

Application of Agency Theory in the Dairy Industry of Bangladesh A Case Study of PRAN Dairy Limited

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Abstract

Farmers in rural Bangladesh have been involved in the dairy industry since the 17th century. It is widely regarded as a means of subsistence. Milk is used in nutrition, cottage industries, and industrial dairy processing. PRAN Dairy Limited (PDL) in Bangladesh works with rural dairy farmers under a contractual partnership to secure daily milk supplies. This study discusses PDL's relationship with rural dairy farmers through the lens of Agency Theory. In four districts of Northern Bangladesh, 45 farmers were selected and interviewed; PDL has worked with them for at least ten years. This study employs the qualitative method with NVIVO12 to analyze the interview transcripts thematically. A new version of the agency contract in the dairy industry was created by categorizing the existing one using a set of 15 codes based on five themes (risk, motivation, skills, penalties, and efforts). The study concluded that the implications of Agency Theory in the dairy industry from Bangladesh's perspective paved the way for multidisciplinary approaches to uncover more research opportunities in this sector, such as farmers' intentions to join the agency relationship with PDL.

Keywords: Agency theory, Contract, PRAN Dairy Limited (PDL), Rural dairy farmers, Thematic analysis.

1. INTRODUCTION

The dairy industry in Bangladesh is thriving and has the potential to become an independent economic sector. This sector relies heavily on ruminants, such as cattle, buffalo, sheep, and goats, to provide a solution to the world's malnutrition issues. Milk production in Bangladesh has been on the rise. The total milk produced as of June 9, 2021, is 10.703 million metric tonnes, up from 9.921 million in the previous year (Department of Livestock Services (DLS), 2021). These numbers were also above projections made by DLS, the government of the People's Republic of Bangladesh.

Moreover, the private sector produced 9.920 million metric tonnes of milk in 2018-2019, implying a sizable contribution to addressing Bangladesh's poverty and malnutrition issues through increased milk output and creating jobs. In addition, PRAN Dairy Limited (PDL), a subsidiary of PRAN Group, helps reduce rural poverty and food insecurity in Bangladesh. It is crucial to work toward the goal of making Bangladesh economically independent. PDL, like other initiatives in the dairy industry, works to keep small farmers competitive and informed of the evolving market.

Despite milk production, the contribution of PDL can be more contributory to ensuring a sustainable livelihood in rural Bangladesh. PRAN has a contractual partnership with dairy farmers in rural Bangladesh for the supply chain of raw milk regularly. It warrants the integrity of the contractual relationship, which benefits both parties. Agency Theory (AT) can play a vital role in justifying this partnership. This association has been around for decades, but no one has studied AT in Bangladesh. This research will explore AI's application to a contract between rural dairy farmers and PDL.

The intricate connections between PDL and rural dairy farmers can be better visualized with the help of Agency Theory. Stephen A. Ross first proposed AT in 1973. This research aimed to apply Agency Theory to analyze PDL's relationships with dairy farmers in rural Bangladesh. PDL employs farmers in rural areas to produce milk for the company to use in its various manufacturing processes. So, the study's overarching goal was to construct a theoretical framework informed by Agency Theory to characterize the relationship between PRAN Dairy Limited (PDL) and rural dairy farmers in Bangladesh. Researchers were interested in the following, so those are the questions that informed their work:

RQ1: How does PDL keep its agency relationship with rural dairy farmers in Bangladesh?

RQ2: What factors contributed to this relationship?

2. METHODOLOGY

This study employed a qualitative method because of the open-ended nature of the project and the fact that the researchers gathered the qualitative data (Palaiologou et al., 2015). Researchers used qualitative research to explain the principal

(PDL) and agent (rural dairy farmers) relationship in Agency Theory (Creswell et al., 2003). They developed a theory of the agency relationship (Trochim et al., 2008).

