

Research Article



An Economic Assessment of Problems Associated with Small-Scale Farmers in the Dairy Sector of Pakistan (A Case Study of Punjab Province)

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Abstract | The contribution of livestock in the economic development of a country is vital. Pakistan is blessed with abundant natural resources, especially vast agricultural resources on account of its fertile irrigated land, four seasons and glorious history of old traditions of farming. The current study is designed to analyse the response of participants an informal and formal supply chains for small-scale dairy farmers in Pakistan. The study aimed at explaining the costs of the chosen supply channels and their transaction costs, the role of the mid-agent opportunistic behaviour in the relative milk supply chain. Using case study and qualitative method approach, eight key informants including five farmers, one local middleman, and representatives of two dairy companies were interviewed during the study, focusing the social aspects and people behaviour towards the dairy sector. Results showed a lack of coordination among small-scale farmers and associated high transaction costs. This case study suggests that small-scale farmers are illiterate and not properly trained. The way they handle and produce milk shows the dominance of informal mid-chain agents, where producers face high uncertainty caused by the opportunistic behaviour of middlemen.

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Introduction

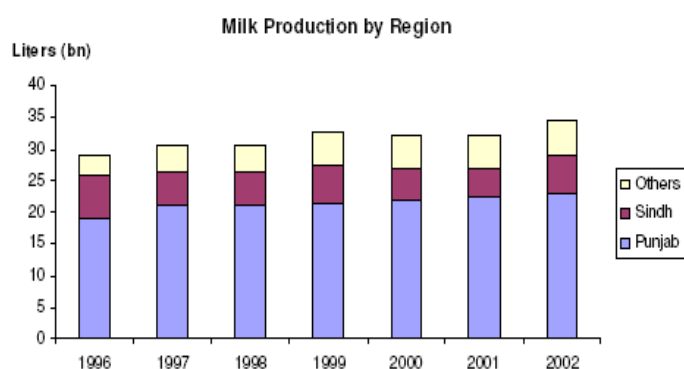
Pakistan annual production of milk is about 33 billion litres and stood fourth among milk producing countries of the world (Fakhar and Law Walker, 2006). The informal channels provide 97 percent of milk to the consumer who lacks the quality of milk and hygienic conditions. The reason behind this situation is that a massive number of farmers lack connection to formal markets. Dairy farming practices in the country are very primitive and traditional. Lack of advisory services, poor infrastructure, general

negligence by the government of the dairy sector and specifically small-scale farmers are the key issues at present in the country like Pakistan (Hemme and Otte, 2010).

Milking animals are poorly organised and mostly their milk production, and marketing activities are largely carried out in isolation from one another. It has been stated that 33 percent of total milk is sold to urban families and related industries. The formal channels are processing only three percent of the total milk, while the rest of the milk is processed through the

informal chain of marketing (Zia, 2006). For small farmers in Pakistan, these poorly developed market channels may be inhibiting the development of their milk production and farm business.

Punjab province is one of the major producers of milk in Pakistan (Figure 1), where small-scale farmers and landless farmers produce a huge amount of total milk production (FAO, 2010). Punjab Province contributes 70 percent to the total milk supply in the country (Abid and Mushtaq, 2008). The dairy industry in Pakistan is dominated by small-scale dairy farmers who keep three to five milking animals, in rural areas. These farmers are not organised and consequently rely on the middlemen (Gawala or local Dhodhi). In addition, the farmers are not in a position to bargain with large companies in Pakistan like Nestle and Haleeb. A small portion of the total milk supply is processed through formal channels. Therefore, in the complex system of collection and distribution milk, little quantity produced by the small farmers is processed by the large commercial enterprises.



Source: IFCN, 2003.

Figure 1: Distribution of milk production in Pakistan (Ali, 2006).

At the same time, it is estimated that demand is growing at seven percent annually and supply is only increasing at a half rate. The country is also importing a huge amount of powdered milk every year (Zia, 2006).

Milk is an important source of balanced nutrition which is one of the prominent sources of marketing good. In developing world, milk is produced mainly by small-scale farmers, where demand is predicted to increase by 25 percent by 2025 (Amin et al., 2010). Pakistan is currently ranked as the world's fourth-largest dairy producer, producing in excess of 40 million tons annually, mostly coming from small rural farms with two to four animals (Ajmal et al., 2015; Zia et al., 2011). These many small producers, remotely located from the concentration of urban consumers, presents a challenge

in coordinating a supply chain.

Milk production in Pakistan

Dairy production in Pakistan is one of the major agriculture sectors in Punjab province and mostly comprised of small-scale farmers. Zia et al. (2011) report that 95 percent of Pakistan dairy producers have two to four animals. At the same time, Ajmal et al. (2015) report that farms with up to 50 animals only represent one-third of the total number of animals, indicating a strongly skewed industry structure. In general, research in the dairy sector in Pakistan is very limited, as very few institutes are involved in this sector to promote the dairy sector and develop the socio-economic conditions of the small-scale farmers engaged in the dairy sector. In order to improve the dairy sector of Pakistan, government institutions must ensure the information flows through research and development to reach the small-scale farmers, in order to improve the productivity of this sector (Qadri, 2009).

Small and poor farmers face the main constraint in the form of seasonal fluctuations concerning milk production in Pakistan, affecting the milk quantity in summer and winter seasons. Low milk productivity also accredited to low genetic potential of the majority of animals, poor infrastructure and inadequate health control, refrigeration and transportation facilities are the other key issues need to be addressed (Birthal et al., 2007).

Generally, the dairy sector in Pakistan is suffering from poor animal nutrition, mismanagement, failure to control disease and lack of proper marketing system. At the same time, the government, as well as large-scale private initiatives are promoting the dairy sector. Milk and dairy products are considered to be an essential part of the daily diet and used extensively by households, and livestock enterprise is seen as something in which small farmers can successfully engage to improve their socio-economic condition and livelihood, moving from subsistence to market orientation (Qadri, 2009).

