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Transactions in Paraná's dairy AGS: a study based on transaction and measurement costs

Transações no SAG lácteo no Paraná: um estudo a partir dos custos de transação e de mensuração

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How to cite: Caunetto, M. M., Souza, J. P., & Schiavi, S. M. A. (2024). Transactions in Paraná's dairy AGS: a study based on transaction and measurement costs. *Revista de Economia e Sociologia Rural*, 62(1), e267722. <https://doi.org/10.1590/1806-9479.2022.267722>

Abstract: This article aimed to understand how governance structures and the search for value protection influence transaction costs in the relationship between dairy producers and processors in Paraná, Brazil. These aspects are treated by Transaction Cost Economics (TCE) and by Measurement Cost Economics (MCE). For data collection, 30 semi-structured interviews were conducted and Content Analysis was used for data treatment and results analysis. For the theory, the study contributed demonstrating that although the alignment between transaction attributes and governance structures contribute for value protection as proposed by TCE, in the absence of complete information, this alignment is still not enough to guarantee economic rights, as predicted by MCE. Empirically, it contributed suggesting the use of formal contracts and the importance of formal information available to milk producers and processors to improve their results in the activity. Thus, considering the governance structures in Paraná's dairy AGS, it is predicted that even if the hybrid structure is adequate, under TCE view, due to its alignment with transaction attributes, MCE concepts help to explain why agents still need guarantee mechanisms. Those mechanisms, such as long-term relationships, normative instructions and informal agreements, attempt to protect value, given informational problems.

Keywords: governance structures, guarantee mechanisms, value protection.

Resumo: O objetivo do artigo foi compreender como as estruturas de governança e a busca pela proteção do valor influenciam nos custos de transação na relação entre produtores e processadores de leite no Paraná. Esses aspectos são tratados pela Economia dos Custos de Transação (ECT) e pela Economia dos Custos de Mensuração (ECM). Para a coleta de dados, foram realizadas 30 entrevistas semiestruturadas e os mesmos foram tratados pela Análise de Conteúdo. Para a teoria, o estudo contribuiu demonstrando que, embora o alinhamento entre atributos da transação e estruturas de governança contribuam para a proteção de valor, conforme se espera pela ECT, na ausência de informações completas, esse alinhamento não é suficiente para garantir direitos econômicos, como previsto pela ECM. Empiricamente, o estudo contribuiu sugerindo o uso de contratos formais e a importância da distribuição de informações formalizadas aos produtores e processadores de leite, a fim de que melhorem seus resultados na atividade. Assim, conclui-se que mesmo que a estrutura de governança híbrida seja adequada, devido ao alinhamento com os atributos da transação, os conceitos da ECM explicam porque ainda são necessários mecanismos de garantia (relações de longo prazo, instruções normativas e acordos informais) dados os problemas de informação.

Palavras-chave: estruturas de governança, mecanismos de garantia, proteção de valor.

1. Introduction

The dairy agroindustrial system (AGS) has been studied in Brazil for a long time. In 1999, Jank, Farina and Galan already predicted that, in a short time, there would be reductions in the number of medium and large producers due to problems related to high costs, insufficient scale and lack of salaried labor (Jank et al., 1999). From this perspective, in recent years, several



studies have been conducted aiming to understand the dairy AGS. Among them, Casali et al. (2020) observed that a portion of milk producers abandoned the activity due to difficulties in meeting institutional and market demands, such as scaled production and milk quality standards. In addition, the authors also identified problems of information asymmetry, especially in the case of producers without any relationship with cooperatives (Casali et al., 2020).

Furthermore, transactions in the dairy AGS are predominantly coordinated through informal agreements, which, associated with information problems between producers and processing industries, make room for opportunistic behavior, increase environmental uncertainties and enable the capture of rent between agents (Souza & Bánkuti, 2017). Some of these aspects are treated by Transaction Cost Economics (TCE), derived by Williamson's studies (1985), and by Measurement Cost Economics (MCE), represented by Barzel (2005). As theoretical currents derived from New Institutional Economics (NIE) theory, these assume that the macro institutional environment plays an important role in the efficiency of transactions.

Both of them discuss the main factors that influence competition between agents and efficiency of transactions. However, as Zylbersztajn (2018) argued, TCE and MCE still have some differences that justify the study of efficiency of transactions from these two perspectives. In general, it can be considered that in search for efficiency, TCE focuses its analysis on governance structures, while MCE discusses the mechanisms which protect value and agents' property rights. Following Williamson (1985), who claimed that governance and measurement were interdependent, this study deals with efficiency of transactions between producers and processors in the dairy AGS in Paraná, in the search for a better understanding of the problems already mentioned.

Considering TCE, Williamson (1991) proposes that an increase in asset specificity increases transaction costs. Such costs tend to be higher when contractual structures do not align with changes in specificity, generating inefficiencies. On the other hand, MCE predicted that the presence of appropriation risk and poor value distribution among agents is configured as inefficiency. To MCE, the availability of information through measurement is related to guarantee mechanisms adopted by agents in search for value protection (Barzel, 2005).

In this sense, although a transaction is considered efficient when low transaction costs are present from TCE perspective, it may still have problems and inefficiencies in MCE view, considering the protection of property rights and value distribution due to availability of information and the guarantee mechanisms adopted. In Barzel's (2005) proposal, measurement is able to identify these dimensions and to contribute not only to protection of rights, but also to a better value distribution among agents. These and other complementarities justify the need to analyze the efficiency of transaction by these two theoretical currents.

Thus, the object of this study was the transaction between milk producers (sellers) and processors (buyers) in Paraná (a state in the south of Brazil), seeking to observe the presence of opportunistic behavior, bilateral dependence and measurement information asymmetry. We interviewed small, medium and large producers and processors, the latter in many cases buying from interviewed producers. In addition, two key agents were interviewed (one consultant and one organic milk producer who sells directly to consumers) to obtain an exogenous perspective on the behavior of agents in the transaction, enabling the triangulation of information.

Considering the empirical view, it is important to note that the macro-institutional environment in the dairy AGS in Brazil is composed of Normative Instructions (NI) aiming to coordinate milk quality standards that must be observed in producers and dairy processing transactions, which impacts milk prices (NI 76 & 77/2018, of the Ministry of Agriculture, Livestock and Food Supply – MAPA) (Brasil, 2018a, 2018b). However, there are still many problems considering transactions in the dairy AGS. Although some studies consider that price system works properly and serves

as a basis for negotiation between producers and processors, it is common to observe high volatility in milk prices, since neither producers nor industries have control over future prices, hindering the availability of information in transaction (Acosta et al., 2018; Carvalho et al., 2020). Furthermore, Souza & Bánkuti (2017) demonstrated that even if measurement is facilitated by regulations in the macro-institutional environment, there are still problems in information sharing between producers and processing industries.

Although in some cases the price is given by Paraná's Joint Council of Dairy Producers and Processors (*Conseleite-Paraná*) and the quality standards are considered in this process based on the normative instructions, there are also problems related to the protection of economic rights and value appropriation by processing industries. Moreover, the dairy AGS in Paraná is surrounded by high environmental uncertainties that also influence value distribution, related to price, production inputs and climate, affecting production costs (Miraes & Souza, 2017). Still, even in this context, it is observed that producers have sought to maximize their gains by increasing levels of knowledge and production quality (Acosta et al., 2018).

Therefore, in the case of milk, the identified transaction costs are mainly related to the opportunistic behavior of agents, bilateral dependence and the information sharing. The recurrent difficulty of obtaining reliable information, mainly on the part of producers, configures a risk of value appropriation (Barzel, 2005), which is greater for the seller's side than for the buyer's side. In this context, it is predicted that even in transactions considered efficient due to the low transaction costs – arising from the reduction of opportunistic behavior, and given the alignment between transaction attributes and governance structures – the potential to establish mutual gains between agents and value protection may not be reached. Thus, this research was driven by a research problem dedicated to answering the following question: how do governance structures and the search for value protection influence transaction costs in the relationship between producers and processors of the AGS of milk in Paraná?