Choosing an appropriate level of analysis and the observational unit is crucial in qualitative studies like this one. When conducting research, one must first identify the unit of analysis, which is the entity about which conclusions will be drawn, and the unit of observation, which is the thing that is observed, measured, or collected to gain knowledge about the unit of analysis (Trochim et al., 2008). Using the five types of units of analysis and units of observation described by Trochim et al. (2008), this study categorized the agency relationship between rural dairy farmers and PDL as a social phenomenon and treated both parties as the units of observation. The research considered these two parties as the units of analysis to determine the agency behavior influenced by their agency contract. The study used two approaches: (i) a review of existing works on the dairy industry; and (ii) interviews with PDL representatives and rural dairy farmers.

Since the study intends to apply agency theory to the dairy industry in Bangladesh, so the researchers must assess the theory or evidence in this field to ensure that they accurately identify the principal (PDL) and the agents (rural dairy farmers) involved (Snyder, 2019, p. 334). For this study, Scopus and related websites were consulted to gather business data on Agency Theory and the dairy industry.

The lead researcher conducted face-to-face interviews 45 between July 29 and August 5, 2022. PDL provided a list of 50 farmers who have been under a contractual partnership with the company for at least 10 years. The researcher selected 45 farmers in good standing. These farmers are considered as running farmers associated with four of the seven hubs of PDL. See Table 2.1. These hubs are located in the Northern districts of Bangladesh. They live within a 2 kilometers distance from the collection center. The interviewees desire anonymity, so researchers only reveal the number of interviewees associated with each hub. The demographic profile of subject farmers is shown in Table 2.2.

Table 2.1 Hub Locations List of Farmers Interviewed

PDL Hub locations	Number of Farmers Interviewed	Valid %
Pabna	15	34%
Nature	10	22%
Rangpur	10	22%
Sirajgonj	10	22%
Total	n = 45	100%

Table 2.2 Demographic Information of rural dairy farmers

Demographics (personal and farm)	Categories	Frequency	Valid (%)	
Personal	Gender	Male	43	95.6
		Female	2	4.4
	Age (years)	21-30	1	2.2
		31-40	13	28.9
		41-50	18	40.0
		51 and above	13	28.9
	Marital status	Unmarried	1	2.2
		Married	43	95.6
		Divorced	1	2.2
	Education Level	No Education	7	15.6
		Primary	24	53.3
		Secondary	6	13.3
		College/Diploma	7	15.6
University		1	2.2	
Experience	10-14	36	80	
	15-19	7	15.6	
	20-24	2	4.4	
	25-30	0	0	
	31 and above	0	0	
Farm size	Small	19	42.2	
	Medium	22	48.9	
	Large	4	8.9	
Number of cows	1-5	21	46.7	
	6-10	15	33.3	
	11-15	6	13.3	
	16-20	3	6.7	
	21 and above	0	0	

According to their convenience, the average interview lasted between 30 and 40 minutes. There were 43 (95.6%) men and 2 (4.4%) women farmers. At no point during the study's execution were participants' identities revealed, and the researchers guaranteed their complete confidentiality. Discussions with the dairy farmers were held in Bangla for the farmers' convenience. Researchers translated Bangla interview transcripts into English and used NVIVO 12 to generate codes in preparation for thematic analysis following Braun and Clarke (2006)(Braun & Clarke, 2006). According to the paper by Moloj and Marwala (2020; p.97), which relied heavily on interviews with PDL and rural dairy farmers, NVIVO12 was used to generate 16 codes, and the study took into account the following themes. These ideas shaped the strength and longevity of the agency contract relationship. The codes and themes discovered through a thematic analysis are listed in Table 2.3.

