35
	High Cost of Packaging Material	21	47
	Lack of extension services	4	9
	Overall	**45**	**100**

Figure 34 shows the packaging behavior of potato growers, 91 percent packed their potato produce and only 9 percent did not pack their potato produce

Figure 34: Packaging Behavior

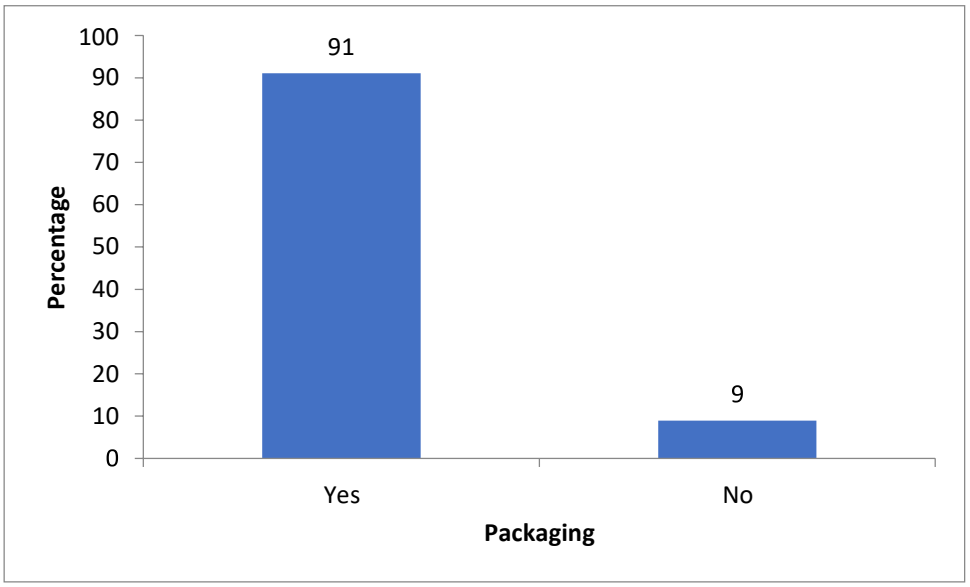


Figure 35 shows the method of packaging the produce by the potato growers; 93 percent of growers packed potato manually and only 7 percent packed potato mechanically.

Figure 35: Method of packaging the produce

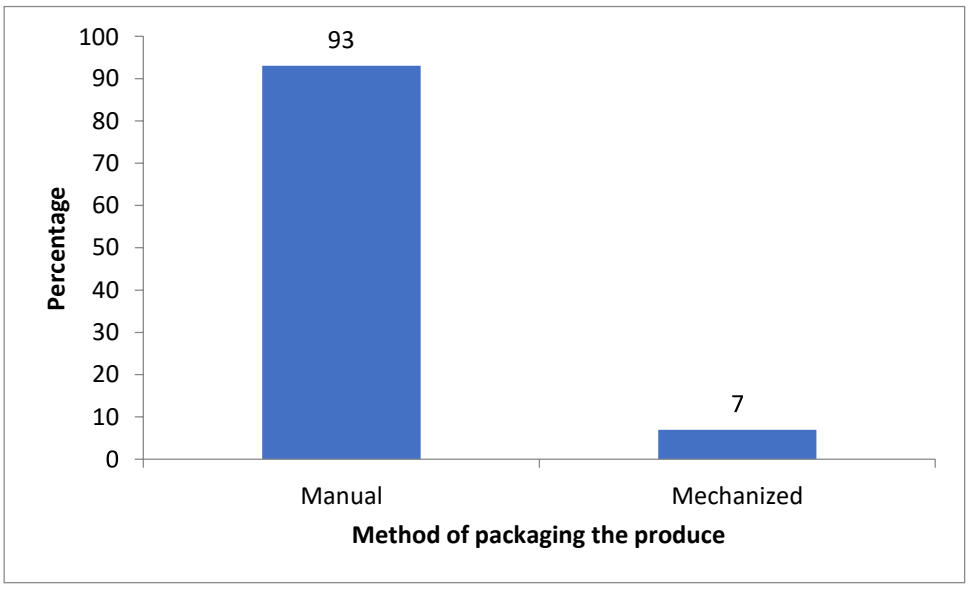


Figure 36 shows the label of packing material of potato produce; 58 percent of respondents packed the potato produce by packaging, 27 percent of respondents packed by using marka and 15 percent did not label or brand their packing material.

Figure 36: Label of Packing

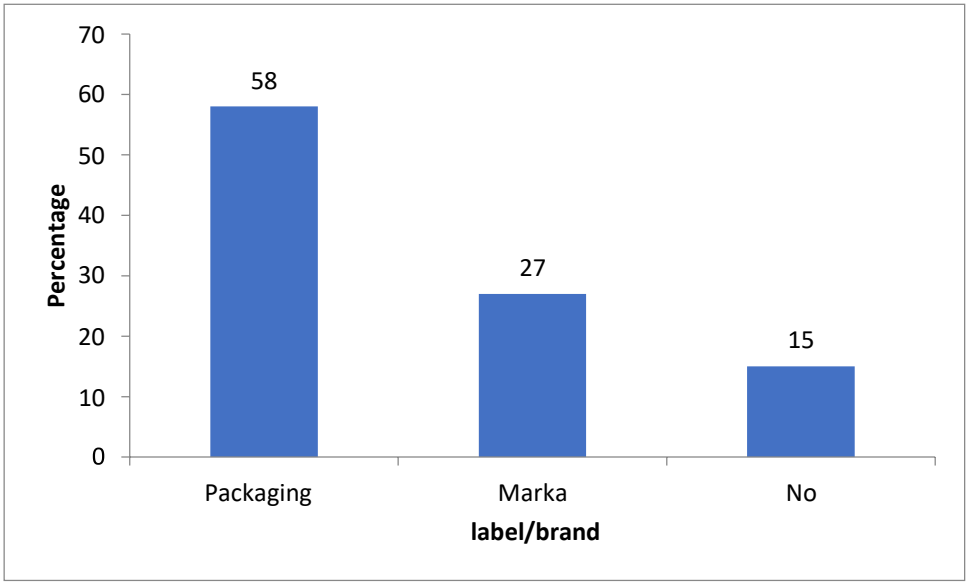


Figure 37 shows the problems being faced by potato growers in packaging their produce, 47 percent faced high cost of packaging material, 35 percent faced shortage of packagingmaterials, 9 percent faced lack of skilled labor and 9 percent faced lack of extension services.

Figure 37: Problems facing in packaging

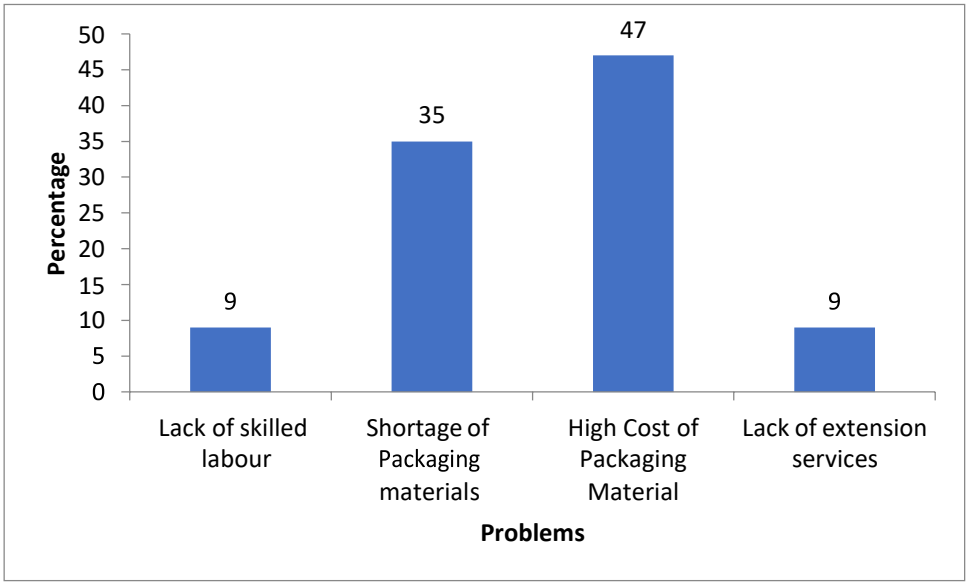


Table 14: Summary Statistics of Storage

Variables	Description/Group	Frequency	%age
Do you store your farm produce?	Yes	33	73
	No	12	27
	Overall	**45**	**100**
Where do you store?	At farm	2	6
	Private storage facility	31	94
	Overall	**33**	**100**
Storage Cost per bag	**Rs. 510**		
For how long do you store? (Months)	**6.29 Months**		
Does it affect the quality of your produce?	Yes	26	79
	No	7	21
	Overall	**33**	**100**
What is the amount of losses per bag (Kgs)	**4.79 Kg**		
Reasons of loss/damage	Weight losses	12	36
	Pest and Disease	4	12
	Decay	10	30
	Rotting	7	22
	Overall	**33**	**100**
Problems are you facing in storage?	High Cost	13	40
	Poor Services	8	24
	Low Capacity	10	30
	Other	2	6
	Overall	**33**	**100**

Figure 38 shows the storage of potato by growers; 73 percent of potato growers stored their produce and 27 percent of growers did not store their produce and sell all the produce at one time.

Figure 38: Storage

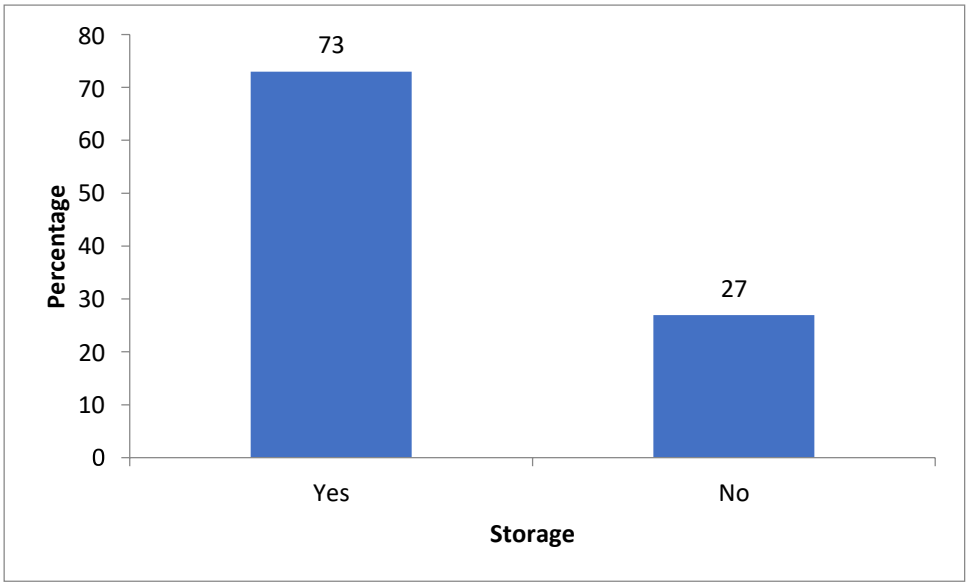


Figure 39 shows where growers store their produce; 94 percent of growers stored their produce at private storage facility and only 6 percent stored their produce at farm.

Figure 39: Where do store?

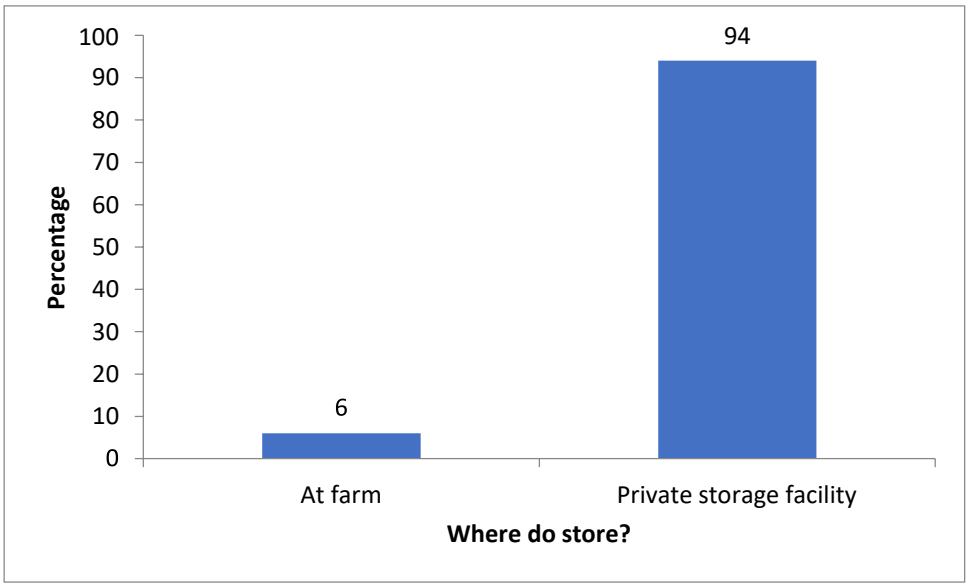


Figure 40 shows the storage affect the quality of produce, 79 percent of respondents were of the view that storage affected the quality of produce and 21 percent were of the view that storage does not affect the quality of produce.

Figure 40: Does storage affect the quality of produce?

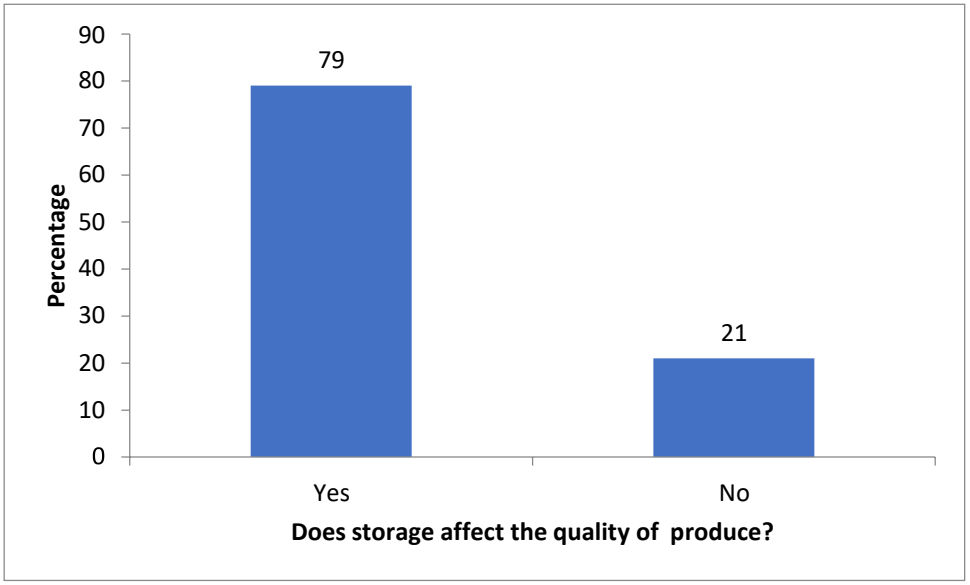


Figure 41 shows reasons of loss/damage of potato during storage; 36 percent said that weight losses was the main reason of damage of potato, 30 percent said decay, 22 percent of growers said rotting and 12 percent said pest and disease were the reasons of loss of potato during potato.

Figure 41: Reasons of loss/damage of Potato during storage

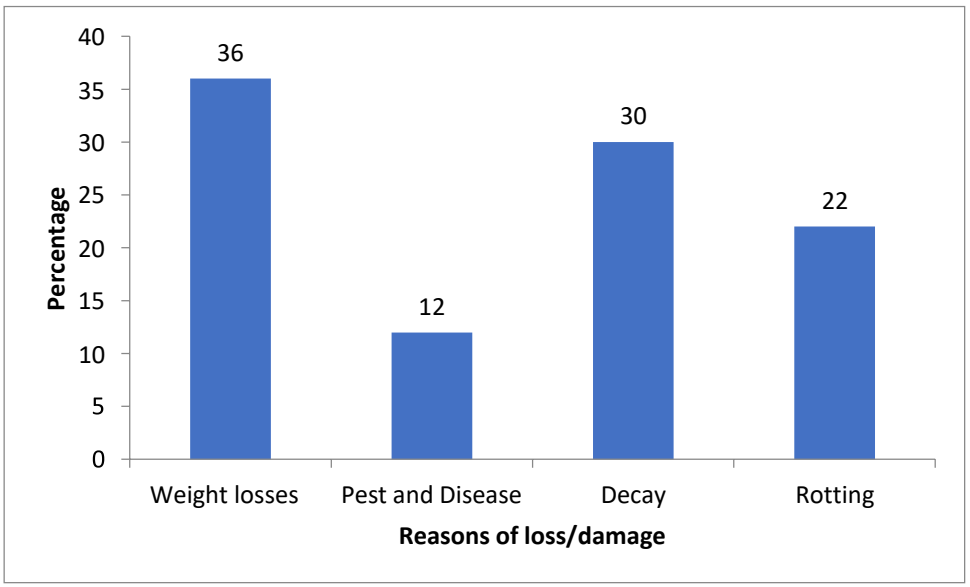


Figure 42 shows problems being faced by growers during storage; 40 percent faced high cost of storage, 30 percent faced low capacity of workers, 24 percent faced poor services of storage house facilities and 6 percent faced other problems.

Figure 42: Problems in Storage

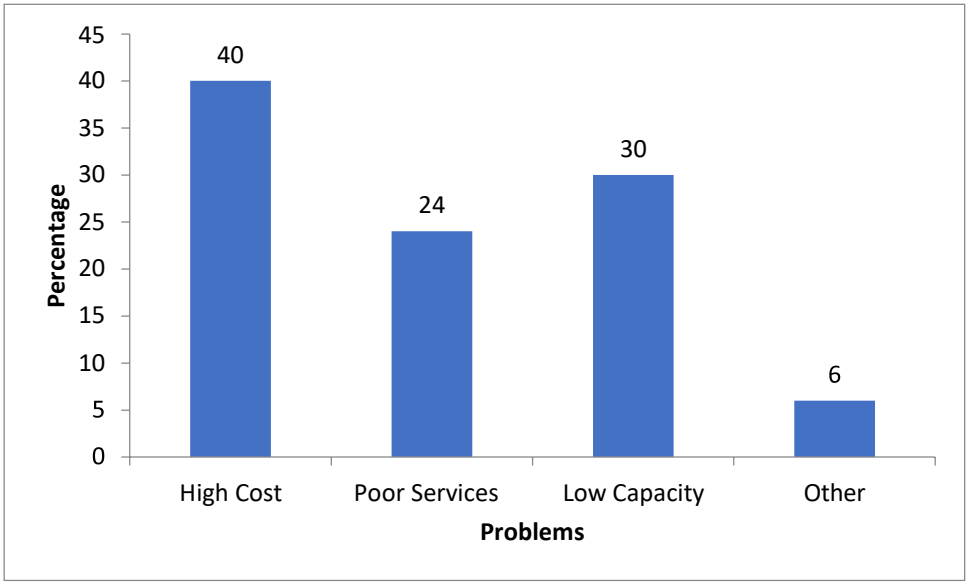


Table 15: Summary Statistics of Transportation

Variables	**Description/Group**	**Frequency**	**%age**
How do you transport your produce?	Own	32	71
	Rental Services	13	29
	Overall	**45**	**100**
Type of transport	Trolley		
Capacity (No. of bags)	136.1		
Any loss during transport	Yes	16	36
	No	29	64
	Overall	**45**	**100**
Reasons of loss, how?	Poor handling	14	31
	In-adequate vehicle	8	18
	Poor roads	23	51
	Overall	**45**	**100**
What is the percentage of losses?	**2.37 %**		
Problems in transportation	High cost	17	38
	Poor Roads	20	44
	Non-Availability of Transport	8	18
	Overall	**45**	**100**

Figure 43 shows the transportation of produce from field to market; 71 percent of potato growers had their own transportation and 29 percent opted rental services to transport their produce to market.

Figure 43: Transportation

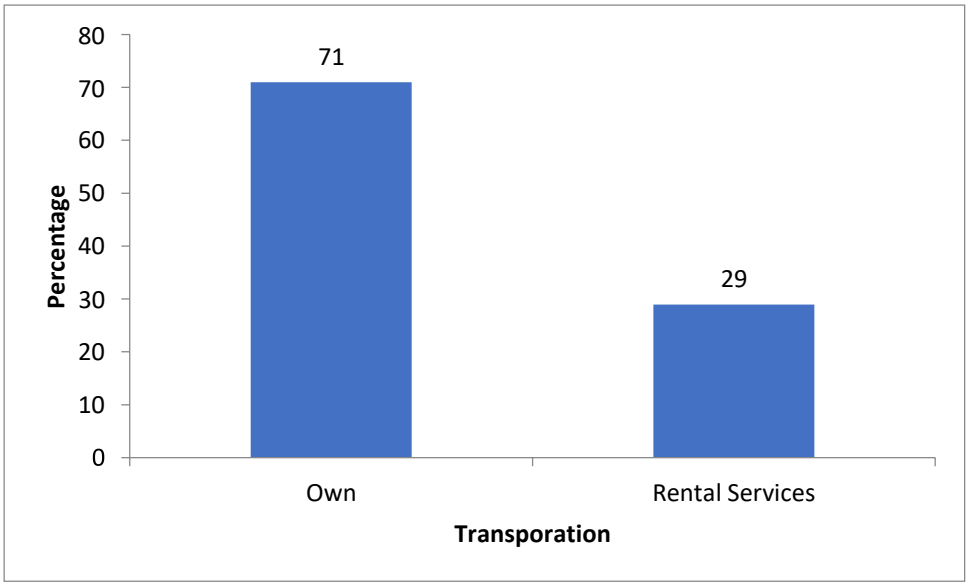


Figure 44 shows the loss during transportation; 64 percent of growers believed there were no losses during transportation of their produce and 36 percent believed that there were losses during transportation of their produce to market.

Figure 44: Loss during transportation

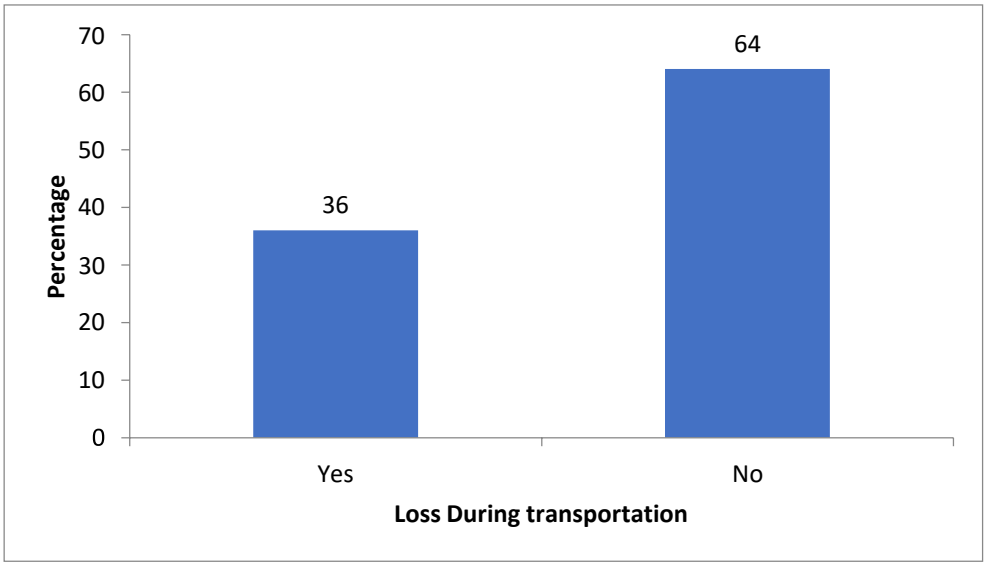


Figure 45 shows reasons of loss during transportation; 51 percent of potato growers are of the view that poor roads were the reason of loss of potato, 31 percent point of view that poor

handling during transportation from one place to other and 18 percent point of view that in adequate vehicles were the reasons of loss during transportation.

Figure 45: Reasons of loss during transportation

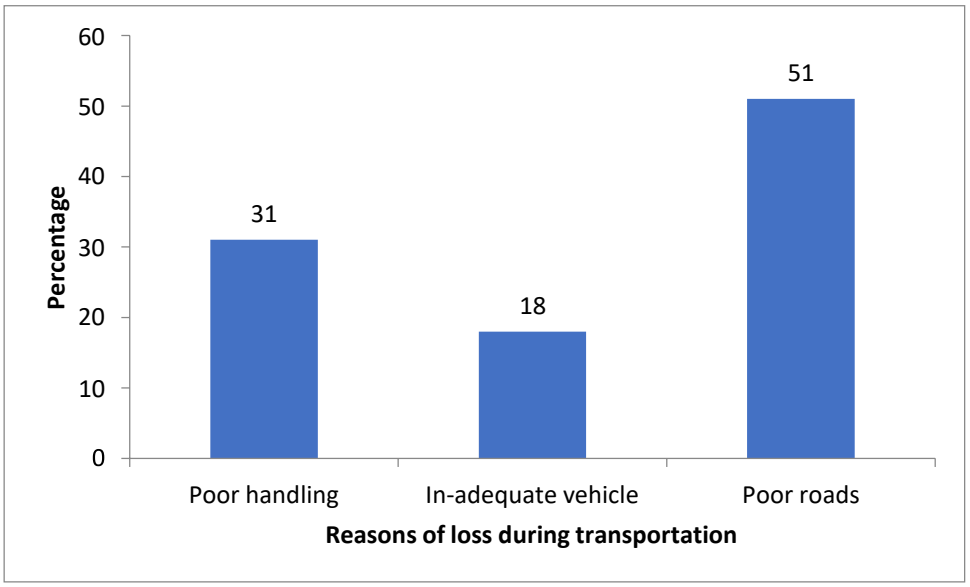
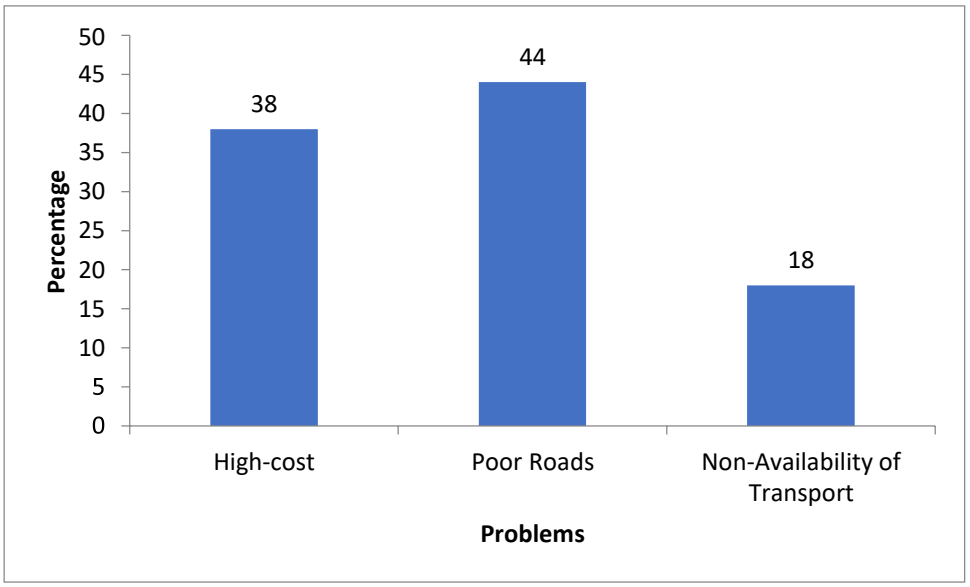


Figure 46 shows problems faced by potato growers during transportation of their produce, 44 percent of growers reported that poor roads were the major hurdle in transportation, 38 percent reported high cost of transportation and 18 percent reported that non-availability of transport.

Figure 46: Problems of Transportation



4.2. Commission Agent Case

Table 1: Summary Statistics of Commission Agent's Socioeconomic Characteristics

Variables	Description/Group	Frequency	%age
Education	Primary	2	17
	Middle	0	0
	Matric	7	58
	Intermediate	1	8
	Graduate	2	17
	Overall	**12**	**100**
Experience as a Commission Agent	1 to 10	2	17
	11 to 20	4	33
	21 to 30	3	25
	Above 31	3	25
	Overall	**12**	**100**
Experience as Potato Commission Agent	1 to 10	4	33
	11 to 20	5	42
	21 to 30	2	17
	Above 31	1	8
	Overall	**12**	**100**
Family Business	Yes	8	**67**
	No	4	33
	Overall	**12**	**100**
Nature of Business	Sole proprietor	10	83
	Partnership	2	17
	Overall	**12**	**100**
Types of Vegetables do you deal?	• Potato • Onion • Tomato • Peas • Green Chilies		

Business premises/shop?	Own	9	75
	Rented	3	25
	Overall	**12**	**100**
Business Capital	Personal Investment	9	75
	Borrowed from informal sources	2	17
	Borrowed from Formal sources (Banks)	1	8
	Overall	**12**	**100**
Record Keeping	Manually	8	67
	Electronically	4	33
	Overall	**12**	**100**
Trading License	Name of License	Rana Brothers and Co. Rana Idrees Rana Asif Qurban Hussain Jura and Company Mar Manzoor and Sons Al-Khalil Brothers Abdul Ghaffar and Sons Okaro Commission Agent Khalkiya Commission Agent Mian Zulfiqar Traders	

Figure 1 shows that out of 12 interviewed commission agent's majority that is 58 percent had matric degree, while 17 percent did graduation, 17 percent did primary and 8 percent were having intermediate degree.

Figure 1: Education of Respondents

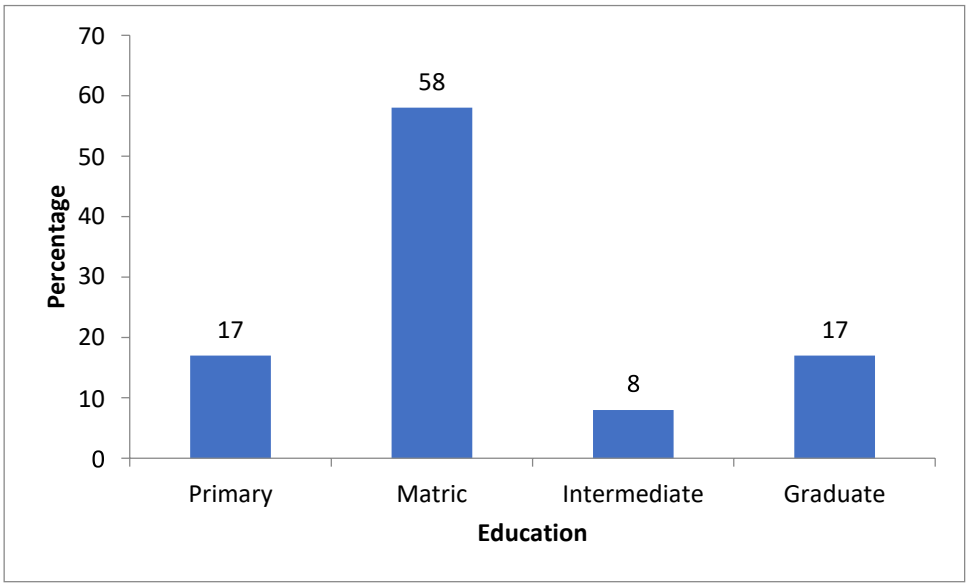


Figure 2 shows respondents experience as commission agent; 33 percent of commission agent had experience ranged from 11 to 20 years, while 25 percent had experience above 31 years and 17 percent had experienced from 1 to 10 years

Figure 2: Experience as Commission Agent

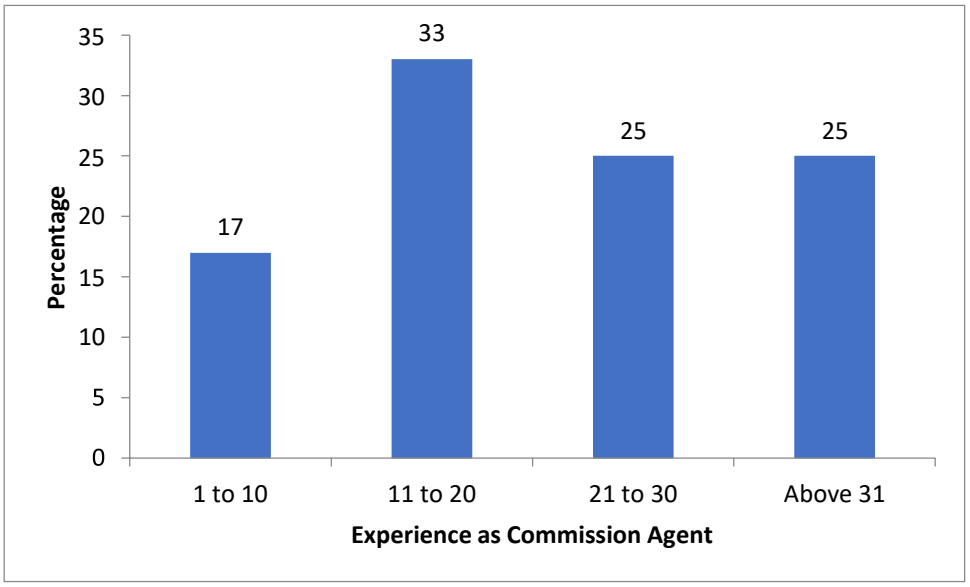


Figure 3 shows respondents experience as potato commission agent; 42 percent of commissionagent had experience ranged from 11 to 20 years, while 33 percent had experience from 1 to 10 years, 17 percent had experienced from 21 to 30 years and 8 percent of respondents had experienced above 31 years.

