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Socioeconomic Dynamics Of Wheat Distribution: Commission Agents And Social Structures In District Pakpattan, Punjab, Pakistan

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ABSTRACT

This study aims to analyse the determinants and roles of commission agents in the wheat supply chain, as well as identify the market channels and margins in Pakpattan, Punjab, Pakistan. This research work involves gathering primary and secondary data from a variety of sources. Through the application of the ordinary least square (OLS) technique, this study aims to identify the various factors that influence the quantity of wheat produced in the supply chain. Based on the results of this study, it is evident that various factors have a significant and positive impact on the quantity of wheat produced. These factors include the size of the land holding, farming experience, access to credit, education level, past prices other than government inputs, and improved input seeds. In this study, the market channel and margin are visually depicted, and the farmer's preference for middlemen (arthi) is discussed in a theoretical manner. By implementing policies that prioritise the needs of farmers, we can effectively reduce the lack of government support experienced by these individuals. These policies should aim to assist farmers during the cultivation process and also provide them with better opportunities to sell their produce. This would be a significant improvement compared to the current situation, where the government only purchases wheat from a limited number of selected farmers.

Keywords: Wheat supply chain, Market margin, Arthi system, Assemblers, Millers, Wholesalers, Retailers, Farmer preferences, Determinants of wheat supply, Econometric model, Pakpattan.

1. Introduction

Agriculture is vital for Pakistan's economy, directly supporting its population and accounting for 18.5% of the Gross Domestic Product (GDP). Approximately 38.5% of the labour force works in agriculture, and around 68% of the population lives in rural areas, connected to the agricultural sector in Pakistan (Government of Pakistan, 2019).

The early years of Pakistan's independence saw minimal growth in the agricultural sector, prompting the initiation of the Green Revolution in the late 1950s to improve agricultural productivity (Zaidi, 2015). Despite various initiatives, the growth rate of the agricultural sector fluctuated over the years due to factors such as economic policies, OPEC price shocks, currency devaluation, and natural disasters (Chandio et al., 2016).

The agriculture sector in Pakistan faces numerous challenges that hinder its progress when compared to other economies. These challenges are farmer illiteracy, limited access to new agricultural technology, resentment between landlords and peasants, soil erosion, water scarcity, lack of loan availability, poor infrastructure, and rising prices of agricultural inputs (Haq et al., 2013; Nawab, Khan, & Niaz, 2019a; Nawab & Khan, 2019b).

Wheat plays a crucial role in Pakistan's agricultural landscape and is a key ingredient in many local dishes. There has been a disparity

between wheat production and demand due to insufficient increases in production to match population growth. The government of Pakistan should take policy measures to reduce the gap between the demand and supply of wheat and to increase wheat production per acre (Ali et al., 2011).

Wheat production has been adversely affected due to rising problems with irrigation. Our reservoirs are Tarbela and Mangla, which have issues of silting, and the increased population near riverbanks led to a decline in the amount of water available per person (Prikhodko and Zrilyi, 2013; Raza, 2017).

In the agricultural supply chain of Pakistan, 'Arthi' means intermediaries or middlemen play a vital role. They operate in local grain markets and provide finances and assistance to peasants in crop sales (Haq et al., 2013).

Our research is mainly based on understanding the socioeconomic role of 'arthi' and the factors that impact the wheat supply chain in Pakpattan, Punjab, Pakistan. The study focuses on examining peasant decisions regarding middlemen, distribution channels, profit shares, and the factors influencing wheat supply. The findings of the study aim to provide important insights for policymakers, financial institutions, and other stakeholders to develop their strategies for improving the welfare of farmers as well as to address challenges within the wheat supply chain.

2. Literature Review

Like every agricultural country, landholdings determine the socio-political power of an individual. Landlords evict peasants and assume ownership of the land through the use of mechanised agriculture. The violent removal of peasants led to peasant unrest. The one-sided choice to expel caused dissatisfaction among the peasants and led to their organisation into the peasants' movement. The organised peasants defeated the private militia of the landlords and burned their property and residences, causing them to leave. Peasants improved their living standards in health and education by successfully eliminating landlord exploitation through peasant movements. They were also very conscious of their rights, especially political rights and knowledge (Nawab, Khan, & Niaz, 2019a; Nawab & Khan, 2019b; Nawab, Jalil, & Hussain, 2021; Nawab, Samad, & Mulk, 2022).

Other significant stakeholders in the rural economy, aside from peasants and landlords, are middlemen. These middlemen, also known as informal money lenders or "Arthi," play a vital role in various countries, especially in the rural economies of developing nations (Sharma & Chamala, 2003). Research offers two perspectives on middlemen: some recognise their essential function in providing capital to farmers (Spulber, 1996), while others criticise their practices, highlighting how they can ensnare farmers in cycles of debt (Weijland, 1991). Furthermore, the literature explores market concepts, factors influencing the wheat supply chain, and market margins in different researched regions.

Middlemen are seen as essential for supplying funds to farmers, indirectly assisting in feeding millions (Sharma & Chamala, 2003). They preserve stable relationships that are advantageous for both sides (Knomnga & Weijland, 1989). These intermediaries help ease transactions between buyers and sellers by offering financing and simplifying access to international trade (Spulber, 1996; Ahn et al., 2011). The literature does not provide detailed information about the various sorts of intermediaries needed in global value chains and their precise functions (Gereffi et al., 2005).

Although advantageous, middlemen may charge higher interest rates than traditional financial institutions, such as banks (Aleem, 1990). They can harm local rice prices, regional productivity, and agricultural output (Weijland, 1991). Additionally, the elevated transportation

expenses and market dominance of intermediaries can impede rural families' advantages from globalisation (Goetz, 1992; Hertel & Winters, 2005).