Table 2.3 Codes and themes generated from the thematic analysis

Codes	Themes
Natural calamity	Risk
Inflation	
Cattle diseases	
Pollution	
Award system	Motivation
Support in curbing risk	
Cattle vaccination	
Quick payment system	
Training and development opportunity	Penalties
Loss of contract	
Inappropriate cattle foods	Skills
Decision-making skills	
Cattle farm operations skills	
Physical skills	Efforts
Physical efforts	
Mental efforts	

Source: Authors

Scopus papers were consulted for the literature review because that database is regularly updated and is considered reliable by the researchers who conduct these reviews because of the wide variety of journals it covers (Falagas et al., 2008). The Scopus database included 9827 documents as of July 31, 2022. A total of 6854 articles were published, making them the most common document type. The first article in Scopus was in 1923; the highest annual total of papers published is 2020 with 653. The fields of agriculture and biology (4355) and biochemistry, genetics, and molecular biology (2268) and environmental science (1,426), and the areas of business, management, and accounting (349), and economics, econometrics, and finance (343) are just a few of the many that have contributed to the body of knowledge surrounding the dairy industry. With 26 contributions, Massimo de Marchi dominated this field of study.

Milk is the primary input for the dairy business. As defined by Belitz et al. (2008, pp. 500-504), milk is the stored fluid of the udders of female mammals; for the purposes of the dairy industry, this includes milk from cows (bovine), buffalo, goats, camels, and sheep. Other forms of milk mentioned by Gumustas et al. (2017) are condensed milk and dried milk (Gumustas et al., 2017, p. 425). Soybeans, rice, almonds, oats, hemp, coconut, rice, macadamia nuts, quinoa, and other nuts and seeds have all been noted as potential plant-based milk sources by various authors (Astolfi et al., 2020; Chalupa-Krebzdak et al., 2018, pp. 86–87; Jeske et al., 2017, p. 27), noted that plant-based sources of milk could be obtained from hazelnut, walnut, cashew and so on). Proteins, water-soluble vitamins, lactose, and salts are found in the aqueous phase of this emulsion; the fat and fat-soluble vitamins can be found in the other part (Gumustas et al., 2017, pp. 424–425). Many factors, including the breeding conditions, the health of the cattle, the genetic constitution, the physiological condition, and the age of the cattle, have a significant impact on the nutrient composition of milk.

Countless dairy products are made, in some way, from milk. Due to regional, cultural, and societal differences, it is difficult, if not impossible, to compile a comprehensive online list of dairy products. Some well-known dairy products, however, are exported to many countries. Consumer milk, fresh milk, yogurt, cream, cream products, and butter are the most common dairy products mentioned by (Belitz et al., 2008, p. 504). Moreover, Cheese, milkshakes, ice cream, and other blended dishes are all considered dairy products (Yuan et al., 2013, p. 937); Ghee (Singh et al., 2019); sweetmeats (Sarkar et al., 2021); biscuits (Aggarwal et al., 2016); chocolates (Morais et al., 2014), and so on all rely heavily on milk in their production.

Dairy farming is considered one of the most ancient industries of humankind. According to researchers, goats were the first domesticated mammal used for milk production around 10,000 to 11,000 years ago, followed by cattle around 9,000 years ago (Hirst, 2019). In the 7th century BCE in northwestern Anatolia, the 6th millennium BCE in eastern Europe, the 5th century BCE in Africa, and the 4th millennium BCE in Britain and Northern Europe, milk processing quickly gained popularity (Hirst, 2019). According to (Rytönen et al., 2013, p. 19), the dairy industry shifted from a cottage industry to a heavy FMCG industry in the 19th century as human civilization developed.

Also, they said that early urbanization, World Wars I and II, and the Great Depression made it necessary for state policies to address food safety and security and that technological and industrial changes in food and agriculture drove this change (Rytönen et al., 2013, p. 19).