Then, the aim of this article is to understand how governance structures and the search for value protection influence transaction costs in the relationship between dairy producers and processors in Paraná. It is expected that the efficiency of transactions, given by the reduction of transaction costs, can be configured differently when considering the adaptability of structures, accompanied by the possibility of establishing mutual gains between agents and value protection.

Based on data from field research, the study theoretically contributes by demonstrating that transaction cost is configured differently, through TCE and MCE lenses. Also, the study showed that such theories complement each other in discussions about the efficiency of transactions, based on the choice of most appropriate governance structure. As a proposition, it is inferred that the alignment between attributes and governance structure can contribute to reduce costs to protect against opportunistic behavior, but is not enough to guarantee economic rights. This proposition is guided by Williamson's assumption (Williamson, 2002) that, in the search for efficiency, governance structures must be capable of creating order, mitigating conflicts and distributing gains between the two sides involved in a transaction.

Finally, this research assumes importance both theoretically and empirically; It advances in the discussions on the interdependence between TCE and MCE theories, and for dairy AGS in Paraná because it highlights the importance of information sharing and value distribution to both sides of the transaction, in order to improve the sector's performance, seeking alternatives for the future of dairy chain. In addition, the characteristics of the dairy AGS transactions in Paraná can be extrapolated to the Brazilian context, serving as a reference in import and export decisions, investment and strengthening of the AGS, in favor of expanding its participation in the international context.

2. Theoretical foundation

2.1. Transaction Costs Economics (TCE)

As defined by Williamson (1985), TCE considers the problem of economic organization as a "problem of contracting" (Williamson, 1985, p. 20). When considering transaction costs, Williamson (1985) defines them as the friction costs of the economic system, or as the costs of negotiation and renegotiation between agents, in an attempt to protect against opportunistic behavior. Furthermore, as Foss and Foss (2022) highlight, transaction costs are also seen as the costs of defining and enforcing property rights (Coase, 1960; Foss & Foss, 2022). As already shown, such costs cannot be eliminated and the agents have to find an organizational form that contributes to their reduction (Coase, 1937; Williamson, 1985).

As Sent & Kroese (2022) state, Williamson was one of the main theorists to operationalize the concepts of NIE, from the theoretical apparatus of TCE in three main phases: first, by analyzing in depth governance through vertical integration; second, by developing the theoretical construct of TCE; third, by placing its main contributions in the area of Institutional Economics. To develop TCE, Williamson (1985) identifies three important groups of parameters and theoretical dimensions: behavioral assumptions; transaction attributes and governance structures – which provide the explanatory power of his theory (Carter & Hodgson, 2006).

Therefore, as a first step to operationalize the NIE concepts and present the TCE rationale, Williamson (2002) draws attention to the need to describe human actors in more realistic terms. The contractual man is understood from two behavioral assumptions: limited rationality – limits on the cognitive competence of individuals – and opportunistic behavior – the self-interested action (Williamson, 1985).

Further, three main factors are considered as transaction attributes: frequency, uncertainty and asset specificity involved in the transaction. Among them, Williamson (1991) states that asset specificity is the main factor considered for the choice of governance structures because it creates bilateral dependence between agents and allows greater risks of opportunistic behavior. Thus, asset specificity is understood as the degree to which an asset can be reallocated to a second transaction without decreasing its value (Williamson, 1985). In turn, the other two attributes of the transaction are combined with the degree of asset specificity for the choice of governance structures (Williamson, 1991).

Such governance structures differ among market, hybrid forms and hierarchy or vertical integration (Williamson, 1991), and as Sent & Kroese (2022) highlight, they are seen as an economizing response to transaction costs. As Williamson (2002) presents, each governance structure has strengths and weaknesses that combined with its characteristics and transaction attributes, justify the best way to coordinate transactions among agents. Also according to the author, governance structures differ in terms of contractual laws, adaptability to disturbances, levels of incentive and power of control (Williamson, 2002).

In short, it is understood that market and hierarchy are polar structures, and when moving from market to hierarchy agents experience a trade-off between higher level of incentives and higher level of control (Williamson, 1991; Carter & Hodgson, 2006; Crook et al., 2013; Sent & Kroese, 2022). Considered as an intermediary between market and hierarchy, the hybrid governance structure has medium levels of incentives and control. Its strengths are characterized by greater ease of adaptation when compared to hierarchical structures and a greater degree of control when compared to the market. On the other hand, in situations of high environmental uncertainty, due to their higher level of bilateral dependence, hybrid structures are more subject to opportunism (Williamson, 1991). Therefore, in a context of high environmental uncertainties, depending on the level of asset specificity, Williamson (1991) points out that the best structure is the market at low specificity levels (k1) or the hierarchy at high specificity levels (k2), as shown in Figure 1.

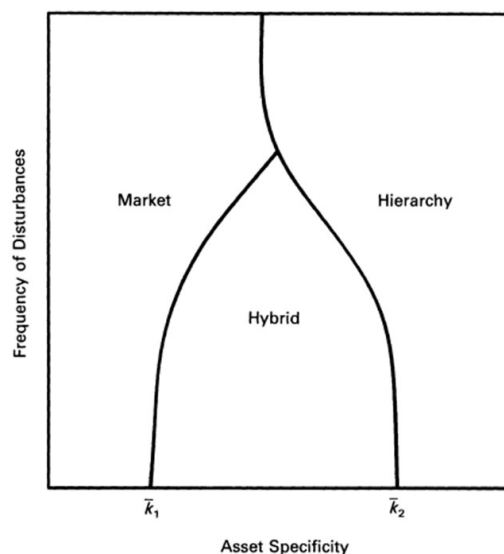


Figure 1 – Organization form responses to changes in uncertainty.
Source: Williamson (1991, p. 292).

Even so, although hierarchy appears as the most efficient form in a certain degree of asset specificity (high specificity), Williamson (2002) draws attention to the bureaucratic costs of this structure and as a rationale for the governance structures, hierarchy is generally seen as the last option. Therefore, the author recommends to “[...] try markets, try hybrids and have recourse to the firm only when all else fails” (Williamson, 2002, p. 183).

As shown in Figure 2, up to the level of specificity k_1 , the market is the most efficient choice, because it is able to respond to adaptation and control needs. Between k_1 and k_2 , the most efficient structure is the hybrid one, because it allows greater control, when compared to market, it is easier to adapt than the hierarchy, with the advantage of lower bureaucratic costs. Finally, as the asset specificity rises beyond k_2 , the market and the hybrid structures cease to be efficient, and hierarchy becomes the most efficient form, providing greater control and protection against opportunistic behavior and lower TC, when compared to other governance structures.

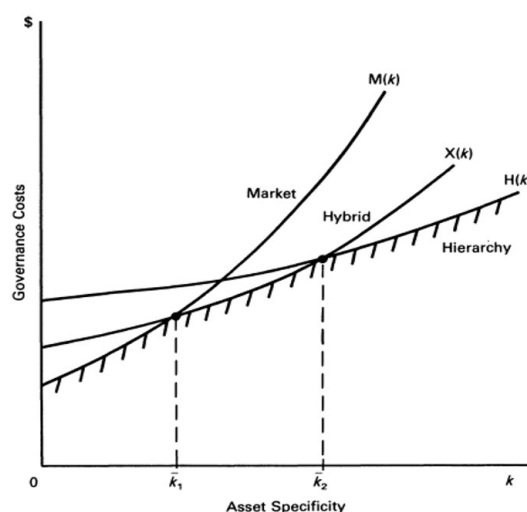


Figure 2 – Governance structures as a function of asset specificity.
Source: Williamson (1991, p. 284).