A market is a place where buyers and sellers trade goods and services (Ashenafi, 2010). Markets function as arenas for economic transactions, dealing with issues concerning production, distribution, and consumption (Kohls et al., 1985). Marketing is the act of meeting human needs through the timely provision of items in suitable locations (Abbot & Makeham, 1981). The marketing system involves different commercial entities that facilitate the movement of items from production to consumption (Branson & Norvel, 1983).

Several factors impact the wheat supply chain, such as household characteristics, market information accessibility, proximity to markets, and output volume (Ayelech, 2011; Urgessa, 2011). Research has examined how these factors impact the available supply of fruits, teff, tomatoes, and wheat (Abraham, 2013; Nosheen & Iqbal, 2008).

Existing literature discusses both favourable and unfavourable elements of intermediaries in the economy. There is a lack of definition concerning their involvement in global value chains, according to Belavina & Gilotra (2012). Studies have identified factors affecting marketable supply but have not thoroughly examined these elements within the wheat supply chain in Pakpattan, Punjab.

This literature review examines the role of landlords, peasants, and middlemen, specifically Arthi or informal money lenders, in the wheat supply chain in Punjab's Pakpattan district, Pakistan. It discusses the positive aspects of ‘arthi’ i.e., middlemen's involvement, such as providing money to farmers and facilitating transactions, as well as the negative aspects, such as high interest rates and market control inequalities. The review delves into market concepts, highlighting the significance of marketing systems and channels in product distribution and marketing margins. There is a gap in the existing literature on Pakpattan's wheat supply chain and farmers' preferences. The goal is to enhance comprehension of rural economies and agricultural markets. Moreover, this study aims to address gaps in understanding farmer preferences, ‘arthi’ selection, market networks, market margins, and determinants of the wheat supply chain by focusing on Pakpattan.

3. Theoretical Framework

Peasants involved in the production of agricultural goods distribute surplus products to consumers or intermediaries like Kacha Arthi, Pakka Arthi, or assemblers. The Pakka Arthi then distributes its share to mills or assemblers.

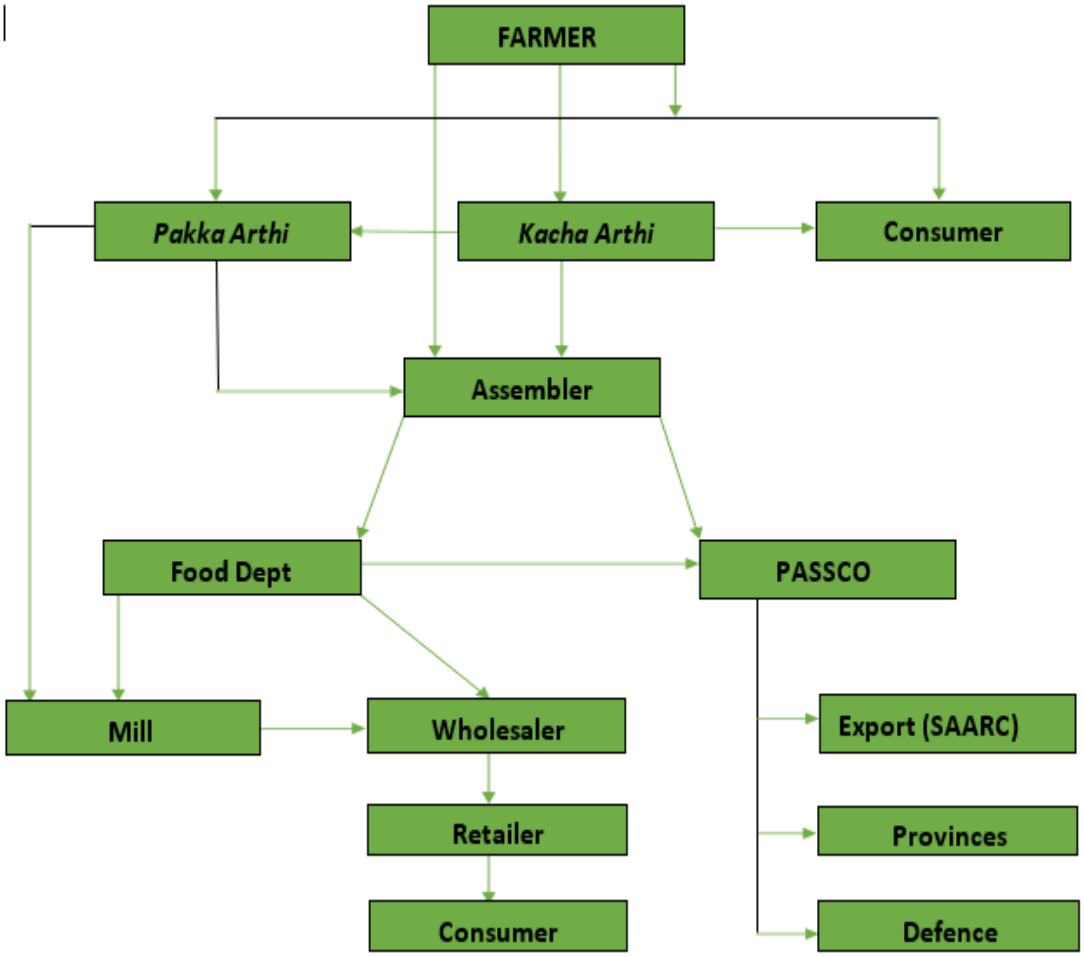
The Kacha Arthi distributes their share to assemblers, wholesalers, and customers directly. The assemblers supply the product to the food department and Pakistan Agriculture Storage and Services Corporation (PASSCO).