Pakistan, in spite of largest milk producer in the world, still imports powdered milk to meet the domestic demand. The livestock in Pakistan consists of 50 percent of value-added products and 11 percent to GDP (Hassan et al., 2007).

Milk marketing chains in Pakistan

The situation of distribution and collection of milk in Pakistan is complex (Ahmed, 2010). Much of the dairy sector work on a non-commercial basis in the informal sector while the organised and formal sector processes only a small portion of milk in the country. The subsistence dairy farmers keep cows and buffaloes in small herd sizes, with limited sales of what the family does not consume, while market-oriented households keep large herd sizes for commercial milk production (Burki et al., 2005). The milk market in Pakistan is comprised of urban, rural and process sectors. Only some processors and agents in these three sectors have access to basic infrastructure for effective handling and distribution of milk, and almost 15 percent of milk is lost due to lack of cold storage and unviable processing channels (Zia, 2006). Ishaq et al. (2016) identify two general milk marketing systems in Pakistan, which they refer to as traditional and modern milk marketing. The traditional system is informally organised and is based on local collectors who link small-scale producers with consumers. The modern system is based on large dairy processing companies, who mostly produce ultra-high temperature (UHT) processed milk and powdered milk for urban markets.

While noting that most of the milk produced by small farms is consumed at the household or local community level, Ahmed (2010) identifies two main types of milk collection systems used by the large-scale dairies that supply urban markets: self-collection, where the large dairies purchase and process milk directly from farmers or via a community collection point; and contract-collection, where intermediaries are contracted to provide milk. These different systems operate under very different conditions, with the self-collection system having a formal structure and control determined by the dairies and Pakistan laws and the contract-collection system operating much more informally with weaker control and adherence to rules and regulation.

The intermediaries or middlemen in the contract-collection system, who are called dhodhi, play a significant role in the rural dairy sector and marketing supply chain of Pakistan. In addition to contracting with the large-scale dairies, many of the estimated one million dhodhi, depend upon their financial and technical efficiencies to redistribute the milk from many small producers to a wide range of paying customers, including sweets shops and other retailers

and end consumers.

Generally, the dhodhi offer many services, including for example collection and transport, relationship management, credit, and advising, but the nature of their role is basically exploitative. They argue that since they are taking various risks in various stages of marketing, they are entitled to a considerable share of the revenues from their sales. The more they can limit the explicit cost they are paying farmers for the milk, the greater their profits. (Badar, 2008). However, Ahmed (2010) also notes that the dhodhi, operating in a largely informal system, may not always follow good hygiene practices, nor may they adhere to the practices of the formal economy (paying taxes, etc.).

While some effort has been made to understand the role the dhodhi are playing in the dairy supply chain (Ahmed, 2010; Badar, 2008; Ishaq et al., 2016), most interest has focused on milk quality and supply. Little focused attention has been given to the consequences for farmers of selling their milk through the dhodhi versus other channels.

Small-scale dairy farmers in Pakistan are generally located in rural areas, whereas the consumer markets are in urban areas. Under such conditions, two general approaches to solving the problem of collection, eventual processing and delivery of milk are evolved. The milk marketing channels in the country can be classified into two categories. On the one hand, there is informal dairy supply chain with multiple intermediary independent actors fulfil the supply chains. While, on the other hand, there are formal supply chains, where the large corporate actors coordinate and control the supply chain functions. It has been noted that the informal supply chains consisting of various agents are suffering from low milk productivity, little hygienic control and distribution inefficiency. Whereas the formal supply chains are claimed to be more efficient in production and quality control (Burki et al., 2005).

The internal production, processing, marketing and distribution channels are the key issues which need to be examined and analysed in the case of Pakistan. The scope of the work is to investigate the problems and issues associated with the milk supply chains in Pakistan.

Materials and Methods

The rationale of this section is to present the design

and methodology of the study. It further explains the complete mechanism of conducting interviews and how the data was analysed.

This study is based on a case study approach. Yin (2009), 18) writes that the case study method is suitable when one wants to “understand a real-life phenomenon in depth, but such understanding encompasses important contextual conditions. The empirical case being studied is the milk supply chain in Punjab, Pakistan, as revealed primarily by interviews with eight chain actors. The empirical case is analysed with an explanation building technique, supported by a theoretical framework based on transaction cost theory and agency theory.

The current study interviewed eight respondents including five farmers, two dairy processing companies' managers and one middle man working in the local dairy processing area. Interview data is supplemented with information from publications and prior case studies to build a full understanding of the supply chain case. The information collected through these different sources provides the grounds for the analysis and discussion.

Murthy (2000) describes the difference between qualitative and quantitative research, where qualitative research is said to be about discovering and underlying motives of human behaviours, desires, and a concept involving a kind or quality of a variable; whereas the measurement of variables in numeric or absolute terms is referred as quantitative research. A qualitative approach primarily focuses on developing an understanding of the social phenomenon, seeking to find answers regarding various questions of how people behave, their behaviour and attitudes, and how they are affected by different events in their surroundings (Hancock, 2007). This stands in contrast to a quantitative approach, where focus lies in achieving a statistically accurate description of a population as expressed in discrete, measurable variables (Murthy, 2000).

As the aim in the present study is to understand the social aspects of the consequences of the informal and formal supply chain paths, a qualitative approach was used.

Interviews

To obtain information about the key issues a

questionnaire was designed and used to guide interviews. All the respondents were also asked open-ended questions with the aim to acquire more detailed information. The interview guide was constructed with an aim to accumulate detailed information from the individuals engaged in the dairy sectors mostly located in the rural, peri-urban and urban area of Punjab province. The interview guide was themed in a variety of questions to obtain information on the issues of interest.