Figure 3: Experience as Potato Commission agent

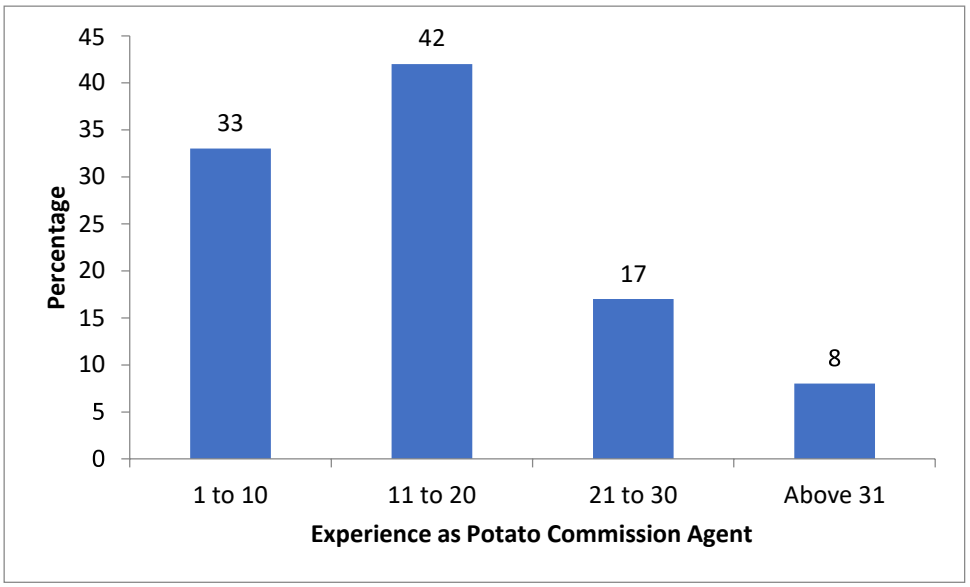


Figure 4 shows the business type of commission agents; 67 percent of commission agents said that this was their family business and 33 percent said this was not their family business and they started it on their own.

Figure 4: Business Type

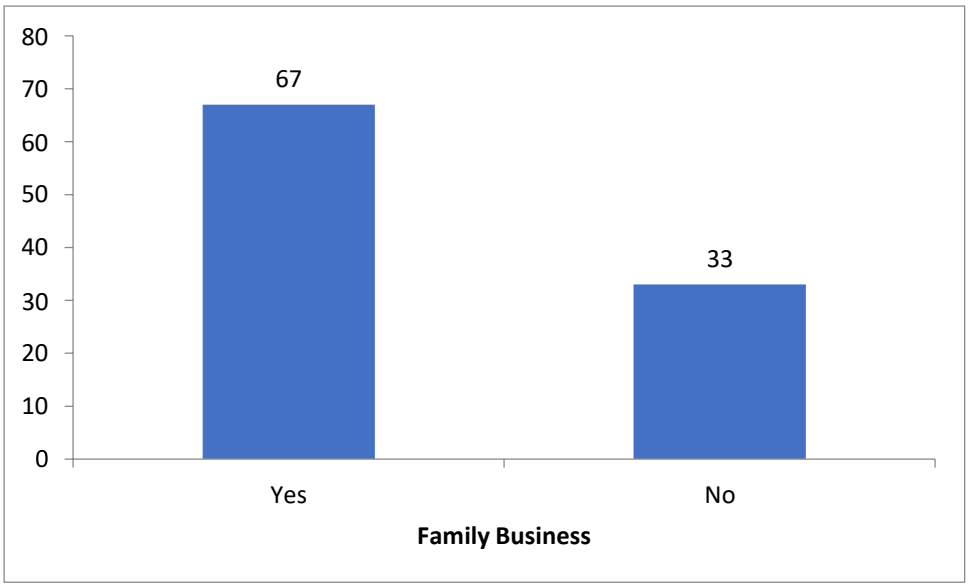


Figure 5 shows the nature of business of commission agents; 83 percent of the commission agents were doing their business as sole proprietor and 17 percent were doing the business withtheir partners.

Figure 5: Nature of Business

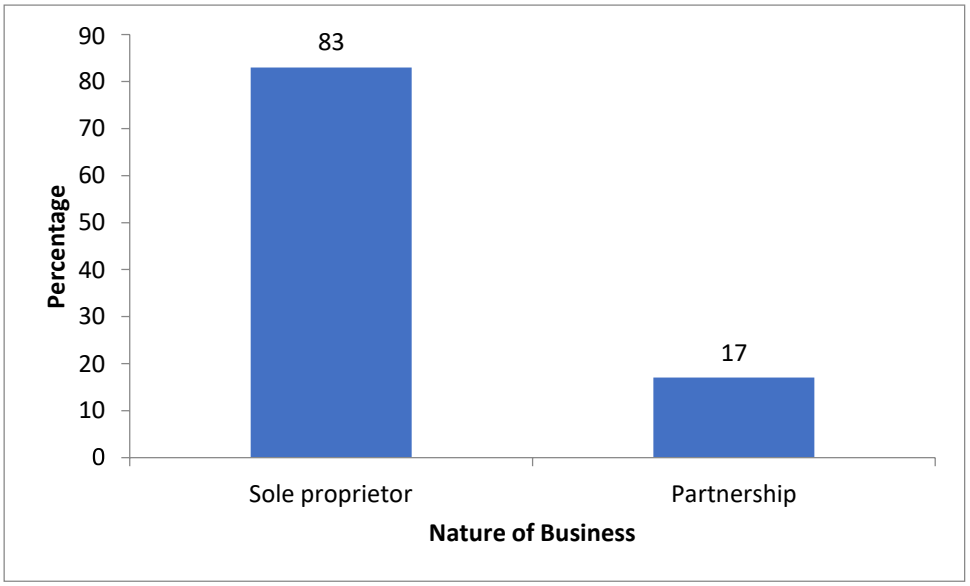


Figure 6 shows the business premises of commission agents; 75 percent of commission agents had their owned shop and 25 percent of commission agents had rented their shops.

Figure 6: Business Premises

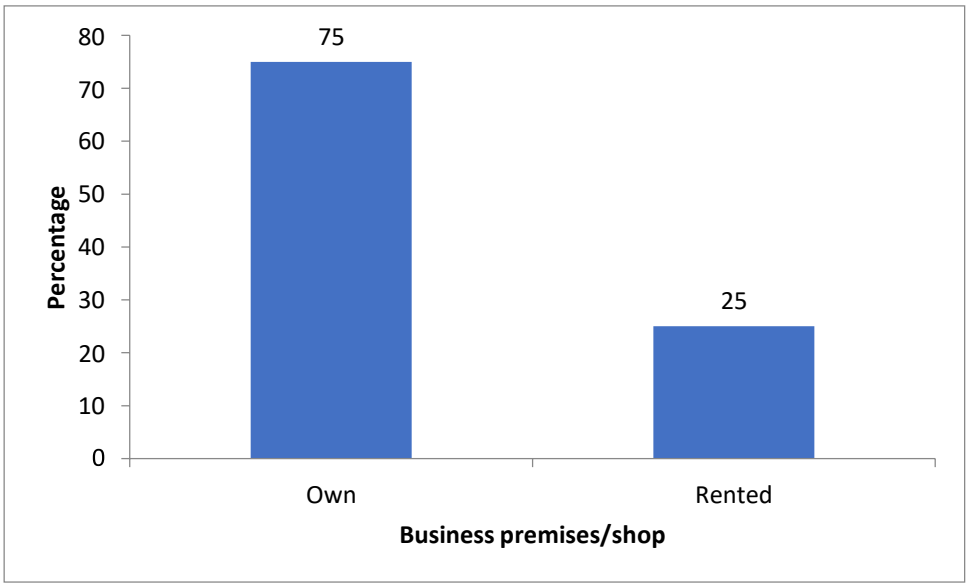


Figure 7 shows the business capital of commission agents; 75 percent of commission agents had their personal investment, 17 percent borrowed from informal sources and 8 percent borrowed from formal sources such as banks.

Figure 7: Business Capital

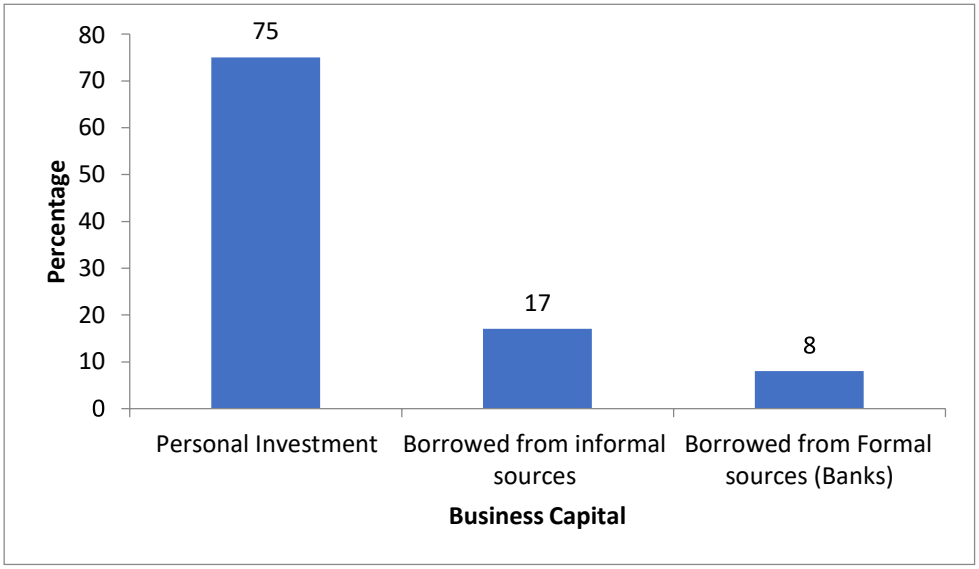


Figure 8 shows record keeping of business; 67 percent of commission agents kept their records manually and 33 percent of commission agents kept their records electronically.

Figure 8: Record Keeping

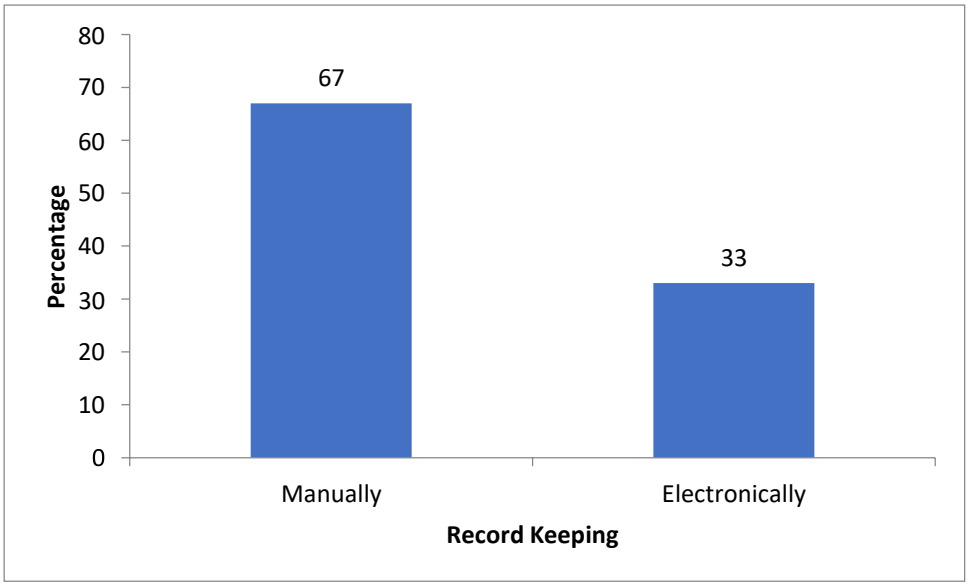


Table 2: Summary Characteristic of Potato Trading Landscape

Variables	Description/Group	Frequency	%age
Mostly who brings Produce?	Growers	7	59
	Beopari	4	33
	Commission agents from other markets	1	8
	Overall	**12**	**100**
How do you attract your suppliers (grower, traders)?	Giving credit for input purchase	5	42
	Giving better prices	4	33
	By advance payments	2	17
	Social Relationship	1	8
	Overall	**12**	**100**
Do you provide finance to growers	Yes	11	92
	No	1	8
	Overall	**12**	**100**
	How many farmers do you deal? NOs	46 Farmers	
	How much you have advanced in potato crop? PKR (million)	Rs. 1.27 million	
	Advanced in kind of inputs	• **Seed** • **Fertilizer** • **Pesticides** • **Diesel**	

Figure 9 shows who bring produce to commission agents; 59 percent of commission agents said that growers brought produce, 33 percent said that beopari (village dealer) brought produceand 8 percent said commission agents from other markets brought produce.

Figure 9: Who brings Produce to Commission Agents?

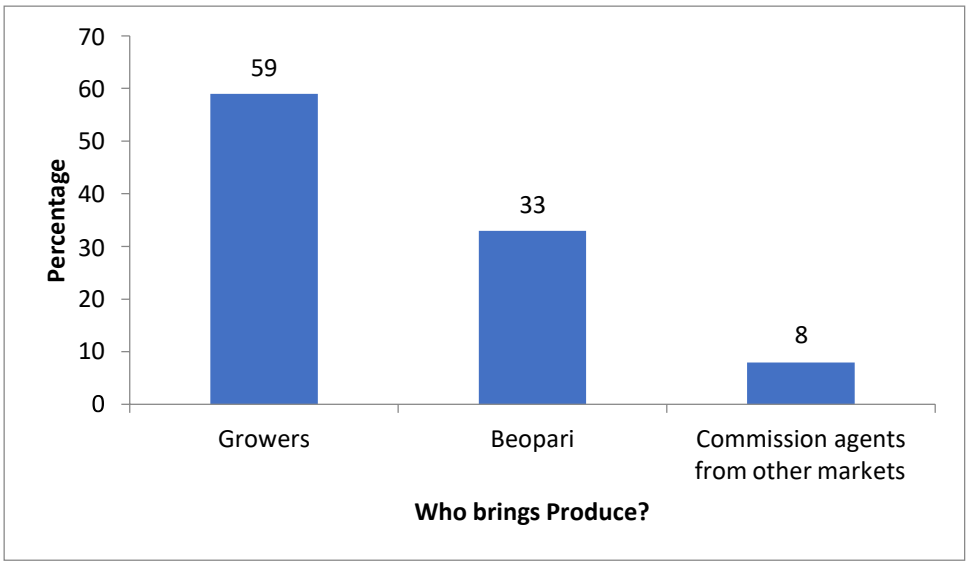


Figure 10 depicts the methods used for attracting suppliers; 42 percent of commission agents used credit for input purchase a method to attract suppliers of potato, 33 percent of commission agents provided better prices to attract suppliers, 17 percent of respondents attracted suppliers by giving advance payments and 8 percent used social relationships to attract suppliers.

Figure 10: Methods used to Attract Suppliers

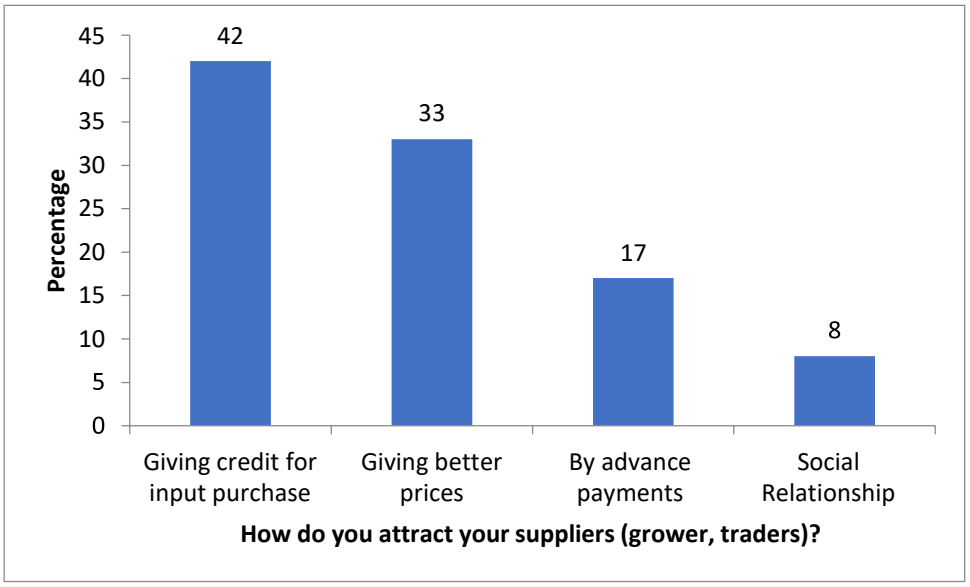


Figure 11 shows finance to growers; 92 percent of commission agents provided finance topotato growers and 8 percent of commission agents did not provide finance to potato growers.

Figure 11: Finance to Growers

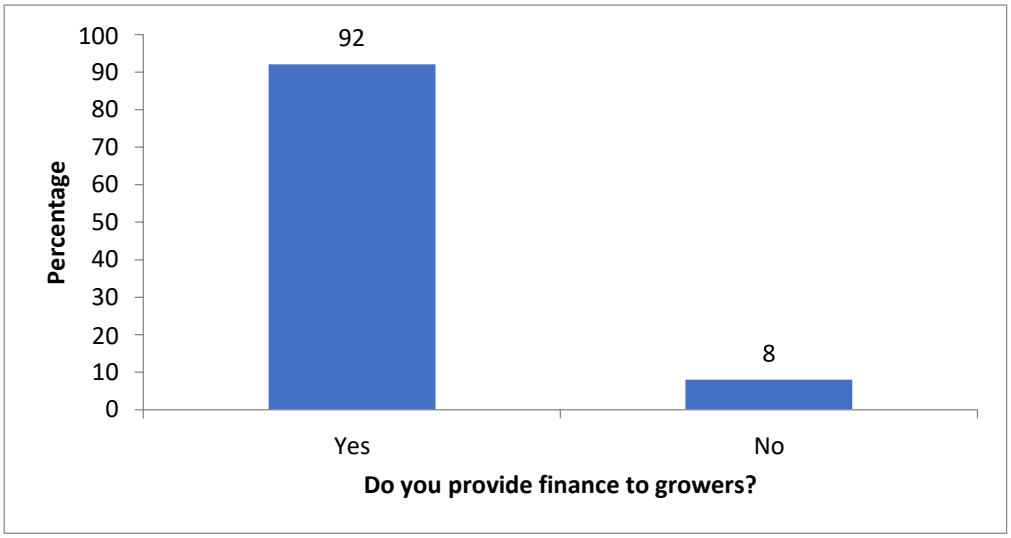


Table 3: Summary Statistics of Commission Agent's Auction Process

Variables	Description/Group	Frequency	%age
What is the time of Auction?	• Sahiwal: 05:00 AM • Okara: 10:00 AM • Depalpur: 10:00 AM		
After arrival of commodities, when do you perform the auction	Same Day	11	92
	Next Day	1	8
	After 2 or 3 Days	0	0
	Overall	**12**	**100**
Types of Auctions	Open	12	100
	Under Cover	0	0
	Overall	**12**	**100**
Who perform the auction function?	Commission agent himself	7	58
	Auctioneer	3	25
	Munshi	2	17
	Overall	**12**	**100**
Where Auction take place?	Trader shed	7	58
	Shop	5	42

	Overall	**12**	**100**
Who are the buyers from auction?	Wholesalers	8	67
	Retailers	3	25
	Exporters	1	8
	Overall	**12**	**100**
Do you display the product before auction?	Yes	12	100
	No	0	0
	Overall	**12**	**100**
Pattern of display	Variety	8	67
	Weight	1	8
	Grade	3	25
	Overall	**12**	**100**
How the base price for auction is determined?	Last day price	3	25
	Arrivals on that day	6	50
	Unsold stock	2	17
	Price in other markets	1	8
	Overall	**12**	**100**
Does grower's representative come in market for auction purpose?	Always	8	67
	Sometimes	3	25
	Never	1	8
	Overall	**12**	**100**
What is the Cost/Bag of auction including Parchi and other charges? (Rs)	Rs. 1.6		
Who pay for Loading / Unloading charges?	1. Farmer 2. Beopari		
What percentage is of unsold?	6.91 %		
How do you handle the unsold?	Sold Next Day		
Suggestion about current auction process	• Open space for Potato Trade should be available in Sahiwal • Proper space for potato auction should be provided		

	• All markets are congested, there is need to shift market from city center to peripheral areas of city • Lack of basic facilities, No shed during auction process

Figure 12 shows the time of auction after arrival of commodities; 92 percent of commission agents performed auction same day and 8 percent performed auction the very next day.

Figure 12: Auction Time

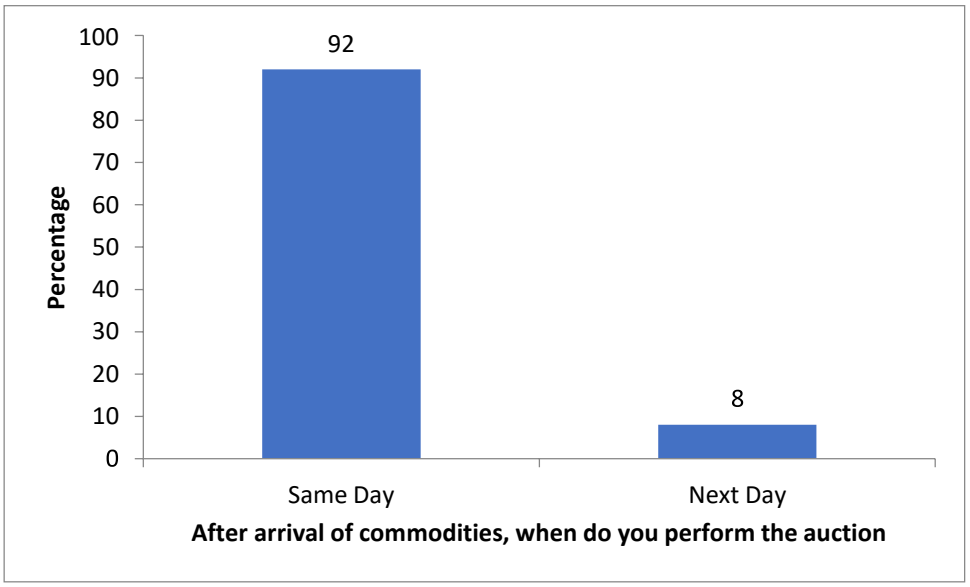


Figure 13 shows the type of auction performed by commission agents, all the commission agents which were interviewed performed open auction for potato and there was no undercover type of auction in the study area.

Figure 13: Type of Auction

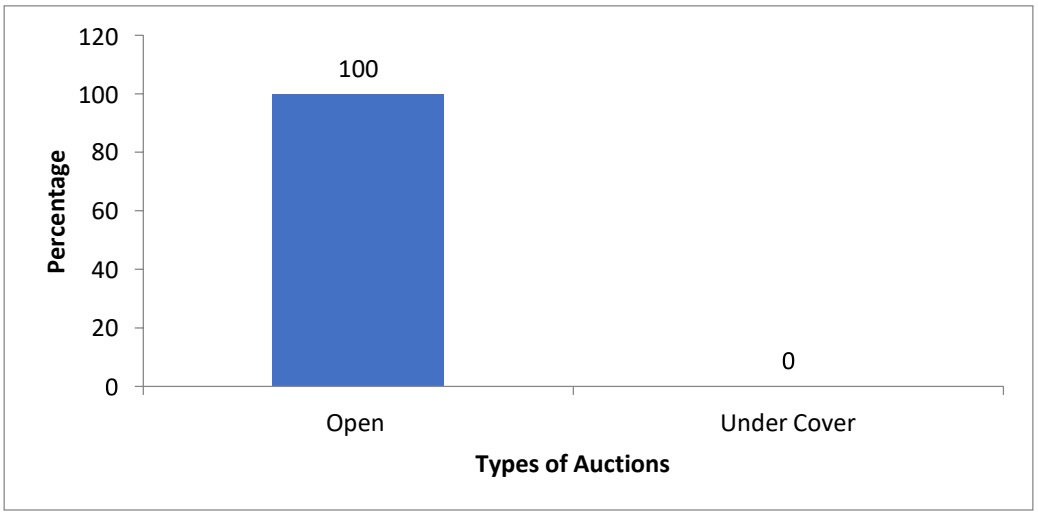


Figure 14 shows who perform the auction function; 58 percent of respondents said that commission agent himself performed auction function, 25 percent of respondents said that auctioneer performed auction and 17 percent said that munshi performed auction.

Figure 14: Who perform auction

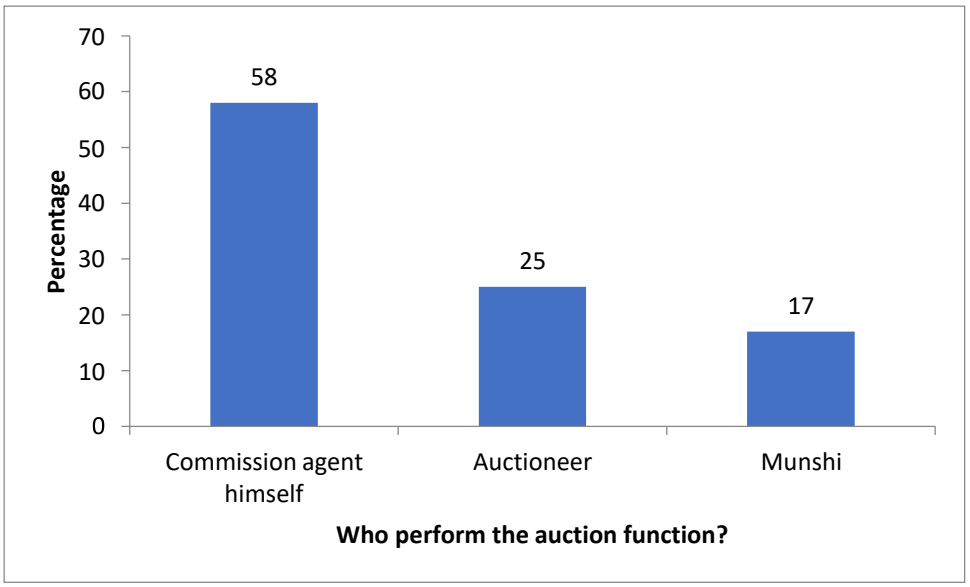


Figure 15 depicts the location of auction where it takes place, 58 percent of commission agents did auction in the trader sheds and 42 percent of commission agents did auction in the shops.

Figure 15: Location of Auction

Figure 16 shows the kind of buyers from auction; 67 percent buyers were wholesalers, 25 percent were retailers and 8 percent were exporters.

Figure 16: Buyers from auction

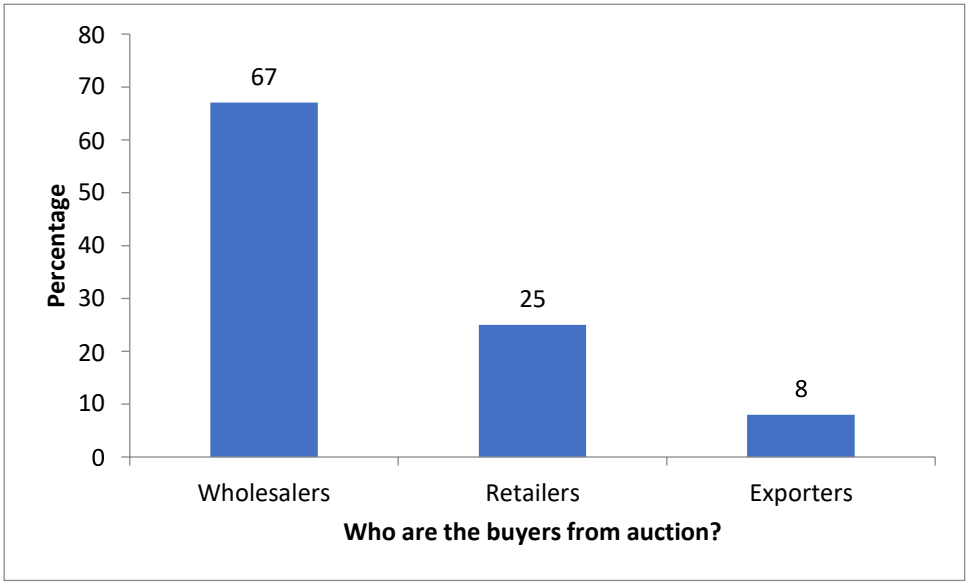


Figure 17 shows the display of product before auction; all of the interviewed commission agents display their product before the auction process.

Figure 17: Display of product before auction

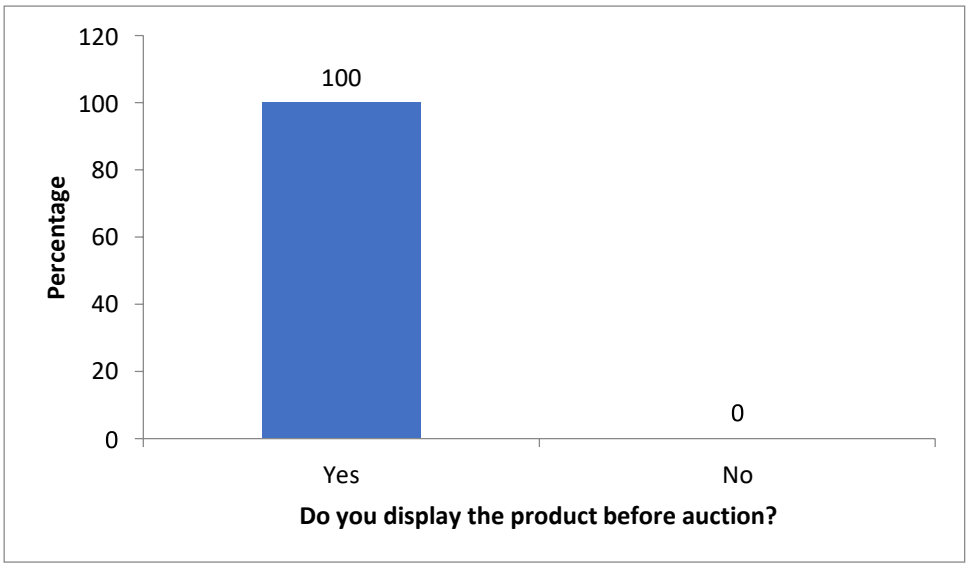


Figure 18 shows the patterns of display of potato adopted by commission agents during auction process; 67 percent of commission agents displayed the potato on the basis of variety, 25 percent displayed the potato on the basis of grade and 8 percent displayed the potato on the basis of weight.

Figure 18: Pattern of Display

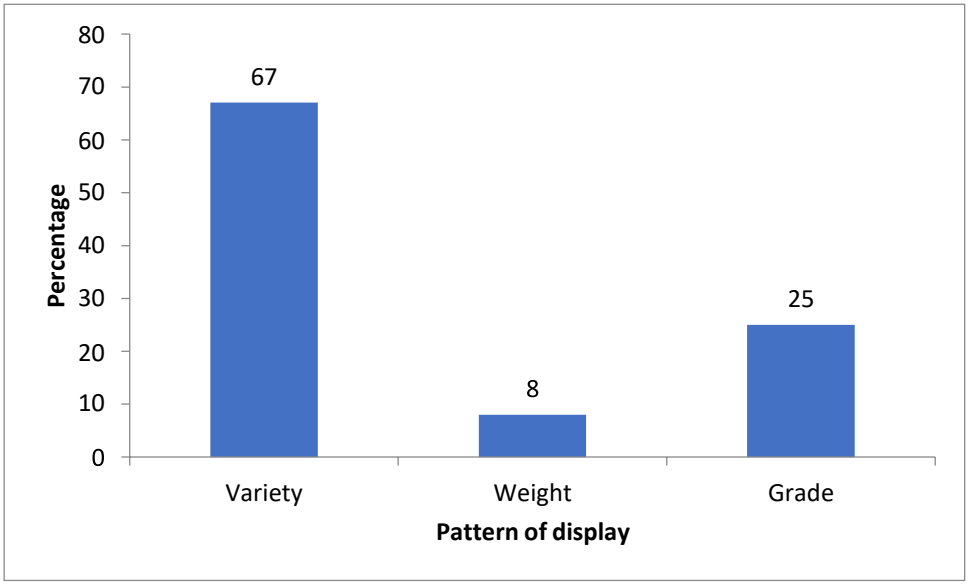


Figure 19 shows the method for the determination of base price of potato during the auction process. Major factors contributing towards the determination of base price are supply on same day (50 percent), last day price (25), unsold stock (17 percent), and prices in other markets (8 percent).

Figure 19: Determination of Base price of Potato

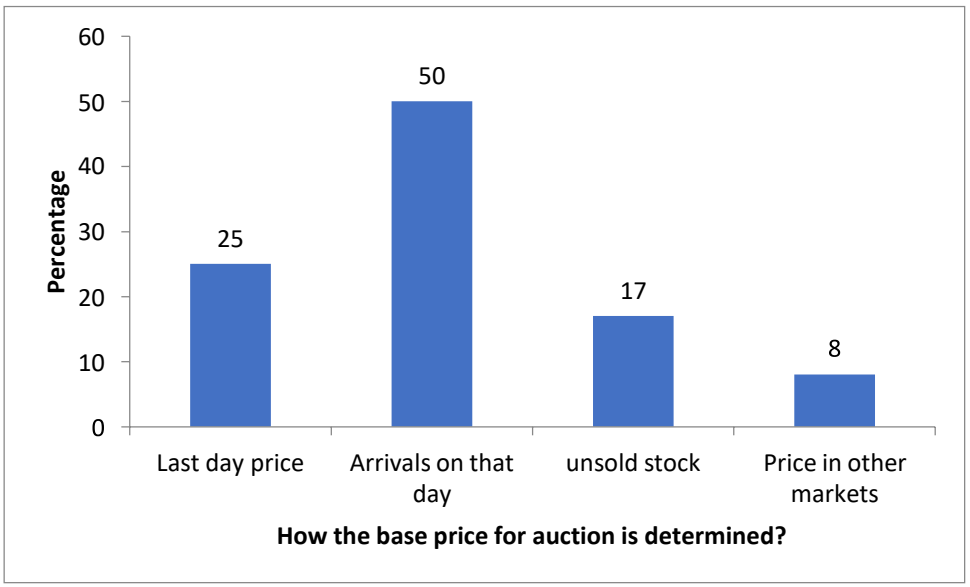


Figure 20 shows the visit of grower's representative during auction process in market, 67 percent of commission agents said that grower's representatives always visited the market for auction process, 25 percent said that sometimes visited the market for auction process and 8 percent of commission agents said that grower's representative never visited the market for auction process.