3. OVERVIEW OF PRAN DAIRY LIMITED (PDL)

PRAN Dairy Limited (PDL) is a subsidiary of PRAN-RFL Group. PDL was founded in 2003 by the late Major General Amjad Khan Chowdhury, who envisioned "Making Bangladesh a dairy-self-sufficient country by freeing our farmers from economic oppression and leading them to prosperity." Their website says that they have 18 brands of butter, cheese, fresh milk, ghee, powder milk, value-added milk, and yogurt (PRAN Dairy Limited, 2021). "Everyday Milk for Everyone" is their goal. They want to build a strong and healthy country by getting people from all walks of life to drink as much as 250 ml of milk daily. Table Below is a list of how much PDL makes each year:

Table 3.1 Market position of Pran Dairy Limited

Company	Yearly Sales Value	Market Share
Abul Khair	6,880,000,000	21.94%
Meghna	5,440,000,000	17.35%
PRAN	4,755,641,886	15.17%
MilkVita	4,405,420,000	14.05%
Others	2,715,656,000	8.66%
Brac	2,671,300,000	8.52%
Newzealand Dairy	2,185,000,000	6.97%
Arla Foods	1,120,000,000	3.57%
Akij	467,661,500	1.49%
Baghabari	250,000,000	0.80%
Grameen Danon	200,000,000	0.64%
RD	152,925,000	0.49%
Imported	112,462,500	0.36%
Grand Total	31,356,066,886	100.00%

Source: Business Research Unit, PRAN-RFL Group

Table 3.1 shows that PDL holds the 3rd position with a 15.17% market share. Table 3.2 indicates the number of countrywide hubs, the number of registered and running farmers, and their beneficiaries.

Table 3.2 Number of registered and running dairy farmers in all PDL hubs and their beneficiaries

Sl. No	Name of Hub	Location	Number of Dairy Farmers (Registered)	Number of Dairy Farmers (Running)	Number of Beneficiaries
1	Hub 1	Pabna	2573	1098	3294
2	Hub 2	Natore	2485	870	2610
3	Hub 3	Rangpur	1892	590	1770
4	Hub 4	Sirajgonj	2981	730	2190
5	Hub 5	Bogura	110	72	216
6	Hub 6	Khulna	440	254	762
			10481	3614	10842

Source: Business Research Unit, PRAN-RFL Group

Note: one beneficiary means 3 persons (husband, wife, and one child)

As per the preceding table, the farmer's contract with PDL helps them financially and their beneficiaries. The agency contract will significantly affect the local communities serving as hubs, as highlighted by the table below. The following diagram shows the supply chain flows from the farmers to the consumers via PDL.

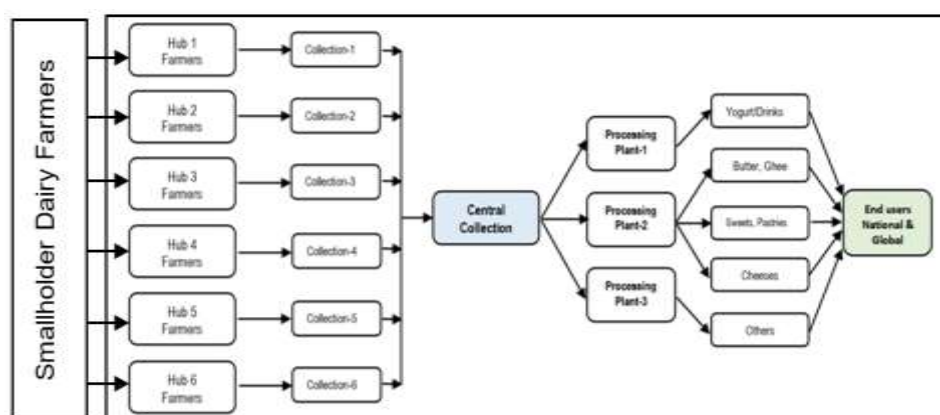


Diagram 3.1 Supply Chain Flow of PDL

4. THEORETICAL FRAMEWORK: AGENCY THEORY

Panda and Leepsa (2017) enumerate that AT has greatly changed since Adam Smith's research in 1776 (Panda & Leepsa, 2017, pp. 75–77). They reiterate that the owners invest their own money and take risks for their business can make money. On the other hand, business owners are risk-averse and seek maximum profit. The principal and the agent have different ideas about how risk should be shared, causing agency conflict. Ross (1973) and Mitnick, who used incentive and institutional approaches, changed how people think about how principles and agents work together (Mitnick, 2019; Ross, 1973). PDL gets milk from dairy farmers in rural areas and processes it for various value-added products. So, agency theory can be a good fit for engagement.