Interviews were conducted with different stakeholders involved in the dairy chain from producer to the processors and retailers, with prior appointments. According to Sekaran and Bougie (2016) “conducting telephone interviews has the main advantage of access to different people across the globe easily and relatively in a short period of time”.

In total, five farmers, one local middleman, and representatives of two dairy companies, Haleeb and Nestle participated in the interview study. The five farmers were selected to represent a range including average, progressive and commercial farmers respectively. These eight key informants each has a specialised role and varying experience in the dairy sector in both rural and peri-urban areas near to capital city Lahore, Punjab.

Milk marketing chains

The collected data supplemented by the literature reveals that there are two types of milk marketing chains: one for small-scale rural farmers and one for larger scale peri-urban farmers. Small-scale farmers, who are largely present in the rural areas, sell their milk directly to dhodhi (middlemen). They rely on dhodhi to market their milk produce, and they have no other alternative channel to process their milk. Also, the dhodhi are usually equipped with cooling equipment, helping to preserve milk quality and value until it can be sold. The dhodhi collect milk from the small farmers, paying about Rupees 40-45 per liter after checking the milk quality and fats ingredients. Sometimes the dhodhi travel to the farms to collect the milk, and the farmers bear no direct responsibility for transportation costs. Other times, however, farmers who are very far from the dhodhi's place of operation bring their milk to the dhodhi, and therein must face transportation costs themselves. Both the farmers and the dhodhi are typically not satisfied with each other, and they are often involved in conflict

situations. According to farmers, the dhodhi cut their milk price by complaining about adulteration and low fats ingredients. The farmers are often bound to the dhodhi as the dhodhi are the only source in the area to provide short term loans. The dhodhi often have a monopoly in their area, ensuring their position and power in the chain. The dhodhi, in turn, further transports the milk to cities or towns, where he sells the milk to sweets shops/ bakers, milk shops, restaurants and home-deliver consumers. Figure 2 shows rural milk supply chain. Where small-scale farmers direct sell their milk to middlemen (Dhodhi). The following chain shows that farmers directly sell their milk to the middlemen.

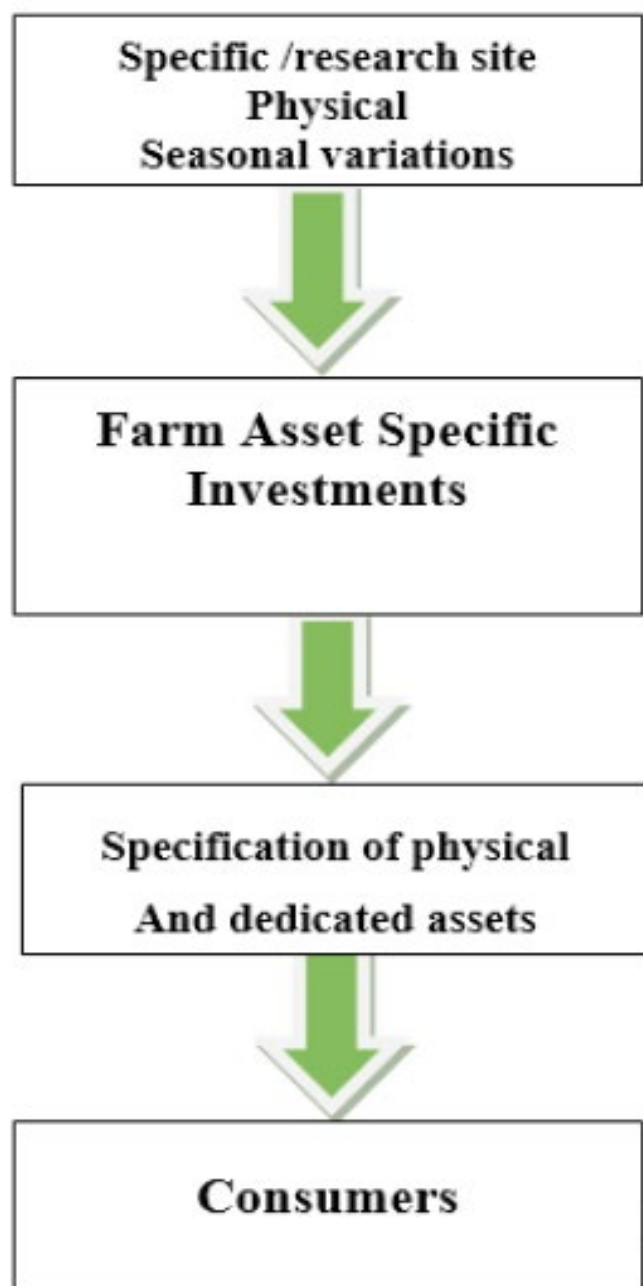


Figure 2: Supply Chain of Rural Dairy Farmer.

The larger scale peri-urban/urban farmer chain is different from the rural subsistence farmer's chain. The peri-urban or urban dairy farms are usually owned by market-oriented, progressive farmers, with larger herd size. These larger dairy farms sell their milk directly to commercial dairy companies at the farm gate. Dairy milk processing companies like Haleeb and Nestle have their own mid agents who collect milk in the peri-urban areas from direct and progressive farmers. Haleeb and Nestle have milk collection points in the peri-urban areas where farmers bring their milk to the company agents in the nearest towns or villages sub-centres. Nestlé and Haleeb are competitors in Punjab; they approach large dairy farmers whose herd size comprised of 250 or above at their farm gate. It is depicted in the milk marketing chain (Figure 3) that instead of relying on middlemen the farmers sell the milk directly to the commercial companies.