Figure 20: Visit of Grower's Representative during auction process

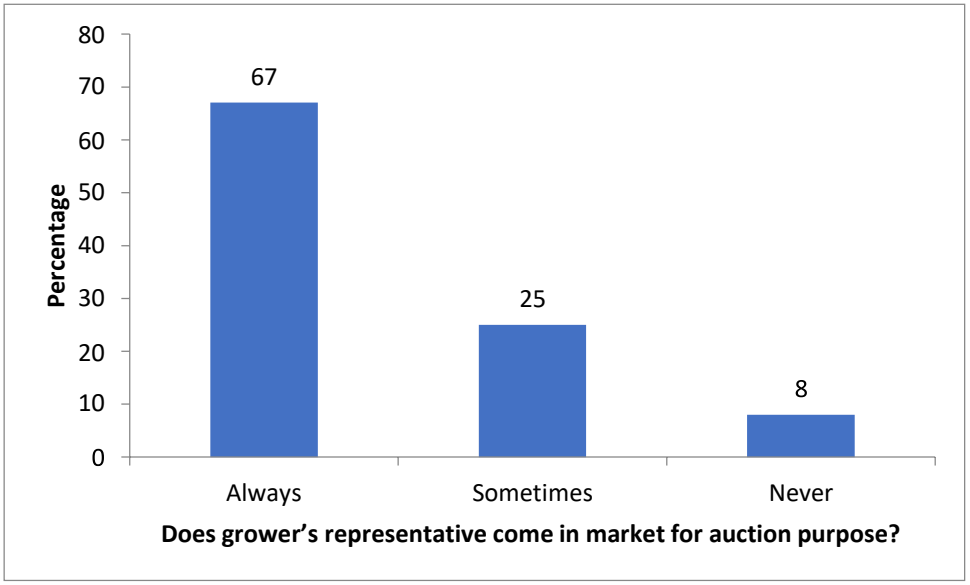


Table 4 showed the various costs of commission agents i.e. variable and fixed costs in detail. Table showed that permanent labor incurred more cost as compared to other costs. The average cost of commission agents was estimated Rs. 111673.

Table 4: Costs per Month (PKR) of Commission Agents

Cost	Sr#	Particulars	Total Cost (PKR)
Fixed/ capital	1	Shop rent	17500
	2	Infrastructure	3000
	3	Permanent labor	43000
	4	Other	2175
Variable	1	License fee	4400
	2	Casual labor	23087.5
	3	Utilities/ Bills	14511.1
	4	Miscellaneous Variable Costs	4000
		Total	111673.6

Table 5 shows that on an average commission agent traded 241 bags of red (fresh) potato and336 bags of white (stored) potato per day and each bag consists of 100 to 110 kilograms of potato. Average price per bag of red potato was Rs 2321 and price of white potato was Rs. 1872. Commission agents charged their commission from both seller and buyer at the rate of
3.5 percent each on an average. Income from commission was estimated for red potato was Rs. 39155 and income from commission for white potato was estimated Rs. 44029.

Table 5: Potato Trading Statistics

Variety	Unit traded (Bags/day/100-110 kgs)	Average Price/bag (Rs.)	Income from Commission (Rs.)
Red (Fresh)	241	2321	39155
White (Store)	336	1872	44029

4.3. Wholesalers Case

Table 1: Summary Statistics of Wholesaler's Socioeconomic Characteristics

Variables	Description/Group	Frequency	%age
Education	Illiterate	4	33
	Matric	6	50
	Intermediate	2	17
	Overall	**12**	**100**
Experience as Wholesaler	1 to 10	3	25
	11 to 20	6	50
	21 to 30	2	17
	Above 31	1	8
	Overall	**12**	**100**
Experience as Potato Wholesaler	1 to 10	5	42
	11 to 20	4	33
	21 to 30	2	17
	Above 31	1	8
	Overall	**12**	**100**
Family Business	Yes	7	**58**
	No	5	42
	Overall	**12**	**100**
Business capital	Personal Investment	7	58
	Investors	1	8
	borrowed from informal resources	2	17
	Formal sources (banks etc.)	2	17
	Overall	**12**	**100**
Shop Infrastructure	Own	5	42
	Rented	7	58
	Overall	**12**	**100**
Nature of Business	Sole proprietor	11	92
	Partnership	1	8

	Overall	**12**	**100**
Association registration	Yes	2	17
	No	10	83
	Overall	**12**	**100**
	Name of Association	Imtiaz and Company M Younas	
Record keeping	Yes	9	75
	No	3	25
	Overall	**12**	**100**
Basic requirements for wholesalers	Trading license	4	33
	Capital	3	25
	Experience	5	42
	Overall	**12**	**100**

Figure 1 shows that out of 12 interviewed potato wholesalers; majority 50 percent had matric degree, while 33 percent were illiterate, and 7 percent did intermediate.

Figure 1: Education of Respondents

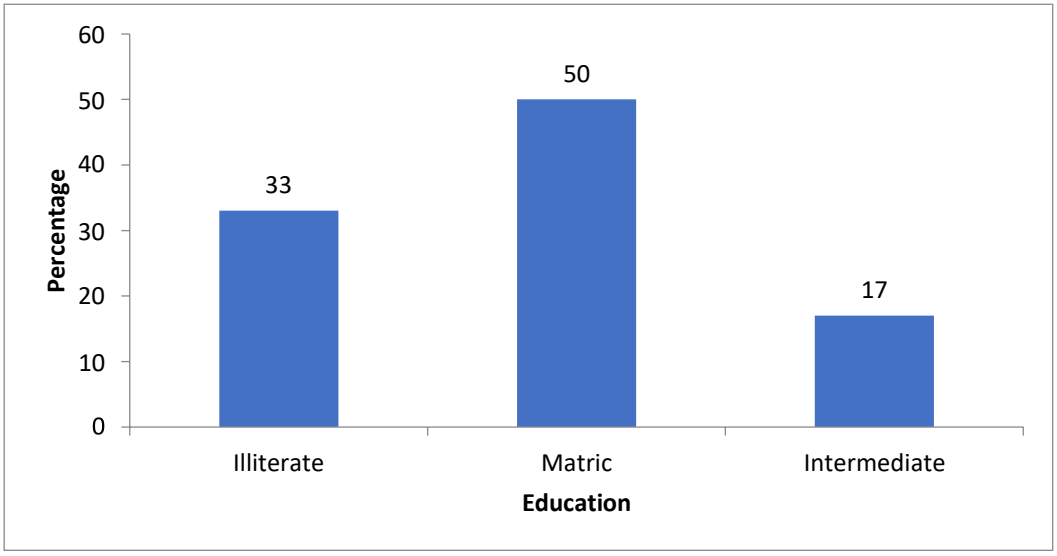


Figure 2 shows respondents experience as wholesaler; 50 percent of wholesaler had experience ranged from 11 to 20 years, while 25 percent had experience from 1 to 10 years, 17 percent had experience from 21 to 30 years and 8 percent had above 31 years.

Figure 2: Experience as Wholesaler

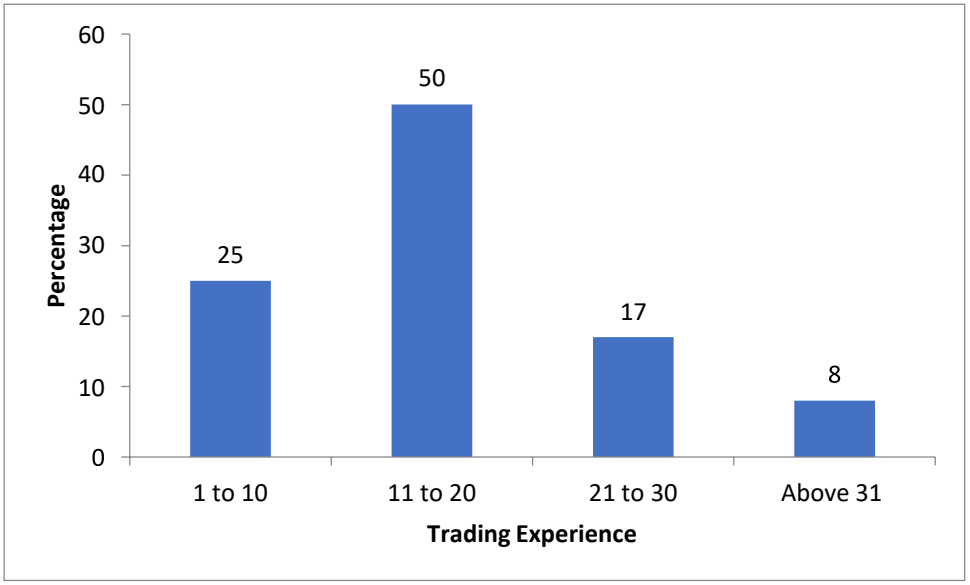


Figure 3 shows respondents experience as potato wholesaler; 42 percent of wholesaler had experience ranged from 1 to 10 years, while 33 percent had experience from 11 to 20 years and 17 percent had experience from 21 to 30 years and 8 percent had above 31 years.

Figure 3: Experience as Potato Wholesaler

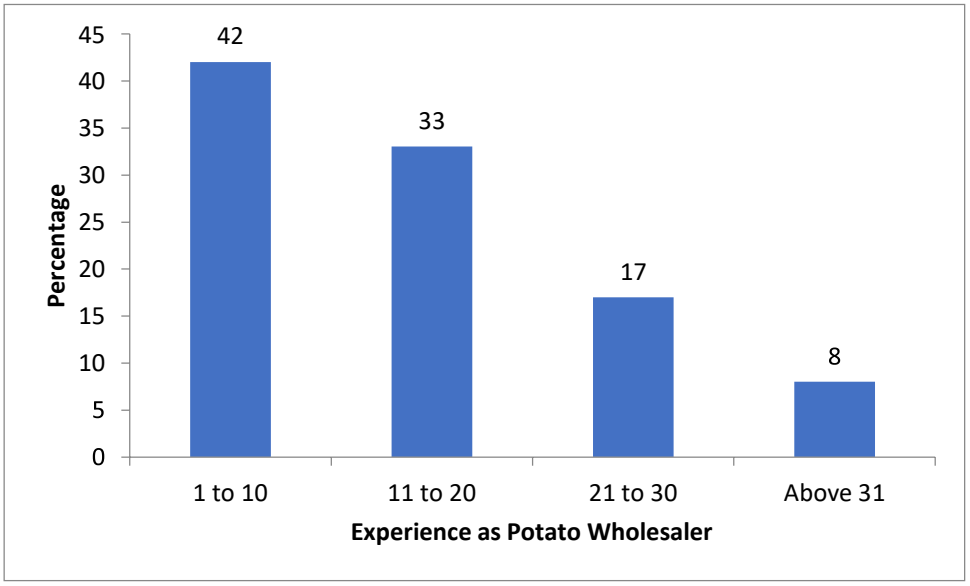


Figure 4 shows the family business of wholesalers; 58 percent of wholesalers said that this was their family business and 42 percent said this was not their family business and they started it on their own.

Figure 4: Family Business

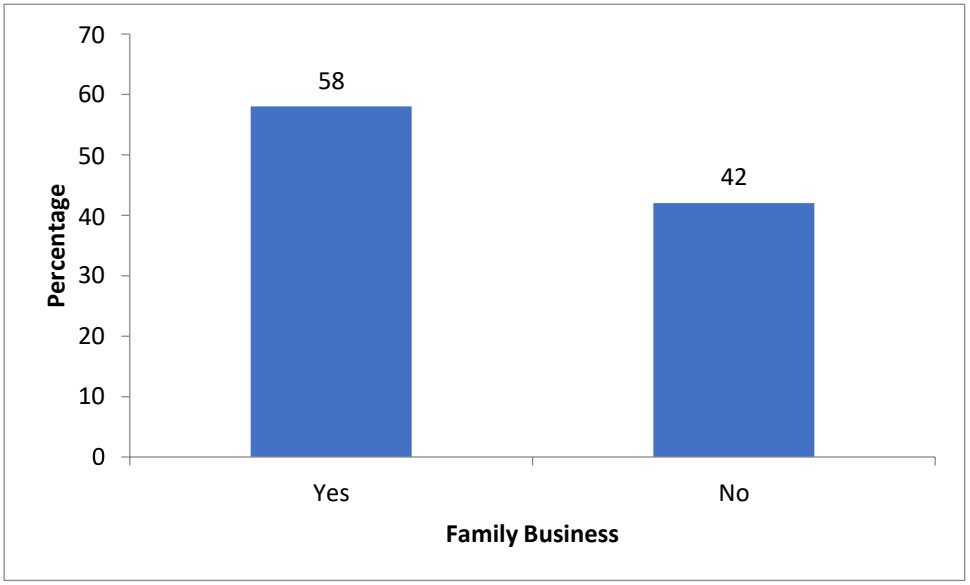


Figure 5 shows the business capital of wholesalers; 58 percent of wholesalers had their personal investment, 17 percent borrowed from formal sources such as banks and 8 percent of investors invested in their wholesalers business.

Figure 5: Business Capital

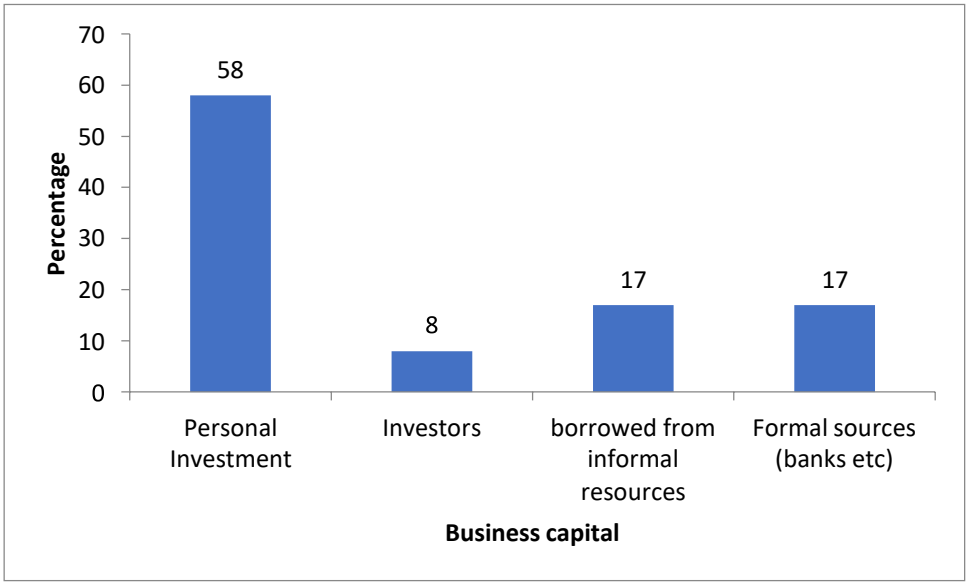


Figure 6 shows the shop infrastructure of wholesalers; 58 percent of wholesalers had their rented shop and 42 percent of wholesalers had their owned shops.

Figure 6: Shop Infrastructure

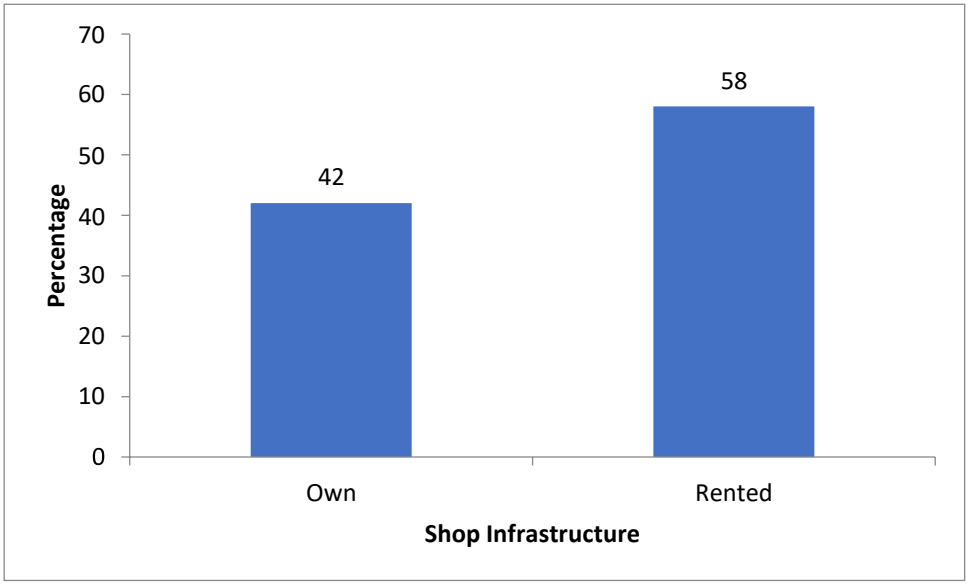


Figure 7 shows the nature of business of wholesalers; 92 percent of the wholesalers were doing their business as sole proprietor and 8 percent were doing the business with their partners.

Figure 7: Nature of Business

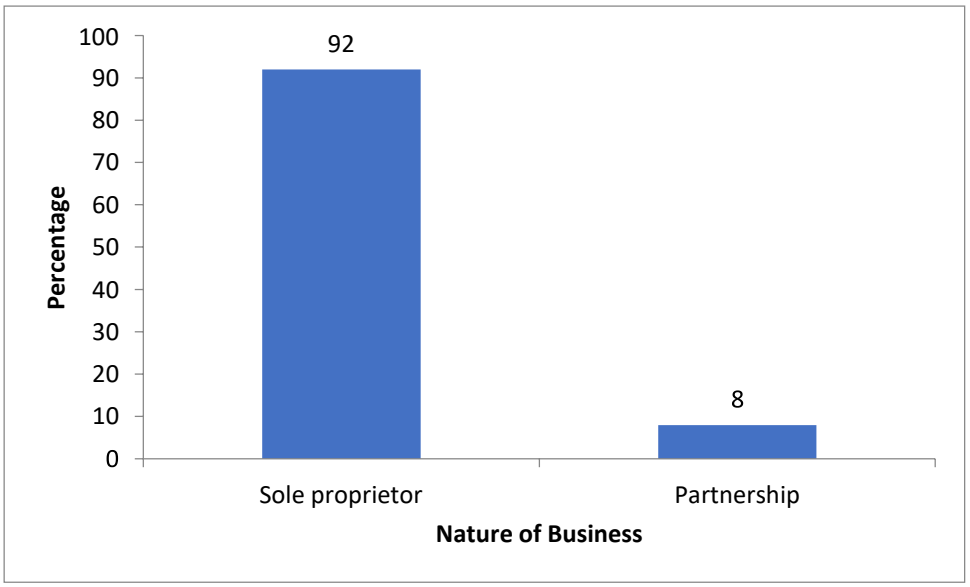


Figure 8 shows the association of registration of wholesalers; 17 percent of wholesalers were registered in any association and 83 percent were not registered members of any association.

Figure 8: Association Registration

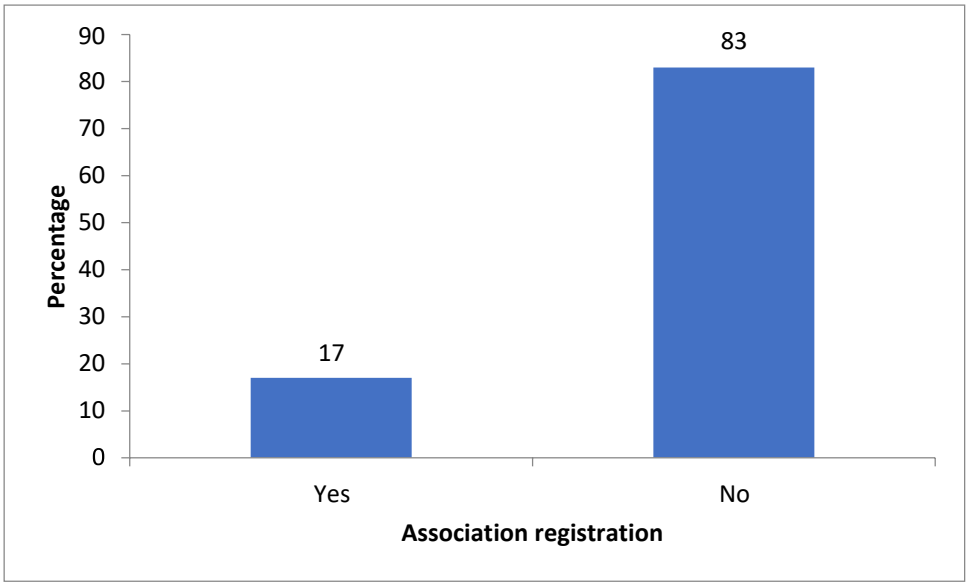


Figure 9 shows record keeping of business; 75 percent of wholesalers keep their records and 25 percent of wholesalers did not keep their records.

Figure 9: Record Keeping

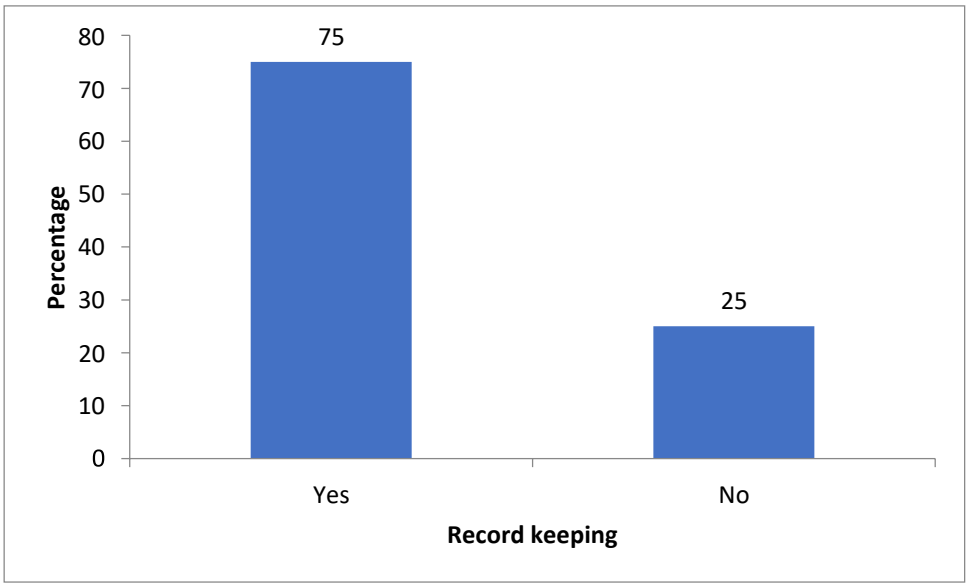


Figure 10 shows basic requirements for wholesale business; 42 percent of wholesalers said experience was basic requirement for doing wholesale business, 33 percent said trading license and 25 percent said capital was basic requirement for doing wholesale business.

Figure 10: Basic requirements for wholesale Business

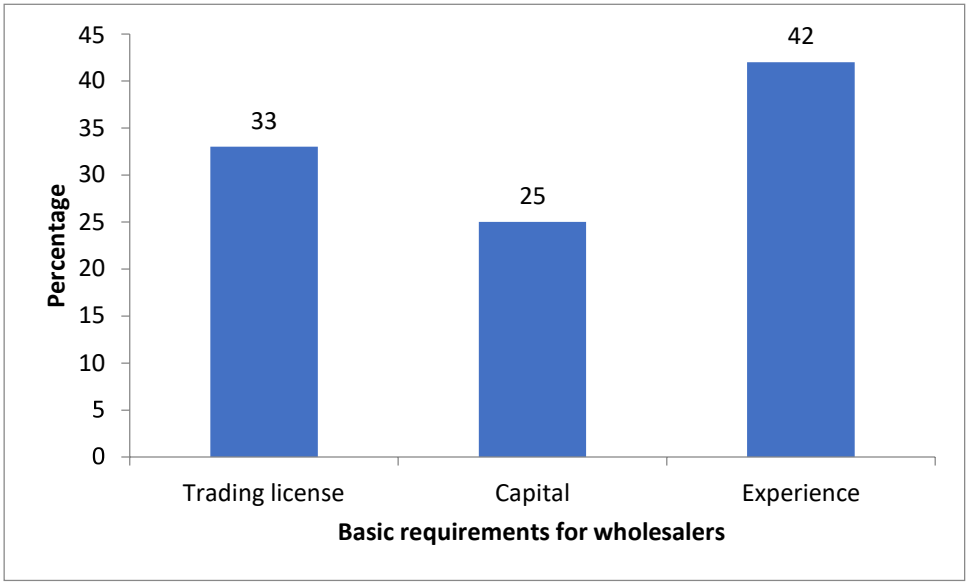


Table 2: Summary Characteristic of Potato Buying Practices

Variables	Description/Group	Frequency	%age
Potato buys from	Grower	1	8
	Aarthi	11	92
	Overall	**12**	**100**
Way of buying	Trading	2	17
	Auction	10	83
	Overall	**12**	**100**
Frequency of Buying	Daily	9	75
	Twice a Week	2	17
	Thrice a Week	1	8
	Overall	**12**	**100**
Buying Deal	Written	2	17
	Verbal	10	83
	Overall	**12**	**100**
How did you know the market prices?	Reference Group	2	17
	Open Market	9	75
	AMIS/ Govt Services	1	8
	Overall	**12**	**100**

Mode of buying	Credit	5	42
	Cash	7	58
	If on credit, what is due period?	Within 5 Days	
	Overall	**12**	**100**

Figure 11 shows the potato buying practices of wholesalers; 92 percent of wholesalers bought potato from Aarthi and only 8 percent bought directly from potato growers.

Figure 11: Potato Buying Practices

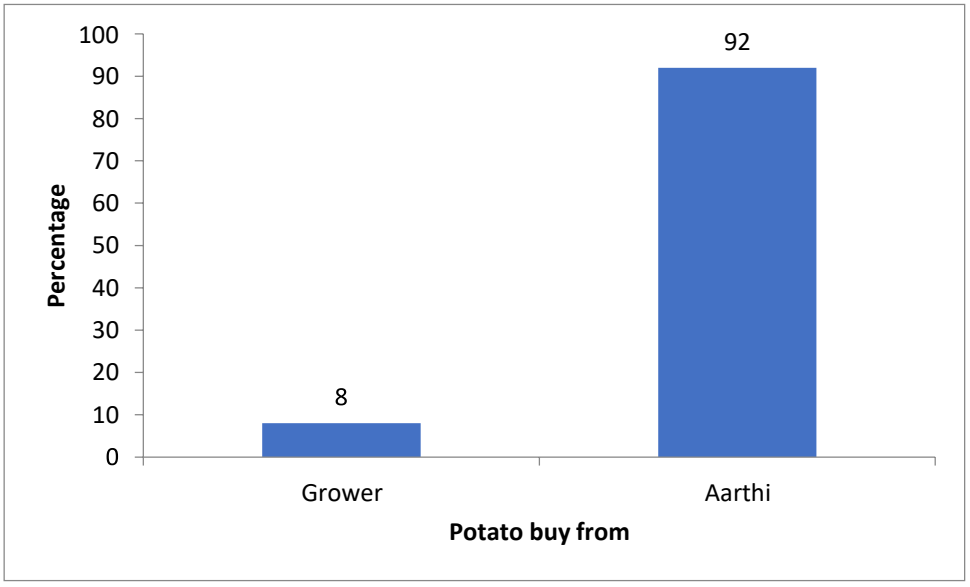


Figure 12 depicts the way of buying potato; 83 percent of wholesalers bought potato through process of auction and 17 percent bought potato through trading.

Figure 12: Way of buying

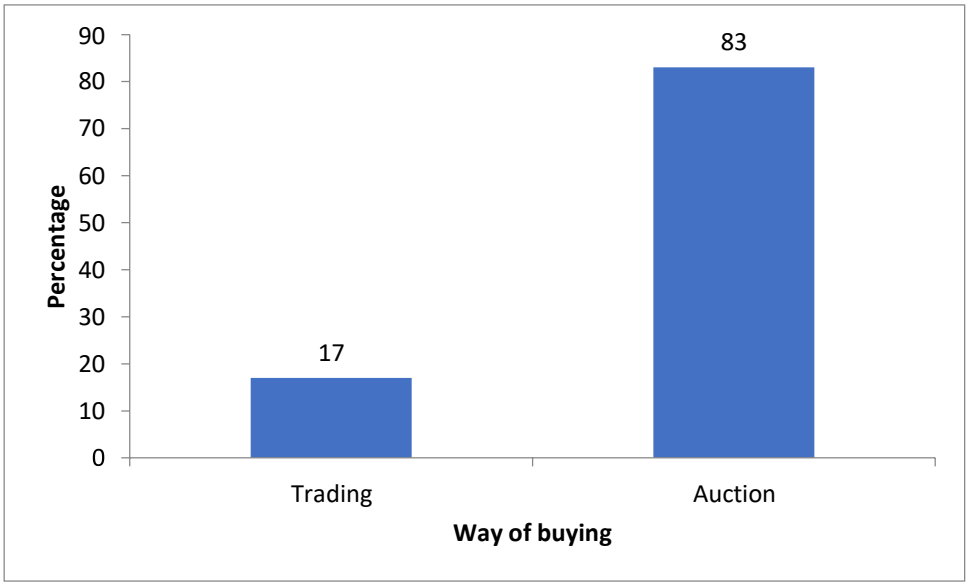


Figure 13 shows the frequency of buying potato; 75 percent of wholesalers bought potato daily,17 percent bought twice a week and 8 percent bought potato thrice a week.

Figure 13: Frequency of Buying

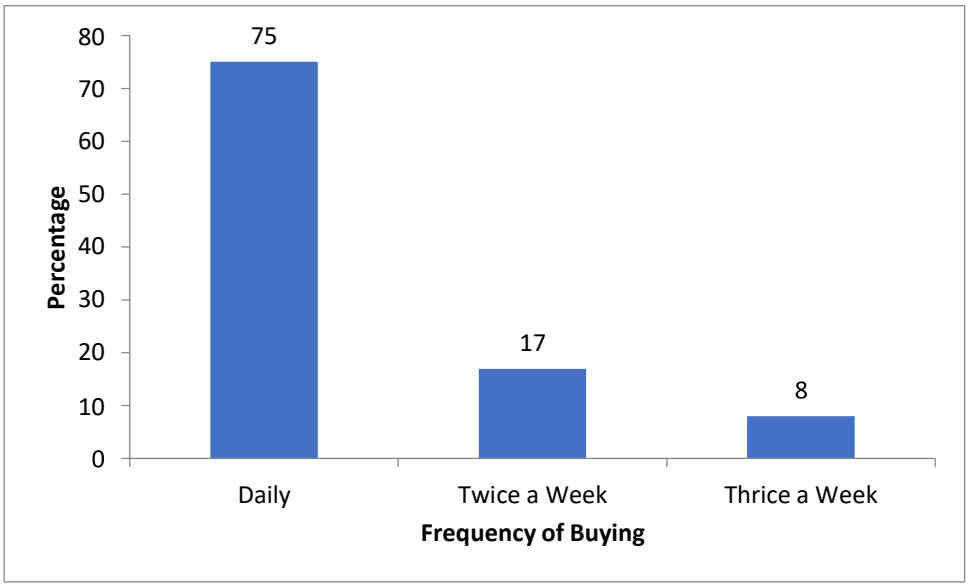


Figure 14 shows the buying deal of wholesalers; 83 percent of wholesalers did verbal deal and 17 percent did written agreement for buying of potato.

Figure 14: Buying deal

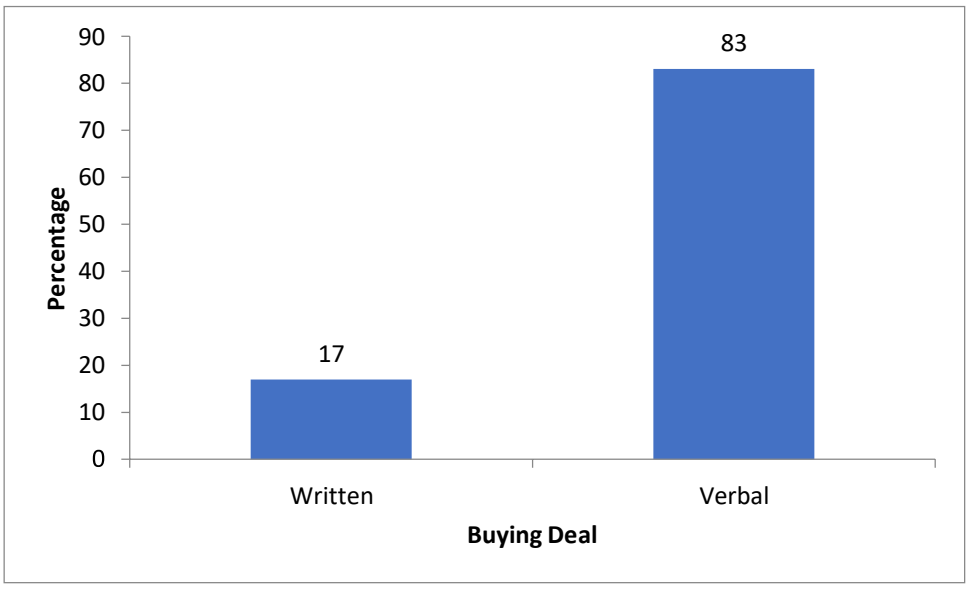


Figure 15 shows the information of market prices; 75 percent of wholesalers knew market prices from open market, 17 percent used their references to know market prices and 8 percent got prices from AMIS or other government services.