Finally, TCE rationale is dedicated to demonstrating how governance structures differ, comparatively, according to their characteristics, strengths and weaknesses (Williamson, 1991; Zylbersztajn, 2018). In addition, the objective of that rationale is to demonstrate how the alignment between these structures and transaction attributes is able to contribute to efficiency of transaction, understood as the reduction of TC arising from efforts to protect against opportunistic behavior – at the same time in which it provides order, mitigates internal conflicts and distributes gains (Williamson, 2002).

2.2. Measurement Costs Economics (MCE)

Like TCE, Measurement Cost Economics starts from the concept of efficiency, but has a different analytical rationale (Barzel, 1982, 1985, 2005). Based on Coase (1960), MCE discussions are dedicated to establishing the mechanisms that will guarantee the property rights involved in the transaction (Barzel, 1982). In a recent work, Zylbersztajn (2018) ratifies that the MCE assumption is that in the presence of information provided by the measurement, the value of traded rights is maximized (Barzel, 2005; Zylbersztajn, 2018).

According to Foss & Foss (2000), MCE focuses on determining the ownership structure that contributes to maximizing value, in situations of high measurement costs (MC). In order to determine these property rights structures, Barzel (2005) argues that, when carrying out economic transactions, agents need information about assets, in addition to information about the terms on which they will be traded. The author assumes that in the real world information is costly to produce and to transmit among agents. Therefore, it is argued that as circumstances change, individuals start to look for different types of agreements and modes of organization to guarantee, produce and transfer information between all agents involved in economic exchanges (Barzel, 2005).

For Barzel (2005), measurement is considered a way of providing information, which can be performed at different moments of the transaction (Barzel, 2005; Souza & Bánkuti, 2017). As the author states, it can also be incomplete, making property rights difficult to be perfectly delineated. Thus, it is understood that the less information available to agents through measurement, the greater the transaction costs are to guarantee economic property rights. In addition, such costs are also associated with the need for double measurement and with the withdrawal of the transaction, due to the impossibility of measurement. Thus, Barzel (2005) concludes that transaction costs are the costs to guarantee agents' economic rights.

The property rights model is a central discussion factor for MCE, which, associated with measurement costs and information transmission, is important for the selection of guarantee mechanisms (Zylbersztajn, 2005). As Barzel (1997) defines, the term "property rights" carries two meanings: the first refers to the "ability to enjoy a piece of property", nominated economic property rights; and the second is "what the state assigns to a person", legal property rights (Barzel, 1997, p. 6). According to the author, economic rights are the end and legal rights are the means, which establishes the conditions for the protection and maintenance of economic rights. To conduct the MCE discussions, Barzel (1997) recognizes the importance of legal rights, but is mainly concerned with the definition and protection of economic rights, considering that these are more difficult to be observed. In this context, legal rights actions through formal or informal protection are important to protect and guarantee economic rights for both sides of the transaction (Barzel, 1997).

In addition, discussing contractual failures intentionally or unintentionally left by agents, as Ito & Zylbersztajn (2016) explained the model in Figure 3, in the absence of information,

attributes not specified in contracts (A^c) by measurement remain only under the domain of economic rights and without the protection of legal rights offered by contracts (Barzel, 1997; Ito & Zylbersztajn, 2016). Under these conditions, in search for value maximization, agents can appropriate economic rights without spending resources. This situation justifies the need for measurement and guarantee mechanisms that help to perfectly delineate the rights, reducing transaction costs and distributing the value between sellers and buyers (Barzel, 2005).

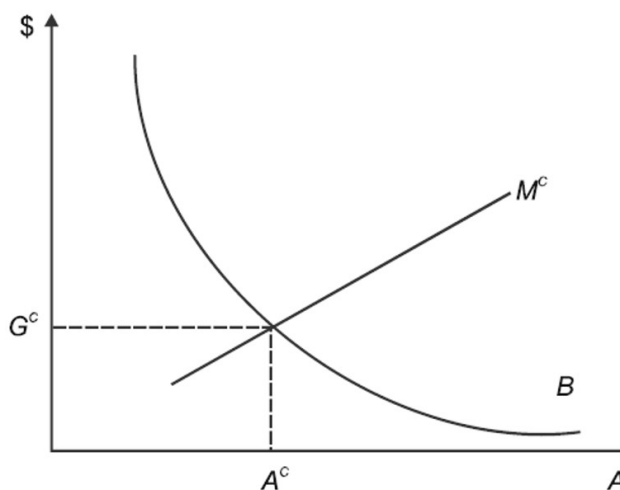


Figure 3 – Competitive contracts choice.

Source: Ito & Zylbersztajn (2016, p. 9).

Thus, Barzel (2005) determines that transactions can be coordinated by various guarantee mechanisms, including long-term relations, caveat emptor and auctions, contractual relations, transfers within organization and multiple enforcers. For the author, each of these forms differs according to the need for information: in caveat emptor, information is collected before transaction; in long-term and contractual relations, sellers offer guarantees to buyers, reducing buyers' need for measurement before the transaction; and in vertical integration, information is transmitted internally within the firm (Barzel, 2005).

In summary, in MCE rationale, it is understood that when measurement can be performed at low costs, external contracts guaranteed by legal rights can be chosen. On the other hand, when measurement is costly, agents need mechanisms to guarantee and protect the value exchanged (Barzel, 2005; Zylbersztajn, 2005). Objectively, as Barzel (2005) presents, easy-to-measure assets are guaranteed by contract, while difficult-and-costly-to-measure assets are coordinated by the long-term relations, depending on reputation and trust between agents. Thus, in MCE view, the measurement complexity influences the definition of guarantee mechanisms, also called governance structures (Souza & Bánkuti, 2012).

2.3. Interdependencies between TCE and MCE

As Zylbersztajn (2018) explains, TCE and MCE have characteristics in common and some differences that influence the coordination of the firm and empirical applications of the theory. Both of them aim to explain the size, scope and structure of the firm. However, as Williamson already presented in 1985, they are interdependent theories and some factors that are addressed by MCE – such as the transmission of information – are not addressed by TCE. The joint view of the two theories is justified when considering that, even though they have evolved in recent

years, TCE and MCE can still advance in conceptual, theoretical and empirical aspects (Hodgson, 2010; Zylbersztajn, 2018).

First, it is observed that contracts for MCE are different from contracts for TCE. As Barzel (2005) presents, contracts in MCE carry legal rights, are guaranteed by the state and require an objective description of the dimensions of the assets. In turn, TCE contracts differ in classical market contracts, neoclassical contracts for hybrids and cooperation contracts for vertical integration, which do not necessarily have the enforcement by the state (Williamson, 1991).

Furthermore, according to Souza & Bánkuti (2012), Barzel (2005) expands the debate on quasi-rent capture opportunities related to asset specificity and vertical integration presented by Williamson (1985). From MCE perspective, Barzel (2005) demonstrates that hierarchy is just another alternative and that standardization and the use of long-term relations are other alternatives to be considered, even with high asset specificity. For the author, the opportunity to capture quasi-rent will always exist and agents will spend resources to capture as much value as possible, characterizing a common competition movement, not only in the presence of high asset specificity (Barzel, 2005).

Besides that, while Williamson (1991) justifies the choice of hierarchy based on the increase in asset specificity, Barzel (2005) justifies vertical integration for better transmission of information between agents and for monitoring quality of products. Thus, considering this difference between theories, the hierarchy is chosen as the most appropriate governance structure not only for reducing transaction costs to protect against opportunistic behavior, but also to facilitate the transmission of information when measurement is complex or impossible to be performed (Barzel, 2005).

According to Souza & Bánkuti (2012), by inserting measurement as a way to ensure legal property rights, Barzel (2005) provides a new explanation for contractual relations. For the author, the choice of contractual arrangement is only possible in the presence of guarantee mechanisms and measurable information to protect property rights. Therefore, even in situations of high asset specificity and possibilities of opportunistic behavior – which would justify vertical integration in TCE – contractual relations described by MCE are still able to protect rights (Souza & Bánkuti, 2012).