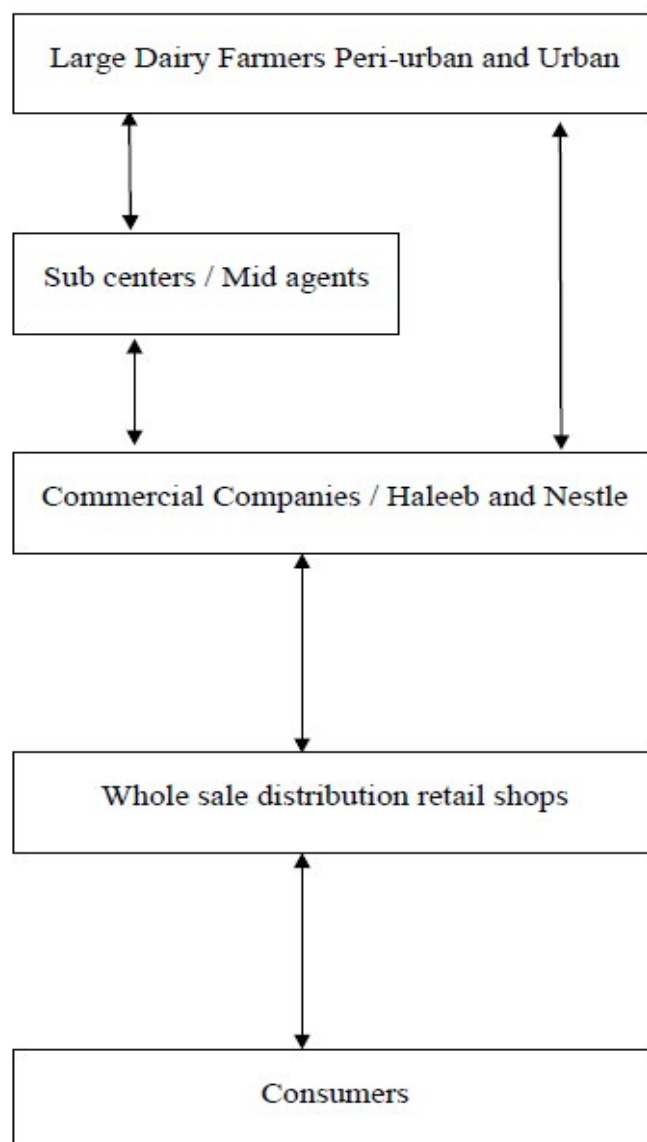


Figure 3: Large-Scale Peri-Urban Farmer Chain (Authors Own Illustration).

Table 1: *Respondents biodata.*

Presentation of Respondent									
Code Name	Gender	Age	Type of Farming	Herd size	Milk production farm level (In Liters)	Milk price PKR	Milk price-eSEK	Channels used	Contract-Type
A	Male	32	Dairy Farming	10	50-55	40-45	3.19-3.59	Middlemen	Verbal
B	Male	40	Dairy farming	12	40-45	40-43	3.19-3.43	Middlemen	Verbal
C	Male	35	Dairy farming	17	40	50	3.99	Haleeb	Verbal
D	Male	27	Dairy farming	104	450	50	3.99	Haleeb	Written
E	Male	36	Dairy farming	520	3350	50-55	3.99-4.39	Nestle	Written
F	Male	48	Middle-men	Nil	300	40-45	3.19-3.59	Sweets shops Cities/ homes	Verbal

Representation of respondent cases

Table 1 shows the classification of respondents based on gender, age, herd size milk production at the farm level, milk price, the channel of marketing and contract type. It shows that a major portion of the respondents were in the age group of 25-50 years. Furthermore, the type of farming was mainly dairy and they were producing milk in the range of 40 to 3350 liters.

Results and Discussion

This section summarises the analysis of each individual farmer, comparative group analyses of farmers and discussion on institutional economic theories with special focus on transaction cost economics and agency theories.

Farmer A (average farmer)

Farmer A is an average landless farmer. Main source of income is dairy farming. Farmer A belongs to the rural area of Punjab and completely depended on the informal 'Dhodhi' channel. Farmer A does not have adequate financial resources and other farm inputs to increase his milk production. His poor farm inputs and traditional ways of dairy farming stop him from invest in his farm. The site specificities cause the transaction cost high.

Farmer A farm is geographically located in the rural area, and it is very difficult for him to move it from one place to other where he can find the alternate trading partner or transport his milk to the formal corporate dairy channel. The high fixed transportation cost or distance etc. makes the transaction cost high. Farmer A other specific cost to consider is his human resources e.g. the right skills education etc., are the major hurdles in his way to strengthen his milk production

and connect to the formal dairy supply chain. No formal corporate companies are operating in the rural areas which have bound Farmer A completely to middlemen the local Dhodhi. The local middlemen enjoy a monopoly in the area and purchase milk from Farmer A at a low price as the middlemen exploit farmer A during the price adjustment process. Both the trading partners hold the verbal contract.

The middlemen are fully aware of farmer A's weak financial base as farmer A sometimes takes loans from middlemen, this situation bound farmer A to middlemen. The socio-economic condition of the Farmer A is dependent on the middlemen who takes advantage of the farmer's economic vulnerability. Here farmer A is bounded to his trading partner when he takes the loans from the middlemen. Middlemen show his opportunistic behaviour at the time of purchasing milk from the farmer. Middlemen criticise Farmer A milk quality and pay a low price to farmer A. The situation refers to Williamson (2000) transaction cost economics "bounded rationality and opportunism make the transaction cost high. Farmer A has not signed any written contract with middlemen, and the type of contract is verbal. Farmer A is risk averse and certainly not ready to take any risk. The middlemen have the monopoly in the chain and can break the contract at any time if farmer A does not act on middlemen interest. They have no signed agreement or contract where the farmer can challenge middlemen in courts "Agency theory", examine such situation as the relationship between the supplier and buyer is identified by contracts. A principal can persuade, and agent to behave according to his will and interest. Opportunism and bounded rationality make the transaction cost high.