Agency theory is applied to many disciplines, such as accounting, finance, economics, political science, sociology, organizational behavior, and marketing (Panda & Leepsa, 2017, p. 75). Tiessen and Waterhouse (1983) discussed a situation in which one or more principals hire another agent or agents to work for them (Tiessen & Waterhouse, 1983, p. 254).

The researcher is primarily interested in how PDL and rural dairy farmers work together in this paper. Researchers reiterate that agents' performance is key to the principal's performance (Grossman & Hart, 1983). This means that the amount of milk provided by dairy farmers is vital for PDL. The work of Moloji and Marwala (2020) gives an impression of the theoretical framework of agency theory, and the study tries to take this framework into account when analyzing it (Moloji & Marwala, 2020, p. 97).

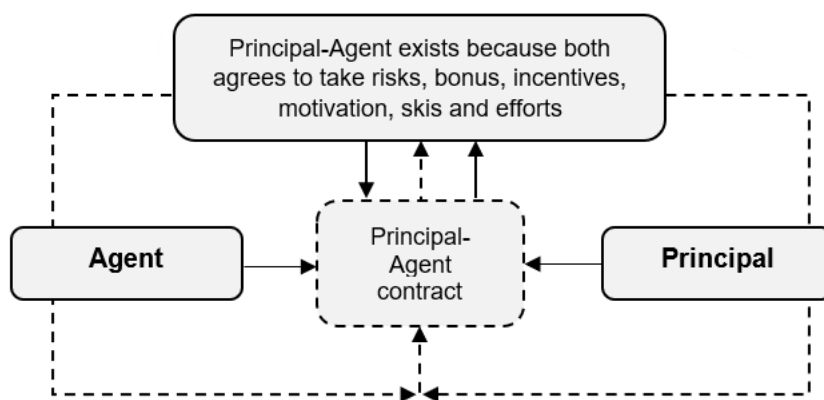


Figure 4.1 A contractual Principal-Agent relationship
Redesigned by the Researchers. Source (Moloji & Marwala, 2020)

They talked about risk, bonuses, penalties, incentives, motivation, skills, and efforts as parts of the contract. For thematic analysis, the researchers combined bonuses and incentives into one thing they called motivation.

5. RESULTS AND DISCUSSION

The risk in the dairy industry, which Bachev and Nanseki (2008) and El Benni and Finger (2013) wrote about, was the first theme of the analysis (Bachev & Nanseki, 2008). Under this theme, the three underlined sub-themes (or "codes") of natural disasters, inflation, cattle diseases (Fourichon et al., 2001), and pollution were important (Hooda et al., 2000). In Bangladesh, natural disasters happen all the time. Flood is the most common natural disaster in a riverine country, and it has a significant effect on dairy farmers just like it does on other farmers. Also, drought and famine in certain areas make it hard to feed cattle. Inflation causes the price of cattle feed to go up, so dairy farmers have to raise the price of a liter of milk. If the milk price goes up, this makes PDL and farmers unhappy. Cattle-related diseases can also make it hard for dairy farmers to make as much milk as they want. When animals die or get sick, it hurts a farmer's production, which affects the milk collection goal. Pollution in the water, air, soil, or sound lowers milk production because it changes how cattle eat and live.