The Food Department distributes its stock to consumers through wholesalers and retailers, while PASSCO either exports its stock or provides it to provinces and defence. The assembler serves as the central storage location for wheat before it is distributed to the relevant provincial or federal departments, such as the Food Department or PASSCO Warehouse, depending on the department that controls the assembler. Wholesalers in this supply chain segment purchase wheat from mills and distribute it to retailers. Retailers are customers who acquire goods from wholesalers for distribution to end consumers. The producers also provide a percentage of their produce directly to consumers. The routes are detailed within the conceptual framework of the wheat supply chain (Figure 1).

4. Conceptual Framework

The conceptual framework includes the supply of wheat from farmers to the consumer:

Fig: 1. Wheat Supply Chain



Source: Source: (Iqbal, 2019).

5. Research methodology

In this study, researchers utilise the econometric model, which is contingent on the dependent variable. The study focuses on the determinants of the wheat supply chain, which is considered a ratio variable based on its definition. In circumstances where the dependent variable is a ratio variable, the analysis applies Ordinary Least Squares (OLS) for regression. OLS is recognised for its simplicity in linear regression. The main goal is to closely synchronise a function with the dataset. It achieves this by reducing the total number of squared errors in the data. OLS regression is a widely used statistical technique in the social sciences. It is used to forecast the values of a continuous response variable by utilising one or more explanatory factors and can also assess the magnitude of the associations.

An econometric model was utilised to analyse the factors influencing wheat supply. The formula is:

$$QWP = \propto_o + \alpha_1 SFL + \alpha_2 MI + \alpha_3 FE + \alpha_4 LP + \alpha_5 EL + \alpha_6 LO + \alpha_7 AC + \alpha_8 DM + \alpha_9 IPI + €$$

QWP = Quantity of Wheat Produced

SFL = Size of farm Land

MI = Access to Market Information

FE = Farmer Experience

LP = Lagged Price of farmer

EL = Education Level

LO = Land Ownership

AC = Access to Credit DM = Distance to market

IPI = Improve Production Input

€ = Error Term

The details of the dependent and independent variables are given below

Dependent Variable is Quantity of Wheat Produced: This represents the amount of wheat supplied to the market by households in Pakpattan, Punjab, measured in mounds. It serves as the focus of the study to understand the determinants influencing wheat production. Maund" is a unit of measurement commonly used in South Asia, particularly in countries like India and Pakistan, to measure weight. One maund is equivalent to approximately 37.32 kilograms or 82.36 pounds. It is often used to measure agricultural produce such as grains like wheat, rice, or barley.

Similarly, Independent Variables are :

Size of Farm (Landholding): Measured in hectares allocated to wheat production, expected to positively impact wheat production due to larger landholders having a higher tendency to produce and supply more to the market.

Access to Market Information: A dummy variable indicating the availability (1) or unavailability (0) of market information to farmers. The availability of market information is anticipated to positively affect wheat supply.

Farmer Experience: Measured in years of involvement in farming activities, with experienced farmers expected to produce and supply more wheat compared to less experienced ones.

Lagged Price: Average annual price received by farmers in the previous year per maund of wheat. Anticipated to positively influence wheat production and marketable supply for the current period.

Education Level: Number of years of schooling of farmers. Expected to positively affect wheat production by influencing decision-making processes.

Land Ownership: Categorized as owner, rented, or rented+owner. More land ownership is expected to lead to higher production, given the lower cost of owned land compared to rented land.

Access to Credit: A dummy variable indicating loan uptake (1) or non-uptake (0) by farmers. Increasing loans are expected to initiate the production process and increase the wheat supply.

Distance to Market: Measured in kilometres, with a negative and significant relationship anticipated between distance to market and wheat production due to factors such as market information availability and reduced carriage and spoilage costs for farmers closer to markets.

Improved Production Input: A dummy variable indicating the use (1) or non-use (0) of improved grains. Expected to positively influence wheat production due to increased output from improved seeds and fertilizers.

These variables are discussed concerning their expected impact on wheat production and supply in Pakpattan, Punjab, based on previous studies and hypotheses presented in the research.

The section on Data and Data Sources outlines the research methods for analyzing the collected data. This study is both exploratory and descriptive, aiming to uncover the role of middlemen in the wheat supply chain in the Arifwala and Pakpattan districts of Punjab, Pakistan.

This research uses interviews to gather reliable data, with structured questionnaires designed for this purpose. Data collection involves filling out these questionnaires, tailored to meet the research objectives. The study relies on both primary information obtained from informal interviews with the target population and secondary data from the Food Department Pakpattan and PASCO Lahore.

To establish a robust methodology, a two-stage stratified random sampling technique was employed in the Pakpattan District of Punjab, Pakistan.

Pakpattan District was purposefully selected because of its significant wheat production and surplus. The sampling method included choosing Punjab as the initial stage and Pakpattan District as the subsequent stage, taking into account its two tehsils: Arifwala and Pakpattan. Random villages were selected from these tehsils, and samples were chosen from these villages. The study gathered information from three primary sources: farmers, middlemen (arthi), and assemblers.

In the farmer sampling process, we aimed to select a representative sample from the total population of farmers in District Pakpattan. With a total population of 1,823,687 farmers according to the Government of Pakistan, we focused on the populations of Tehsil Pakpattan (969,225) and Tehsil Arifwala (854,462).