Based on the model shown in Figure 4, Souza & Bánkuti (2012) demonstrated that, in the presence of safeguards ($s > 0$), opportunistic behavior and uncertainties are reduced, resulting in a greater protection level. Considering measurement possibility ($m > 0$) and contractual safeguards, transactions can be coordinated through contractual relations even with high asset specificity, following MCE predictions (Souza & Bánkuti, 2012).

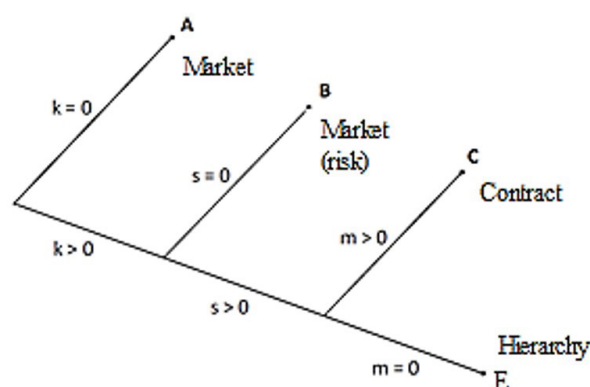


Figure 4 - Contractual scheme in the view of TCE and MCE.

Source: Souza & Bánkuti (2012, p. 87).

Thus, the factors which justify the choice of governance structures between vertical integration or contractual relation, can be considered from two different perspectives. On TCE side, the high specificity of traded assets justifies the choice of vertical integration as the best way to coordinate the transaction. However, according to MCE, in search for value maximization and protection of property rights, based on availability information, the contractual relation can still be considered the most efficient way to coordinate the transaction (Souza & Bánkuti, 2012).

Finally, discussing interdependencies on the way to efficiency of transaction, both approaches offer definitions. To TCE, efficiency of transaction relies on the alignment between transaction attributes and governance structures for transaction costs reduction and protection against opportunistic behavior (Williamson, 1991). However, to MCE, efficiency is associated with the alignment between guarantee mechanisms and availability of information for protection of agents' property rights, value maximization and value distribution (Barzel, 2005). As Zylbersztajn (2018) defines, the choice of the most efficient governance structure should be considered based on the level of asset specificity and in terms of measurement costs, justifying the use of both theories to analyze the efficiency of transaction.

In this way, it is possible to understand that considering the existing connections between TCE and MCE, these theories complement each other in discussions on efficiency of transaction, based on the choice of the most appropriate governance structure. Thus, as a proposition of this article, it is considered that the alignment between attributes and governance structure, can contribute to reduce costs related to protection against opportunistic behavior, but still not be enough to guarantee economic rights. This proposition confirms Williamson's (2002) definition by noting that, searching for efficiency, governance structures must be able to create order, mitigate conflicts and distribute gains between the two sides involved in exchange.

3. Methodology

Given its comprehensive purpose, this article is a qualitative, descriptive, cross-sectional study. Following Richardson's Guidelines (Richardson, 1999), this research comprised data collection, which was carried out from October to December 2020, interviewing agents from the Southwest, West, Central-Eastern, North-Central and Northwest regions of Paraná. The object of this study was the transaction between milk producers (sellers) and processors (buyers) in Paraná, seeking to observe the presence of opportunistic behavior, bilateral dependence and measurement information asymmetry.

Such regions were chosen because they had the highest productivity rates in the state, with emphasis to the municipalities of Castro, Carambeí, Marechal Cândido Rondon, Toledo, Cascavel, among others (Sistema Faep, 2020). For data collection, we designed different research scripts to interview producers, processors and key agents. The research subjects were selected according to accessibility or convenience, and considering their agreement to collaborate. Thus, it is important to mention that the research was not focused on data generalization, but on the deepening and understanding of the studied phenomenon instead (Minayo, 2008).

In the search for understanding transaction efficiency, data were collected seeking to interview agents belonging to the same transaction, whenever possible. For this reason, the following criteria were adopted for the selection of interviewees: milk producers, located in the state of Paraná, who sell to processors in Paraná or other states; milk processors, located or not in the state of Paraná, but buying from producers in Paraná. For data collection, 30 semi-structured interviews were conducted with 18 small and medium-sized milk producers (sellers), ten processors (buyers) and two key agents, one consultant and one organic milk producer who

sells directly to consumers. These respondents were located in Northwest, West, Southwest, North-Central and Central-Eastern regions in Paraná.

The profile of interviewed processors and producers is described in Table 1 and Table 2, including the time agent runs dairy activity, in years, the volume of milk produced or processed per day, and the average time of relationship established between the agents. These aspects are important to be considered, as they define that the profile of the interviewees allows providing information consistent with the analysis parameters of this study. Furthermore, eight producers and four processors are involved in the same transaction: producers 10, 12, 13 and 16 sell to processor 3; producers 2 and 5 sell to processor 6; producer 6 sells to processor 7; and producer 17 sells to processor 8.

To classify the length of relationship between producers and processors, we considered as medium to long-term relationships those comprising more than six years and not necessarily considered transaction frequency or recurrence, given that they may occur, in some cases, even daily.

Table 1 – Characteristics of the interviewed milk producers.

Milk Producers									
Producer	City	Region	Property Size (h/a)	Space for milk production (h/a)	Time in activity (years)	Daily volume (liters)	Type of milk	Number of buyers	Time with the same buyer
1	Umuarama	Northwest	3.4	3.4	10	450	Raw milk refrigerated	1	2 years
2	Cianorte	Northwest	149.6	19	30	800	Raw milk refrigerated	1	3 years
3	Umuarama	Northwest	5.4	5.4	9	540	Raw milk refrigerated	1	1 year
4	Cruzeiro do Oeste	Northwest	21.7	21.7	2	50	Raw milk refrigerated	1	2 years
5	Cianorte	Northwest	14.9	14.9	9	500	Raw milk refrigerated	1	8 years
6	Maria Helena	Northwest	100.6	40.8	20	750	Raw milk refrigerated	1	2 years
7	Alto Piquiri	Northwest	13.6	12.2	8	200	Raw milk refrigerated	1	2 years
8	Umuarama	Northwest	13.6	13.6	7	300	Raw milk refrigerated	1	1 year
9	Tuneiras do Oeste	Northwest	57.1	13.6	8	1250	Raw milk refrigerated	1	3 months
10	Jaracatiá	Northwest	6.5	6.5	10	30	Raw milk refrigerated	1	1 year
11	Inajá	Northwest	102	30	11	200	Raw milk refrigerated	1	6 years
12	Marmeleiro	South-west	45	22	8	6000	Raw milk refrigerated	1	3 years
13	Pranchita	South-west	40	40	25	3000	Raw milk refrigerated	1	6 years
14	Toledo	West	39.4	39.4	20	1000	Raw milk refrigerated	1	20 years
15	Mercedes	West	30	30	32	1800	Raw milk refrigerated	1	6 years
16	Mercedes	West	20	7	30	400	Raw milk refrigerated	1	4 years

Source: the authors based on the research data.

Table 1 – Continued...

Milk Producers									
Producer	City	Region	Property Size (h/a)	Space for milk production (h/a)	Time in activity (years)	Daily volume (liters)	Type of milk	Number of buyers	Time with the same buyer
17	Cafelândia	West	43.5	12.24	27	1500	Raw milk refrigerated	1	27 years
18	Toledo	West	21	21	30	1000	Raw milk refrigerated	1	30 years

Source: the authors based on the research data.

Table 2 – Characteristics of the interviewed milk processors.