Under the motivation theme, the highlighted sub-themes or codes were the award system, support in reducing risks, cattle vaccination, quick payment system, and training and development opportunity. PDL gives monthly and yearly awards to the best dairy farmers based on how much milk they give. Three of the people who answered got awards from their hubs for being the "best dairy farmer of the month." Farmers are more likely to stay with PDL if they know they will get rewards for doing so. Different financial incentives help farmers compensate for the loss of cattle caused by natural disasters and keep cattle food prices from going further. PDL gives vaccinations to the cattle of their farmers. It helps the cattle's immune system and cuts down on the number of deaths caused by diseases. PDL pays their farmers quickly for their milk and prefers to pay them in cash or through mobile financial services. People who were interviewed said that this very responsive payment system was the most important thing that kept them going. PDL gives training and development opportunities for improving farm setup, making better and more sustainable food for cattle, caring for cattle, collecting milk, and storage in ways that don't waste milk.

Suppose farmers fail to achieve production targets or quality. PDL may take steps to punish them. If the milk quality fails QC, PDL can notify them by asking if they need help with training and growth. Even so, if it lasts for a month, they would

back out of the contract and stop giving farmers all the benefits they used to get. They also don't want to work with the farmers if they see that the cattle are being fed low-quality food. Low-quality feed produces low-quality milk. Like PDL, dairy farmers are apprehensive about this because they are committed to their agency contract. Farmers who are interviewed carefully check the food quality of cattle, and once they are sure it's at the right level, they buy it from vendors.

First on the list of skills is the ability to make good decisions. Farmers know who their competitors are, how much they charge, and what gives them an edge in the market. They can change to a different dairy farm company at any time. To ensure the quality comes from the supplier end of PDL, it is also essential to collect, store, and sell milk to the PDL collection booth at the right time. Also, handling animals, managing pastures, and collecting, storing, and milk for sale are important skills for running a farm in today's world. As all interviewees had a lot of experience, they emphasized this skill set as their most important competitive advantage. It gives them two benefits: they are seen as reliable contributors to PDL and do better than other farmers. All of the farmers interviewed preferred additional people to work on their farms. From a farmer's point of view, worker management was necessary, and the farm's success also depended on how well the workers did their jobs. Cattle farmers work almost hourly, so they need physical skills like muscle strength, stamina, endurance, and organ coordination. A physically fit farmer can take care of his farms efficiently and effectively because of the physical skills that PDL always strives for.

Physical and mental efforts are considered in the efforts theme. Physical efforts largely depend on the farmers' physical strengths because the entire milk production and selling system require active physical movement and involvement. Here, physical skills play a role in assuring the better agency relationship. Interviewees said that physical skills positively ensure physical efforts. Due to heavy participation in physical activities, interviewees were concerned about maintaining a healthy lifestyle within their limited income. Mental efforts depend on motivational factors, and the more motivational factors listed above can ensure better mental effort. Interviewees envisaged that PDL encourages farmers to exert mental efforts through the motivational activities that the researchers mentioned before in this section. However, they felt pressure on maintaining the optimum target of selling milk, creating mental stress.