We adopted a stratified sampling approach, selecting 12 villages from both Tehsils as our strata. From each village, we randomly selected 8 farmers as samples. This resulted in a total sample size of 96 farmers, aiming to represent the total population of 87,021 farmers across the 12 villages. The sample size was determined using the following formula:

$$SS = \frac{Z^2 \times P \times (1-p)}{C^2}$$

Where:

SS = Sample size

Z = Z value (e.g., 1.96 for 95% confidence level)

P = Percentage picking a choice, expressed as a decimal

C = Confidence interval, expressed as a decimal

The researchers chose villages from two tehsils, Pakpattan and Arifwala, for sampling. 12 villages were chosen, evenly spread out between the two tehsils. Each selected village received a sample size of 8. The villages were selected based on their population size, which varied from 4,568 to 19,171 in Pakpattan Tehsil and from 4,197 to 7,259 in Arifwala Tehsil, as per the 2017 Population Census. This systematic approach ensured a fair representation of both tehsils in the sample, allowing for a comprehensive analysis of the research objectives.

Details of Arthi and Assembler sampling are given below:

Kacha Arthi Sampling: The study area has a total of 340 Kacha Arthi. Using the sample calculation formula, it has been determined that the sample size is 75, with a confidence level of 95% and a confidence interval of 10.

Pakka Arthi Sampling: There are a total of 12 Pakka Arthi in the research zone, with 7 in Arifwala Tehsil and 5 in Pakpattan Tehsil.

Sampling of assembler data was conducted using two sources:

Food Department: Details regarding assemblers will be obtained from the food department of the Pakpattan district.
PASCO: Assembler data would be collected from the PASCO office in Lahore as well.

6. Result and Discussion

This section examines the attributes of market actors' roles, and the mechanism via which wheat is brought to the market, and offers an elaborate depiction of the market margin of wheat supply using graphical and statistical

formats. Additionally, it addresses the preferences of farmers towards Arthi and empirically examines the factors that influence the supply of wheat.

6.1. Characteristics of Wheat in Supply Chain

The following factors contribute to the wheat supply process;

a. Farmers

Farmers have a crucial role in both wheat production and its marketing, as well as the provision of wheat stock to other sectors of the economy. Farmers cultivate crops and raise livestock using the land and resources at their disposal. This study categorises farmers based on their land tenure, which encompasses both owned land and rented land, including land with ownership rental structures. Small farmers are defined as those who possess less than 5 acres of land. Farmers cultivating land ranging from 5 to 10 acres are classified as medium-sized, while those cultivating more than 10 acres are considered large-sized. The study included 24 small-scale farmers, 45 medium-scale farmers, and 27 large-scale farmers, resulting in a total sample size of 96 respondents.

b. Kacha Arthi

The farmers engage in the production of crops and receive payment biannually as a result of two annual cropping cycles. The Kacha Arthi serves as a financial resource for a farmer during times when he requires funds for the farming process. This aids producers in cultivating wheat for a forthcoming period. Kacha Arthi also assists farmers in transporting their wheat crop for sale after the harvest, covering the labour costs that would otherwise be incurred by the farmers if they were to sell it to other institutions, such as the government. The farmers experienced a significant reduction in costs and an increase in profits by contributing their labour to load and unload the wheat stock. The Kacha Arthi receives a commission from the sale of crops, from which he earns his profit, and allocates the remaining amount to serve the requirements of the farmers.

c. Pakka Arthi

The wheat stock proceeds to the next stage in the supply chain, known as Pakka Arthi, after the Kacha Arthi stage. Pakka Arthi purchases the wheat inventory from Kacha Arthi. There is no direct correlation with farmers. Pakka Arthi purchases stocks of wheat, which are either kept for future sale or directly sold to mills and enterprises in need of wheat. The stored wheat is both sold to traders and exported to create cash. A total of 15 Pakka Arthi were employed in this study, namely in the Pakpattan district. The respondents exclusively sell their wheat stock to mills within the monitored area.

d. Assembler

The assemblers play a crucial role in the supply chain as intermediaries employed by the government to procure wheat directly from farmers. There are two categories of assemblers in district Pakpattan, namely the food department and PASSCO. The farmers can opt to sell their wheat harvest to either Kacha Arthi, the food department, or PASSCO. The data has been gathered from the central office of the food department in Pakpattan district, which operates under the jurisdiction of the provincial government. The data of PASSCO has been gathered from its central office located in Lahore, which operates under the jurisdiction of the federal government. 0.4% of the total wheat yield from PASSCO is subsequently sent to the SAARC countries. PAASCO maintains a reserve of one million metric tonnes of wheat. Upon receiving notification from the Ministry of Food Security, the leftover stock is thereafter distributed to various sectors, such as defence and provinces.

e. Millers

The mills procure wheat inventory from two distinct sources. Mills procure goods from

Pakka Arthi through mutually agreed transactions, as well as from the food department of the provincial government, according to predetermined criteria established by the government. The criteria mandate that the mills purchase the quantity of wheat that their machines are capable of converting into flour within 24 hours.

f. Wholesaler

The wholesaler procures its input goods from two sources, namely mills and the provincial food department. The mills receive wheat supply from the food department, and the Pakka Arthi facility processes it into flour, which is then sent to the wholesaler. The food department immediately supplies their wheat inventory to wholesalers for further processing.

g. Retailers

Retailers operate at the final level of the supply chain, purchasing wheat from wholesalers and selling it directly to end consumers for their consumption requirements. Due to their limited financial resources, merchants operate on a smaller scale and assist in the procurement, transportation, storage, and sale of wheat to end consumers.

h. Consumers

The consumers are the ultimate recipients of the final wheat product. Consumers can obtain wheat either in the form of pre-processed flour from retailers, which has undergone the entire supply chain, or they can directly purchase wheat from farmers on a small scale.