Milk Processors									
Processors	Region	Type	Daily volume (liters)	Products sold	Time in activity (years)	Producers	Average time with the producers (years)	Operation	Branches
1	Central North	Dairy	7,000	Cheese	20	17	10	State	1
2	Central North	Dairy	5,000	Pasteurized milk, butter and cheese	25	30	10	State	1
3	Central North	Cooperative	1,300,000	Pasteurized milk, UHT milk, powdered milk, dairy compound and butter	56	2,800	30	National	4
4	Northwest	Dairy	380,000	UHT milk, cheeses, yogurt, cream, milk drink	56	250	30	National	4
5	Northwest	Dairy	700,000	UHT milk, dairy drink, cream, cream cheese, butter and cream	40	314	3	National	8
6	Northwest	Dairy	18,000	Icecream	25	50	6	PR; MT	2
7	West	Dairy	120,000	Yogurt, butter, cheese, cream cheese and milk candy	20	600	10	PR; MS	2
8	West	Cooperative	600,000	UHT milk, cottage cheese, milk candy, cream, butter, cream, yogurt and fermented milk	43	1,000	40	National	6
9	West	Dairy	38,000	UHT milk, sour cream, curd, dairy drink, cheese and fermented milk	30	100	10	State	6
10	Central-Eastern	Cooperative	380,000	UHT milk and B2B trade	60	1,140	15	National	12

Source: the authors based on the research data.

In order to adjust to the distance needs imposed by the Covid-19 pandemic, in most cases, the interviews were carried out through video calls or by telephone, with an average duration of 40 to 60 minutes. Only in two situations we could conduct face-to-face interviews, with a producer and a processor. The interviews were recorded with the consent of the interviewees. Later, they were transcribed into Microsoft Excel spreadsheets, with the help of the Atlas.ti software, and their content was kept in a digital file under the custody of the authors.

In order to guarantee the convergence and reliability of the research, during the interviews, scripts were divided according to the analysis categories and followed the main points to be analyzed, as shown in Table 3.

Table 3 – Interview script according to analysis categories.

Analysis Categories	Main points analyzed during the interviews
Transaction attributes	<ul style="list-style-type: none"> - the delivery of purchased milk; - investments required in milk production; - the influence of location and the time of delivery in the negotiation; - uncertainties present in transactions; - main problems in transactions; - situations in which the producer or the processor do not comply with the agreed terms; - situations in which the producer or the processor stopped transacting; - trust within the transaction.
Governance Structures	<ul style="list-style-type: none"> - the presence of formal or informal agreements in the transaction; - the negotiation and the relationship between producers and processors; - how producers and processors find and select each other; - the length of the relationship between producers and processors; - the average length of relationship between the same producers and processors; - the importance of long-term relationship to facilitate the transaction and to economize on transaction and measurement costs; - the payment made for the purchased milk; - factors considered for discount, premium price or to discard the product.
Guarantee mechanisms	<ul style="list-style-type: none"> - the mechanisms through which producers and processors access information about milk production and quality; - measured milk quality parameters; - situations in which milk quality parameters are measured; - the frequency of measurement (once or more than once); - information sharing on milk quality; - is the one responsible for milk quality measurement (producer or processor); - trust on the producer's control and on the processor's milk quality measurement; - mechanisms through which producers and processors solve conflicts on milk quality measurement; - the influence of milk quality and measurement on price paid to producer (<i>Conseleite</i> and NI 76 e 77).
Transaction Costs	<ul style="list-style-type: none"> - costs associated to the relationship with milk producers, other than production costs; - the adequacy of the amount received by producer for the milk sold, to reinvest in production; - the adequacy of the amount received by processor, from the sale of dairy products, to reinvest in the dairy processing activity; - what producers and processors do to ensure that the price paid is fair; - what producers and processors do to get a better value in transaction; - problems with breach of contract or breach of informal agreements (the reasons and how they solved it).

Source: the authors.

Furthermore, Content Analysis was used for data treatment and results analysis as proposed by Bardin (2011). The analysis categories were divided in: transaction attributes between milk producers and processors; governance structures; guarantee mechanisms and transaction

costs. These categories were resulted from the theoretical constructs under TCE and MCE. After data collection, no other analysis category emerged. The model in Figure 5 presents these categories. They describe a rationale for the efficiency of transaction, according to the proposition considered by the study: To analyze efficiency of transaction between milk producers and processors, from the perspective of TCE and MCE, it is considered that the costs which result from the alignment between attributes and governance structures can contribute to protection against opportunistic behavior, but is not sufficient to guarantee economic rights.

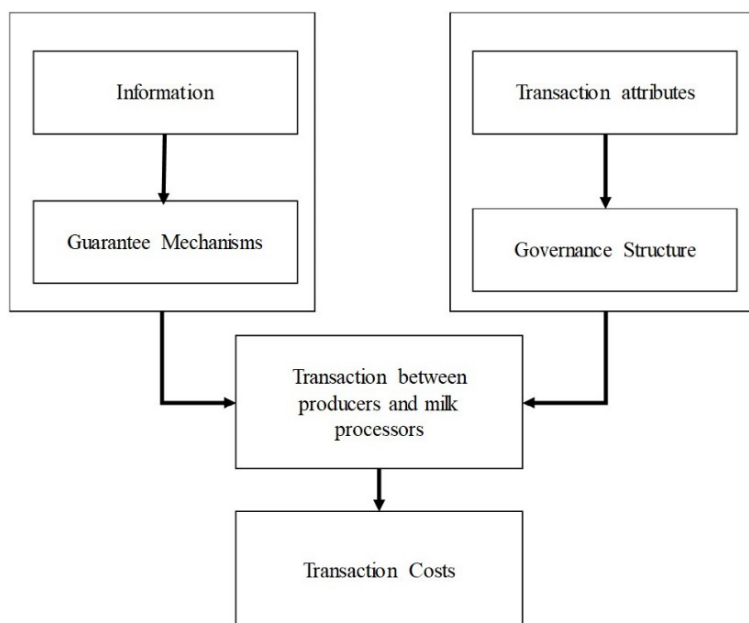


Figure 5 - Proposed model: rationale for efficiency of transaction.
Source: the authors based on theoretical framework.

Finally, the results of the analysis were represented by inferences obtained with: the triangulation of information from producers, processors and key agents; the convergence of the interviewees' speeches; previous studies; and theoretical review. The aim was to offer inferences that contribute to theoretical and empirical advancements, responding to dairy AGS problem and research gap, which was established considering the theoretical gaps and the advances obtained in empirical studies already published, as suggested by Sandberg & Alvesson (2011).

4. Results and discussion

Other studies have already discussed transactions in the milk AGS, such as some more recent ones: Souza & Bánkuti (2017), Acosta et al. (2018), Sudré et al. (2020, 2021), Carvalho et al. (2020), Daneluz et al. (2022), Medeiros et al. (2023). The works by Acosta et al. (2018) and Sudré et al. (2020, 2021), for instance, analyzed governance structures in transactions between dairy producers and processors, especially through the theoretical lens of TCE. Souza & Bánkuti (2017) had already identified that the measurement process, even facilitated by regulation, is costly and, in some cases, ends up being limited to processors and large producers. Along with this look, Medeiros et al. (2023) ratify that uncertainty and opportunism are negative factors in the relationship and performance of agents in the milk AGS, and emphasize the importance of a good relationship between these agents. As these authors observe, that AGS can still advance

in formal, technical, productive and commercial terms so that it achieves greater performance in the long term.

In general, those works discussed transaction efficiency in light of TCE and MCE theories. However, as Williamson (2000) presents, the efficiency of transactions and organizational arrangements changes in an interval of one to ten years, which implies the continuous need for new studies. Also, as much as governance structures create sufficient conditions to coordinate transactions, this does not mean that efficiency will always be achieved, especially when considering the problems of information distribution and value protection in the transaction (Souza & Bánkuti, 2017). Furthermore, for the continuity of the studies, it should be considered that, as Jank et al. already discussed in 1999, the Brazilian economy undergoes frequent and rapid structural transformations, which ends up accelerating the obsolescence of diagnoses already made.