Farmer B (average farmer)

Farmer B is an average farmer of rural area. A main source of income is dairy farming. Farmer B sells his milk to the informal Dhodhi dairy supply chain. Farmer B stated in his interview that he is not satisfied with the middlemen opportunistic behaviour as he cuts the price of milk at the time of selling milk to the middlemen. The middleman is the only person in the area who not only purchase milk from the same farmer but also provide loans to farmer B, taking loans from the local Dhodhi not only bounds the farmer to Dhodhi but make him in fear all the time to back the loans due to his weak financial position. The middlemen take advantage of the situation and act opportunistically towards farmer B in the time of purchasing milk. According to Farmer B interview, he stated that middlemen behaviour towards him is opportunistic and he is always in conflict with middlemen, especially on price adjustment. The middleman knows farmer's socio-economic condition and the absence of other trading partner. There is no formal corporate dairy channel in farmer B area to process his milk and this situation bound farmer B to rely on middlemen. Farmer B farm is located in the distance from middlemen place and the farmer bear transportation cost to sell his milk to middlemen. That is an extra cost and thus the farmer incurs transaction cost. The type of contract between the two trading partners is verbal. Farmer B does not want to break the contract his poor financial position stop him from taking any risk. Middlemen opportunistic behaviour and farmer dependency on middlemen make the transaction cost high. If farmer B does not behave in the interest of middlemen the middlemen can break the contract at any time. Agency theory highlighted such situation that if the contract between the principal and agent is out based, agent behaves in the interest of principal (Einsthardt, 1989).

Farmer B is uneducated and has no skills and has no adequate financial resources to invest in his farm; the asset site specificity makes the transaction cost high. Having so many problems and no formal corporate channel in the area compels him to rely on the informal Dhodhi channel.

Farmer C (progressive farmer)

Farmer C is a progressive farmer from peri-urban area of Punjab. His farm is geographically located in such a place where the formal corporate dairy channel exists. Farmer C sells his milk directly to the corporate channel

Haleeb without the involvement of any local Dhodhi in the chain. According to the corporate channel's interview, they defined progressive farmer (PF).

As progressive farmer is the one who produce milk 16 to 25 liters each day and bring it to the chillers for sale. Farmer C brings his milk to the nearest sub-chillers where the company mid agent inspects the milk quality after total solid test (TST) process is run. The company purchase milk after (TST) from progressive Farmer C. According to Farmer C interview, he stated that he could not say that he is fully satisfied with the company as the company deduct price in the time of TST. Here comes the company, opportunistic behaviour towards Farmer C. Farmer C is not educated and not the skilled person the company might take advantage of his low knowledge and skills and can easily deceive Farmer C in TST procedure. The farmer also knows that no other trading partner in his area can provide other free services. The farmer has no alternate trading partner who completely bounds him to the company. Such a situation makes the transaction cost high, and Farmer C holds a verbal contract with a company. The type of contract is verbal, and the company knows its strong position and the farmer's weak position that farmer is bounded to a company, as the company provide other services to Farmer C.

Farmer D (commercial dairy farmer)

Farmer D is a young commercial dairy farmer connected to the formal corporate dairy supply chain. The corporate dairy company Haleeb purchases milk from farmer D at his farm gate, so there is no transportation cost on the part of farmer D, which makes the transaction cost high. Key et al. (2000), highlighted that the high fixed transaction due to transportation and communication infrastructure or distance obstacles make it costly for the farmer to find trade opportunities and enter into the market. The farmer D farm is located in the peri-urban area and has easy access to the corporate channel. Haleeb and Nestle are close competitors with each other's in the area, and commercial farmers like farmer D has the advantage to trade with a formal dairy supply chain. Farmer D herd size is large and comprised of 42 milking animals and produces 450 liters per day. The reason behind his large-scale production is his farm inputs, and good breed animals. Farmer B is equipped with cooling tanks and other necessary farm tools and equipment. He

also receives various kind of services being linked in the formal supply chain as the company provide him with technical services and veterinary maintenance services free of cost. However, farmer D spoke about in his interview, that the recent energy shortfall in the country has severely affected his farm profitability. In such a situation the farmer is facing uncertainty. Environmental uncertainty is a factor that can affect the transaction cost high (Golovina and Nilsson, 2009). The type of contract between farmer D and corporate dairy company Haleeb is written. Farmer D is an uneducated farmer and can be easily cheated by the company. Farmer D stated in his interview that the company sometimes shows disagreement and violate the contract by charging a low price when the TST is run. The farmer has no access to TST procedure. The company takes advantage of farmer dependency on the relative chain. Moreover, act opportunistically towards farmer D. The behaviour uncertainty emerges due to bounded rationality of human actors, which consist of information asymmetry problems and is affected by the opportunistic behaviour of human as well (Golovina and Nilsson, 2009). Farmer D is not ready to take any risk and lose the contract with the company as he stated in his interview that he has no sufficient funds to invest more in his farm or find other trading partners who acts according to his interest.