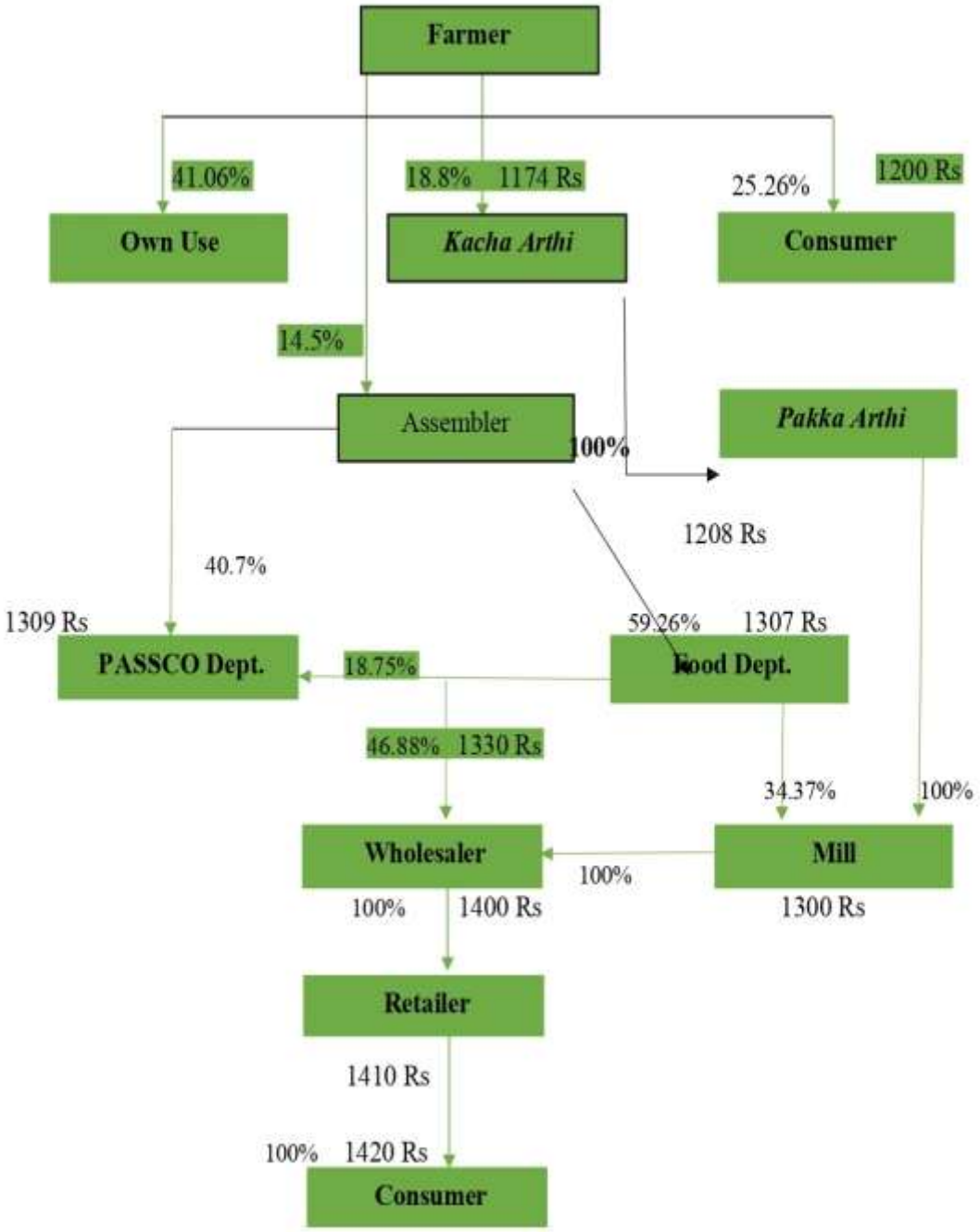
Fig: 2 Market Margin and Channel

6.2. Marketing Channels

Farmers cultivate wheat for self-consumption and trade the excess to consumers or the Kacha Arthi. In Arifwala tehsil, farmers vend their wheat to the local food department, whereas in Pakpattan tehsil, they send it to the PAASCO department.

Within this study, farmers allocate 41.06% of the wheat for their personal needs, while 18.8% is traded to the Kacha Arthi, and 25.26% is directly sold to customers. The assembler receives 14.5% of the wheat supply. The Kacha Arthi transfers its entire inventory to the Pakka Arthi, which in turn transfers its entire inventory to mills. The mills distribute their entire wheat inventory exclusively to wholesalers.

The assembler allocates 59.26% of its stock to the food sector and 40.74% to PASSCO. The food department distributes 34.37% of the wheat to mills association, 46.88% to wholesalers, and 18.75% to PASSCO. The wholesalers thereafter distribute their entire inventory to retailers, who in turn furnish their complete inventory to the ultimate consumers.



Source: Source: (Iqbal, 2019).

6.3. Market Margin

The phrase marketing margin pertains to the disparity in pricing among various tiers of the market. It encompasses the disparity in cost among comparable amounts, characteristics, and manufacturer prices. The marketing margin includes the price differential between the producer and the wholesaler, as well as between the wholesaler and the retailer. The margin encompasses the expenses associated with

moving the product from one stage to another throughout the marketing channel, which includes the costs of delivering marketing services.

When examining the wheat supply chain, the marketing margin can be assessed by analysing the average sale price per maund for different marketing agents involved, including consumers, Kacha Arthi, Pakka Arthi, assemblers, mills, wholesalers, and retailers.

For example, when a farmer sells wheat to a consumer for 1200 rupees per maund with a production cost of 500 rupees, the marketing margin also covers the transportation cost of 50 rupees paid by the farmer. When selling wheat to a Kacha Arthi for 1174 rupees per maund, the marketing margin pays for a commission that the Kacha Arthi imposes of about 34 rupees per maund.