Figure 15: Market Prices

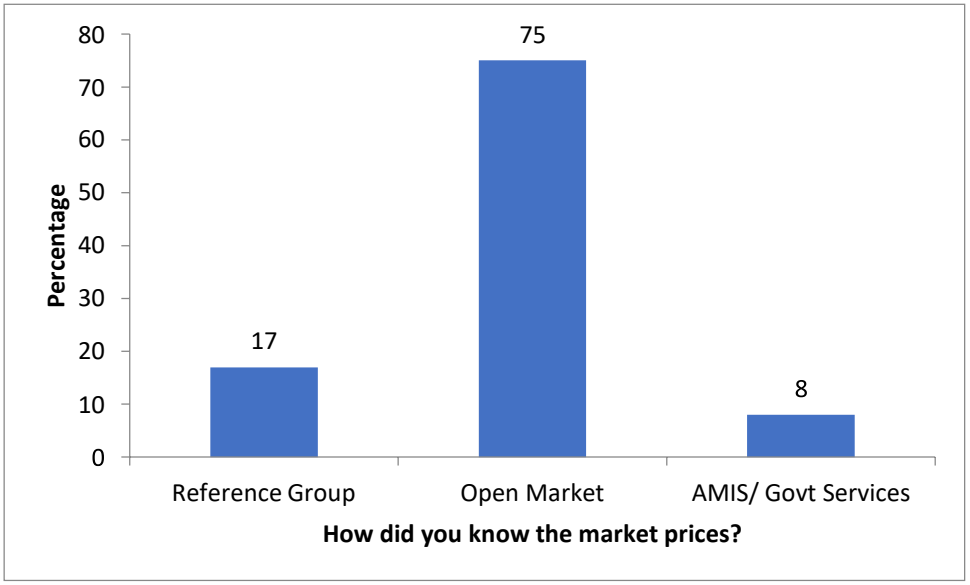


Figure 16 shows the mode of buying potato, 58 percent of wholesalers bought potato on cash basis and 42 percent bought potato on credit.

Figure 16: Mode of Buying

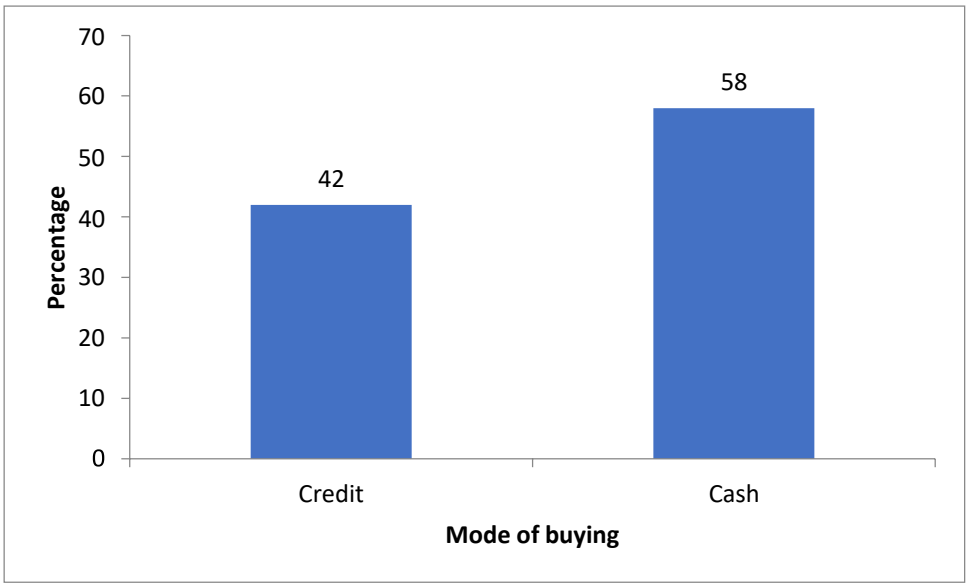


Table 3 elaborated summary characteristic of wholesaler preferences for potato attributes related to Search. Search attributes includes Shape of potato, Size of potato, Freshness of potato, variety of potato, undamaged of potato and unblemished of potato.

Table 3: Summary Characteristic of Wholesaler Preferences for Potato attributes(Search)

Variable	Attributes	Item/Description	Frequency	% age
Search	Shape	Not at all important	0	0
		Not very important	1	8
		Neutral	2	17
		Important	3	25
		Highly Important	6	50
		Overall	**12**	**100**
	Size	Not at all important	0	0
		Not very important	0	0
		Neutral	1	8
		Important	7	59
		Highly Important	4	33
		Overall	**12**	**100**
	Freshness	Not at all important	0	0
		Not very important	0	0
		Neutral	2	16
		Important	5	42
		Highly Important	5	42
		Overall	**12**	**100**
	Variety	Not at all important	0	0
		Not very important	1	8
		Neutral	1	8
		Important	8	67
		Highly Important	2	17
		Overall	**12**	**100**
	Undamaged	Not at all important	0	0
		Not very important	1	8
		Neutral	1	8
		Important	2	17
		Highly Important	8	67

		Overall	**12**	**100**
	Unblemished	Not at all important	0	0
		Not very important	0	0
		Neutral	0	0
		Important	4	33
		Highly Important	8	67
		Overall	**12**	**100**

Table 4 elaborated summary characteristic of wholesaler preferences for potato attributes related to Experience. Experience attributes includes Firmness of potato, ease of peeling of potato, taste of potato, Ripeness of potato and Dryness of potato.

Table 4 Summary Characteristic of Wholesaler Preferences for Potato attributes (Experience)

Variable	Attributes	Item/Description	Frequency	% age
Experience	**Firmness**	Not at all important	0	0
		Not very important	0	0
		Neutral	1	8
		Important	9	75
		Highly Important	2	17
		Overall	**12**	**100**
	Ease of peeling	Not at all important	0	0
		Not very important	1	8
		Neutral	1	8
		Important	8	67
		Highly Important	2	17
		Overall	**12**	**100**
	Taste	Not at all important	0	0
		Not very important	0	0
		Neutral	1	8

		Important	4	34
		Highly Important	7	58
		Overall	**12**	**100**
	Ripeness	Not at all important	0	0
		Not very important	1	8
		Neutral	2	17
		Important	8	67
		Highly Important	1	8
		Overall	**12**	**100**
	Dryness	Not at all important	0	0
		Not very important	1	8
		Neutral	6	50
		Important	5	42
		Highly Important	0	0
		Overall	**12**	**100**

Table 5 elaborated summary characteristic of wholesaler preferences for potato attributes related to Safety. Safety attributes includes cleanliness of potato and chemical free of potato.

Table 5 Summary Characteristic of Wholesaler Preferences for Potato attributes (Safety)

Variable	Attributes	Item/Description	Frequency	% age
Safety	**Cleanliness**	Not at all important	1	8
		Not very important	2	17
		Neutral	2	17
		Important	6	50
		Highly Important	1	8
		Overall	**12**	**100**
	Chemical free	Not at all important	1	8

		Not very important	1	8
		Neutral	5	42
		Important	3	25
		Highly Important	2	17
		Overall	**12**	**100**

Table 6 elaborated summary characteristic of wholesaler preferences for potato attributes related to Marketing. Marketing attributes includes price, Selling place cleanliness, Packaging, Grading and Branding.

Table 6: Summary Characteristic of Wholesaler Preferences for Potato attributes (Marketing)

Variable	Attributes	Item/Description	Frequency	% age
Marketing	**Price**	Not at all important	0	0
		Not very important	0	0
		Neutral	0	0
		Important	5	42
		Highly Important	**7**	58
		Overall	**12**	**100**
	Selling place cleanliness	Not at all important	2	17
		Not very important	1	8
		Neutral	0	0
		Important	5	42
		Highly Important	4	33
		Overall	**12**	**100**
	Packaging	Not at all important	4	33
		Not very important	1	8
		Neutral	4	33
		Important	3	26
		Highly Important	0	0
		Overall	**12**	**100**
	Grading	Not at all important	0	0

		Not very important	2	17
		Neutral	0	0
		Important	6	50
		Highly Important	4	33
		Overall	**12**	**100**
	Branding	Not at all important	4	33
		Not very important	5	42
		Neutral	1	8
		Important	2	17
		Highly Important	0	0
		Overall	**12**	**100**

Table 7: Summary Statistics of Wholesaler's Selling Practices

Variables	**Description/Group**	**Frequency**	**%age**
To whom you sell?	Retailer	7	58
	Processor	2	17
	Exporters	0	0
	Consumer	3	25
	Overall	**12**	**100**
How do you attract your buyers	Offering quality product	6	50
	Giving better prices	3	25
	Giving discount	1	8
	Selling on credit	2	17
	Overall	**12**	**100**
Selling price determining factors?	Labor Costs	3	25
	Market Forces (Demand/Supply)	6	50
	Quality of Product	2	17
	Size of Produce	1	8
	Overall	**12**	**100**
Mode of selling	Credit	5	42
	Cash	7	58

	Overall	**12**	**100**
Do you offer online services?	Yes	1	8
	No	11	92
	Overall	**12**	**100**

Figure 17 shows wholesaler potato selling practices; 58 percent of wholesalers sold potato to retailers, 25 percent to consumer and 17 percent to processors.

Figure 17: Potato Selling Practices

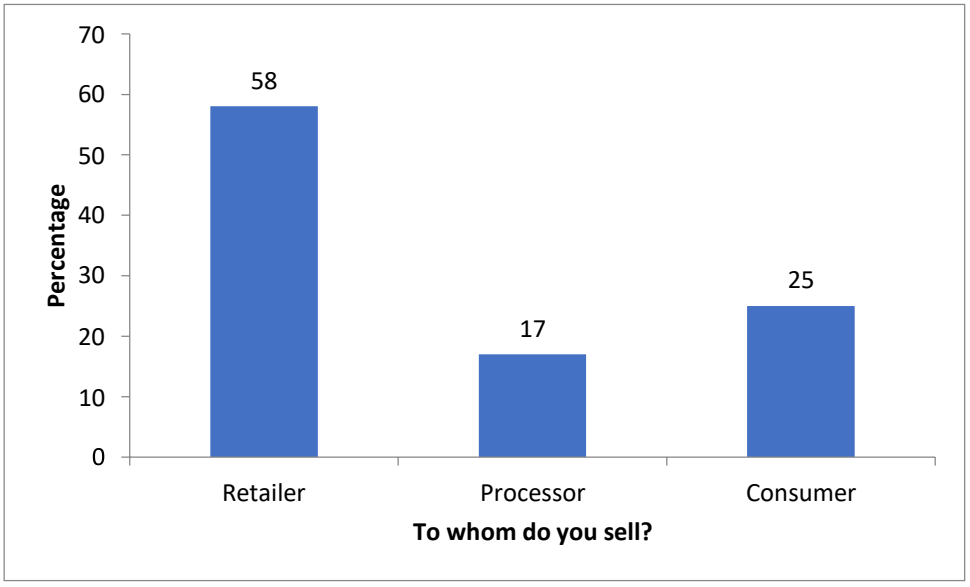


Figure 18 depicts the methods used for attracting buyers; 50 percent of wholesalers used to offer quality product a method to attract buyers, 25 percent provided better prices to attract buyers, 17 percent attracted buyers by selling on credit and 8 percent used discount rates.

Figure 18: Buyers Attracting Practices

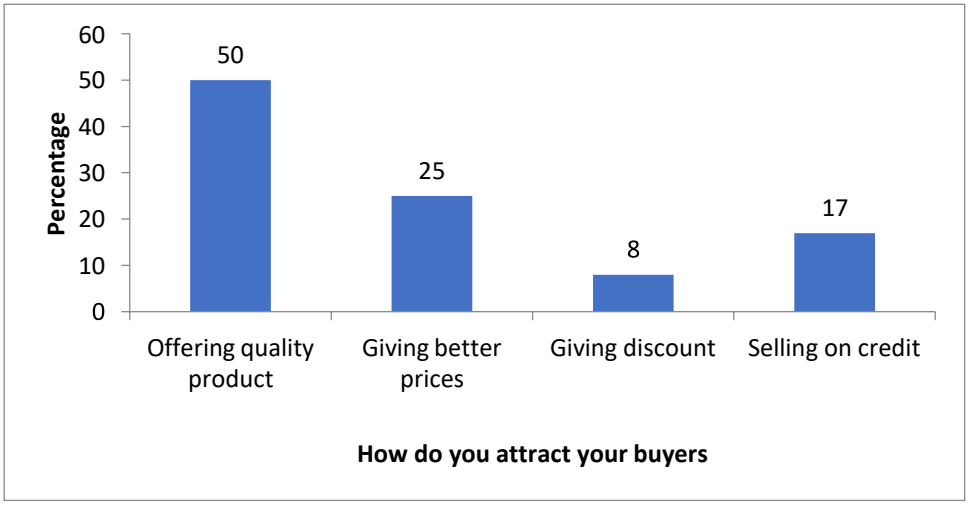


Figure 19 shows the selling price determining factors; 50 percent used market forces as determining factor to settle price, 25 percent considered labor and other costs, 17 percent used quality of produce and 8 percent used size of produce as selling price determining factor.

Figure 19: Selling price determining factors

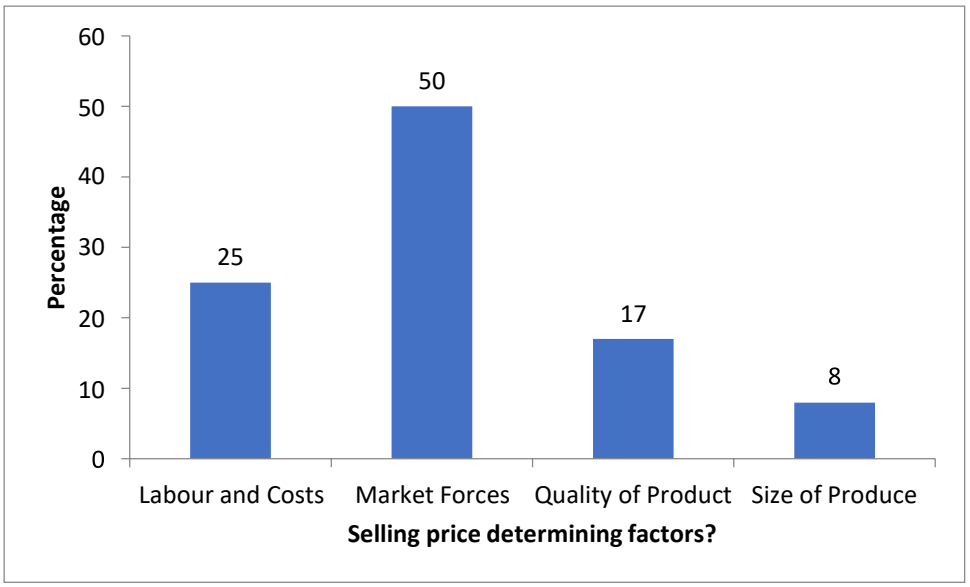


Figure 20 depicts the model of selling by the wholesalers; 58 percent sold their products on cash and 42 percent on credit.

Figure 20: Mode of Selling

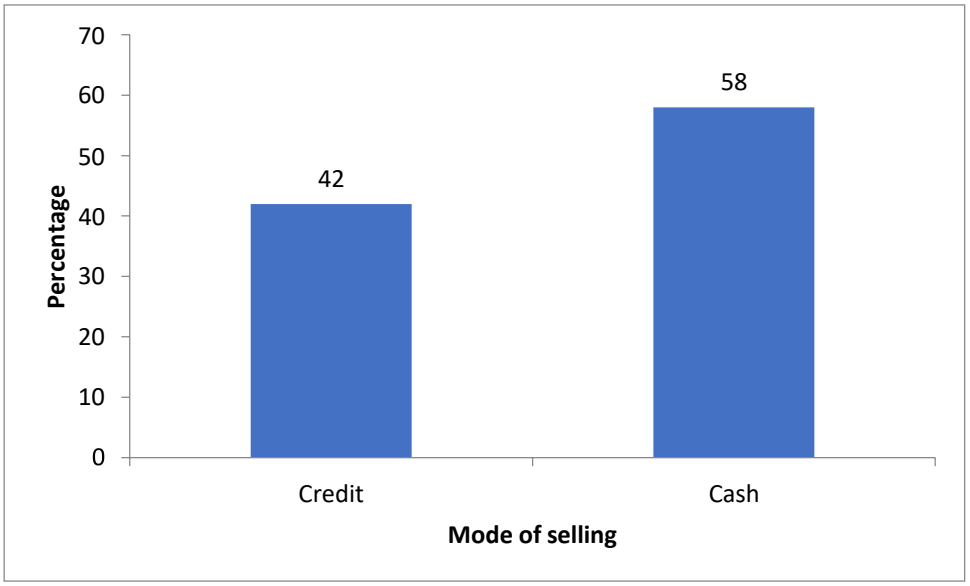


Figure 21 shows the online selling services to customers by the wholesalers; 92 percent of did not provide online selling services and only 8 percent provided the online services.

Figure 21: Online Services

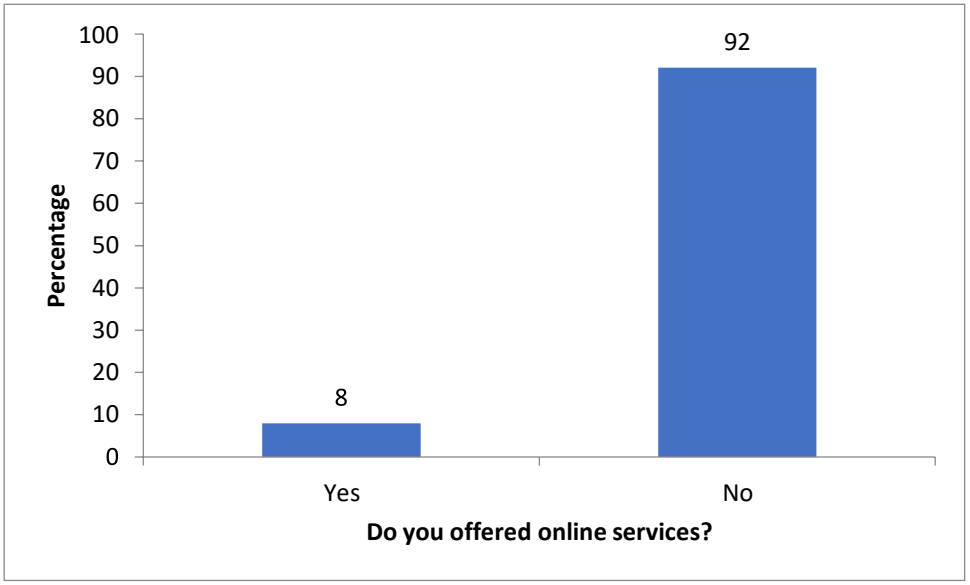


Table 8: Summary Statistics of Wholesaler's Post-harvest Management Practices-I (Cleaning & Washing)

Variables	Description/Group	Frequency	%age
Do you clean or wash?	Yes	5	42
	No	7	58
	Overall	**12**	**100**
Method of clean & Wash	Manual	5	100
	Mechanized	0	0
	Overall	**5**	**100**
Any loss during clean & Wash	Yes	4	80
	No	1	20
	If Yes, No. of Bag loss	3 Bags	
	Overall	**5**	**100**
Reason of Loss	Un-skilled labor	3	60
	Lack of equipment	2	40
	Overall	**5**	**100**
Problems	Lack of Skilled Labor	2	40
	Lack of equipment	1	20
	Lack of Extension Services	2	40
	Overall	**5**	**100**

Figure 22 shows the cleaning or washing of potato by the wholesalers, 58 percent did not cleanor wash potatoes and 42 percent cleaned their potato.

Figure 22: Cleaning of Potato

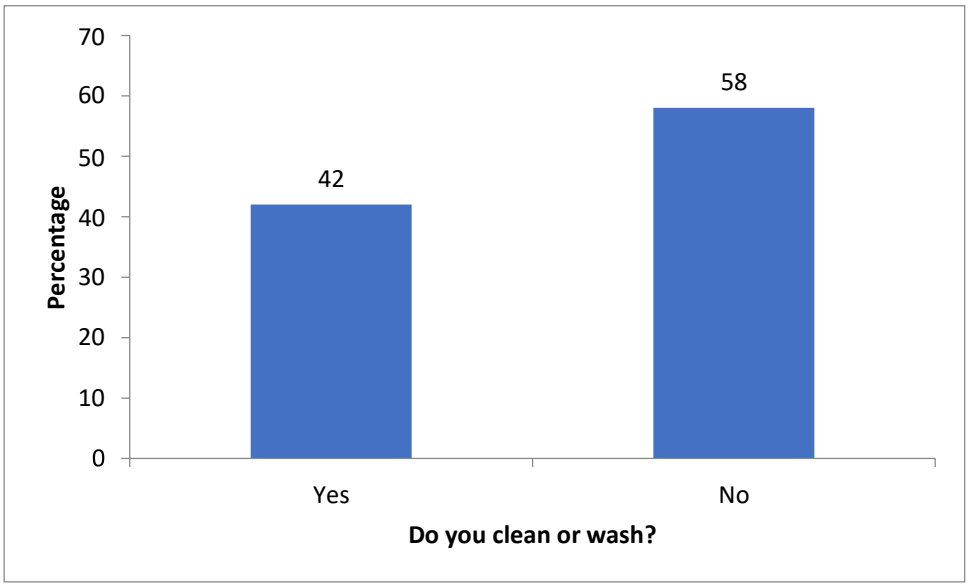


Figure 23 shows the method of cleaning and washing by the wholesalers, cleaning was done both manually and mechanically. All the wholesalers who were interviewed did cleaning manually.

Figure 23: Method of Cleaning

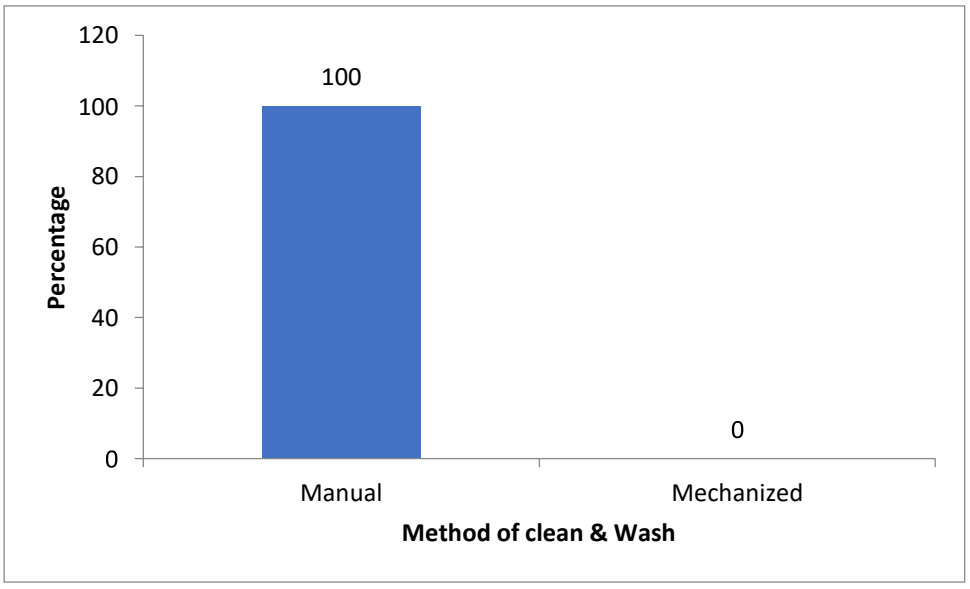


Figure 24 shows losses during cleaning of potato, 80 percent of wholesalers agreed that there were losses during cleaning and 20 percent said that there were not any losses during cleaning and washing of potato.

Figure 24: Losses during cleaning

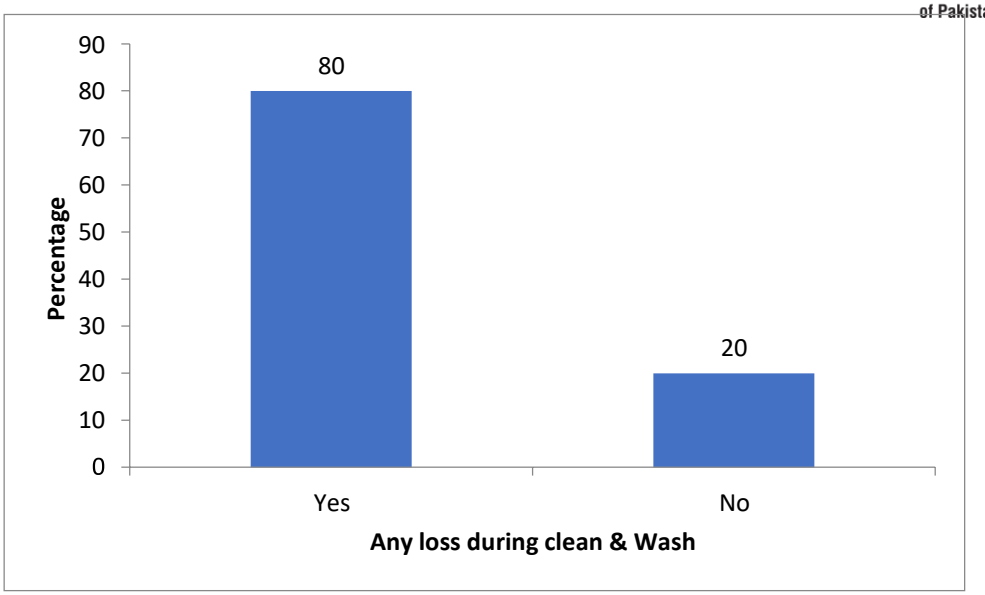


Figure 25 shows the main reason of losses during cleaning of potato; 60 percent of wholesalers said that un-skilled labor was the main reason during cleaning of potato and 40 percent said lack of proper equipment for cleaning was reason of losses.

Figure 25: Reason of Loss

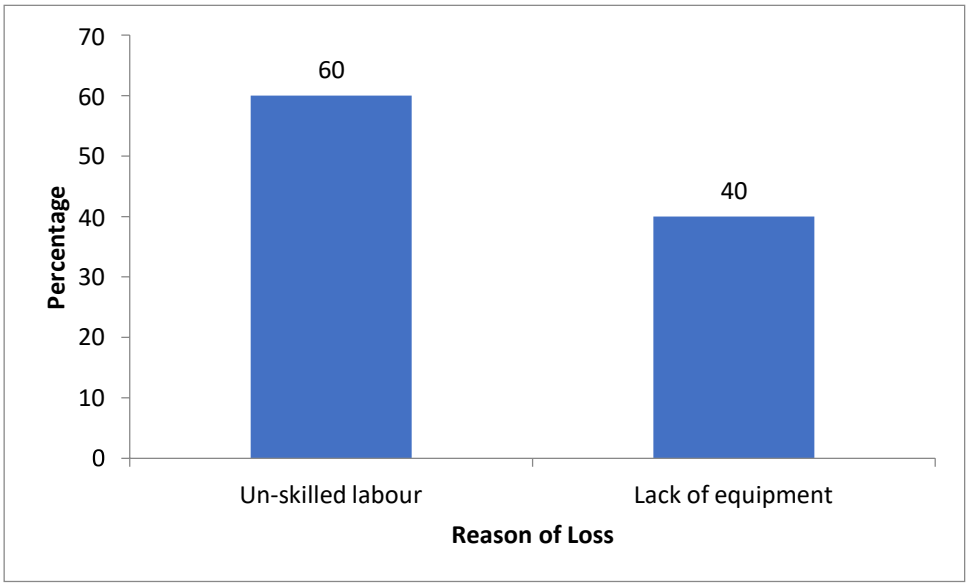


Figure 26 elaborated the problems being faced by wholesalers during cleaning and washing of potato, 40 percent observed lack of skilled labor, while 40 percent observed lack of extension services and 20 percent said that lack of proper equipment were main problems.

Figure 26: Problems of Cleaning and Washing

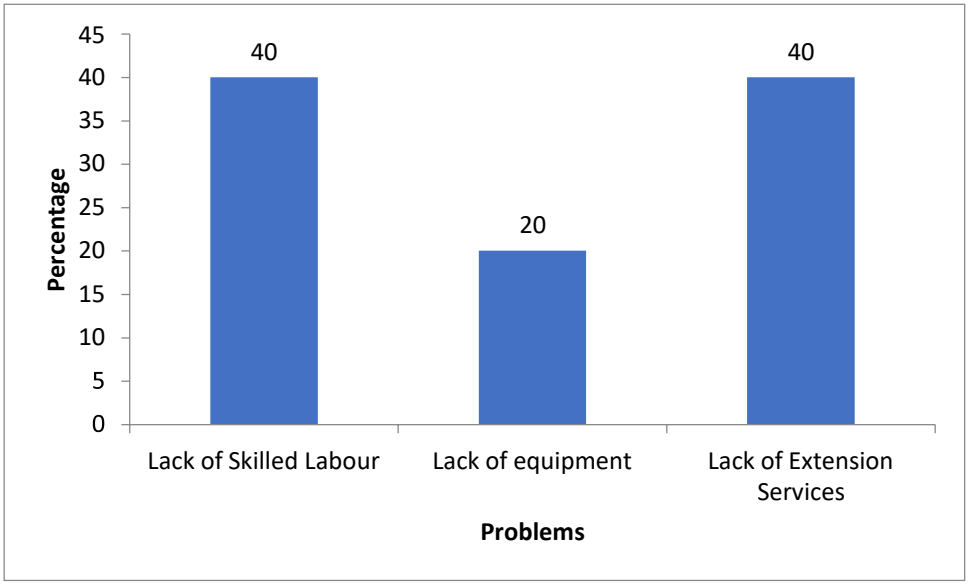


Table 9: Summary Statistics of Wholesaler's Post-harvest Management Practices-II (Sorting & Grading)

Variables	Description/Group	Frequency	%age
Do you sort & grade?	Yes	12	100
	No	0	0
	Overall	**12**	**100**
Method of sort & grade?	Manual	12	100
	Mechanized	0	0
	Overall	**12**	**100**
Any loss during sort & grade	Yes	7	58
	No	5	42
	If Yes, No. of Bag Losses	1.5 Bags	
	Overall	**12**	**100**
How do you sort & grade?	By Size	2	17
	By Color	5	42
	Variety	4	33
	Shape	1	8
	Overall	**12**	**100**

How many grades?	3		
Name of grades?	Small Medium Large		
Why do you sort & grade?	Market Demand	10	83
	Traditional way	2	17
	Overall	**12**	**100**
Problems	Lack of Skilled labor	5	42
	High Skilled Labor Cost	3	25
	Lack of Extension Services	4	33
	Overall	**12**	**100**

Figure 27 shows the sorting and grading by the wholesalers; all the wholesalers who were interviewed did sorting and grading.

Figure 27: Sorting and Grading

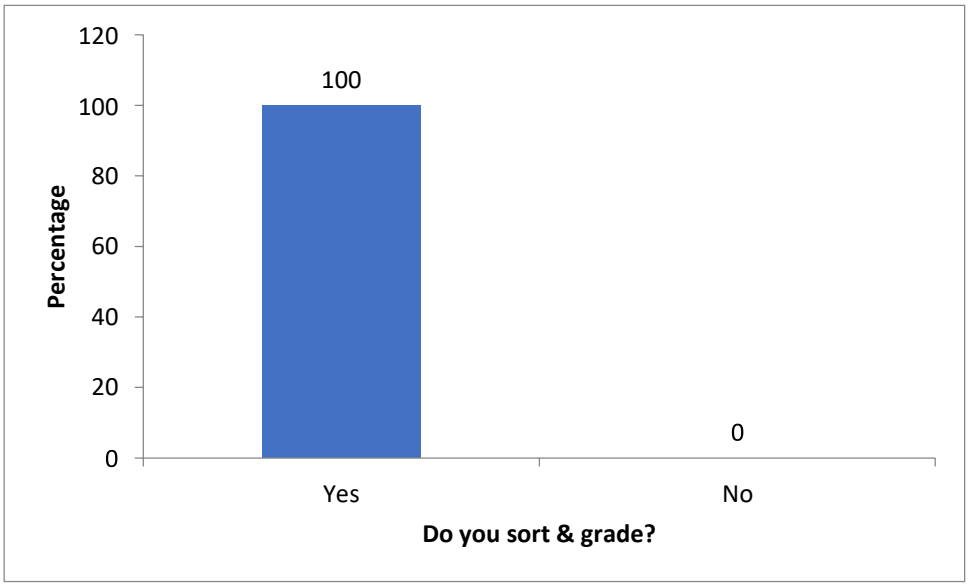


Figure 28 shows the method of sorting and grading by the wholesalers, all the wholesalers did sorting and grading manually.