Farmer E (large commercial dairy farmer)

Farmer E is large-scale commercial dairy farmer in the peri-urban area of Punjab who is directly linked to the corporate dairy supply chain without the involvement of any mid agent. His farm is located in such a place that the company can easily approach farmer E gate and purchase milk at the farm gate. In this case, he bears no transportation cost which makes a rise in transaction cost of dairy products. However, he faces the uncertain situation of load shedding or bad weather conditions which is costlier for him to buy fuel for generators to produce electricity for his farm. One of the postulates of the transaction cost approach is that environmental uncertainty can create transaction cost. The contractual arrangement between the two-trading partner is another problem, which makes the transaction cost high. As the two trading partners hold a written contract. The price is fixed with the company after TST is run. Farmer E is an uneducated and unskilled person who has no knowledge about the TST procedure, and the company can easily deceive farmer E at the time of TST. The Farmer stated in his interview that the

company charge low price after TST is run. In such situation, the company act as an opportunist and cheat farmer E in the test procedure. The company knows its own testing procedure where the farmer has the least knowledge and can be deceived by his trading partner easily. Even though the relationship between the buyer and supplier is identified by contracts but contracts are always incomplete which makes transaction cost high. It is difficult for the involved partners to prevent each other's from opportunism contracts as these types of contracts are imperfect because of bounded rationality of human actors (Nilsson, 2001). Farmer E is aware of the fact that being linked in the formal supply chain, he is receiving various services from the company free of cost, and if he does not act in accordance to the company's will and interest, he can easily loose his contract. He is bound to his trading partner. Having this fear in mind, he would not want to break the contract or take any risk.

Middlemen (the local "Dhodhi" F)

A middleman is known as "Gawala or Dhodhi" is a key player in the informal dairy supply chain. According to the literature, the dhodhi or middlemen community is million in numbers and depend upon their financial and technical efficiencies (white revolution paper, 2006). Middlemen collect milk in the rural area of Punjab from the rural subsistence farmers and sell it in the cities milk shops, sweet bakeries and at doorstep homes. A Middlemen F is equipped with few metallic container cans or plastic drums. Middlemen F transport the collected milk in containers to the cities. The middlemen F and the rural subsistence small-scale farmers have shown their discontent with each other's in their interviews. According to the middlemen F interview, he stated that he does not trust the local farmers; according to him the farmers add ice and water to milk and cheat him. It is obvious from both the farmers A, B and middlemen F interviews that they have conflicting goals. The farmers have a complete dependency on the middlemen in the rural area and displeased with the opportunistic behaviour of the middlemen. On the other side, middlemen are not satisfied with the farmers and looking for some trustworthy trade partner with better quality of milk. Middlemen also provide short term loans to the farmers where he is bound the local farmers. The middlemen know the socio-economic conditions of the farmers and are fully aware of the budget constrained life of the farmers. He has a monopoly in the area, as there is no formal

corporate channel in the rural area. Here middlemen take advantage of being a monopolist in the area, and act opportunistically, and so bound the local farmers.

Comparative analysis of the respondent interviews

From the field data collection through interviews, it is obvious that there are two milk supply chains. The informal Dhodhi and the formal corporate dairy supply channels face dissimilar agency problems and transaction cost. The informal supply chain which is mainly characterised by the presence of a number of small-scale subsistence farmers, middlemen (Dhodhi) milk shops, sweets bakers operating at different stages of a milk value chain. It is important that middlemen are the main intermediaries linking small-scale farmers in the rural area with consumers in urban areas. Farmer A, B are using the informal supply chain selling milk directly to Dhodhi F, whereas, the progressive farmer C and large dairy farmers D and E using the formal corporate channel. Both the field interviews showed that small-scale farmers are abundantly present in the rural areas where no corporate dairy company operate, and the small-scale farmers rely on the local middlemen. The farmers from peri-urban areas C, D and E have the advantage of being linked in the formal corporate dairy chain.

The transaction costs of a chosen channel in case of informal market raised the transaction costs as a result of opportunistic behaviour of a middleman. As the lower prices offered by monopolist dhodhi F, the local Dhodhi knows the socio-economic condition of the small-scale farmers and take advantage of being a monopolist in the area, so acts opportunistically towards small farmers A and B.

Secondly, the proximity to the urban market, size of dairy operations has a strong influence on market channels and product market used by producers in the dairy products. The cost of a transaction is high due to information cost and risk associated with dairy products.

Milk is a perishable commodity, referring to time pressure in the cost of a transaction in comparison to large dairy farmers D and E, the small farmers' farm infrastructure is completely different. Farmers A and B have poor farm infrastructure having no information about how to invest in their farm. They have no proper tools and equipment like chillers and refrigerators to strengthen their milk production.

The progressive farmer C and large farmers D and E are equipped with dedicated assets like chillers, cooling tanks and refrigerators; they also receive other services from formal corporate companies. The reason behind farmer C, D and E using formal corporate channel is their farm geographic location as they belong to the peri-urban area of the province where Nestle and Haleeb the major dairy processors are the close competitors with each other. The transaction between D and E with large corporate channels is organised with the written contract. Contracts are imperfect, and the contract is easily manipulated by any of the trading partners. Even though contracts formally link the large commercial dairy farmers D and E with corporate dairy processors, may be hard to manipulate farmers. However, farmers C, D and E are not taking any risk to break their contract. They know that they have been awarded dedicated assets by their respective companies and are receiving other services from the corporate dairy channel, so they are risk averter. The reverse relationships exist when small farmers A and B are engaged with the local Dhodhi, the local middlemen F provided loans to the rural subsistence farmers A and B and bounded the local farmers. The local middleman knows the farmers complete dependence on them and acts opportunistically towards A and B. The type of contract between middlemen F and Farmers A and B is verbal. The local farmers are not willing to break the contract as they know that there is no alternate dairy supply chain or other trading partners in the area for a trade.

Assessment of transaction costs

The two-milk marketing system shows different agency problems and transaction costs. Transaction costs in milk market indeed influence farmer's decisions in different ways to enter or exit the market.