Before wheat goes to the retailer and final consumer, it passes through several intermediaries such as Pakka Arthi, mills or traders. The determination of the marketing margin, which includes costs and profits for each intermediary involved, is based on every step in the supply chain. For example, Pakka Arthi buys wheat from Kacha Arthi at 1208 rupees per maund and sells it to the mill at 1310 rupees per maund which makes a profit of 52 rupees per maund. The mills process the wheat into flour and deliver it to wholesalers at 1400 rupees per maund, in addition to extra fees for transportation and processing.

Following this, the wholesalers sell the flour to retailers for 1410 rupees per maund, making a profit of 10 rupees per maund. In the end, the traders sell the flour to the final consumer for 1420 Rs. per maund, making a profit of 10 rupees per maund.

In general, the marketing margin in the wheat supply chain encompasses the expenses and earnings at every stage of the process, starting with the farmer and ending with the customer.

Table 6.1: Market Margin

Trader	Kacha Arthi	Pakka Arthi	Mill	Wholesalers	Retailers
Purchasing Price	**1174**	**1208**	**1300**	**1400**	**1410**
Labour Cost	**5**	**5**	**7**		
Loading & unloading	**5**	**5**	**10**		
Transportation Cost		**20**	**20**		
Other Cost	**2**	**5**	**15**	**2**	**2**
Selling Price	**1208**	**1300**	**1400**	**1410**	**1420**
Market Margin	**34**	**92**	**100**	**10**	**10**
Net Profit	**22**	**52**	**48**	**8**	**8**

Source: (Iqbal, 2019).

6.4. Investigating Farmer's Preference Regarding Arthi

The study found a preference among farmers in the study area to borrow from Arthi rather than banks. Arthi offers loans without imposing any prerequisites or requiring collateral, in contrast to traditional banks. Arthi offers a loan that can be given as either cash, fertiliser, or a combination of both. Nevertheless, Arthi does not exclusively offer loans in the form of physical currency. Acquiring a loan from banks

is a lengthy procedure due to the necessity of verifying the farmers' qualifications, but arthi offers loans without such verifications. The study revealed that 64% of participants who had credit access obtained their credit exclusively via Arthi.

If a borrower fails to repay their loans, Arthi provides farmers with additional time to make the payments and refrains from seizing their land or engaging law enforcement. Arthi offers loans that are devoid of interest, in contrast to banks that impose exorbitant interest rates. Arthi profits from the commission they levy when farmers vend their wheat in the market. The study additionally revealed that farmers distribute their wheat to many entities, with 40% selling to Kacha Arthi, 27% to the government, and 31% to both. Farmers opt to sell their produce to the government primarily due to the favourable price granted. However, they refrain from selling to the government due to additional factors, such as the government's specific purchasing requirements for wheat and the complexities associated with the selling procedure.

The government exclusively procures wheat from farmers who are supplied with bardanas, which serve as the packaging material for the wheat. The quantity of wheat purchased by the government is contingent upon the specific type of bardana supplied. Farmers who sell fewer than 500 boris receive immediate payment from the bank, while those selling more than 50 boris go through a phone deposit procedure. The government offers transportation, loading, unloading, and labour services at a reduced rate, which does not favour local farmers. In addition, farmers must own their weighing apparatus and a valid licence, hence exacerbating the challenges associated with selling their produce to the government.

The analysis also indicated that the Sahiwal division's wheat production exceeds the amount purchased by the government. The government's policies and pervasive corruption hinder farmers' ability to sell their wheat to the government. Consequently, farmers persist in depending on arthi for their cash requirements. In summary, the study emphasises the factors that lead farmers to choose arthi as their preferred lending institution, as well as the difficulties they have while selling their wheat to the government.

6.5. Determinants of Wheat Supply

The data presented in Table 6.2 shows that the respondents' land holdings vary from a minimum of 2 acres to a maximum of 24 acres, with an average of 9.229 acres. The study additionally revealed that the respondents' average farming experience amounts to 16.6256 years. The study documented a minimum production of 30 maunds per acre and a maximum production of 50 maunds per acre. The educational attainment of the farmers in the study varies from a minimum of 5 years to a maximum of 14 years. The mean distance of the farms from the market is 8.28 kilometres. Among the 96 participants who were questioned, 65 chose to sell their products to private businesses, while 31 engaged with the government and earned a payment of 1250 Rs. The table presents a frequency distribution of land holding size, farming experience, yield per acre, and education level.

Table 6.2: Descriptive Statistics of Variable

Name of Variables	Minimum	Maximum	Mean	Std. Deviation
Size of Holding	2.00	24.00	9.2292	4.76275
Farming Experiences	10.00	35.00	18.6250	5.00789

Yield Per Acre	30.00	50.00	43.7500	4.70162
Education Level of Farmer	5.00	14.00	10.1562	2.30481
Distance to Mkt. in Km	4	15.00	8.2813	3.19112
Past Price of Other than Govt.	1100.00	1200.00	1105.8462	13.12706

Table 6.3 delineates three distinct categories of cultivated landholders: owners, renters, and those who are both owners and renters. A total of 96 respondents participated in the survey. Out of these, 56 were property owners, 25 were tenants, and 15 were both property owners and tenants. The proportion of individuals who own a property is 58.3%, while the percentage of individuals who rent is 26%. The combined percentage of individuals who own and rent is 15.6%. The cumulative frequency of homeowners is 58.3%, while the cumulative frequency of renters is 84.4%. When combined, the cumulative frequency of both homeowners and renters is 100%.