Figure 28: Method of Sorting and Grading

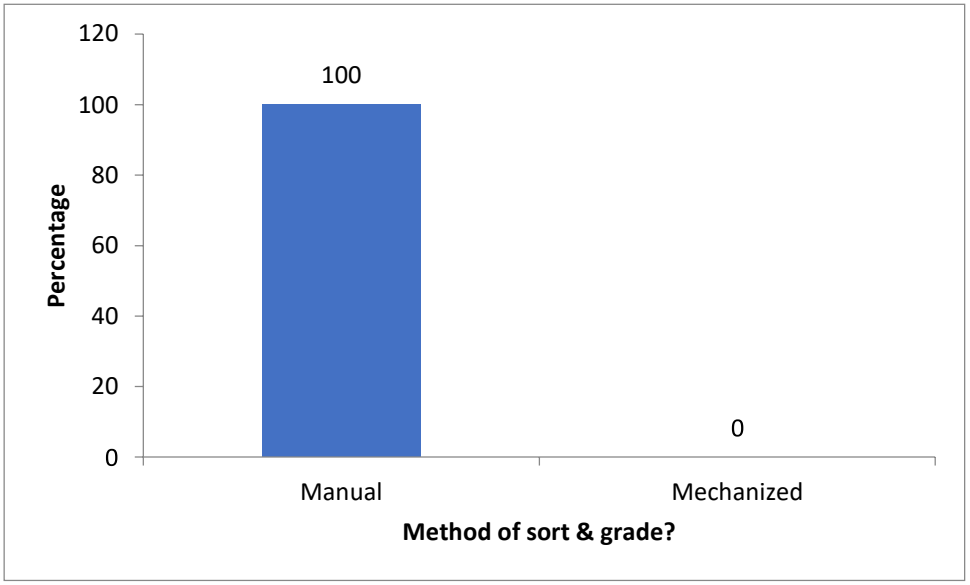


Figure 29 shows the loss during sorting and gradin; 58 percent of wholesalers agreed that there were losses observed during sorting and grading and 42 percent said that there were not any losses during sorting and grading.

Figure 29: Loss during sorting and grading

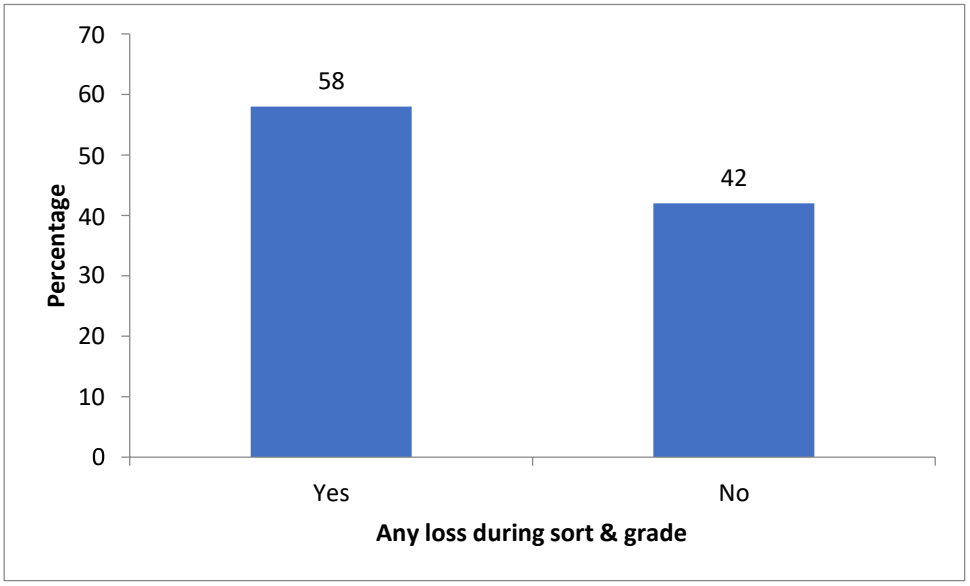


Figure 30 shows the method of sorting and grading; 42 percent sorted and graded on basis of color, 33 percent on basis of variety, 17 percent on basis of size of potato and 8 percent on the basis of shape of potato.

Figure 30: Method of Sorting and Grading

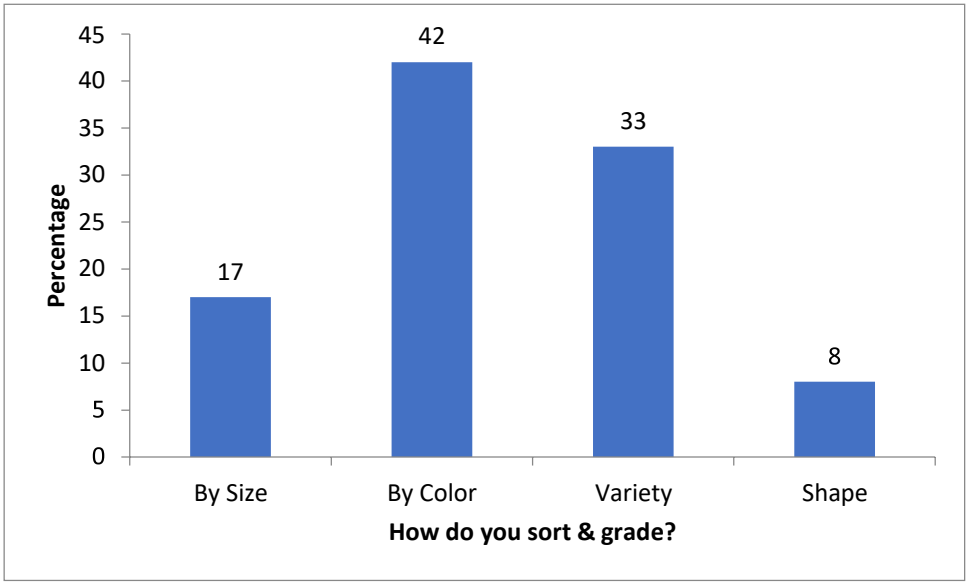


Figure 31 shows the reasons to sorting and grading, 83 percent of wholesalers sorted and graded their potato due to market demand and 17 percent due to traditional way.

Figure 31: Reasons to Sorting and Grading

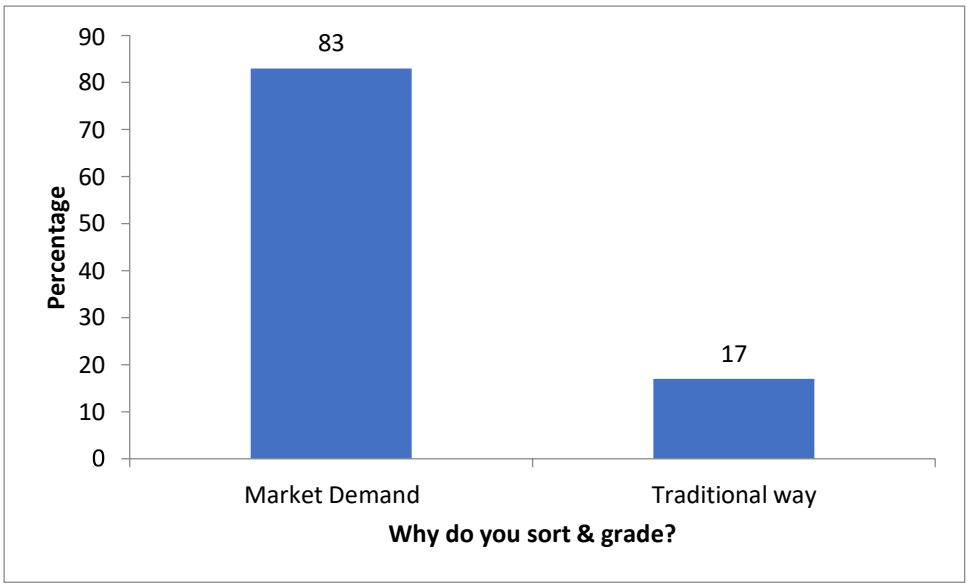


Figure 32 shows the problems being faced by wholesalers during sorting and grading of their produce, 42 percent faced the problem of lack of skilled labor, 33 percent faced the lack of extension services and 25 percent faced high skilled labor cost during sorting and grading of potato.

Figure 32: Problems of Sorting and Grading

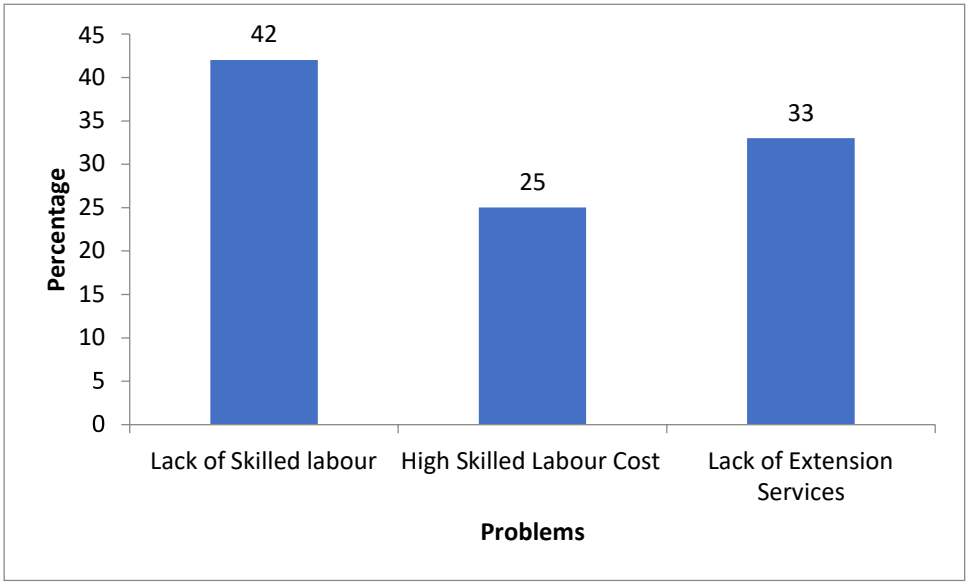


Table 10: Summary Statistics of Wholesaler's Post-harvest Management Practices-III (Packaging)

Variables	Description/Group	Frequency	%age
Do you perform packaging?	Yes	7	58
	No	5	42
	Overall	**12**	**100**
Materials of Packaging?	Plastic crates	1	14
	Polythene bags	6	86
	Jute Bags	0	0
	Overall	**7**	**100**
Any loss during Packaging?	Yes	**3**	43
	No	4	57
	Overall	**7**	**100**
Methods of Packaging?	Manual	7	100
	Mechanized	0	0
	Overall	**7**	**100**
Where do you buy Packaging materials?	Locally Available	5	71
	From District Market	2	29
	Overall	**12**	**100**
	Packaging	1	14

How do you label/brand?	Marka	4	57
	No	2	29
	Overall	**7**	**100**
Problems	Lack of skilled labor	1	14
	Shortage of Material	2	29
	High Packaging Cost	4	57
	Lack of Extension Services	0	0
	Overall	**7**	**100**

Figure 33 shows the packaging by wholesalers, 58 percent did packaging of their produce and 42 percent did not pack their produce.

Figure 33: Packaging

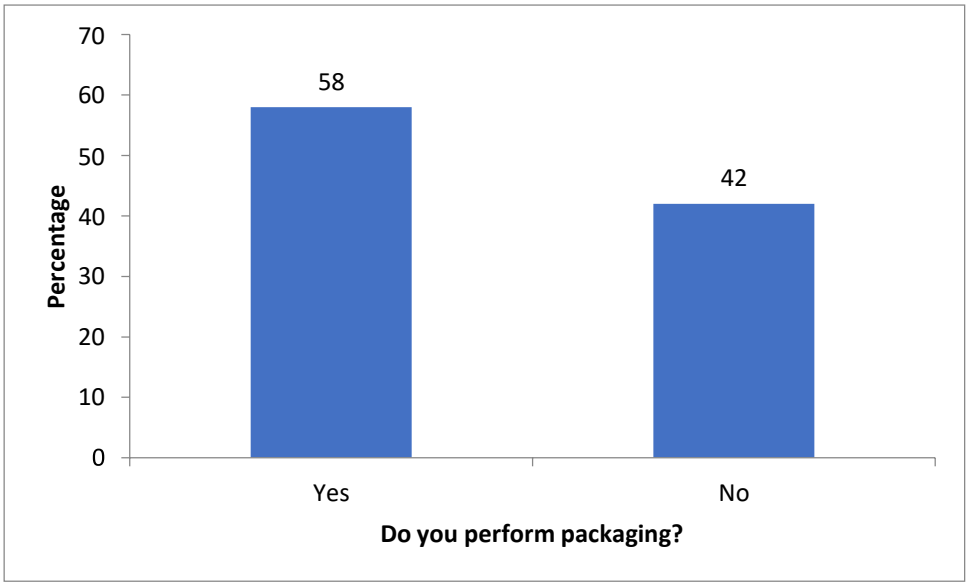


Figure 34 shows the material of packaging; 86 percent of wholesalers used polythene bags for packaging potato and only 14 percent used plastic crates for packaging.

Figure 34: Materials of packaging

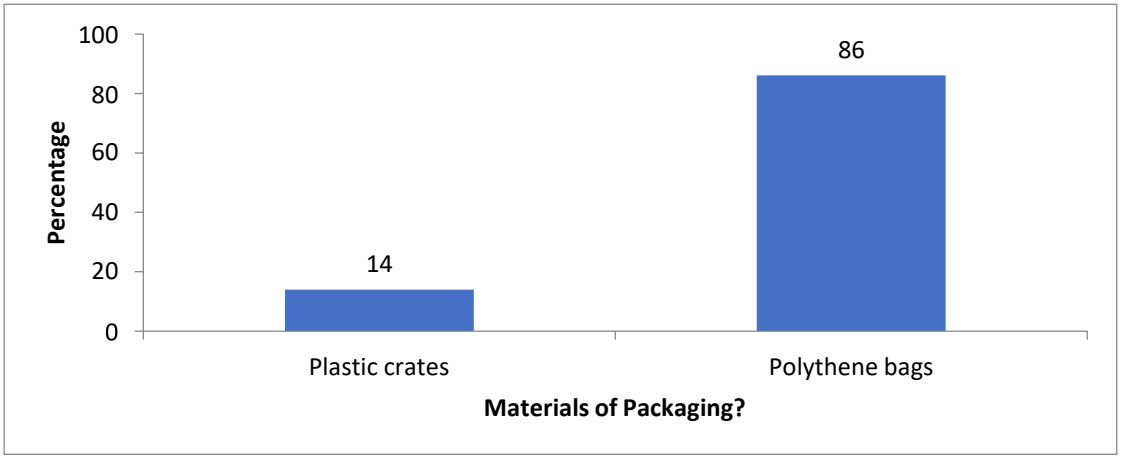


Figure 35 shows loss during packaging of potato; 57 percent reported that there were not any losses during packaging and 43 percent reported that there were losses during packaging.

Figure 35: Loss during Packaging

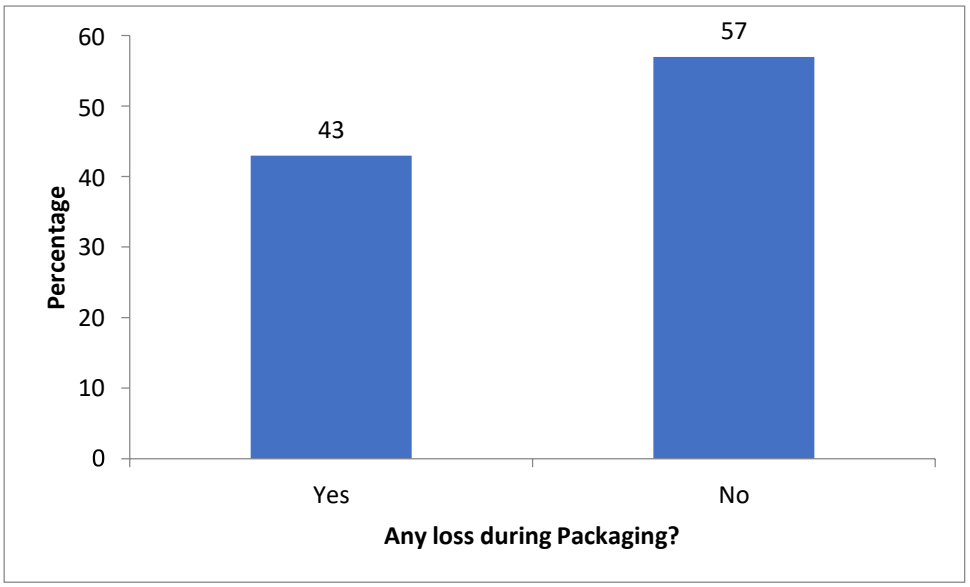


Figure 36 shows the methods of packaging, all the wholesalers who were interviewed did packaging of potato manually.

Figure 36: Methods of Packaging

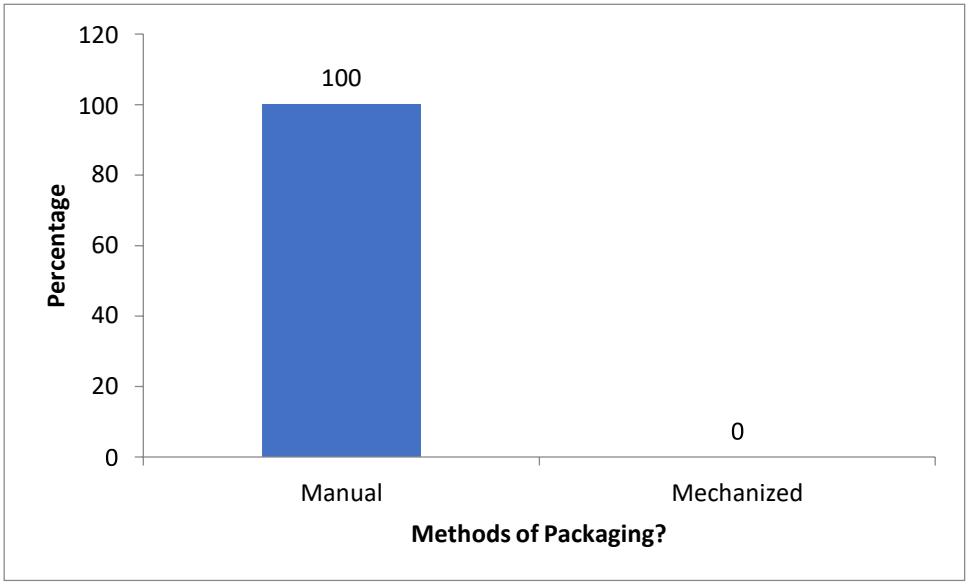


Figure 37 shows the location of packaging materials; 71 percent of wholesalers bought packaging material from locally available areas and 29 percent bought from district market.

Figure 37: Buying Location of packaging materials

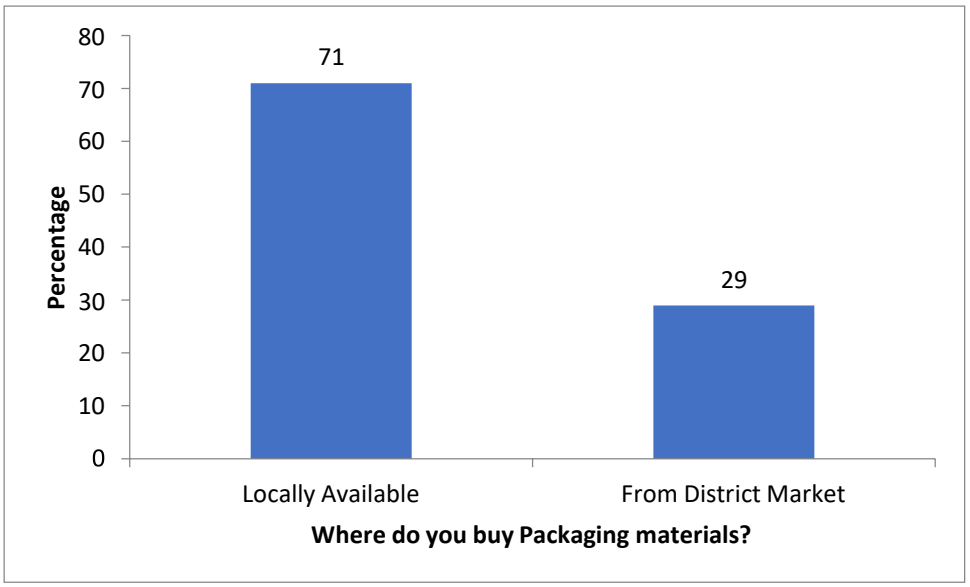


Figure 38 shows the labeling or branding of packaging material of potato; 57 percent of wholesalers used marka for labeling of packaging material, 29 percent did not label their packaging material and 14 did label with simple packaging material.

Figure 38: Labeling/Branding of Packaging Material

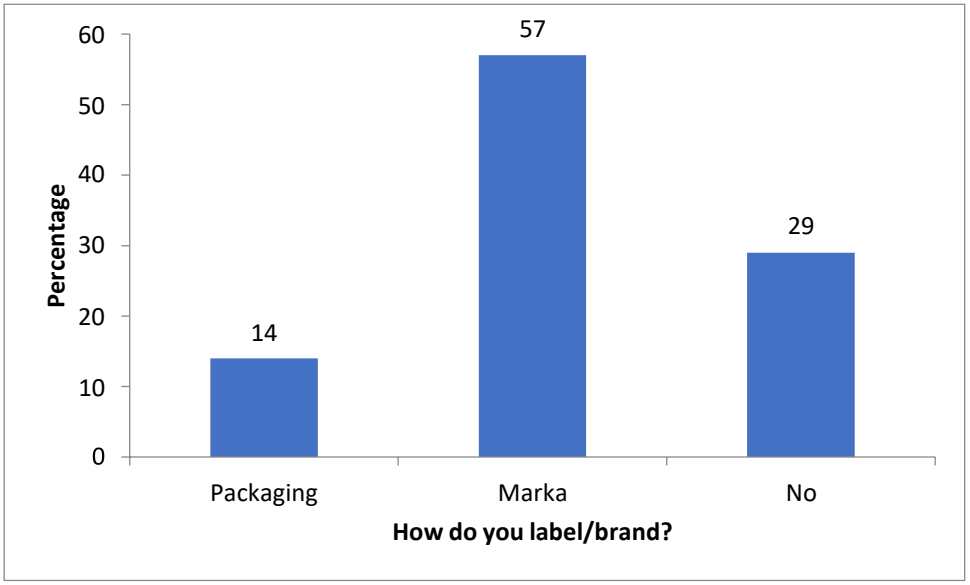


Figure 39 shows the problems being faced by wholesalers during packaging of potato; 57 percent reported high packaging cost, 29 percent reported shortage of packaging material and 14 percent reported lack of skilled labor.

Figure 39: Problems in Packaging of Potato

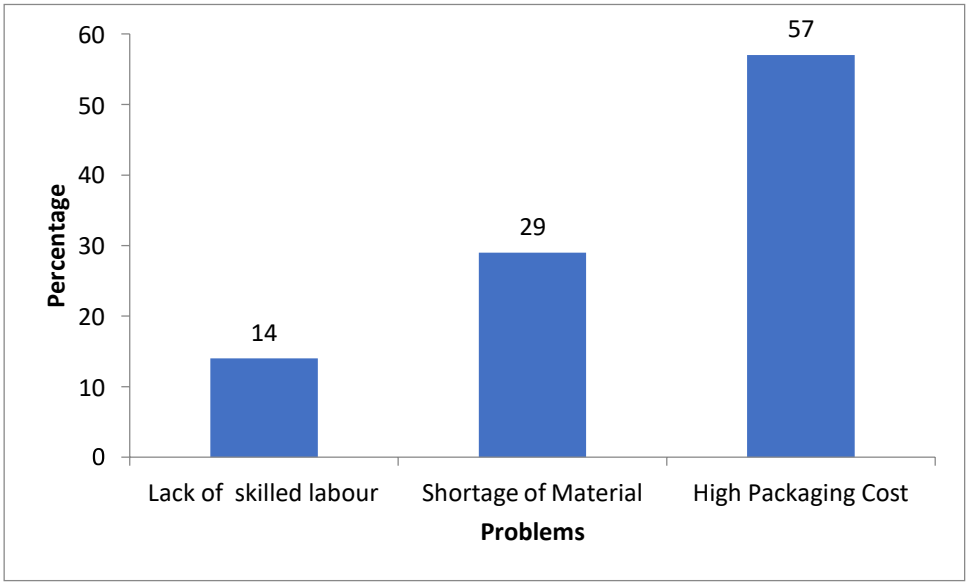


Table 11: Summary Statistics of Wholesaler's Post-harvest Management Practices-IV(Storage)

Variables	Description/Group	Frequency	%age
Do you store potato?	Yes	4	58
	No	8	42
	Overall	**12**	**100**
Where do you Store?	At Mandi	1	25
	Private Storage Facility	3	75
	Overall	**4**	**100**
For how long do you store? (Months)	3 Months		
Any loss during Store?	Yes	1	25
	No	3	75
	Overall	**4**	**100**
Reason of loss/damage?	Weight Loss	2	50
	Decay	1	25
	Rotting	1	25
	Overall	**4**	**100**
Problems	High Cost	1	25
	Poor Services	3	75
	Overall	**7**	**100**

Figure 40 shows the storing of potato by the wholesalers; 58 percent of wholesalers stored the potato and 42 percent did not store the potato.

Figure 40: Storing of Potato

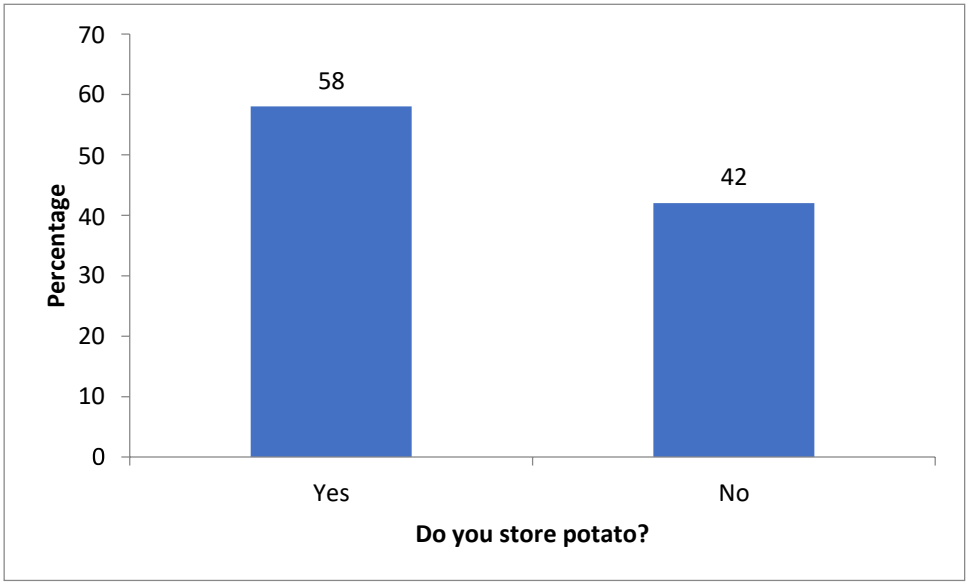


Figure 41 shows the location for the storage of potato by wholesalers; 75 percent of wholesalers stored their potato at private storage facility and 25 percent stored at mandi.

Figure 41: Location for the Storage of Potato

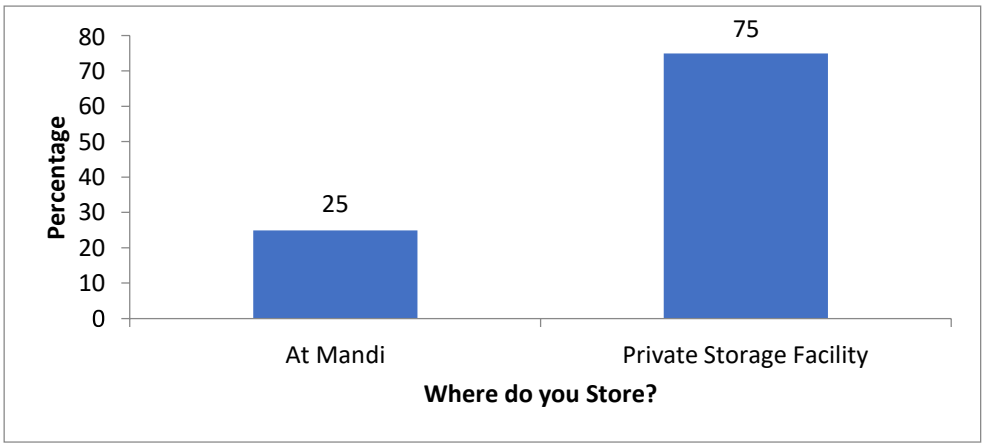


Figure 42 shows losses of potato during storage; 75 percent of wholesalers reported that therewere not any losses during storage and 25 percent reported losses during storage of potato.

Figure 42: Losses during storage

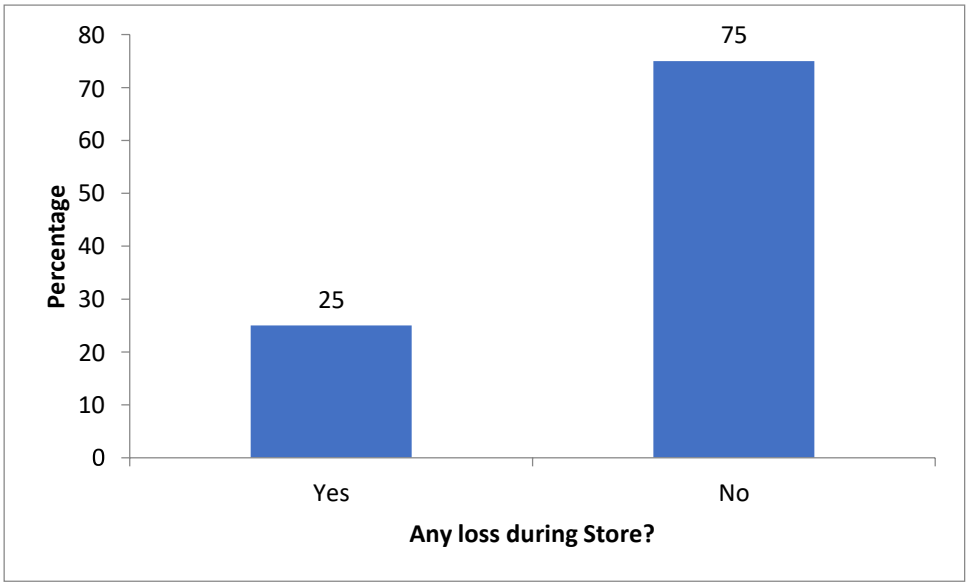


Figure 43 shows the reasons of loss or damage of potato during storage; 50 percent of wholesalers elaborated the weight loss main reason of loss, 25 percent reported the decay of potato and 25 percent reported rotting of potato was the main reason of loss or damage of potato during storage.

Figure 43: Reasons of Loss or Damage of Potato

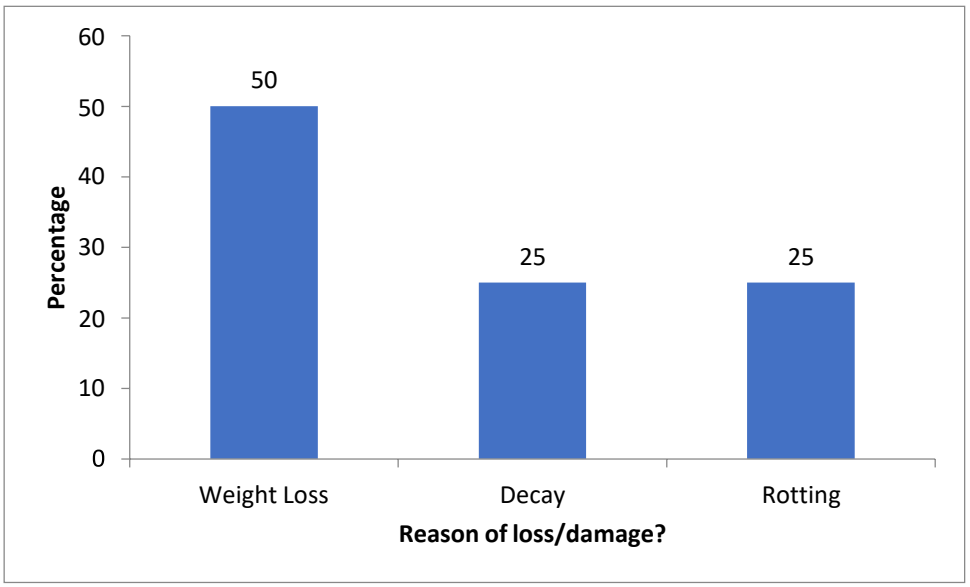


Figure 44 shows the problems which the wholesalers faced during storage of potato; 75 percent reported that poor services by the storage facilities providers and 25 percent reported the high cost of storage was the problem during storage.

Figure 44: Problems of Storage

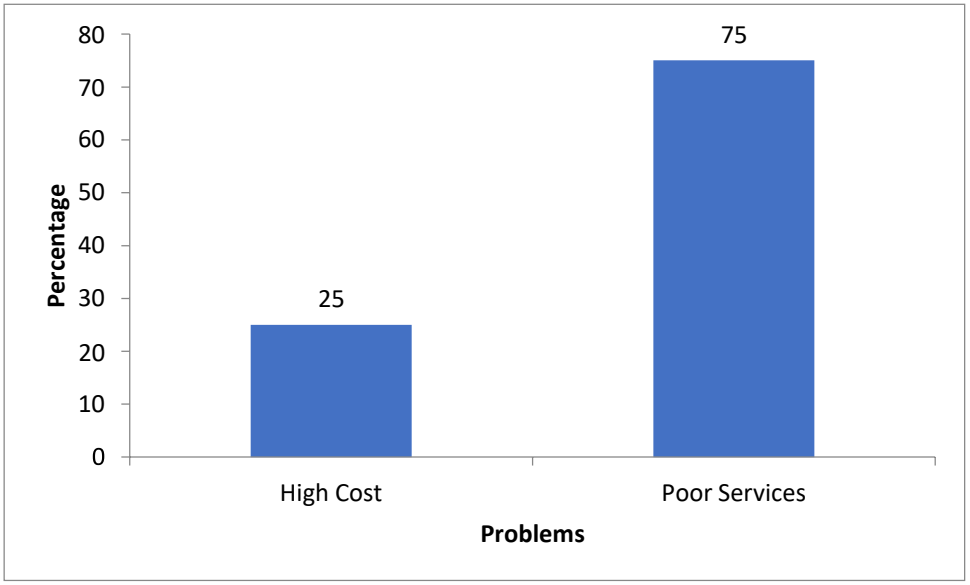


Table 12 showed buying and selling statistics of wholesaler. On an average wholesaler traded 20.3 bags of red (fresh) potato and 13.2 bags of white (stored) potato per day and each bag consists of 100 to 110 kilograms of potato. Average purchase price per bag of red potato was Rs 2212.6 and purchase price of white potato was Rs. 1937.5. Average sale price per bag of red potato was Rs 2615.6 and sale price of white potato was Rs. 2450.