The theory puts the main factors of [Williamson \(2000\)](#) transaction cost that leads to influence transaction costs and its types of institutions which are the asset-specificity uncertainty and externality. The theory put asset specificity the most important element for describing transactions. Assets are specific to a certain use, and it is making them useless in another setting ([Anderson and Cobia, 2004](#)). For example, a chilling cistern for milk will be almost useless if there is no milk. In a dairy farm many things are high in specificity, and therefore it is not easy to change the way of production. The dairy farmers are directly

affected by the fluctuation in the economic activities in the country.

The investment made by one party in assets enables the transaction, done by another party. The exchange, in this case, is unique as this contains a value of exchange. [Williamson \(2000\)](#) identified the other key dimension of asset specificity as, the location or site-specific assets for example natural resource available at a certain location and movable only at a great cost.

Small-scale farmers are mainly found in rural areas, and it is costly for them to transport their milk produced to large-scale dairy farms or big commercial companies. Because the infrastructure and the geographic conditions of the area, the transportation cost makes the transaction cost high. The site-specific assets create high costs of milk collection and investment for the trading partners. Site specificity, an example can be a farm, it is located on a certain place geographically, and it is very difficult to move it, it can always sell and buy a new, but that is easier said than done. This means that the farmer will incur transport costs as well as only a limited number of trading partners. Milk is a time-specific product that refers to a time limitation and because of its perishable nature, frequent deliveries need to be done to protect its quality. The case was not found as a crucial problem in the case of large commercial farmers. Dedicated assets as suggested theory is a certain dedicated investment, so that the trade can occur with a specific partner. Since it has been given the dedicated assets, so the milk quality is exposed to less frequent transactions.

The cost of marketing channels and the two milk marketing channels (TC) were thoroughly investigated. The implications to be drawn from such empirical cases shows that, the increased transaction costs arise from opportunistic behaviour, for instance, the lower prices offered by the monopolistic Dhodi.

[Williamson \(2000\)](#) argued that two human factors lead to TC, which are (1) bounded rationality and (2) opportunism. Considering the problems of small-scale farmers where they are encountering to dedicated assets, like proper tools and equipment to ensure milk quality, no transportation system and no cold storage facilities to safeguard and strengthen milk production. As the amount of milk is too small to connect the formal milk supply channel, consequently they must rely on middlemen dhodhi.

However, here comes the problem of opportunism as the local dhodi middlemen behaviour is opportunistic as long as they supply that in an informal market. They lack any alternate channel for milk supply and trading partner. From the empirical study it is the small-scale farmers exposed to the threat of opportunism, as according to the small-scale farmers' interviews, the transaction between them is organised with informal agreements with a fixed price. Here, they have conflicting goals. Both the partners are not satisfied with each other. The local Dhodi usually charge low price complaining milk quality. The little incentives in the form of loans make the farmers vulnerable towards middle man Dhodi. The main fear is taking loans and not be able to amortise them in due time. Such scenarios bound the small farmers to behave in accordance with the will of local dhodi. If there is bounded rationality, then the planning process breaks down, and the socio-economic and political risk increases leading to a need for greater coordination. This is one of the crucial problems the farmers face, and consequently, they have no other trading partner or alternative channel to choose for their milk supply.

The middlemen in his interview stated that the farmers cheat by extracting fats ingredients from milk and adds water to milk. The agreement between them is easy to be manipulated by both the trading partners. According to the theories, if opportunism self-interest prevails, then certain rules and standards must be drawn up. Trust is a key word according to transactions as it makes the transaction costs high or low. You must trust your trading partner and will not behave opportunistically.

Cooperation and working towards a common united goal cannot be done having any trust in one another ([Golovina and Nilsson, 2009](#)). The threat of opportunism is subjected to a lack of trust if the farmers feel insecure with trading partners they must search for another partner. Which will increase their transaction costs, and opposite to this if farmers have a trustworthy partner the transaction between them will continue as long as necessary, all along the supply chain. The small farmers who do not trust middleman Dhodi and having this belief, that they are treated opportunistically. So the farmers have no ability to change the present situation. The Nestle and Haleeb are offered higher prices compared to small-scale farmers as they have relatively higher investments in high selective breeds, hygienic, and management

practices and their respective herd size is above 100, has the increased bargaining power. Large-scale farmers hold a formal written contract with large dairy processors. However, there is also a possibility of opportunism because of the dedicated assets, as they have been given the tools and equipment. A big concern for any farmer whether smaller or larger is the difficulty in verifying the milk test results and access to the TST (total solid test) procedure. They feel that they have been deceived and paid the low price. Here comes the key role of trust which is limited and implies transaction costs.

It is also important to highlight the role of socio-economic characteristics of the farm which affect the transaction costs. The other transaction specific costs to consider are human asset specificity. Like the right skills or education, age and experience in the relative field. Education matters a lot in terms of reducing the costs of seeking information. Knowledge about available sources and the way how to get it. The respondent was asked about their age gender, education and experience in dairy farming. The small-scale farmers are either illiterate or have a very low level of education, they have no modern skills and knowledge to develop their farms. Mostly the farmer's age ranged 30-45 and possessed the old ways of traditional farming being told by them. Due to illiteracy, it gives rise to transaction costs of searching for information and negotiation. As earlier mentioned in theory, the presence of TC is monitoring and information. The higher level of education can reduce the cost of searching information and negotiations with trading partners. The more they are highly educated and technically sound the more correctly will information be processed and will enhance its implementation value.

Uncertainty affects transaction costs. There is a different type of uncertainty that arises due to the unexpected changes in the environment. It is the source of disturbances to which transactions are subject to, as the transactions are prone to several disturbances like unexpected environmental changes bounded rationality and opportunistic behaviour. Small-scale farmers in the rural and peri-urban areas are landless farmers they have to lend the land for feeding animals, due to climate changes in case of floods and other unexpected environmental changes the farmers buy feed for their animals from the market which is very costly for the farmers.