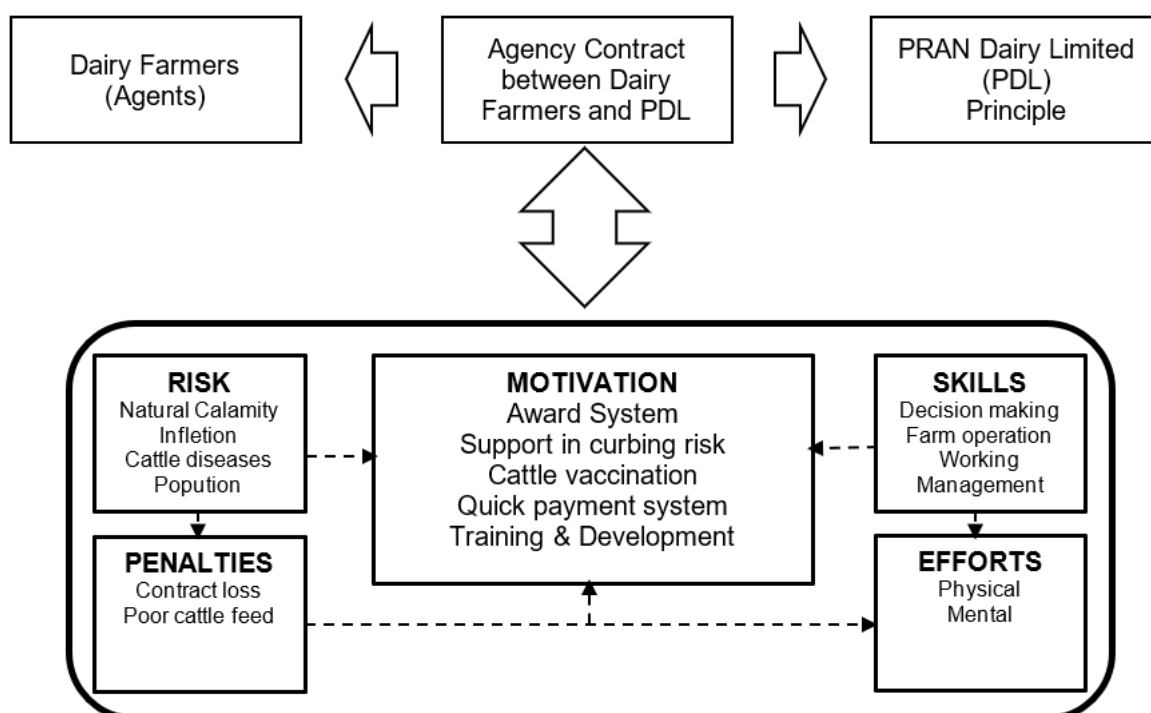


Figure 5.1 Underlying factors are affecting the agency relationship between PDL and rural dairy farmers.

6. CONCLUSIONS

6.1 Limitations

First, the sample size was small because it was challenging to consider a large sample when interviewing people in a scattered remote location of Bangladesh. Second, it was difficult to organize a group conversation to obtain a further in-depth picture. Third, the study only explored PRAN Dairy Limited as the only company and the rural dairy farmers who worked with them. So, a comparative study that compares the two would be more critical.

6.2 Significance

Based on the work of Moloi and Marwala (2020), this study made an agency theory model that gives a more detailed explanation of each factor that affects the agency contract between the principal (PDL) and the agents (rural dairy farmers). Each of the highlighted elements and sub-factors is important for figuring out how long the agency contract will last, and

the study results give a clear picture of this claim. As agency theory applies to many different fields, this study looked at it from the viewpoint of the dairy industry, which is a part of agriculture.

6.3 Implication

The study's theoretical implication is that this improved agency theory model can be used to examine the relationship between other dairy farms in the country and rural dairy farmers. This new model can also describe how local vendors and agencies work together. These vendors are not huge companies like PDL, but they sell milk and products made from milk in their area. This study shows that managing farms in a way that is good for the environment is essential for their long-term success.

The study could help managers figure out how to improve the relationship between PDL and rural dairy farmers by giving them information about how to build and keep the relationship and deal with problems. Another management implication could be to make people more aware of how pollution could hurt dairy production across the country.

6.4 Future Research Direction

Future researchers could look at a much bigger group of rural dairy farmers as subjects. In the future, researchers could also focus on how hub employees of PDL feel about the agency relationship. Another direction for future research could be to look at the relationships between two or more dairy farms in Bangladesh. This could give a better picture of the country's dairy industry and its ability to stay in business.

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Authors contribution: Chapter 1 MKH & VR; Chapter 2 MKH & VR; Chapter 3 MKH; Chapter 4 MKH; Chapter 5 MKH & VR; Chapter 6: MKH

References: MKH; Funding MKH; Script checking MKH& VR

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