Table 12: Potato Purchasing Statistics

Variety	Season	Quantity purchased (Bags/day/100-110 kgs)	Average Purchase Price/bag (Rs.)	Average sale Price (PKR)
Red (Fresh)	Early	16.6	2194.5	2702
	Middle	24.5	1710	1920
	Late	19.6	2733.3	3225
	Daily Average	**20.3**	**2212.6**	**2615.6**
White (Stored)	Early	11.6	1487.5	1825
	Middle	19.5	1850	2575
	Late	8.5	2475	2950
	Daily Average	**13.2**	**1937.5**	**2450**

Table 13 showed the various costs of wholesaler i.e. variable and fixed costs in detail. Table showed that permanent labor incurred more cost as compared to other costs. The average costof wholesaler was estimated Rs. 32213.3.

Table 13: Costs (PKR) Associated with Wholesalers per Month

Cost	Sr#	Particulars	Cost
Fixed/ capital	1	Shop Rent (Rs.)	5500
	2	Utilities (Rs.)	1375
	3	Permanent Labor / Monthly (Rs.)	20000
Variable	1	Labor/day (Rs.)	560
	2	Transport /day (Rs.)	2591
	3	Consumer convenient packaging cost (shopping bag etc./) (Rs.)	409
	5	Marketing charges /fee	10
	6	Processing costs (sort, grade, clean)/day	1296.2
	7	Any other	471
	Total		**32213.3**

4.4. Retailer Case

Table 1: Summary Statistics of Retailer's Socioeconomic Characteristics

Variables	Description/Group	Frequency	%age
Education	Illiterate	1	8
	Primary	2	17
	Middle	3	25
	Matric	2	17
	Intermediate	4	33
	Overall	**12**	**100**
Experience as Retailer	1 to 10	1	8
	11 to 20	5	42
	21 to 30	4	33
	Above 31	2	17
	Overall	**12**	**100**
Experience as Potato Retailer	1 to 10	3	25
	11 to 20	4	33
	21 to 30	3	25
	Above 31	2	17
	Overall	**12**	**100**
Nature of Business	Sole proprietor	11	92
	Partnership	1	8
	Overall	**12**	**100**
Type of Business	Registered	4	33
	Unregistered	8	67
	Overall	**12**	**100**
Business Capital	Personal investment	8	67
	Investors	0	0
	borrowed from informal sources	1	8
	formal sources (Banks)	3	25
	Overall	**12**	**100**

Type of Retailing Outlet	Traditional	11	92
	Modern Retailers	1	8
	Overall	**12**	**100**
Do You maintain Record keeping	Yes	4	33
	No	8	67
	Overall	**12**	**100**

Figure 1 shows that out of 12 interviewed potato retailers; majority i.e., 33 percent had intermediate degree, while 17 percent did matriculation and 8 percent were illiterate.

Figure 1: Education of Respondents

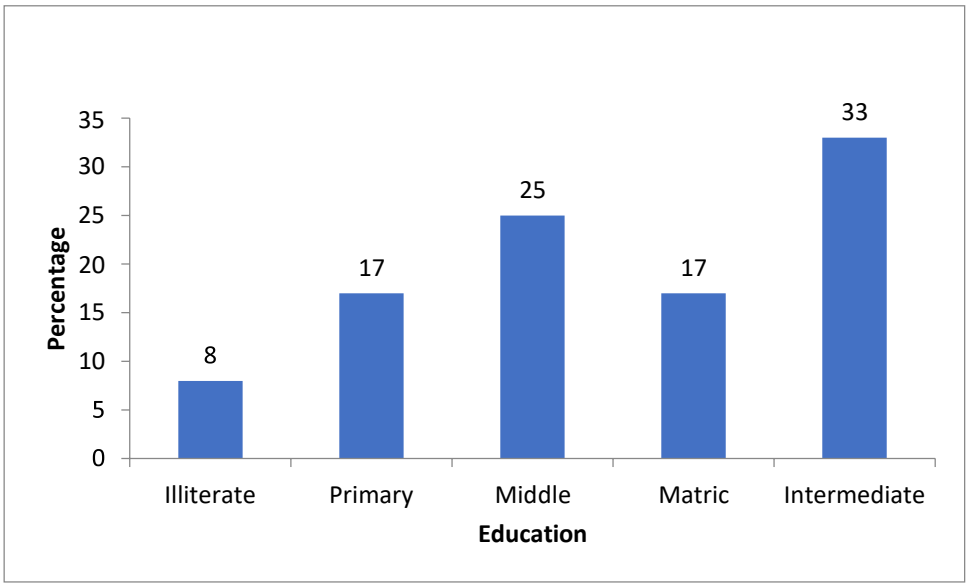


Figure 2 shows respondents experience as retailer; 42 percent of retailer had experience ranged from 11 to 20 years, while 17 percent had experience above 31 years and 8 percent had experienced from 1 to 10 years

Figure 2: Experience as Retailer

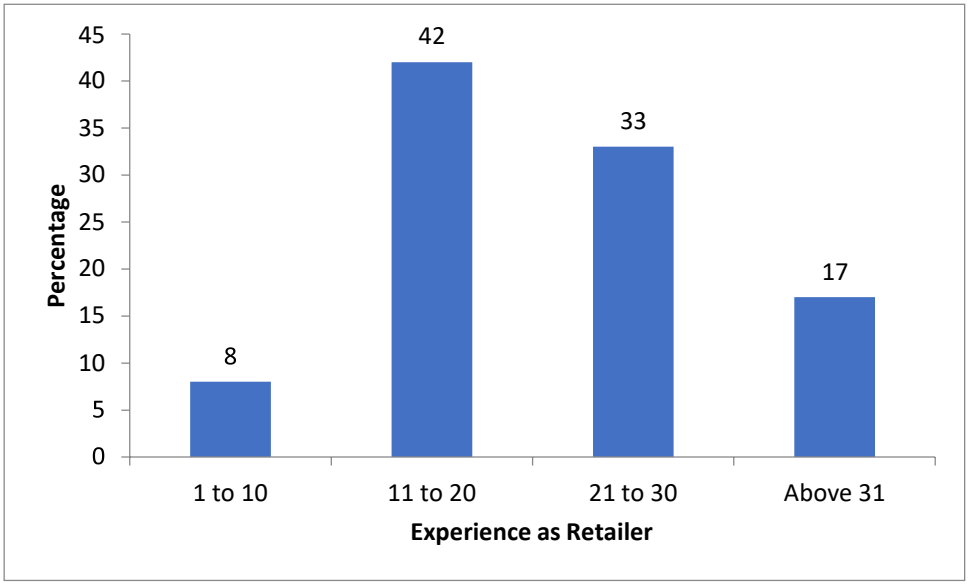


Figure 3 shows respondents experience as potato retailer; 33 percent of retailer had experience ranged from 11 to 20 years, while 25 percent had experience from 1 to 10 years and 17 percent had experienced from above 31.

Figure 3: Experience as Potato Retailer

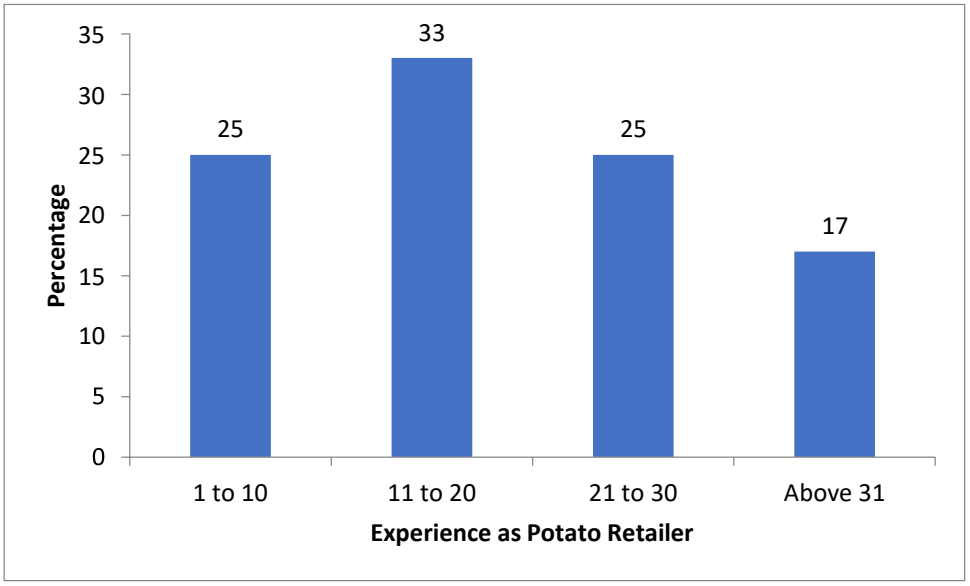


Figure 4 shows the nature of business of retailers; 92 percent of the retailers were doing their business as sole proprietor and only 8 percent were doing the business with partners.

Figure 4: Nature of Business

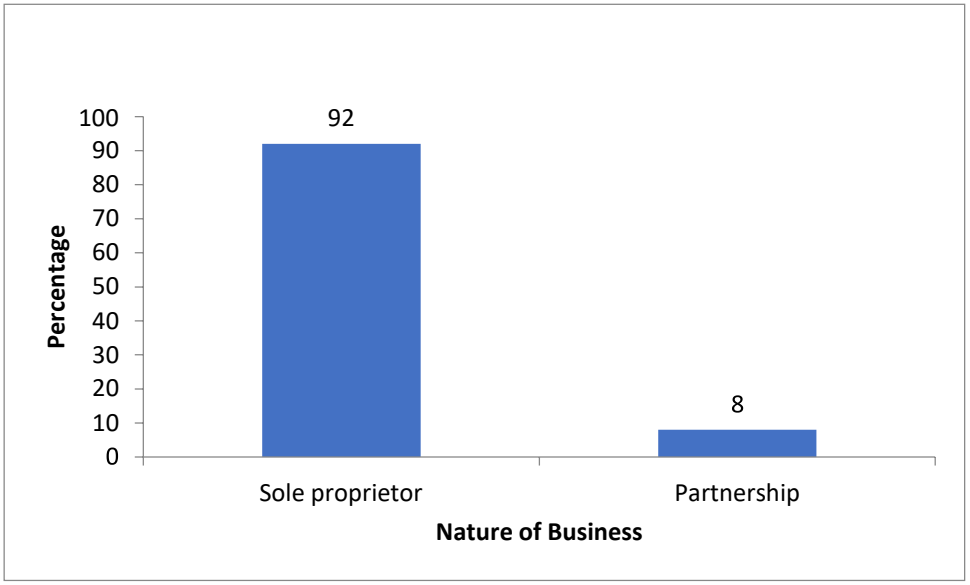


Figure 5 shows the type of business; 67 percent of the retailers were unregistered and 33 percent of retailers were registered as retailer properly.

Figure 5: Type of Business

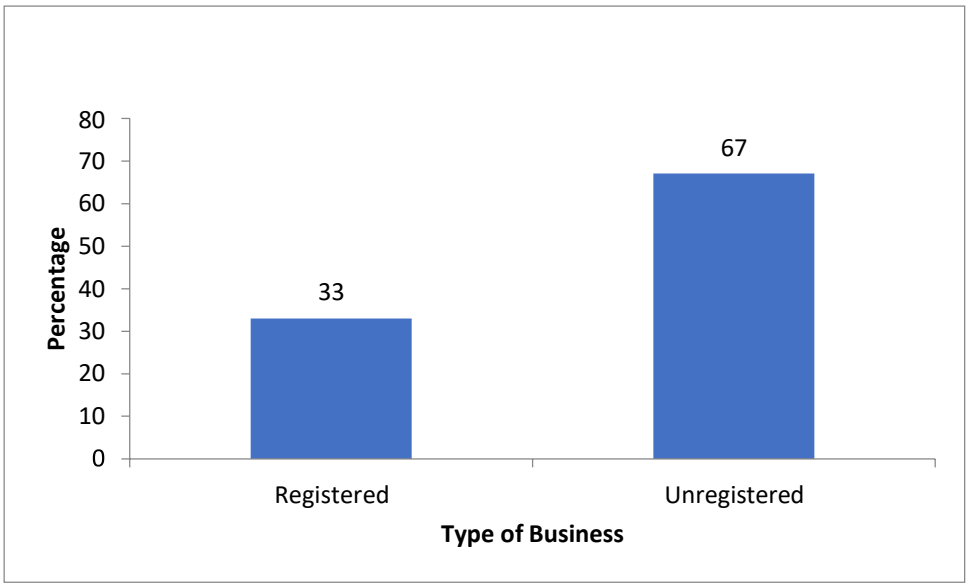


Figure 6 shows the business capital of retailers; 67 percent of retailers had their personal investment, 25 percent borrowed from formal sources such as banks and 8 percent of retailers borrowed from informal sources.

Figure 6: Business Capital

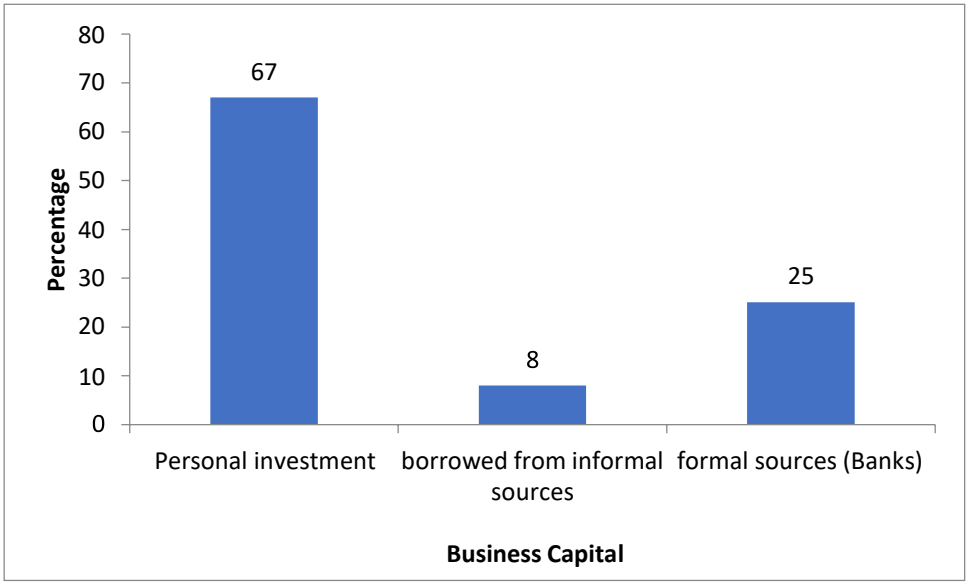


Figure 7 elaborated the type of Retailing outlet of retailers; 92 percent of the retailers were doing their business as traditional way and only 8 percent were doing as modern retailers.

Figure 7: Type of Retailing Outlet

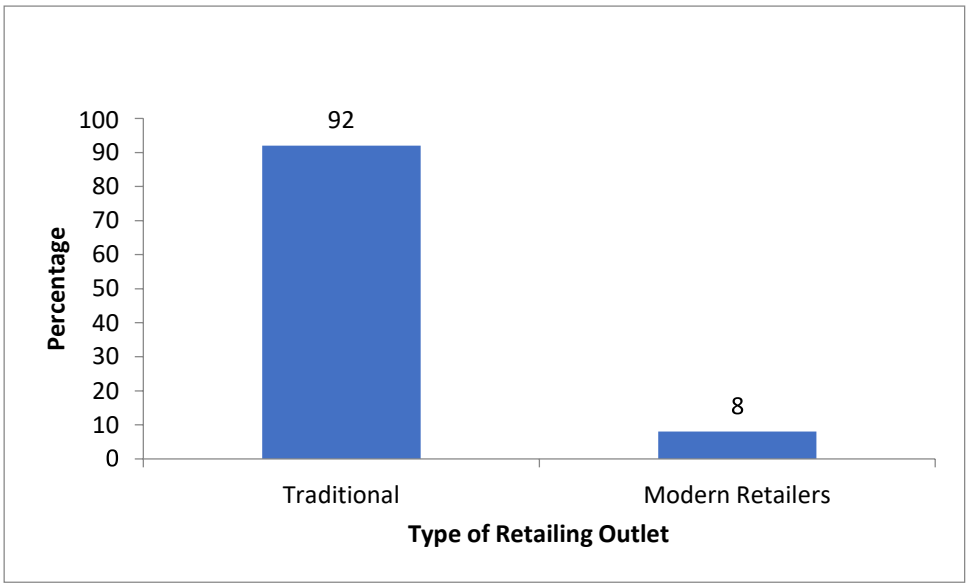


Figure 8 shows record keeping of business; 67 percent of retailers did not keep their records and 33 percent of retailers did keep their records.

Figure 8: Record Keeping

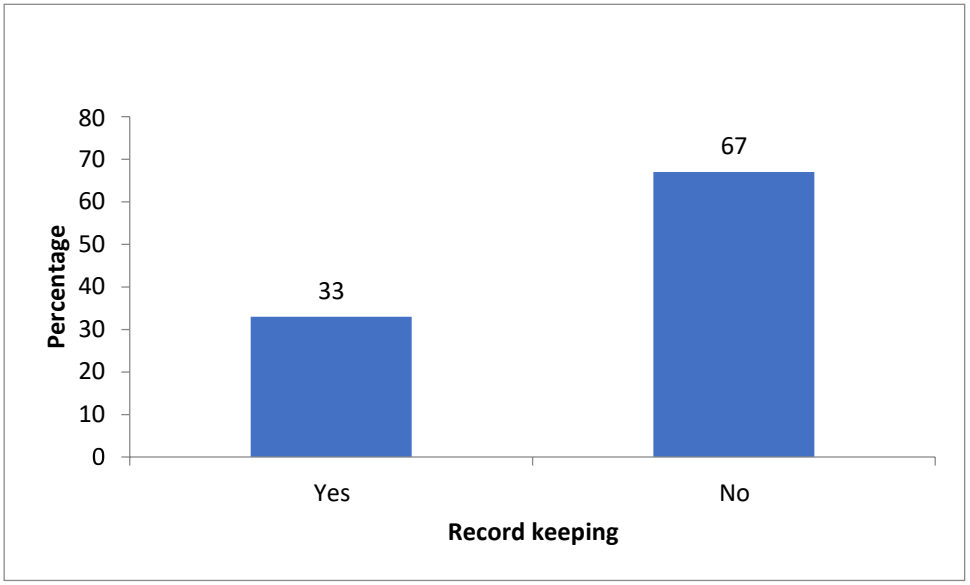


Table 2: Summary Characteristic of Potato Buying Practices

Variables	Description/Group	Frequency	%age
Sources of supplies	Growers	1	8
	Aarthi (Commission agents)	6	50
	Pharia (wholesaler)	5	42
	Overall	**12**	**100**
What is potato selling trader selection criteria	Quality	3	25
	Variety	6	50
	Quantity	0	0
	Creditability of trader	2	17
	Payment terms	1	8
	Overall	**12**	**100**
Mode of purchase	Credit	8	67
	Cash	4	33
	Overall	**12**	**100**
Mode of transportation	Rickshaw	5	42
	Van	2	17
	Public transport	1	8
	Palledar	4	33
	Overall	**12**	**100**

Figure 9 shows sources of potato supplies to retailers; 50 percent of retailers got their suppliesof potato directly from Aarthi (commission agents), while 42 percent got from Pharia (wholesaler) and 8 percent directly received from growers.

Figure 9: Source of Supplies

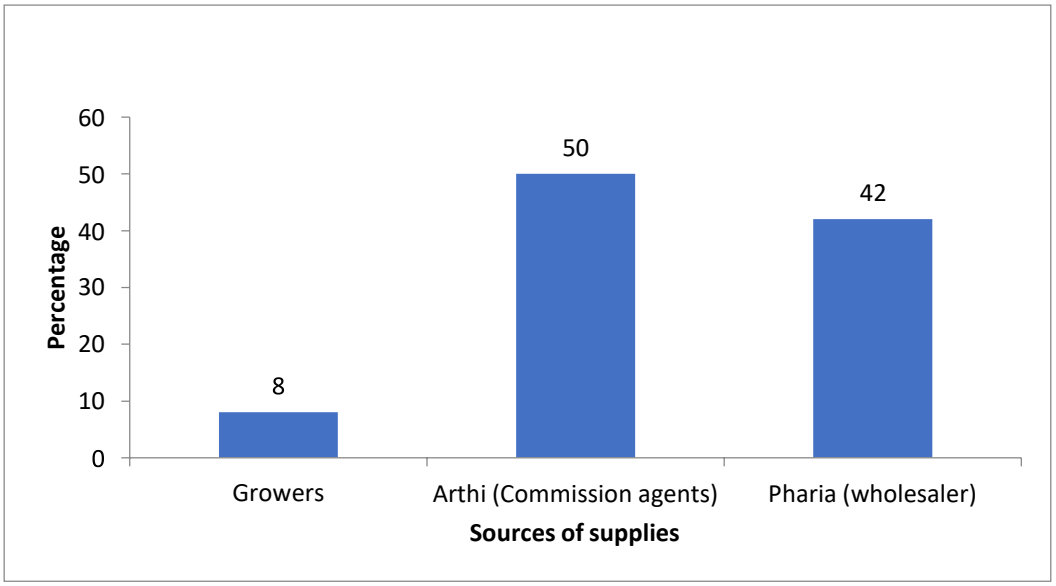


Figure 10 shows potato selling trader selection criteria; 50 percent of retailers selling selection criteria was based on variety of potato, 25 percent was based on quality of potato, 17 percent on creditability of trader and 8 percent was payment terms.

Figure 10: Potato Selling Selection Criteria

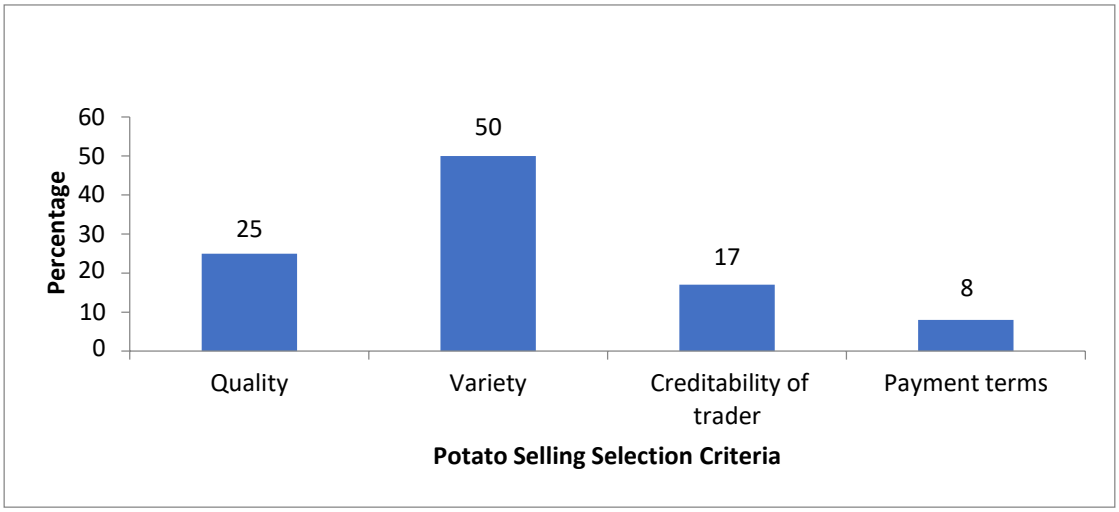


Figure 11 shows the mode of purchase of potato by the retailers; 67 percent of retailerspurchased potato on credit and 33 percent purchased on cash.

Figure 11: Mode of Purchase

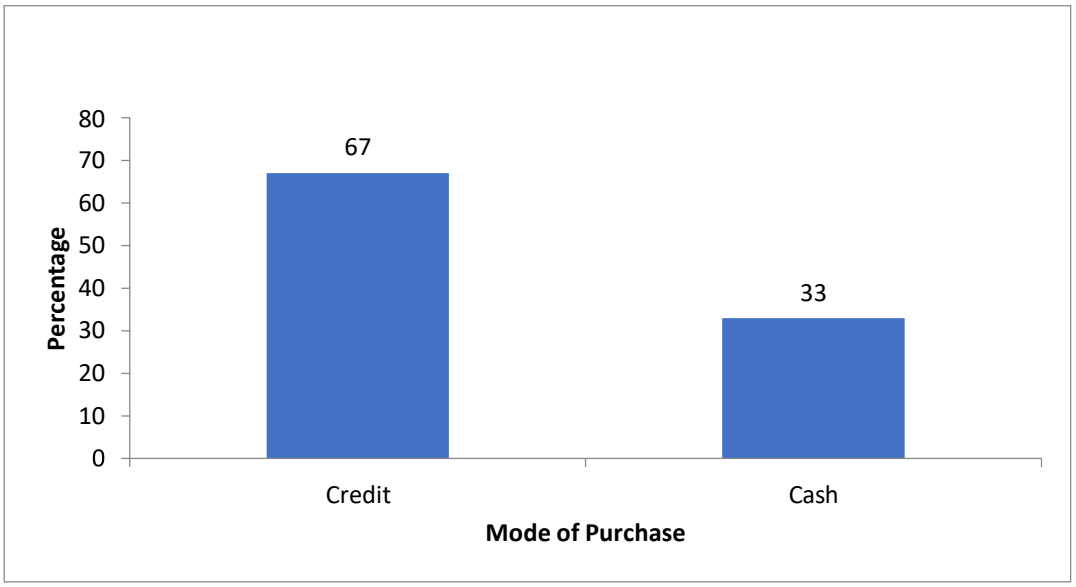


Figure 12 shows mode of transportation used for transporting potato; 42 percent of retailers used rickshaw, 17 percent used van and 8 percent used public transport for transporting potato.

Figure 12: Mode of Transportation

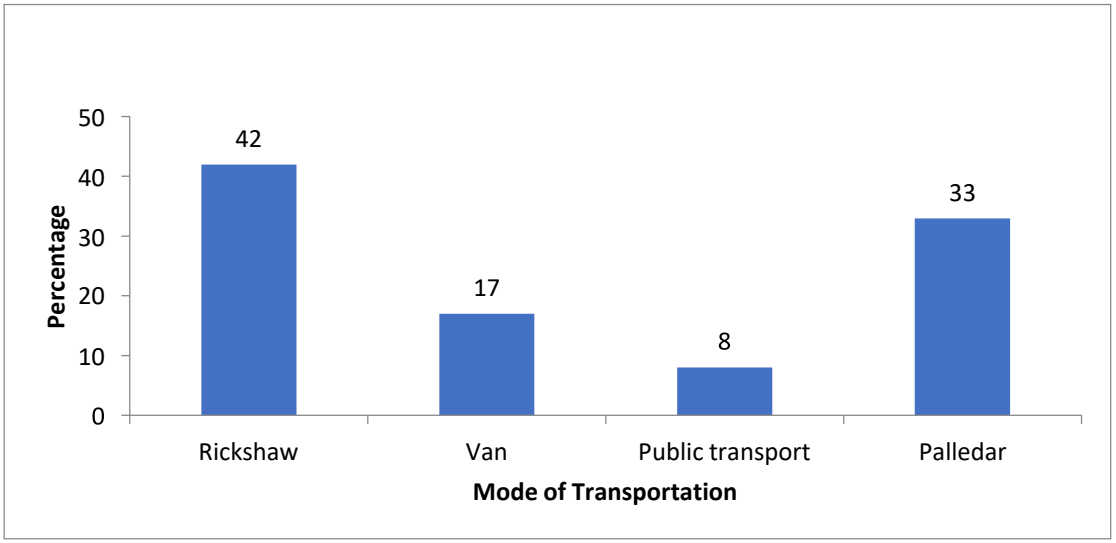


Table 3 elaborated summary characteristic of retailer preferences for potato attributes related to Search. Search attributes includes Shape of potato, Size of potato, Freshness of potato, variety of potato, undamaged of potato and unblemished of potato.

Table 3: Summary Characteristic of Retailer Preferences for Potato attributes (Search)

Variable	Attributes	Item/Description	Frequency	% age
Search	**Shape**	Not all important	0	0
		Not very important	1	8
		Neutral	1	8
		Important	4	34
		Highly Important	6	50
		Overall	**12**	**100**
	Size	Not all important	0	0
		Not very important	0	0
		Neutral	3	25
		Important	2	17
		Highly Important	7	58
		Overall	**12**	**100**
	Freshness	Not all important	0	0
		Not very important	1	8
		Neutral	2	17
		Important	5	42
		Highly Important	4	33
		Overall	**12**	**100**
	Variety	Not all important	0	0
		Not very important	1	8
		Neutral	2	17
		Important	5	42
		Highly Important	4	33
		Overall	**12**	**100**

	Undamaged	Not all important	0	0
		Not very important	0	0
		Neutral	1	8
		Important	6	50
		Highly Important	5	42
		Overall	**12**	**100**
	Unblemished	Not all important	0	0
		Not very important	2	17
		Neutral	3	25
		Important	4	33
		Highly Important	3	25
		Overall	**12**	**100**

Table 4 elaborated summary characteristic of retailer preferences for potato attributes related to Experience. Experience attributes includes Firmness of potato, ease of peeling of potato, taste of potato, Ripeness of potato and Dryness of potato.

Table 4 Summary Characteristic of Retailer Preferences for Potato attributes (Experience)

Variable	Attributes	Item/Description	Frequency	% age
Experience	**Firmness**	Not all important	1	8
		Not very important	0	0
		Neutral	2	17
		Important	7	58
		Highly Important	2	17
		Overall	**12**	**100**
	Ease of peeling	Not all important	1	8
		Not very important	0	0
		Neutral	4	34
		Important	6	50
		Highly Important	1	8

		Overall	**12**	**100**
	Taste	Not all important	0	0
		Not very important	0	0
		Neutral	5	42
		Important	5	42
		Highly Important	2	16
		Overall	**12**	**100**
	Ripeness	Not all important	0	0
		Not very important	0	0
		Neutral	4	33
		Important	5	42
		Highly Important	3	25
		Overall	**12**	**100**
	Dryness	Not all important	1	8
		Not very important	4	34
		Neutral	1	8
		Important	3	25
		Highly Important	3	25
		Overall	**12**	**100**

Table 5 elaborated summary characteristic of retailer preferences for potato attributes related to Safety. Safety attributes includes cleanliness of potato and chemical free of potato.

Table 5 Summary Characteristic of retailer Preferences for Potato attributes (Safety)

Variable	Attributes	Item/Description	Frequency	% age
Safety	**Cleanliness**	Not all important	2	17
		Not very important	2	17
		Neutral	2	17
		Important	1	8
		Highly Important	5	41

		Overall	**12**	**100**
	Chemical free	Not all important	1	8
		Not very important	1	8
		Neutral	3	25
		Important	4	34
		Highly Important	3	25
		Overall	**12**	**100**

Table 6 elaborated summary characteristic of retailer preferences for potato attributes related to Marketing. Marketing attributes includes price of potato, Selling place cleanliness of potato, Packaging of potato, Grading of potato and Branding of potato.

Table 6 Summary Characteristic of Retailer Preferences for Potato attributes (Marketing)

Variable	**Attributes**	**Item/Description**	**Frequency**	**% age**
Marketing	**Price**	Not all important	0	0
		Not very important	0	0
		Neutral	1	8
		Important	6	50
		Highly Important	**5**	42
		Overall	**12**	**100**
	Selling place cleanliness	Not all important	2	17
		Not very important	3	25
		Neutral	3	25
		Important	4	33
		Highly Important	0	0
		Overall	**12**	**100**
	Packaging	Not all important	2	17
		Not very important	1	8
		Neutral	2	17
		Important	5	41

		Highly Important	2	17
		Overall	**12**	**100**
	Grading	Not all important	0	0
		Not very important	0	0
		Neutral	1	8
		Important	8	67
		Highly Important	3	25
		Overall	**12**	**100**
	Branding	Not all important	5	41
		Not very important	2	17
		Neutral	3	25
		Important	2	17
		Highly Important	0	0
		Overall	**12**	**100**

Table 7: Summary Characteristic of Potato Selling Practices

Variables	**Description/Group**	**Frequency**	**%age**
What practices do you perform before selling	Cleaning	4	33
	Grading	6	50
	Display	2	17
	Packing	0	0
	Overall	**12**	**100**
How do you arrange potatoes at display?	Grade-wise (shape/color/size)	8	66
	Variety	2	17
	Mix	2	17
	Overall	**12**	**100**
Do you make some extra arrangements for consumer attraction?	Decoration	1	8
	Attractive Packing	2	17
	Attractive Display	9	75
	Overall	**12**	**100**

What do you do to maintain freshness of potatoes?	Water spray	4	33
	Cleanliness	3	25
	Cover From Sun	5	42
	Overall	**12**	**100**
Do you display price List for consumers?	Yes	9	75
	No	3	25
	Overall	**12**	**100**
Do you follow the official price list?	Yes	8	67
	No	4	33
	Overall	**12**	**100**
How do you settle your price with customer?	Fix	5	42
	Negotiable	7	58
	Overall	**12**	**100**
Do you offer online selling services to your consumer?	Yes	2	17
	No	10	83
	Overall	**12**	**100**

Figure 13 shows practices retailer perform before selling potato; 50 percent of retailers did grading before selling, 33 percent cleaned the potato and 17 percent of retailers displayed potato for attractive look.