Therefore, based on the results achieved by previous works, the present study sought to advance the discussion on efficiency, beyond the consideration of transaction attributes and governance structure adopted among those agents in Paraná's dairy AGS. For this, it considered, in addition to factors observed through TCE, the protection of value, given by the availability of information to both sides of the transaction, as observed in the discussions on MCE.

4.1. Transaction attributes and governance structure

According to the respondents and to the rationale proposed by Williamson (1985), it is observed that the transactions between producers and processors in these regions of Paraná are frequent, with a daily recurrence or at 48 hours. Furthermore, locational and temporal asset specificities are considered in a transaction surrounded by environmental and behavioral uncertainties, as brought in the speeches by the processor 3 and producer 13, on Table 4. Such uncertainties occur to a greater degree related to the amount to be paid to producers, making it difficult to plan and to reinvest in the activity. This configuration, according to the TCE assumptions, indicates the need for more complex governance structures, capable of absorbing transaction costs arising from misalignments between attributes and governance structure.

Among the six types of asset specificities proposed in TCE, two types are present in the dairy AGS in Paraná: time specificity, as mentioned above, and locational specificity. Such specificities are configured as medium to low level, confirming previous studies (Acosta et al., 2018). In particular, locational specificity influences decision on milk collection by the processor and the amount paid to producer, which is supported by the speech of processor 3: "It influences: road conditions must allow access to collection even on rainy days", and according to producer 12, who sells to that cooperative: "When it's too far away, the price drops a lot because not many people go to pick it up. And the opposite is true: the easier the access, the more people want to buy from that producer and this increases the price. If it is in a place that does not allow access, you cannot collect the milk".

In addition, it is observed that, regardless of the region, transactions are coordinated, in their great majority, through informal agreements, as it can be observed in the speech by processor 2, on Table 4. With the exception of producer 4 in Northwest and processors 2 and 3 in North Central regions, which have a small part of the transactions coordinated by formal contract, all the rest only have an informal agreement. Such agreements are related with forms of payment, some type of price forecast and the conditions of delivery and quality, but do not offer guarantees on the amount to be paid.

Considering the speech by producer¹⁵, on Table 4, and the majority of the producer's perspective, it is possible to infer that the presence of these informal agreements may be associated with a condition of bilateral dependence between milk producers and processors, created by the regulations and by asset specificity. According to NI 76 and 77 (Brasil, 2018a, 2018b), refrigerated raw milk must be processed in industries, respecting the quality standards defined by the law, before being sold in final distribution. Therefore, the regulation restricts this only alternative and unless the producer distributes the milk in an informal market, the processors will always be an intermediary agent before the final consumer.

Further, as Barzel (2005) already indicated, the fact that processors analyze quality standards, but not all of them value these standards, in the price given to the producer, is characterized as a situation in which the risk of value appropriation is greater on the producer's side, since he does not measure and only receives the price at the payment. As Williamson (1991) argues, this configuration may indicate characteristics of negotiations in market, whose main objective is to define the monthly price paid to the producer. However, transaction recurrence between the same agents and the use of informal agreements in the dairy AGS enable coordination through hybrid structures from TCE perspective, considering a stronger correlation than in the market.

Therefore, ratifying Acosta et al. (2018) and Sudré et al. (2020), this article shows that hybrid governance structure, based on the use of informal agreements and combined with some market characteristic, is adopted to coordinate transaction between dairy producers and processors in Paraná. To TCE, according to Williamson (1991), hybrid structure is justified in this transaction by the degree of environmental uncertainties in the way it provides greater control than the market, but is still more flexible than vertical integration to adapt to disturbances. Thus, in the case of these respondents, the hybrid structure can offer greater protection than the market, better coordinated adaptation, absence of bureaucratic costs, but still have a lower power of control than the hierarchy, ratifying Williamson (1991). Table 4 summarizes the highlights identified in the interviewees.

Table 4 – Interview highlights according to analysis categories.

Respondents	Region in Paraná	Highlights	Analysis Categories
Processor 3	Central North	"Influences: road conditions must provide access to collection even on rainy days"	Transaction attributes
Producer 13	South-west	"I think the biggest mistake we have is that we deliver practically 45 days of our production to find out how much will be earned. So, we are in their hands."	
Processor 2	Central North	"Most of them are drawer contracts, but the dairy honors what it promised and demands from the producer as well."	Governance Structure
Producer 15	West	"Unfortunately, this is our problem with milk, we never have a guarantee, right. What the dairy wants to pay, it pays. It doesn't change much because it's another region, we're in their hands, when they want, they pay well."	
Processor 4	Northwest	"We have a relationship of 30 years or more. It makes it easier at the time of negotiation, because the producer puts it on the scale. And also we, when it comes to exhibiting for the direction, we also put this in, so as not to lose a loyal producer, who has always been with us. And the producer also thinks a lot about leaving out."	Guarantee Mechanisms
Producer 5	Northwest	"I never insisted on that, because as they don't pay for quantity and quality, it doesn't matter because they don't value the quality of the milk. They don't look at anything, they pick it up and take it away. I think the milk is in good quality, because if it was bad they would pay even less."	

Source: the authors based on the research data.

Table 4 – Continued...

Respondents	Region in Paraná	Highlights	Analysis Categories
Producer 11	Northwest	"There's not a lot of negotiation because we usually accept it, there's no conversation. They pass and we accept. In recent years we gave up, because there is no opening."	Transaction Costs
Processor 9	West	"Usually they accept it, because as we pay according to the establishments nearby, there is not a big discrepancy. They see that there's not much difference, so it's not much of a problem."	

Source: the authors based on the research data.

Finally, it is important to emphasize that although the hybrid structure is an available alternative to coordinate the transaction between agents, given the degree of uncertainty present in the activity, the absence of formal contracts can generate greater risks of value appropriation by one of the transaction sides. Such risks can be observed considering the availability of information and the guarantee mechanisms present in the transaction in addition to the governance structure. Those factors are presented below in accordance with MCE concepts.

4.2. Guarantee Mechanisms

As required by normative instructions 76 and 77, measurement is mandatory in all transactions, regardless of the property size, the daily volume or even the long-term relation established between the agents. Unlike what has been defined by Barzel (2005), even if agents benefit from long-term relation, in the dairy AGS this guarantee mechanism is not responsible for reducing measurement costs because milk analysis must always occur in order to guarantee the quality standard distributed to the final consumer.

In addition, it is observed that, even though those NI were updated in 2018 and made effective in 2019, they do not interfere with the choice of governance structures when considering TCE parameters, since they did not involve an increase in asset specificity, which remained at a medium level in this study. However, NI's remain as a guarantee mechanism under MCE perspective, since they establish quality standards and provide parameters that work as a basis for improvements in operations, negotiation and value protection, for both producers and processors.

In most cases, only the processor carries out the measurement and passes the information to the producer. The context of information asymmetry discussed in Barzel (2005) is identified in this AGS considering that while producers 2 and 5 do not receive information about the analyses that buyer 6 performs, all others receive the analysis reports monthly, at the time of payment, but they do not carry out their analysis. Furthermore, as Barzel (2005) argues, agents need both information about assets and information about the terms on which they will be traded. In this case, even though the transfer of information about the dimensions defined by the normative instructions exists, information asymmetry is related to the fact that most of the interviewed producers do not know the price to be paid during the negotiation.

In general, measurement and transfer of information are present in transactions in this AGS. However, as it is performed only by the processor, it is difficult to protect property rights, making the producer dependent, with less bargaining power, and having to accept the price. In this situation, according to MCE, the risk of value appropriation, even in the presence of information, is greater for the producers, who need guarantees to protect themselves ex ante transaction.

In general, all interviewees are looking for long-term relationships and avoid replacing buyers/sellers, since this happens only in search of better prices and negotiation conditions, as can

be seen in the speech by processor 4, in Table 4. From producers' side, it was observed that most of them establish a medium to long-term relationship with their buyers, with more than six years of relationship - except for producer 9, who had only been with his current buyer for three months. In particular, it is highlighted that producers 14, 17 and 18 establish an even longer relationship, between 20 and 30 years with the same buyer. Regarding processors, it was considered that all of them have a medium to long-term relationship with their producers, with emphasis on processors 3, 4 and 8, which maintain a relationship of 30 to 40 years with some of their milk suppliers.