Some other behavioural uncertainty emerges due to trading partners as well.

It is important to highlight the role of middlemen, where he acts opportunistically. In the absence of large companies, the farmers rely on middlemen. The middlemen provide loans to small-scale farmers and bound them. The middlemen exploit the farmers in different ways by cutting the price of milk complaining that the milk quality is not good. The average farmers have no other alternative channel to process their milk. Owners of small firms feel insecure about increasing production as still, they have no proper channel to deliver. Which means they are not in the position to sell the increased amount of milk. What if they invest and expand their production, their limited budget and financial position make them quite vulnerable and prone to future investment. In such scenario, they are risk averse for future investment as it will not pay off for them in the near time.

According to farmer's interviews, the farmers stated that during summer the middlemen charge a very low price and it is very difficult and too costly to sell their milk in the cities. In such circumstances, farmers have not been provided with dedicated assets, like cooling tanks or refrigerators to store the milk and the middleman has a monopoly in the area to discriminate the local farmers. Regarding the contractual arrangements, small farmers hold a verbal contract with their trading partner dhodhi. The transaction between them is organised with informal contract and are subject to cancellation at any time with middlemen dhodhi. As nothing is written formally between them and milk is paid at a fixed price.

The contracting costs are important, as good relations between them is to be maintained. However, trust is still the key element to be addressed. Trust is established through sustaining better social relationship which will reduce the opportunistic behaviour up to some extent. In the case of large-scale farmers, they are equipped with dedicated assets, i.e. cooling tanks and chillers. They also show their concerns regarding the opportunism where dedicated asset make them vigilant about the expected opportunism by their trading partners regarding the issue of TST procedure, but apart from the theoretical perspective regarding opportunism, transaction cost theory is not without its critiques we have found in the empirical studies, that both the formal and informal channels

show variation in the prices offered by their respective trading partners, as the large farmers receive high price for their milk produce engaged with big commercial companies comparatively to those farmers who have dependency on local dhodhi. Foss and Klein (2010), argued that the basic assumption of opportunism ignores the relative ground of human action and outside force behaviour is transaction cost economics, for example, monetary payment expectations. Modern studies suggest that TCE is unable to point out that how opportunistic behavior is minimised through alteration in government structure. The difference exists between psychological state of opportunism and propensity to behave opportunistically. Cases observed that since self-interest opportunism is moderate and not potentially severe. Furthermore, milk is also exposed to environmental uncertainties. Like bad weather seasonal variations and natural calamities which push the prices for feed crops as they buy feed for their animal at a higher cost.

Conclusions and Recommendations

This case study suggests that the dairy sector in Punjab province can be classified into two major categories namely, the informal Dhodhi supply chain and the formal corporate dairy chain. The two channels show dissimilar functions and operations from the classification of two milk marketing channels, it has been concluded that which party is benefiting from the relationship and which milk marketing channel provides a better arrangement for the farmers, with reduced transaction costs. At one level the small-scale farmers in rural Punjab, who are not appropriately coordinated, having low herd size, low bargaining power, middlemen opportunism, distance and limited budget had reduced milk supply to the modern chain. The results from studied cases indicated that small-scale farmers who rely on the informal mid agents' middlemen face high uncertainty caused by the opportunistic behaviour of middlemen. The type of contract with small farmers is not run under legislation so, both the involved partners in the transacting process may deceive each other. From the empirical results, it has been seen that the socio-economic conditions of the rural small farmers differ from the peri-urban farmers connected to the formal corporate dairy chain. Their farm structure, lack of capital, government support, feed management, hygienic standards and traditional marketing practices leaving them exposed to high uncertainties. The prices offered

to the small-scale farmers and large-scale farmers by their respective producers' shows variations. The large farmers get a high price for a per litre of milk as indicated in the empirical table whereas small-scale farmers get a low price for them per litre milk from middlemen as they have middlemen as their last resort. This has been observed in the case study that there is no government support for small-scale farmers. Government is not playing an effective role to uplift the small farmer from lower yields and low profit to higher yield and more profits. On the other hand, the private sector is supporting farmers in some indirect ways like paying large farmers comparatively high prices than small farmers and providing basic facilities for the farm management. All these challenges attribute to small-scale farmers in the rural areas contribute to high transaction cost. At the other side, the large-scale farmers of peri-urban farmers connected to the corporate dairy supply chain, possess good marketing practices and/are equipped with dedicated assets like cooling tanks, chillers and refrigerators, receive additional services from there contract companies free of cost.

Furthermore, large-scale farmers connected to the formal supply channel have long term written contract which minimise the cost of maintaining contracts, while the small-scale farmers' show relative dependency on Dhodhi channel and their type of contract (verbal) face high transaction costs. Therefore, when the farmers choose a dairy channel, they need to consider the preceding attributes or challenges. In such state of affair small-scale farmers operating in an uncertain environment, their relative dependency on middlemen opportunistic behaviour (middlemen as their last resort), the theory suggests, between the small-scale farmers and the buyer a third party should intervene, where vertical integration is evident to be lowering the transaction cost between the partners. The large farmers engaged in a governance environment similar to the governance form in practice in the country is totally different. Then that participant as large farmers are seen to be benefiting from the chain whereas small-scale farmers are benefiting from the alternate form of governance operates in vertical integration is preferable, which will make the transaction easier between the trading partners.

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Author's Contribution

Khawaja Tariq Ziad: Carried out the research work and wrote the first draft of the manuscript.

Umar Hayat: Supervised the overall study.

Muhammad: Conducted the interviews and compiled results.

Muhammad Suleman Bacha: Helped in the overall improvement in the final draft of the manuscript.

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