Figure 13: Practices perform before selling

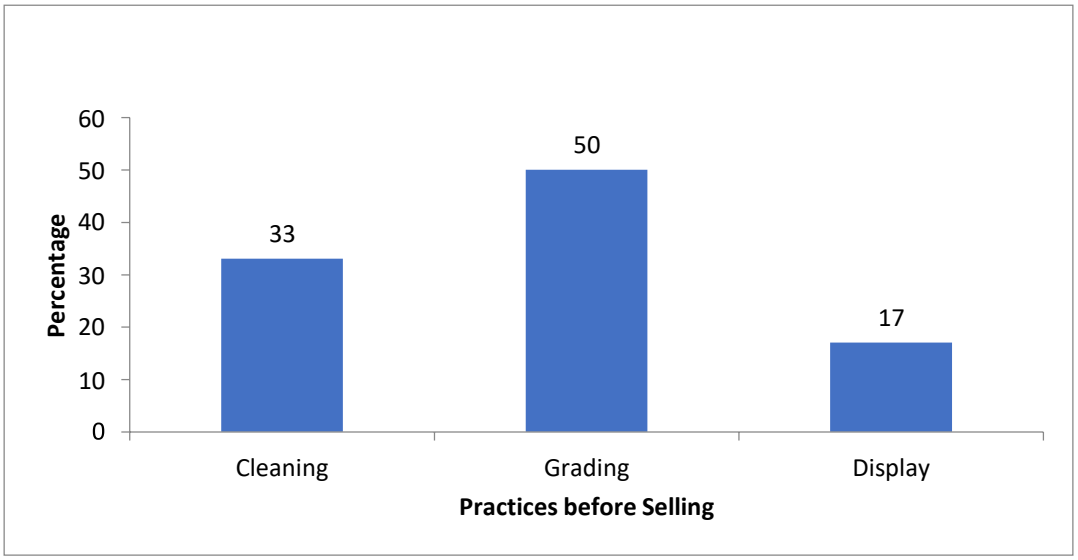


Figure 14 shows the arrangement of potato at display for selling; 66 percent of retailers arranged potato grade wise (shape/color/size) while 17 percent arranged variety wise and 17 percent arranged potato both as grade and variety wise.

Figure 14: Arrangement of potatoes at display

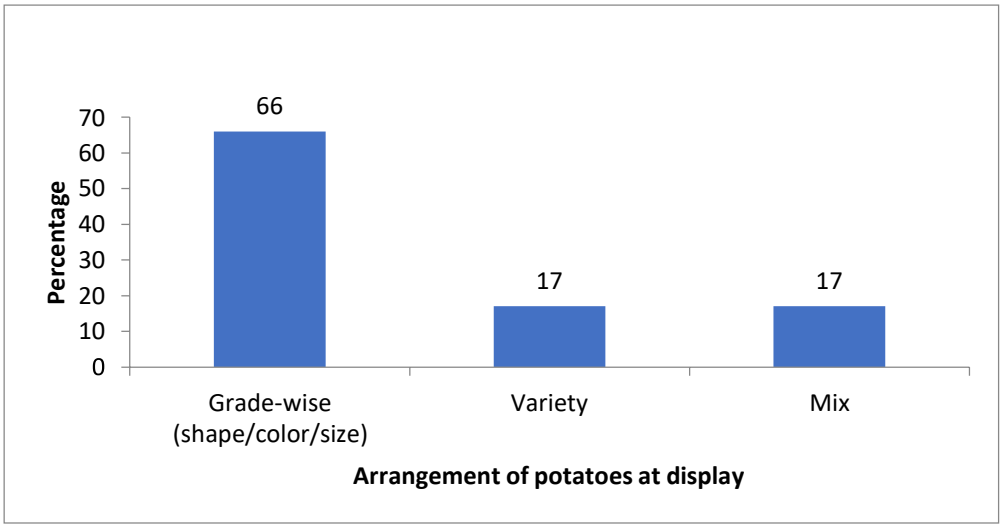


Figure 15 shows extra arrangements for consumer attraction for selling potato; 75 percent of retailers did attractive display for consumer attraction while 17 percent did attractive packing and 8 percent decorated their shop so that they can attract consumers.

Figure 15: Extra arrangements for consumer attraction

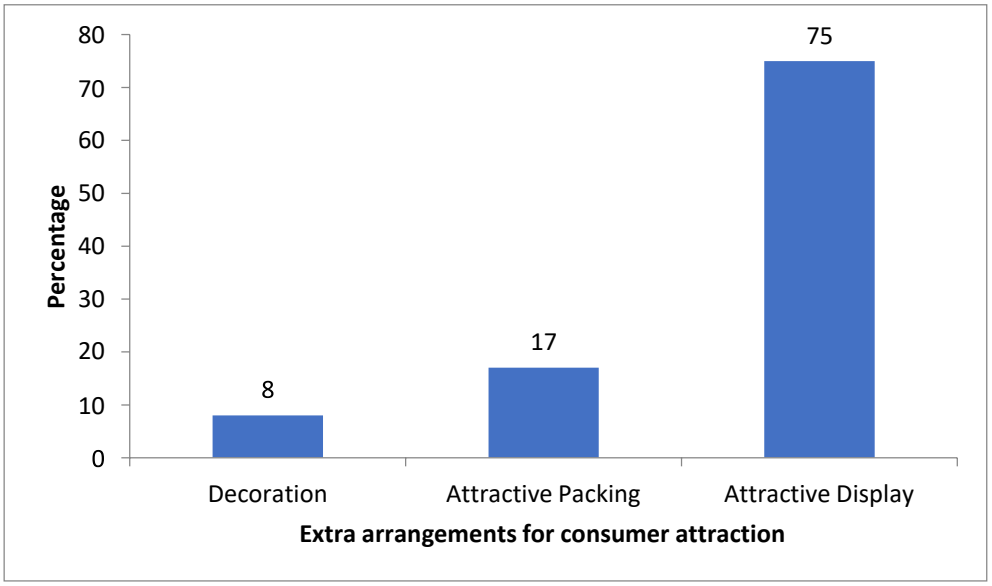


Figure 16 shows different practices used by retailers for maintaining freshness of potatoes; 42 percent of retailers covered the potato from sun, 33 percent sprayed water and 25 percent ensured cleanliness to maintain freshness of potato.

Figure 16: Freshness of potatoes

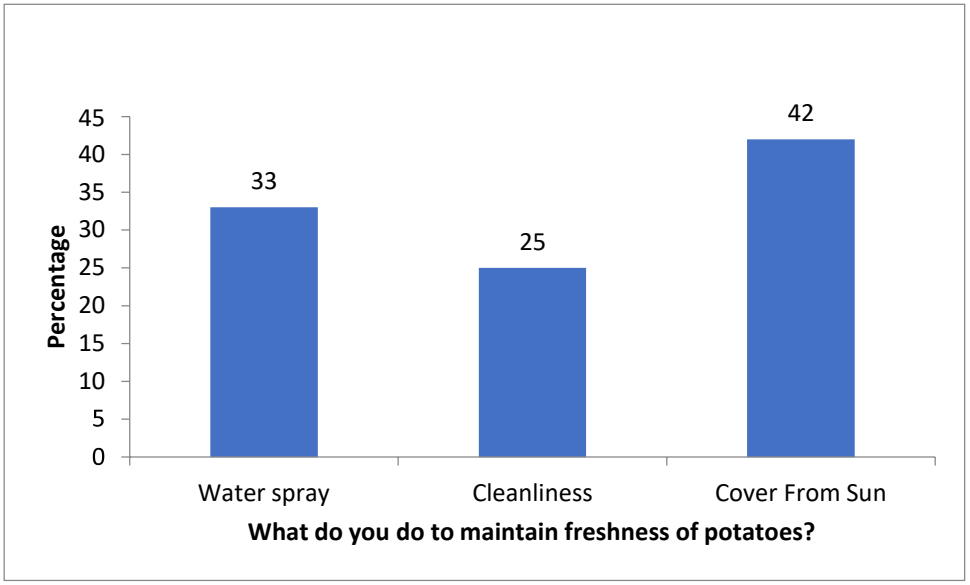


Figure 17 shows the displaying of price list for consumers; 75 percent of retailers displayed display price list and 25 percent did not display price.

Figure 17: Displaying Price List for consumers

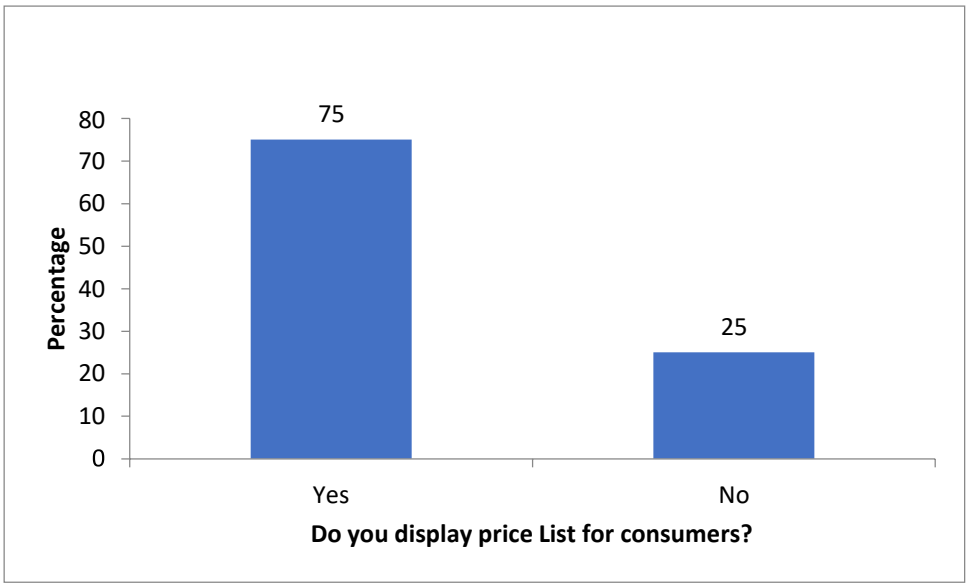


Figure 18 shows the official price list followed while selling potato; 67 percent of retailers followed official price list and 33 percent of retailers did not follow official price.

Figure 18: Official Price list

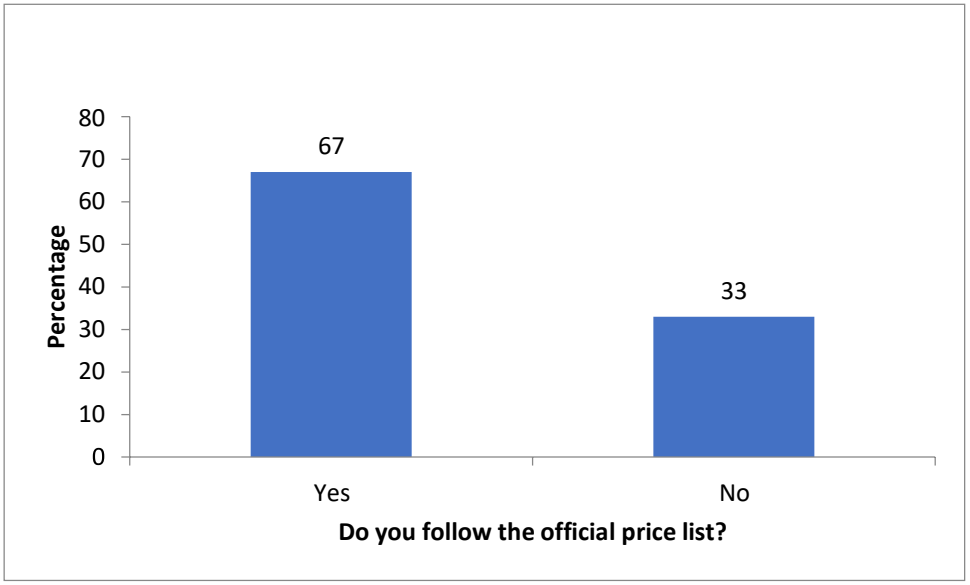


Figure 19 shows how retailers settle price with customer; 58 percent of retailers settled price through negotiations and 42 percent had fixed their prices already.

Figure 19: Price settling with customer

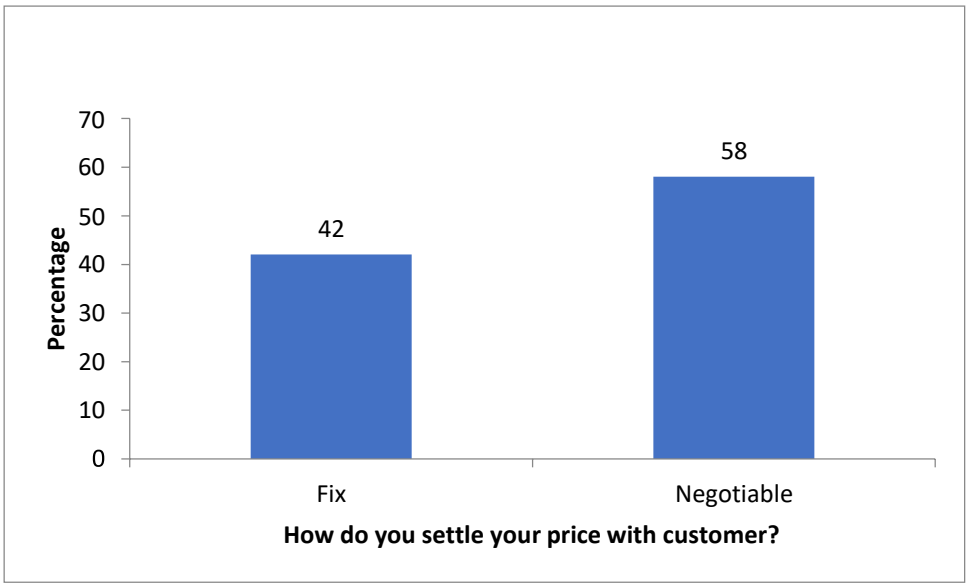


Figure 20 shows the online selling services to consumers by the retailers; 83 percent of retailers did not provide online selling services and only 17 percent provided the online services to consumers.

Figure 20: Online selling services to Consumer

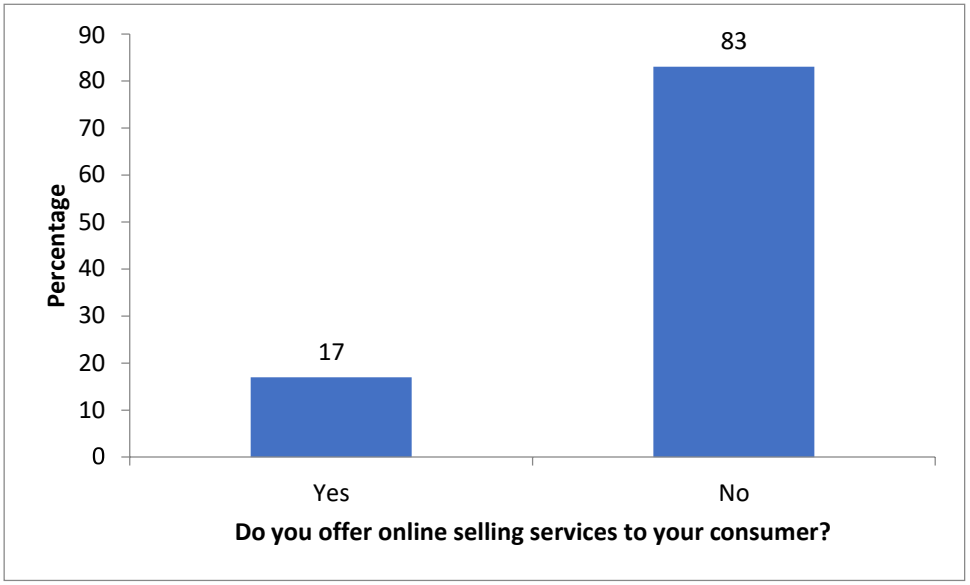


Table 8 presents buying and selling statistics of retailers. On an average retailers traded 2 bags of each red (fresh) and white (stored) potato per day and each bag consists of 50 kilograms of potato. Average purchase prices per kg of red and white potato was Rs. 40 and Rs.45 respectively. Average sale prices per kg of red and white potato was Rs. 46 and Rs.52 respectively.

Table 8: Potato Trading Statistics

Variety	Season	Purchases (Bags) I bag= 50 kg	Average Purchase Price/bag (50Kg)	Average Purchase Price/kg	Average Sales Price/Kg
Red (Fresh)	Early	2	2582	52	59
	Middle	2	2628	39	45
	Late	2	2471	29	33
	Daily Average	**2**	**2560**	**40**	**46**
White (Store)	Early	2	3050	61	70
	Middle	2	1740	35	40
	Late	2	1960	39	45
	Daily Average	**2**	**2250**	**45**	**52**

Table 9 showed the various costs of retailer i.e. variable and fixed costs in detail. Table showedthat potato purchase cost incurred more cost as compared to other costs. The average cost of retailers was estimated Rs. 3951.2.

Table 9: Costs (PKR) Associated with Retailers

Cost	S#	Particulars	Cost
Fixed/ capital	1	Shop Rent / day (Rs.)	407.2
	2	Utilities (Rs.)	638.8
	3	Permanent Labor / day (Rs.)	522.2
	4	Any other	375
Variable	1	Potato purchase cost (Rs. /bag)	1125.3
	2	Labor cost (Paladari/bag) (Rs.)	16.5
	3	Preparation costs (washing/ cleaning/grading/packaging etc.) (Rs.)	55.7
	4	Consumer convenient packaging cost (shopping bag etc./) (Rs.)	328.3
	5	Marketing charges /fee	182
	6	Any others (Miscellaneous)	300
	Total		**3951.2**

4.5. Consumer Case

Table 1: Summary Statistics of Consumer's Socioeconomic Characteristics

Variables	Description/Group	Frequency	%age
Age (Years)	20 to 30	5	17
	31 to 40	13	43
	41 to 60	9	30
	Above 60	3	10
	Overall	**30**	**100**
Education	Middle	6	20
	Matric	5	17
	Intermediate	2	7
	Graduate	4	14
	Master	12	39
	Doctorate	1	3
	Overall	**30**	**100**
Family Size (Nos.)	1 to 3	4	13
	4 to 7	21	70
	Above7	5	17
	Overall	**30**	**100**
Occupation	Govt. Servant	10	33
	Private Employee	8	27
	Businessman	4	13
	Student	2	7
	Housewife	6	20
	Overall	**30**	**100**
Monthly Income (Rs.)	< 25000	2	7
	25001-50000	10	33
	50001-75000	7	23
	75001-100000	8	27
	>100000	3	10
	Overall	**30**	**100**

Figure 1 shows that 43 percent of Potato consumers were ranged between 31 to 40 years of age, while 30 percent was between 41 to 60 years, consumers of age ranged from 20 to 30 were17 percent and 10 percent were of above age 60.

Figure 1: Age of Respondents (Years)

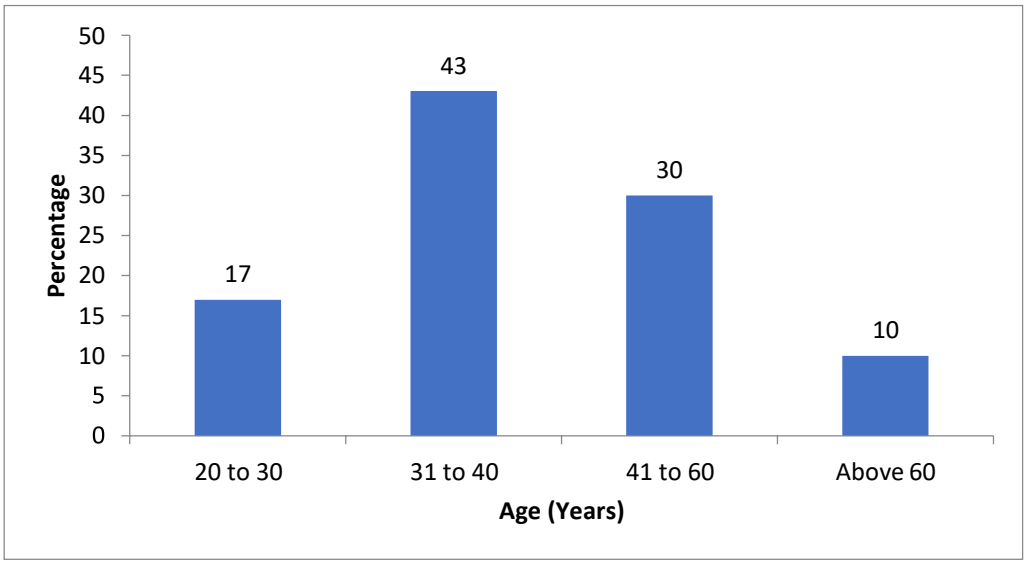


Figure 2 shows that out of 30 interviewed potato consumers, majority that is 39 percent had master's degree, while 17 percent did matriculation and 14 percent were graduates.

Figure 2: Education of Respondents

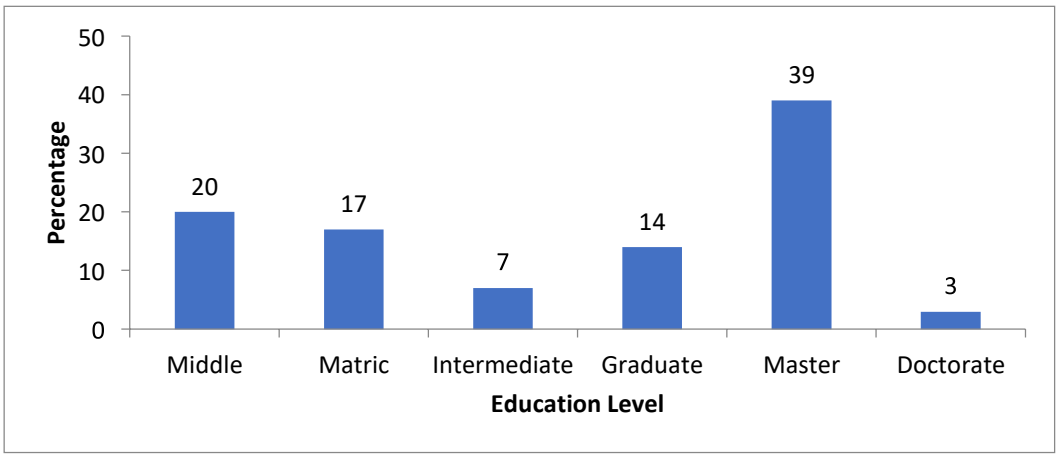


Figure 3 shows that 70 percent had family size of 4 to 7 members, while 17 percent had more than 7 members of family and 13 percent had family size of 1 to 3.

Figure 3: Family Size of Respondents (Numbers)

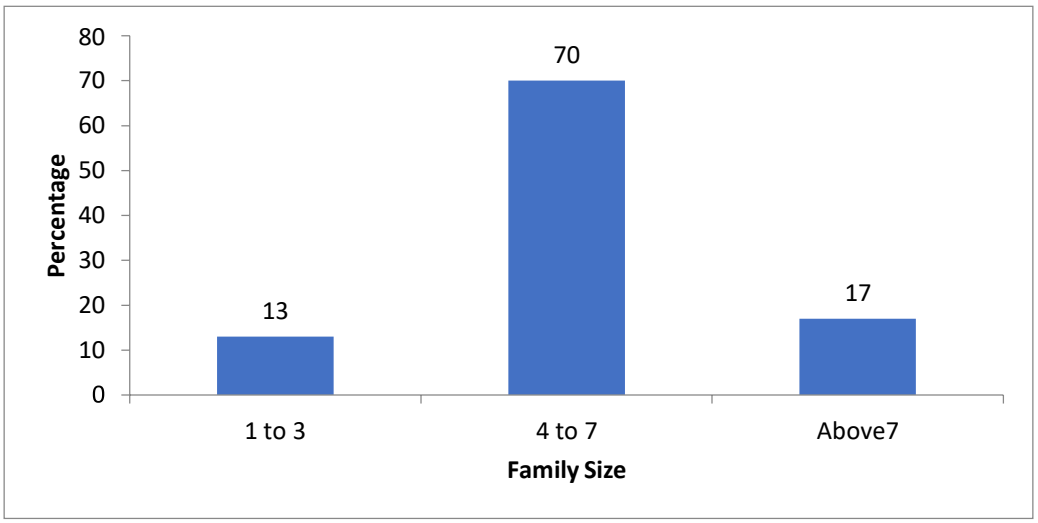


Figure 4 shows that 33 percent of the respondents were government employees; 27 percent were doing private jobs; 13 percent were doing their own business; 7 percent were students; and 20 percent were housewives.

Figure 4: Occupation of Respondents

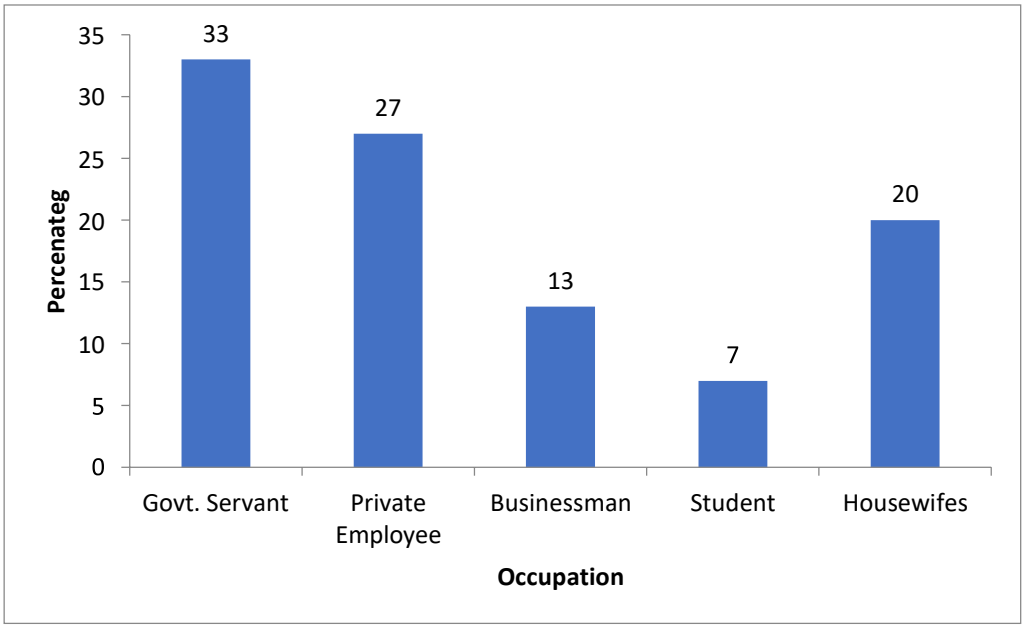


Figure 5 shows that 33 percent of the respondents had income ranged from 25,000 to 50,000, 27 percent of consumers' income ranged from 75,000 to 100,000 and 7 percent had income less than 25,000.

Figure 5: Monthly Income of Respondents

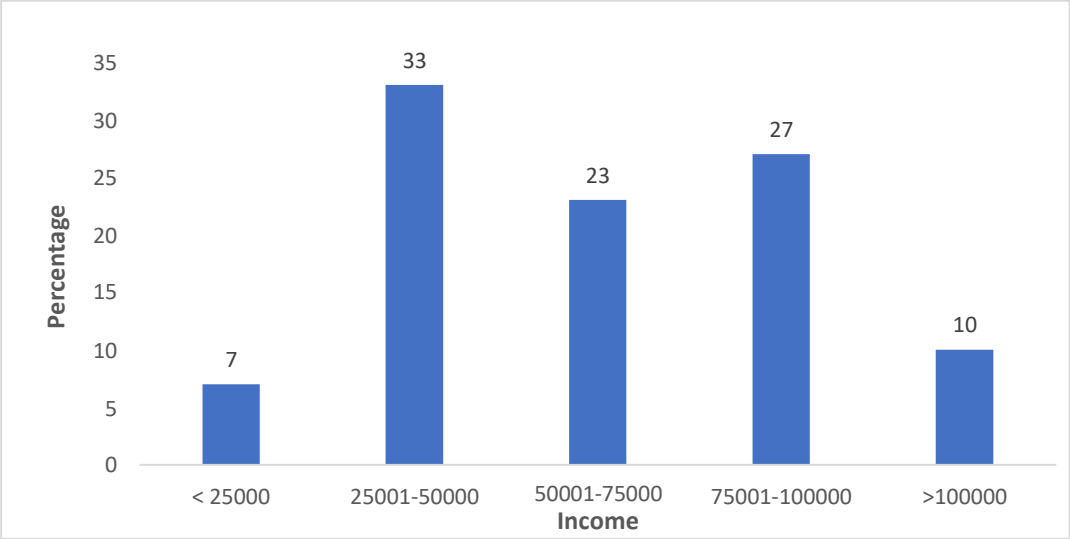


Table 2: Summary Characteristic of Consumption Preferences

Variable	Item/Description	Frequency	% age
To what extent consumers like potato?	Very little	10	34
	Somewhat	7	23
	To a great extent	13	43
	Overall	**30**	**100**
Why do you like to consume potato?	Taste	19	63
	Good for health	4	13
	Easy availability	7	24
	Overall	**30**	**100**
How frequently do you consume potato?	Daily	4	13
	Twice a week	14	47
	Thrice a week	6	20
	Weekly	6	20
	Overall	**30**	**100**
In which form do you consume potatoes?	Cooked	1st Preference	**56**
		2nd Preference	**17**
		3rd Preference	**27**
		Overall	**100**
	Chips	1st Preference	**20**

		2nd Preference	**53**
		3rd Preference	**26**
		Overall	**100**
	Mashed	1st Preference	**27**
		2nd Preference	**33**
		3rd Preference	**40**
		Overall	**100**

Figure 6 shows that 43 of respondents liked potato to great extent while 34 percent liked very little and 23 percent of respondents somewhat liked potato.

Figure 6: Extent Consumers like potato

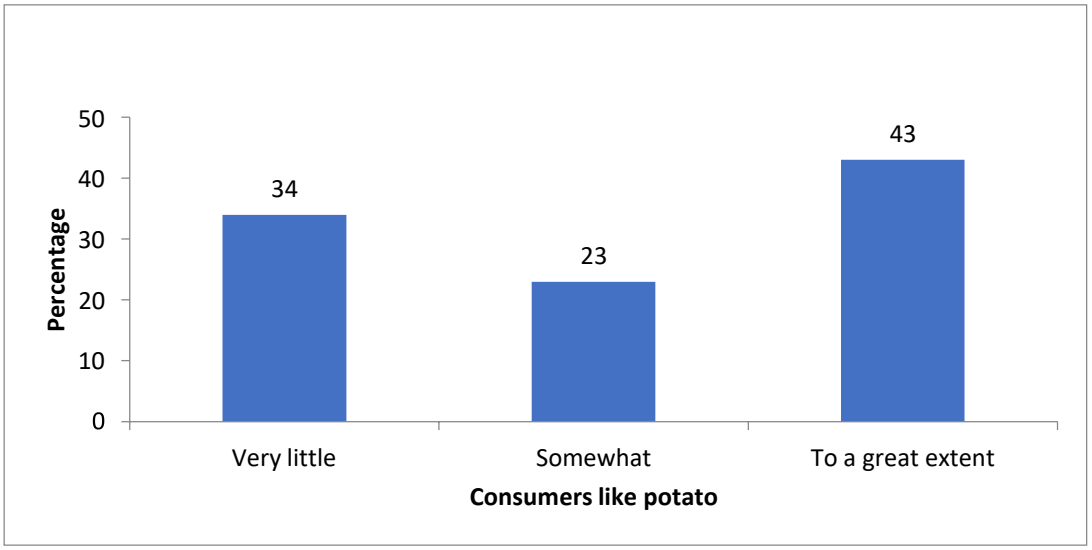


Figure 7 shows 63 percent of respondents liked to consume potato due to its taste, 24 percent liked potato due to its easily availability and 13 percent liked potato for good for health.

Figure 7: Likeness to Consume Potato

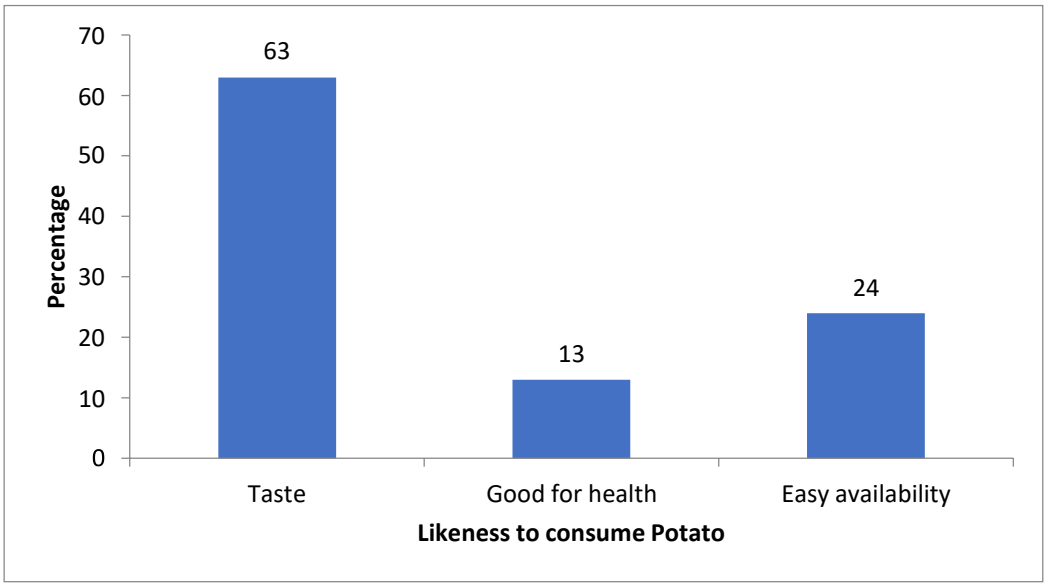


Figure 8 shows that 47 percent of respondents consumed potato twice a week, 13 percent consumed daily, 20 percent consumed thrice a week and 20 percent consumed potato weekly.