Thus, both sides (producers and processors) declared they spend resources to find potential buyers and sellers, to describe the assets transacted and to define the contractual terms, as Barzel (1985) already described. In this search for value protection, as alternatives, agents invest mainly in long-term relations, so that most producers have a relationship of two to six years with processors. However, as highlighted by producer 13, although this condition is considered, it does not directly influence the price to be paid because there is no standard minimum value and even with the long-term relation, the price can still be reduced, depending on the quality and on the market average prices. Long-term relationships, in turn, positively influence gains in terms of predictability and mitigation of uncertainties, although agents still spend resources to better deal with informational problems.

Agreements can function as promises between agents, as is expected to happen in long-term relations, according to Barzel (2005). In this case, the producers offer promises that the milk will be in the expected quality and the processors offer promises of better prices and payment within the established period. However, these agreements are informal and do not guarantee value protection, as the price of milk is only informed at the payment and not established before the transaction. Furthermore, although the theory states that the long-term relation reduces measurement costs, in the dairy AGS this is also not confirmed, given the requirement established by normative instructions 76 and 77 (Brasil, 2018a, 2018b).

Thus, in search for value protection agents use what Barzel (2005) calls multiple enforcers, namely: a. long-term relation and reputation investments; b. contractual relations, although they are tacit contracts and there are difficulties in obtaining guarantees from the state, they still offer some kind of permanence in transaction; c. *Conseleite Paraná*, which provides a price parameter and access to information; d. normative instructions and legal apparatus (NI 76 and 77), determining a quality standard to be followed in milk and providing rights and duties to both transaction sides.

In addition, even though in the dairy AGS in Paraná, legal rights are exercised by normative instructions and by legal apparatus, ratifying the importance of the macro-institutional environment characterized by NIE, these concern only the standardized milk quality attributes and not ensure that the payment will be based on this observed quality, as it is shown with the speech by producer 5, on Table 4. Thus, in the absence of formal contracts and information, the attributes not specified in contract are located on the economic rights side, as it can be seen in the model proposed in Figure 5, adapted from Ito & Zylbersztajn (2016).

Through Figure 6, it is observed that in the absence of a formal contract and given the dependence of producers on the information that the processor provides, the risk of value appropriation by economic rights is greater for producers. In this case, the main generator of doubts at the time of the transaction between the producers and processors interviewed in the study is what is embedded in the amount to be paid. In this AGS, according to the terms proposed by Barzel (2005), formal contract is important because it restricts value appropriation attempts, reduces costs for investment in reputational capital and reduces additional costs for value protection.

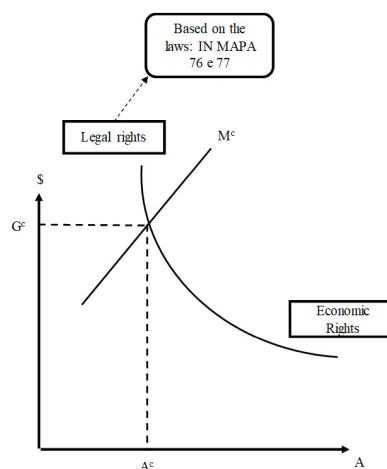


Figure 6 – Contract power in the dairy AGS in Paraná.
Source: adapted from Ito & Zylbersztajn (2016, p. 9).

As Barzel (2005) highlights and is identified by the interviews, it can be inferred that in the dairy AGS, value distribution is impaired because producers partially receive the value of the asset since not all processors pay for quality, even though they all value and look for attributes such as volume, fat and protein. Ultimately, the search for economic right can generate ex post transaction costs, which may increase as agents need to renegotiate according to the price paid, influencing the efficiency of transaction.

4.3. Transaction Costs

In general, considering the transaction costs present in the negotiation between producers and milk processors, these costs may be associated with the search for new negotiations, the producer's search for a better price, as well as frequent adjustments in this amount, in addition to costs associated with measuring and information asymmetry between agents. These costs are observed by both sides, however, they can lead to greater loss of value on the producer's side, depending on the guarantees present. Figure 7 summarizes the key information described so far and assists in discussions of efficiency.

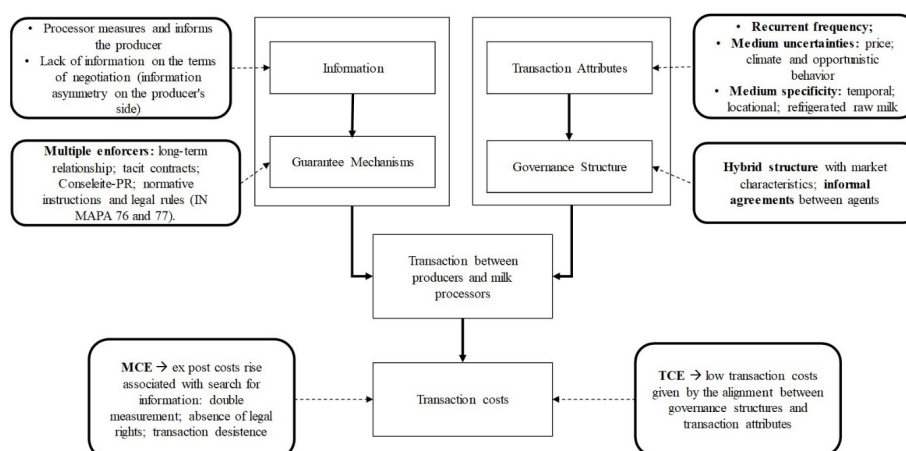


Figure 7 – Analysis model: transactions in the dairy AGS in Paraná from TCE and MCE view.
Source: the authors based on the research data.

For the majority of producers, renegotiations are infrequent, being made at the time of contracting and small monthly negotiations on the price to be paid. It is observed, on the other hand, that the absence of renegotiation between agents is not only due to the alignment between transaction attributes and governance structures, as Williamson (1985) proposes. On the producers' side, as a consequence of the dependence between agents, the absence of negotiation is due to the lack of the processor's openness, the lack of formal and better guaranteed contracts, or even because some producers give up on the negotiation and just accept the price, as producer 11 and processor 9 highlight, on Table 4.

Given this, it is considered that even if the negotiation between the producers and processors interviewed is not costly and the agents get better protection in hybrid structures than in the market, as expected by Williamson's (1985) definitions, there is still room for opportunistic behavior. Since, in this AGS, the transaction is surrounded by uncertainties, medium level of asset specificity and bilateral dependence, factors that can increase the risks of opportunistic behavior in the absence of information and legal rights, as provided by Barzel (1985).

Thus, considering the discussions of efficiency through TCE and MCE perspectives, it is observed that, if on the one hand the hybrid governance structure, as identified by this study and by previous studies, may be the most appropriate to adapt to frequent environmental disturbances (as proposed by TCE). On the other hand, considering value protection and the guarantee of economic rights in MCE orientation, some observations should be considered.

Analyzing the alignment between transaction attributes and governance structures in terms proposed by Williamson (1991), based on the interviews in this AGS, it is possible to infer that this takes place according to what the theory defines, as shown in Figure 8. The hybrid structure is justified by the medium level of asset specificity "k1", for presenting only locational and temporal specificities and for being commercialized raw milk refrigerated, which is standard for all producers and processors. Even so, this hybrid structure is closer to coordination via market, as mentioned above, and away from vertical integration. This structure is considered to be in line with the level of uncertainties, also considered medium because they relate to uncertainties about price, climate and opportunistic behavior reduced by the existence of normative instructions, and because the price is given by the market in almost all cases.