Table 6.3: Type of Cultivated Land

Frequency		**Per cent**	**Valid Percent**	**Cumulative Percent**
Owner	56	58.3	58.3	58.3
Renter	25	26.0	26.0	84.4
Valid				
Owner + Renter	15	15.6	15.6	100.0
Total	96	100.0	100.0	

Out of the overall sample size of 96, as indicated in Table 6.4, 34 respondents, accounting for 35.4% of the total, chose not to utilise credit. The reason for this is that some individuals had their funding available for the cultivation process, while 62 respondents obtained credit for the production process, accounting for 64.6% of the total. The proportion of farmers who do not take credit is 35.4%, whereas the proportion of farmers who do take credit is 100%. The farmers who obtained loans only relied on arthi and had no other means.

Table 6.4: Access to Credit

Frequency		**Per cent**	**Valid Percent**	**Cumulative Percent**
Valid	34	35.4	35.4	35.4
	62	64.6	64.6	100.0

	96	100.0	100.0	

Table 6.5 indicates that out of the entire sample size of 96 respondents, 14 individuals, accounting for 14.6% of the total population, did not have access to information on costs from the maker. Out of the total number of respondents, 82 individuals had access to market information, which accounts for 85.4%. The percentage of farmers with access to market information is 14.6%, whereas the percentage of farmers without access to market information is 100%.

Table.6.5: Market Information

Frequency		Per cent	Valid Percent	Cumulative Percent
Valid	14	14.6	14.6	14.6
	82	85.4	85.4	100.0
	96	100.0	100.0	

In Table 6.6, the entire sample of farmers utilised a diverse range of seed varieties. Out of the entire sample size of 96, 79 respondents used enhanced seeds, which is why the production in our study region is higher than usual. Another factor contributing to high productivity in the area is the exceptional fertility of its land. Merely 17 participants utilised indigenous seeds. 82.3% of the participants used upgraded seeds, whereas 17.7% opted for local seeds. The lowest yield of this fertile terrain was estimated to be 30 maunds, even if the farmers used indigenous seeds.

Table 6.6: Type of Seed

Frequency		Per cent	Valid Percent	Cumulative Percent
Valid	79	82.3	82.3	82.3
	17	17.7	17.7	100.0
	96	100.0	100.0	

6.6. Reliability Analysis of the Data

Before analyzing the econometric model, it is crucial to emphasise the dependability and accuracy of the collected data. This is because numerous authors argue that econometric estimations based on primary data obtained from various respondents yield varied results. Without understanding the characteristics of the data and the related issues, the estimation process may introduce bias or produce insignificant outcomes. To assess the reliability of the collected data, we used Cronbach's Alpha value. According to Ryan and Khan (1993), Cronbach's Alpha is recommended as a measure to determine the reliability of the collected data. It is concluded that any primary data with a Cronbach's alpha value greater than

0.50 can be considered reliable and valid. Conversely, if the value is lower than 0.50, it may lead to invalid or biased results in the primary data. The results of Cronbach's Alpha for the ongoing study are presented in Table 6.7. The outcome suggests that the present data is dependable, with an accuracy of around 72.9%. Hence, we may deduce and move forward with the econometric estimations by asserting that the current data analysis is dependable and accurate for econometric estimation.

Table 6.7: Reliability Statistics

Cronbach's Alpha	Number of Items
.729	9

6.7. Estimation of Econometric Model

Table 6.7 provides a clear representation of the results obtained from the linear regression model. It provides an explanation of the variables and their respective behaviour. The size of the holding is the independent variable, and when it is increased by 1 unit, the yield per acre increases by 0.412 units. This relationship is significant and positive, as expected based on the studies conducted by Usman (2016) and Ashenafi (2010). The reason behind this relationship is that holding more land provides individuals with more resources and allows for better management. The significance level was determined to be 1%.

The agricultural experience has a direct and substantial impact on the yield per acre, as increased experience leads to higher production levels. The farmer experience was determined to be statistically significant at a significance level of 10%. This is also evident in Abraham's (2013) earlier research. As the level of expertise diminishes, the productivity per acre also declines.

We observed a positive and statistically significant correlation between credit accessibility in our study region and the yield per acre, which serves as our dependent variable. Agricultural production necessitates credit requirements. Farmers who have better access to loans tend to achieve higher levels of productivity, as shown in research by Alemnewu (2010) and Urgessa (2011). The independent variable has been found to have a significant impact at a 10% significance level.

Farmers' level of education significantly influences the amount of produce per acre. Based on the education level, it was found to have a statistically significant impact at a 1% significance level. Education plays a crucial role in farming by improving knowledge and understanding, which can result in higher productivity when compared to farmers with little to no education. Previous studies cited by Ayelech (2011) support this observation.

Studying the past prices of non-government entities significantly influences the dependent variable, which is the yield per acre of production. The significance level was established at 5%.

The past prices serve as indicators of present market conditions, allowing farmers to optimise production for increased profitability, as demonstrated in Usman's (2016) study.

Enhanced seed quality has a positive and substantial impact on the yield per acre of output. It holds great importance at a significance level of 1%. The cause of this phenomenon is that 75% of individuals in Pakpattan, Punjab employ enhanced-grade seeds, resulting in higher agricultural yields in comparison to farmers who utilise inferior-quality seeds. The literature supports our findings, as evidenced by the research conducted by Ashenafi (2010).

The study's R-squared value was 0.650, indicating that 65% of the variation in the dependent variable can be explained by the independent variables. The adjusted R-squared value, which accounts for the number of independent variables, was 0.541. This suggests that the model used in this case was suitable for analysing the primary data.