Figure 8: Frequency of Potato Consumption

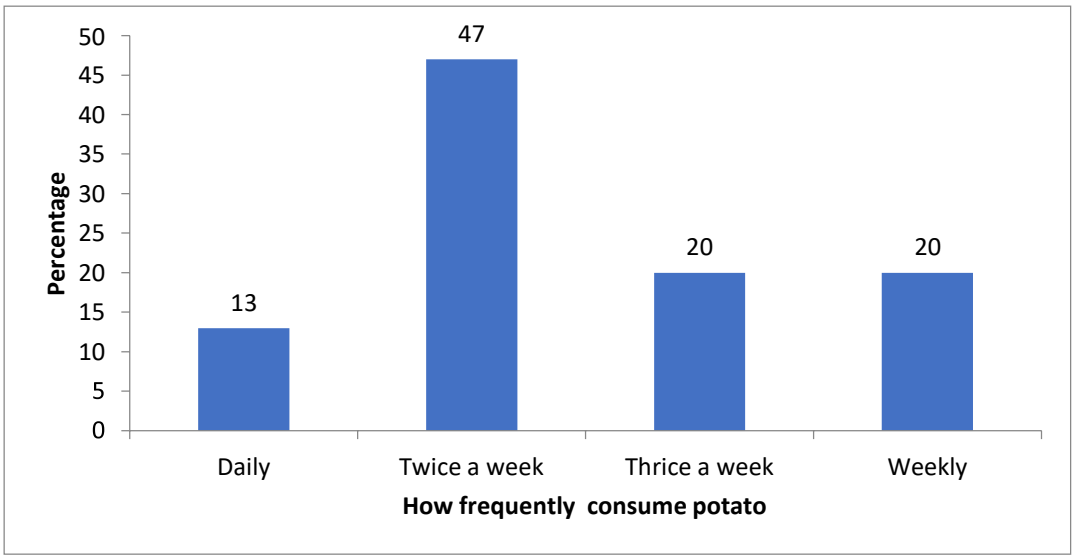


Figure 9 shows respondents preference for the cooked potato, 56 percent respondents preferred cooked potato as their 1st preference, 17 percent respondents preferred cooked potato as their 2nd preference and 27 percent respondents preferred cooked potato as their 3rd preference.

Figure 9: Preference for the Cooked Potato

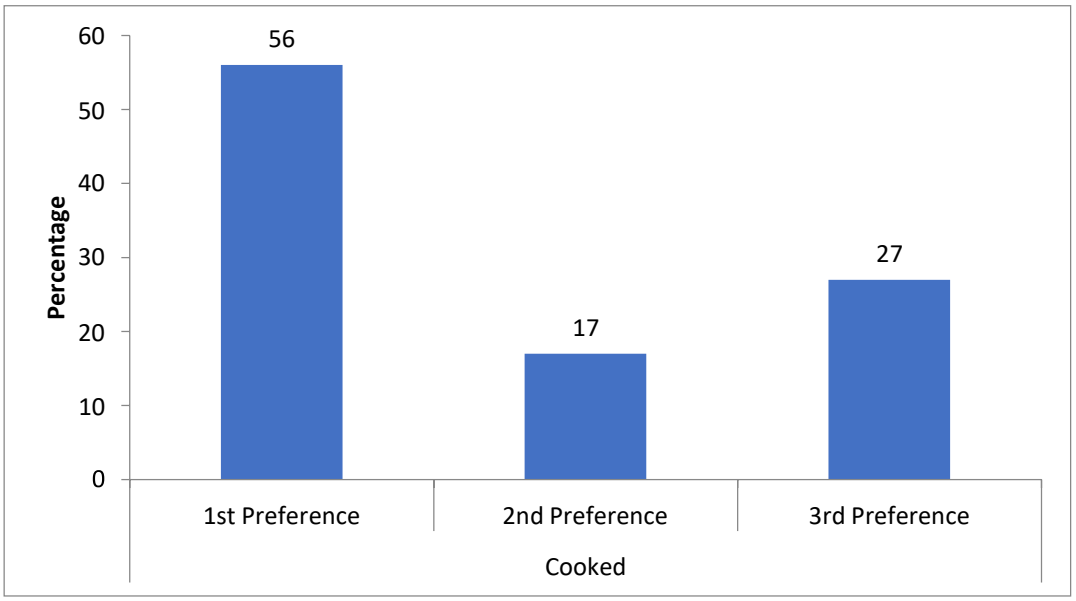


Figure 10 shows respondents preference for the chips, 20 percent respondents preferred chips as their 1st preference, 53 percent respondents preferred chips as their 2nd preference and 26 percent respondents preferred chips as their 3rd preference.

Figure 10: Preference for the Chips

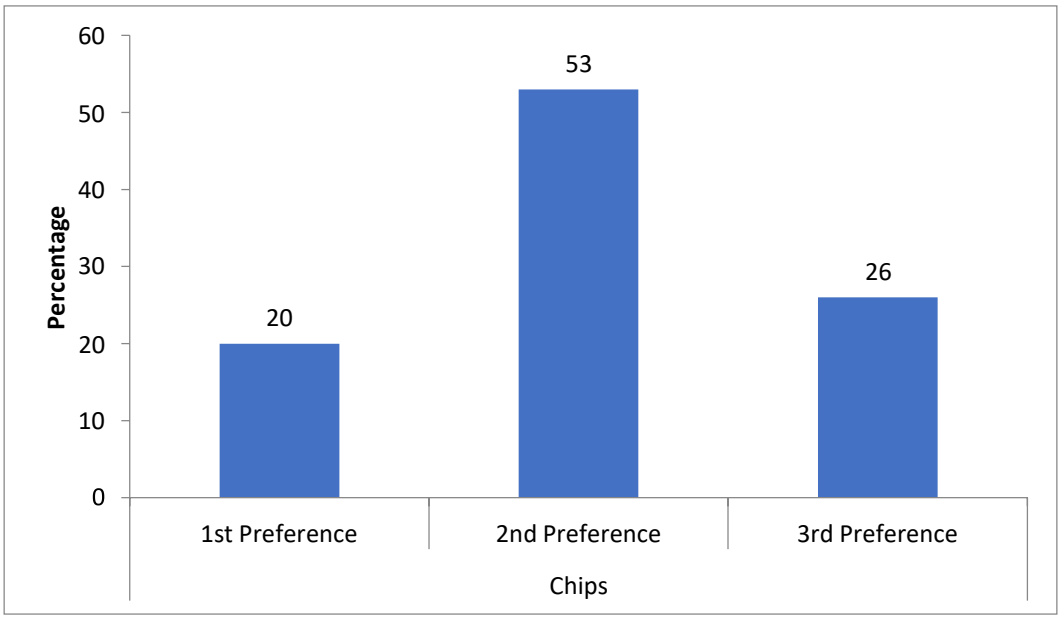


Figure 11 shows respondents preference for the mashed potato, 27 percent respondents preferred mashed potato as their 1st preference, 33 percent respondents preferred mashed potato as their 2nd preference and 40 percent respondents preferred mashed potato as their 3rd preference.

Figure 11: Preference for the Mashed Potato

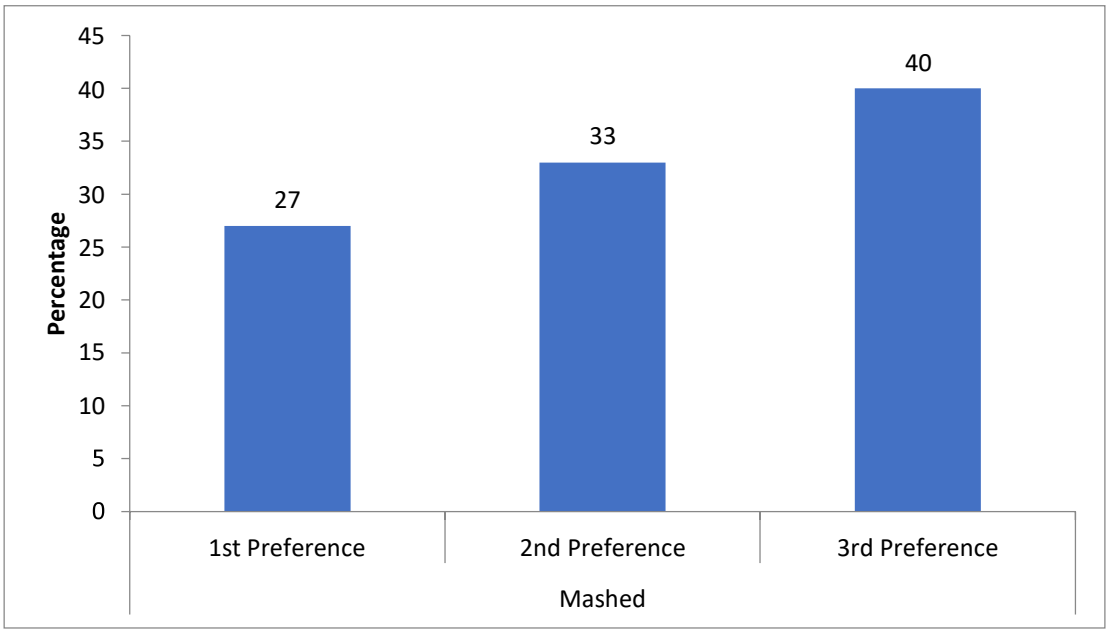


Table 3: Summary Characteristic of Purchase Preferences

Variable	Item/Description	Frequency	% age
How frequently purchase potato	Daily	4	13
	Twice a week	14	47
	Thrice a week	6	20
	Weekly	6	20
	Overall	**30**	**100**
How much quantity (kg) you buy at one time?	1	2	7
	2	3	10
	3	14	47
	4	4	13
	5	3	10
	≥ 5	4	13
	Overall	**30**	**100**
What is your preferred size of potato for buying?	Large (3-4 pieces/kg)	8	27
	Medium (5-7 pieces/kg)	19	63
	Small (>7 pieces / kg)	3	10
	Overall	**30**	**100**

Which variety you prefer while buying potatoes?	red color	14	47
	White (brown skin color)	9	30
	Both	7	23
	Overall	**30**	**100**
Consumer Buying Price (PKR/Kg)	21-40	2	7
	41-60	13	43
	61-80	11	37
	> 80	4	13
	Overall	**30**	**100**
Weekly expenditure on purchase of potato (RS)?	101-200	8	26
	201-300	13	44
	301-400	5	17
	> 400	4	13
	Overall	**30**	**100**
Average price/Kg/RS	Supermarket/ Superstore	69	**Mean Average Price/Kg/Rs. 48**
	Street vendor	46	
	Retailer / Roadside stallholder	55	
	Weekly market	39	
	Wholesale market	30	

Figure 12 shows that 47 percent of respondents purchase potato twice a week, 13 percent daily,20 percent thrice a week and 20 percent purchase potato weekly.

Figure 12: Frequency of Purchasing Potato

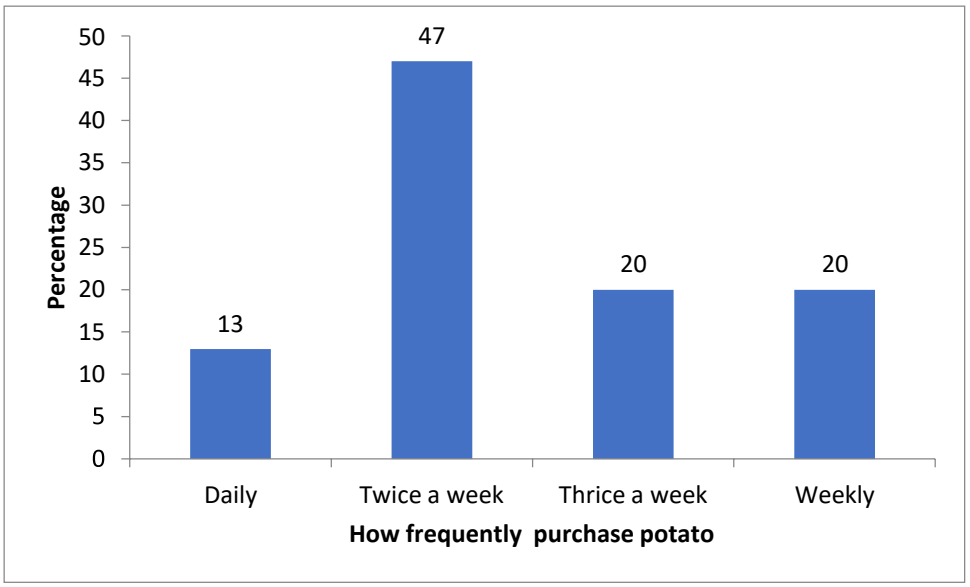


Figure 13 depicts the quantity of potato respondents bought at one time, 47 percent of respondents bought 3 kilograms at a time, while 13 percent bought more than 5 kilograms and only 7 percent of the respondents bought 1 kilogram at a time.

Figure 13: Quantity buys at one time

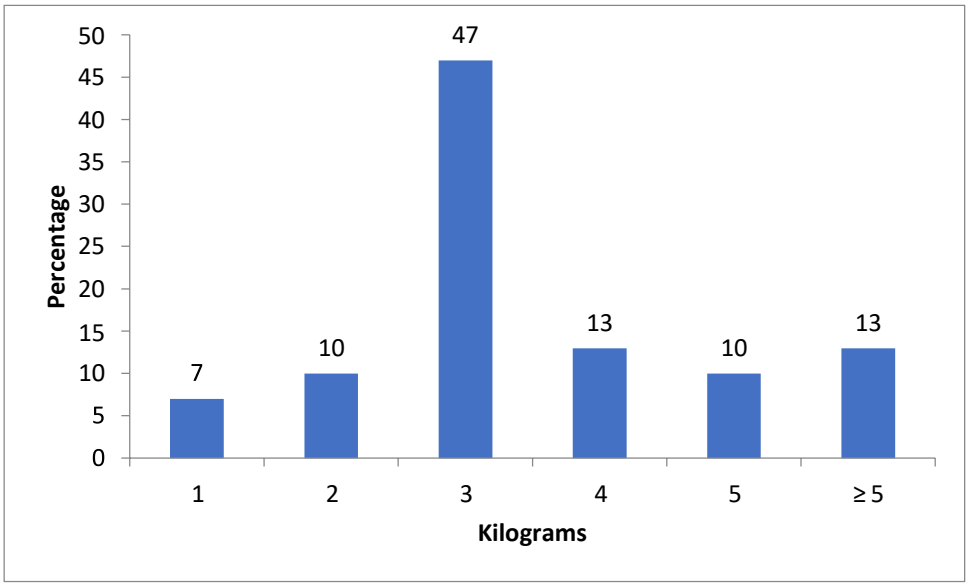


Figure 14 shows preferred size of potato, 63 percent of respondents preferred Medium (5-7 pieces/kg) size, while 27 percent of respondents preferred Large (3-4 pieces/kg) and 10 percent of respondents preferred Small (>7 pieces / kg).

Figure 14: Preferred size of potato for buying

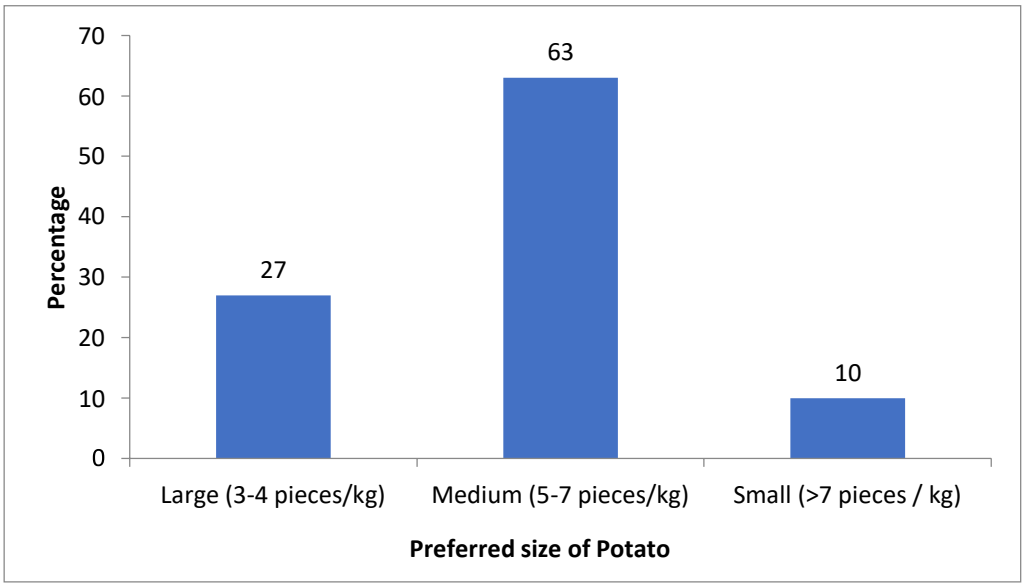


Figure 15 shows the preferred variety of potato by the consumers, 47 percent of respondents preferred red color, while 30 percent preferred white color and 23 percent preferred both red color and white color while buying potatoes**.**

Figure 15: Variety Prefer while buying Potatoes

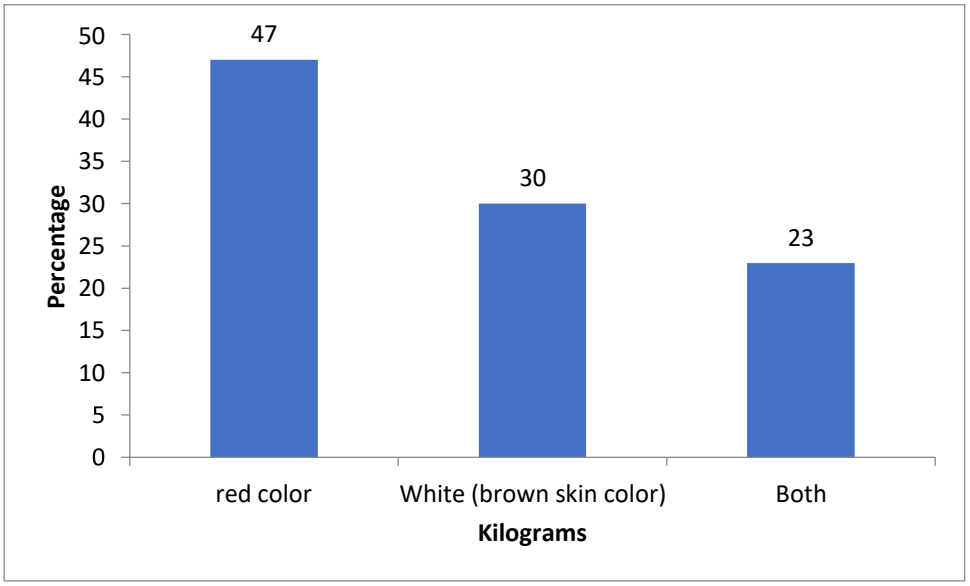


Figure 16 shows buying price of potato, 43 percent bought at price ranged from Rs. 41 to Rs. 60, while 13 percent bought at price more than Rs. 80 and 7 percent bought at price ranged from Rs. 21 to Rs. 40.

Figure 16: Consumer Buying Price (RS/Kg)

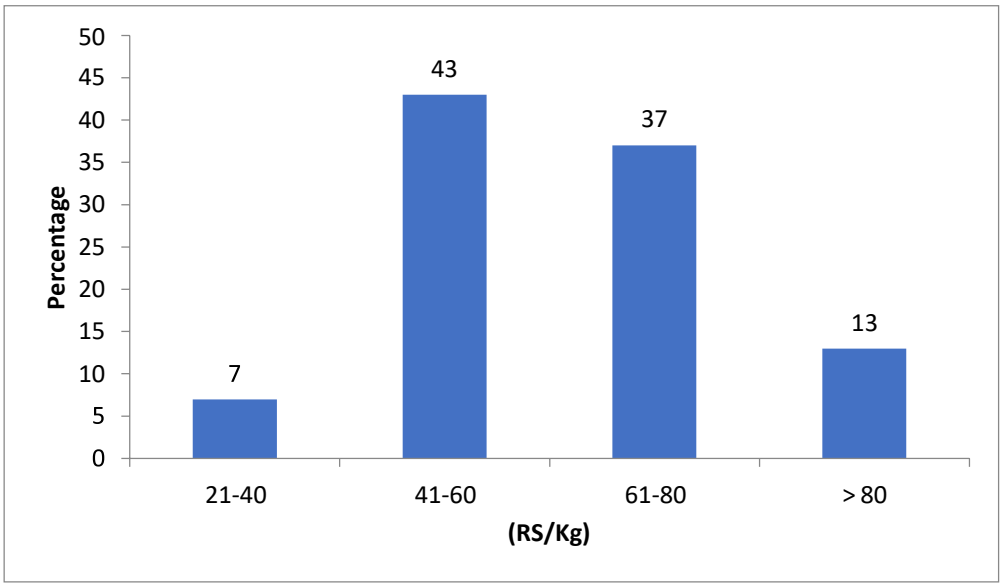


Figure 17 shows weekly expenditure incurred on the purchase of potato; 44 percent respondents incurred Rs. 201-300 on the purchase of potato weekly, while 26 percent of respondents incurred Rs. 101-200 on the purchase of potato and 13 percent of respondents incurred more than Rs. 400 on the purchase of potato weekly.

Figure 17: Weekly Expenditure on purchase of potato (RS)

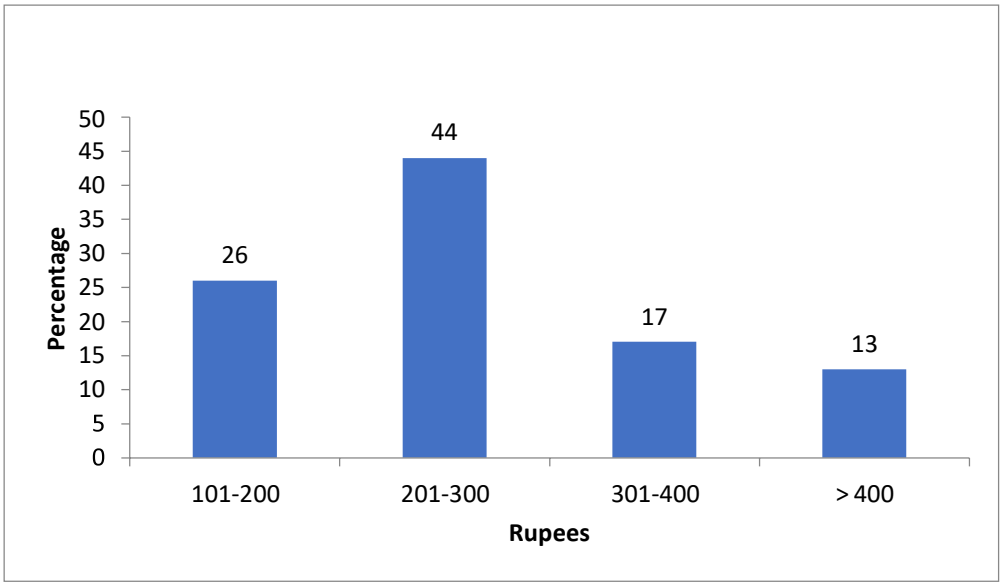


Figure 18 shows the average price/Kg/Rs. of potato revealed by respondents; average price at the Superstore was Rs. 69, average price at the street vendor was Rs. 46, while price at weekly market was Rs. 39 and at the wholesale market price was Rs. 30.

Figure 18: Average price/Kg/RS

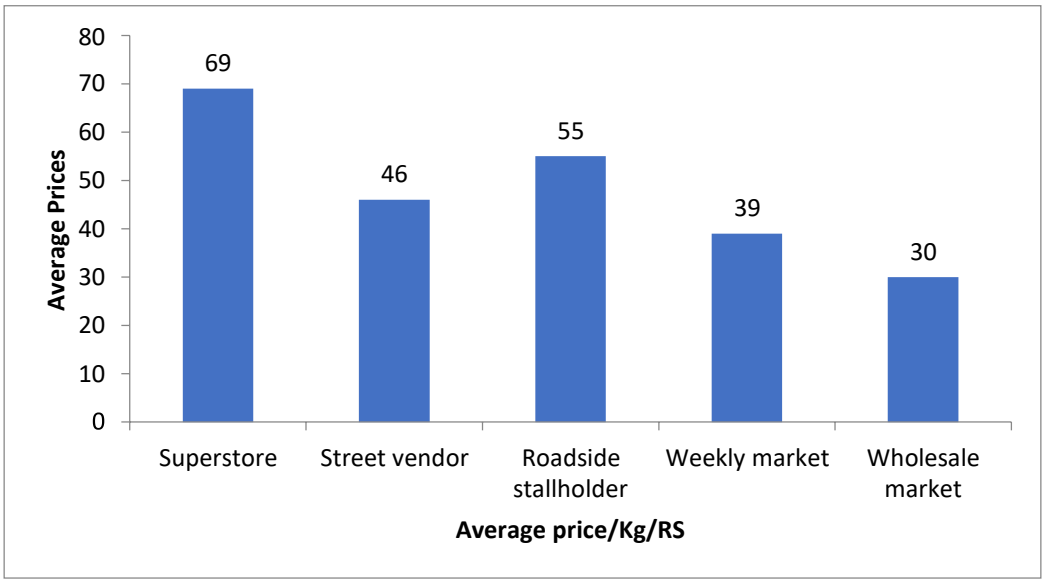


Table 4 elaborated summary characteristic of consumer preferences for potato attributes related to Search. Search attributes includes Shape of potato, Size of potato, Freshness of potato, variety of potato, undamaged of potato and unblemished of potato.

Table 4: Summary Characteristic of Consumer Preferences for Potato attributes (Search)

Variable	Attributes	Item/Description	Frequency	% age
Search	**Shape**	Not all important	2	7
		Not very important	4	13
		Neutral	6	20
		Important	13	43
		Highly Important	5	17
		Overall	**30**	**100**
	Size	Not all important	2	7
		Not very important	2	7
		Neutral	4	12
		Important	11	37
		Highly Important	11	37
		Overall	**30**	**100**
		Not all important	0	0

	Freshness	Not very important	0	0
		Neutral	8	27
		Important	9	30
		Highly Important	13	43
		Overall	**30**	**100**
	Variety	Not all important	2	7
		Not very important	3	10
		Neutral	6	20
		Important	12	40
		Highly Important	7	23
		Overall	**30**	**100**
	Undamaged	Not all important	0	0
		Not very important	2	7
		Neutral	3	10
		Important	19	63
		Highly Important	6	20
		Overall	**30**	**100**
	Unblemished	Not all important	0	0
		Not very important	2	7
		Neutral	5	17
		Important	15	50
		Highly Important	8	27
		Overall	**30**	**100**

Table 5 elaborated summary characteristic of consumer preferences for potato attributes related to Experience. Experience attributes includes Firmness of potato, ease of peeling of potato, taste of potato, Ripeness of potato and Dryness of potato.

Table 5: Summary Characteristic of Consumer Preferences for Potato attributes(Experience)

Variable	Attributes	Item/Description	Frequency	% age
Experience	**Firmness**	Not all important	2	7
		Not very important	1	3
		Neutral	6	20
		Important	8	27
		Highly Important	13	43
		Overall	**30**	**100**
	ease of peeling	Not all important	0	0
		Not very important	0	0
		Neutral	2	7
		Important	22	73
		Highly Important	6	20
		Overall	**30**	**100**
	taste	Not all important	0	0
		Not very important	2	7
		Neutral	3	10
		Important	11	37
		Highly Important	14	47
		Overall	**30**	**100**
	Ripeness	Not all important	2	7
		Not very important	1	3
		Neutral	2	7
		Important	11	37
		Highly Important	14	47
		Overall	**30**	**100**
	Dryness	Not all important	2	7
		Not very important	1	3

		Neutral	6	20
		Important	15	50
		Highly Important	6	20
		Overall	**30**	**100**

Table 6 elaborated summary characteristic of consumer preferences for potato attributes related to Safety. Safety attributes includes cleanliness of potato and chemical free of potato.

Table 6: Summary Characteristic of Consumer Preferences for Potato attributes (Safety)

Variable	Attributes	Item/Description	Frequency	% age
Safety	**cleanliness**	Not all important	0	0
		Not very important	2	7
		Neutral	1	3
		Important	12	40
		Highly Important	15	50
		Overall	**30**	**100**
	chemical free	Not all important	0	0
		Not very important	2	7
		Neutral	6	20
		Important	10	33
		Highly Important	12	40
		Overall	**30**	**100**

Table 7 elaborated summary characteristic of consumer preferences for potato attributes related to Marketing. Marketing attributes includes price of potato, Selling place cleanliness of potato, Packaging of potato, Grading of potato and Branding of potato.

Table 7: Summary Characteristic of Consumer Preferences for Potato attributes(Marketing)

Variable	Attributes	Item/Description	Frequency	% age
Marketing	**Price**	Not all important	1	3
		Not very important	1	3
		Neutral	4	14
		Important	13	43
		Highly Important	11	37
		Overall	**30**	**100**
	Selling place cleanliness	Not all important	0	0
		Not very important	2	7
		Neutral	2	7
		Important	25	82
		Highly Important	1	4
		Overall	**30**	**100**
	Packaging	Not all important	0	0
		Not very important	6	20
		Neutral	13	43
		Important	8	27
		Highly Important	3	10
		Overall	**30**	**100**
	Grading	Not all important	3	10
		Not very important	4	13
		Neutral	5	17
		Important	14	47
		Highly Important	4	13
		Overall	**30**	**100**
	Branding	Not all important	10	33
		Not very important	1	3
		Neutral	8	27
		Important	6	20
		Highly Important	5	17
		Overall	**30**	**100**

5. Summary and Conclusions

Growing consumer demand and rising government attention to the development of horticultural crops has significantly contributed to the expansion of potato area and production in Pakistan. Expansion in the processing industry have also contributed to increasing consumption of potato products. Furthermore, potato is the cheapest source of carbohydrates, vitamins, minerals, and proteins. This study uses field survey data collected from Sahiwal, Okara and Depalpur (major potato producing areas in Punjab province, Pakistan) to quantify the roles of various stakeholders (Farmers, Commission Agents, Wholesalers, Retailers and Consumers) in potato value chain.

Study findings shows that majority of the farmers use their own savings to meet cost of production of potato crop and some also borrowed from Aarthi. Benefit-Cost Ratio for all the three varieties of potato crop is greater than one which indicates that farmers are making profit from investment on potato crop. Price fluctuation and exploitation by middleman are the major issues farmers facing while marketing their produce. Majority of commission agents had their personal investment in business, some also borrowed from informal (friends, relatives etc.) and formal sources such as banks. Most of the surveyed commission agents also provide finances to farmers. On ana average commission agent charges 4 percent commission from both sellers and buyers. Majority of wholesalers uses their personal capital in business, and some also borrowed formal banks as well. They earn reasonable profit from their business. Retailers use both personal capital and borrow money from banks for their business. Retailers earn Rs.5-10/kg from sale of potato crop to consumers.

At farm level, there is need to ensure good quality seed and other inputs. Subsidies is not reaching to farmers. Farmers are being exploited by market intermediaries. To save losses at sowing and harvesting time proper farm machinery is a major constraint. Market committee collects the fee but does not provide proper facilities at marketplace. There is need of electronic auction and mandi.

6. Recommendations

6.1. Farmers Case

- Imported seed is very expensive and this increases cost of production of potato crop. There is need to encourage local production of high-quality potato seed (State Research Organizations & Private Seed Companies).
- There is need to promote farm mechanization services for potato sowing and harvesting practices (Farm Mechanization Service Providers).
- Capacity building of potato farmers on sustainable farm management, storage, and marketing practices (Agriculture Extension Department; Private Seed, Fertilizer, Pesticide companies, NGOs).
- High commission rate charged by Aarthi's and other malpractices at the produce market i.e., improper moisture content deductions need attention from marketing authorities (Punjab Agriculture Marketing Department).

6.2. Commission Agent Case

- Produce Markets have become too crowded and encroached by various market intermediaries. There is need of provision of adequate space for commission agents to conduct their business without any obstruction (Market Committee, Anjuman Arthian, District Administration).
- Basic facilities for farmers and market players like toilets, parking, and clean drinking water have gotten so bad that they are no longer functional and usable.
- No proper waste management mechanism in fruit and vegetable markets.

6.3. Wholesaler / Pharia Case

- It is necessary to legalize and promote the role of wholesalers in the marketing of agricultural products. There is need to issue license to wholesalers by the market committee and it will provide wholesalers a legal standing (Market Committee).
- Wholesalers should be given a working area. Current allocation of area favoritisms the commission agents quite substantially.

6.4. Retailer Case

- The role of the retailer should be acknowledged as a component of the agriculture produce market (Market Committee, City District Government).
- There is need for capacity building of retailers on standard grading, sorting, and business ethics (Training Firms).
- Retailers should be given proper space in market to perform their business activity.

6.5. Consumer Case

- Communicate consumer's preference to potato growers and other market intermediaries (Researchers, Media).
- Consumers are least interested in health and nutritional attributes of potato. There is need of effective marketing strategies and targeted nutritional education

programs, particularly on potato fiber and vitamin C content (Public HealthDepartment, NGOs).

In general there is need to develop forecasting mechanism for potato crop area under cultivation, production, prices, local use, and export etc. This will provide level paly field for all stakeholders of potato value chain and will further strengthen the planning process at State level.