Table 6.8: Result of OLS Model

Unstandardized	Coefficients			
Model	**B**	**Std. Error**	**T**	**Sig.**
(Constant)	29.899	33.663	.888	.378
Size of Holding	.412	.118	3.504	.001
Type of cultivated land	-.032	.612	-.052	.959
Farming Experience	.159	.085	1.871	.064
Access to credit	.972	.524	1.855	.069
The education level of the farmer	1.061	.225	4.708	.000
Distance to market in Km	-.244	.148	-1.646	.105
Market information	.171	1.106	.155	.878
Past Price of Other than Govt	.071	.030	2.367	.020
Which type of seed you use	5.438	1.409	3.860	.000

a. Dependent Variable: Yield per Acre

Model Summary[b]

Change Statistics										
Model	**R**	**R Square**	**Adjusted R Square**	**Std.Error of the Estimate**	**R Square Change**	**F Change**	**df1**	**df2**	**Sig. F Change**	**Durbin-Watson**
1	0.778a	0.605	0.541	3.04729	.605	1.635	9	55	0.000	1.635

Predictors: (Constant), which type of Seed you use, Farming Experiences, Size of Holding, Past Price Other than Govt., Type of Cultivated Land, Market Information, Distance to Market in Km, Access to Credit, Education level of Farmer.

Dependent Variable: Yield per Ac

Conclusion

The study concludes that the middleman relationship with the farmer yields favourable and highly significant results. This phenomenon can be elucidated by the role of middlemen who facilitate the connection between farmers and various services such as the provision of fertilisers, financing, labour, transportation, and more. The adverse effect is nearly insignificant, as it can be attributed to the reduced prices imposed by intermediaries for their services. These findings establish a strong causal relationship between the amount of investment and the resulting profit. In other words, the more an investor invests, the greater the profit they earn. The production of wheat has been found to have a positive and substantial correlation with factors such as the size of the farm, the farmer's experience, access to credit, the education level of the farmer, past

prices (excluding government prices), and the use of better input seeds.

The role of middlemen in the wheat supply chain was perceived more favourably and significantly less unfavourably. The negative role was quite minor in comparison to the good role. By negative role, we are referring to a situation when the government procurement prices, also known as support prices, exceed the existing market prices set by Arthi. Another reason is that the Pakka Arthi exclusively caters to mills and does not engage in transactions with government agencies. Overall, it was determined that a positive association exists and dominates over a negative role. Farmers exhibit a preference for selling their products to intermediaries rather than the government. This inclination can be attributed to the fact that intermediaries offer credit to farmers for cultivation, and when it comes time to sell, they provide assistance to farmers. In contrast, the government sells products to farmers and provides them with "bardana".

Unlike banks, middlemen provide compensation to farmers in the event of losses caused by natural disasters. Additionally, the middleman does not require any collateral, unlike banks, and solely conducts transactions based on personal familiarity and the creditworthiness of farmers, which is determined by their history of timely payments. If a natural disaster occurs and causes the destruction of crops, the farmer will be unable to deliver the goods to Arthi, who has made an advance payment. Consequently, Arthi incurs a loss equivalent to the commission he anticipated earning from the sale of that commodity. The conclusion becomes irretrievable in the year of catastrophe, and its modification is typically carried forward to the following year. Based on many factors and empirical evidence, it has been seen that a significant portion of a farmer's produce, specifically 58.8%, is sold according to our research findings. Furthermore, within this percentage, 44.07% of the production is sold to entities other than the government. Despite having an average experience of 15 years and an average education of 10 years, farmers still choose to rely on middlemen. There are deficiencies in the current procedures of government departments when it comes to purchasing wheat from farmers. This is evident from the overall tendency of farmers to prefer middlemen over the government. This aligns with our initial goal of determining the farmer's preference regarding middlemen.

This study reveals a favourable impact of middlemen on the wheat supply chain, which is the second objective related to market channels. The market margin analysis reveals that mills had the biggest market margin in this study, amounting to Rs 100 per maund. The next item in the sequence is the market margin of Pakka Arthi, which amounts to Rs 92 per maund. Next, there is the market margin of Kacha Arthi, which amounts to Rs 34 per maund. The market margins for both wholesalers and retailers have reached a record low of Rs 10 per maund each. Pakka Arthi has the largest net profit, followed by mills, Kacha Arthi, wholesalers, and retailers.

The conclusion can be attributed to factors such as land size, agricultural expertise, loan availability, degree of education, historical non-governmental prices, and the use of better input seeds, which have shown notable effects on the dependent variable. All of the aforementioned variables had a positive correlation with the dependent variable, which is the yield per acre of output. Therefore, we may conclude that the link between our independent variable and the dependent variable, which is the yield per acre of production in our study area of Pakpattan, Punjab, Pakistan, exhibits a similar positive relationship as previously demonstrated in research studies. This illuminates the third purpose of our study.

Recommendations

1. The middleman fulfils a beneficial function, as evidenced by the research done in Pakpattan,

Punjab. The farmers' lack of preference for government intervention can be mitigated through policies that prioritise their needs, both during production and when they wish to sell their produce. This would be a departure from the existing government practice of purchasing wheat exclusively from a chosen group of farmers.

2. The banks in this scenario should also fulfil their responsibility of supporting the farmers by providing relief during times of natural disasters and by adjusting their policies regarding collateral to compete with Arthritis.

3. The government should augment the allocation of bardanas to the region with higher output levels, surpassing the current capacity of bardanas absorption. To address the issue of the government paying higher prices to farmers and the significant price gap between what Arthis pays and what the government pays, a potential solution would be for the government to implement an open bardana system. This system would allow anyone to sell their portion of production directly to the government, thereby reducing the price disparity. This action will foster competition and narrow the pricing disparity between the government and Arthis. PASSCO provides a remuneration of 9 rupees, while the food department offers 7 rupees, to assist farmers in covering expenses related to labour, loading, unloading, and other associated costs. However, these amounts are relatively modest. The government should establish its own transportation infrastructure when procuring wheat from small-scale producers.

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