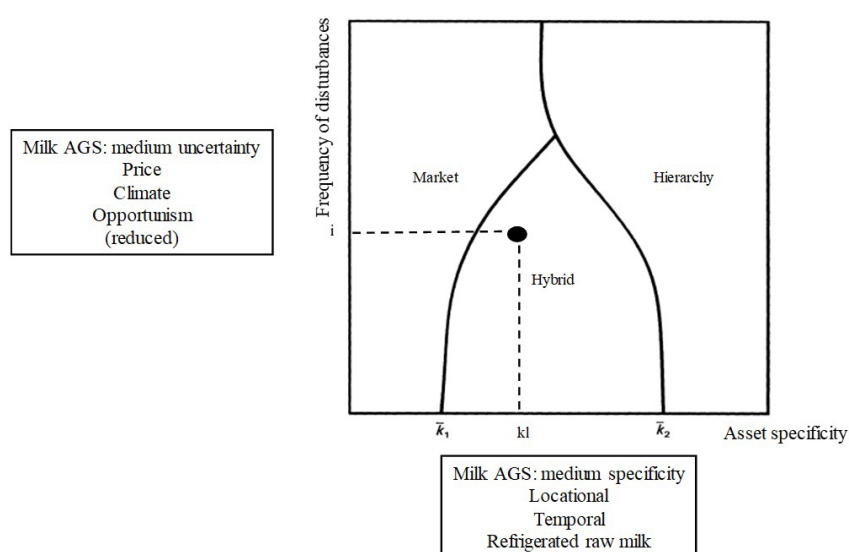


Figure 8 – Governance structures in the dairy AGS in Paraná according to uncertainties.

Source: adapted from Williamson (1991, p. 292).

On the other hand, as Williamson indicated in 2002, on the way to efficiency, the governance structure must also contribute to create order, mitigate conflicts and distribute gains. In the dairy AGS in Paraná, it is observed that in the absence of a standard minimum price and formal contracts, even with an alignment between governance structure and transaction attributes, the order is not easily established, conflicts are present when looking for better prices and earnings are not consistently distributed between the agents. It is justified by observing that, as secondary data present and the respondents confirm, there has been a frequent exit of small producers from the dairy activity in Paraná. For the processors, this output of small producers is offset by increased productivity in larger and more professionalized properties. Even so, this drop in the number of producers may be associated with the difficulties they face in reinvesting in the activity, which may be indicative of quasi-rents appropriation, given the losses in ex post trading.

This difficulty producers face to reinvest in the activity can also be related to problems in value distribution in a context in which the producer needs to accept the value given by the processor. Furthermore, in the absence of a formal contract, a standard minimum price and other guarantee mechanisms, in addition to those already presented, the producer becomes more exposed to risks of value appropriation. This situation indicates inefficiency of transaction from MCE perspective, considering that, as Barzel (2005) conceptualizes, transaction costs are the costs arising from the agents' efforts to guarantee economic rights.

Thus, when transaction costs are observed as a function of measurement in the dairy AGS in Paraná, it is understood that, even with the alignment proposed by TCE, these costs can still rise as agents seek the protection of economic rights, in a context of bilateral dependence and information asymmetry. In search for value protection, it was identified that the agents of this AGS resort to double measurement in some cases, to normative instructions as the only source of information guaranteed by legal right, or at the limit they give up transaction due to lack of information and trust by producers and processors.

As a result, the hybrid structures considered efficient by Williamson's (1991) models may present inefficiencies when considering the interdependencies between TCE and MCE concepts. In the dairy AGS, these inefficiencies are justified considering that only agreements and partnership are not sufficient to protect the producer's value, as Barzel (2005) already indicates in his theory. Thus, agents need other guarantee mechanisms, combining informal agreement with long-term relations, the support of *Conseleite Paraná*, normative instructions and legal apparatus in an attempt to achieve value distribution to both transaction sides.

In Figure 9, adapted from Souza & Bánkuti (2012), it is proposed that the transaction between the dairy AGS producers and processors in Paraná is coordinated by informal agreements (node D), surrounded by contractual safeguards and measurement is present. In this AGS, safeguards are based on the definitions of normative instructions 76 and 77, functioning as a standard to be followed and offering guarantees to the producer that the milk will be evaluated according to this standard and enabling rights to the processor to analyze the quality of the milk. However, unlike what has been defined in Barzel (2005) and Souza & Bánkuti (2012), in the empirical field, the transaction is coordinated through informal agreements, which offer less protection against loss of value.

Furthermore, considering the combination of asset specificity and measurement costs, as proposed by Zylbersztajn (2018), it can be inferred that both TCE and MCE indicate the need for the transaction in this AGS to be coordinated through vertical integration. In other words, it is justified according to asset specificity and also because measurement is costly, although feasible, considering that only the processor performs the quality analyzes and that information about the terms of the negotiation is absent. However, in this AGS the coordination is through external contracts, enforced by normative instructions and supported by guarantee

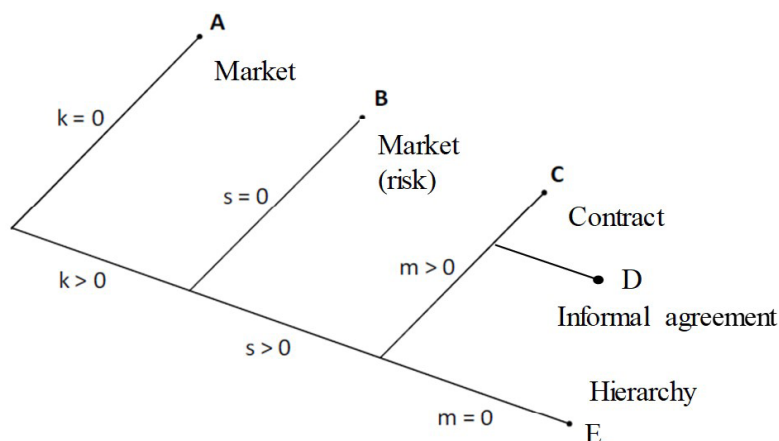


Figure 9 – Contractual scheme for the dairy AGS in Paraná considering TCE and MCE.

Source: adapted from Souza & Bánkuti (2012, p. 87).

mechanisms (multiple enforcers), justified by the medium asset specificity and by the fact that the measurement is possible, even if it is costly.

For this reason, the hybrid structure is justified by the alignment with transaction attributes from TCE perspective, but it still needs guarantee mechanisms for the agents to achieve better value distribution through measurement from MCE perspective. Thus, even if the theories agree on the choice of governance structures, the interdependencies between them reinforces the importance of information in the transaction, as Barzel (2005) already predicted. According to the author, in situations where access to information is costly on one side of the transaction, agents have, as alternatives, to increase the standardization of traded assets or establish prices according to the quality offered by the product, which does not happen in most of the cases identified by this study.

Therefore, it is understood that the choice of governance structures and the search for value protection in the dairy AGS in Paraná may involve higher transaction costs because, as Barzel (2005) already predicted, in the absence of information and formal contracts, the costs rise. In other words, in addition to uncertainties and asset specificity, information asymmetry between agents and the absence of a minimum standard price, formed from the quality to be used as a basis for negotiations, are considered. Ratifying the proposition of the study, it is considered that, although the alignment between attributes and governance structures can contribute to the protection against opportunistic behavior, as proposed by TCE, this is still not enough to guarantee economic rights on both sides of the transaction, as noted in MCE.

Likewise, through the data presented and based on studies of complementarity between TCE and MCE, it can be concluded that such problems are still associated with bilateral dependence between agents. In this case, the producer becomes more dependent on the processor, needing to accept the price given through market analysis, without considering the quality of the milk captured. Therefore, it can be inferred that, as Barzel (2005) proposes, the dairy AGS producers and processors in Paraná resort to ex ante guarantee mechanisms to control ex post costs, arising from the absence of contracts and information during the negotiation.

Finally, even though in the processors' view the high output of small producers from the activity is offset by the increased productivity of larger producers, this may contribute to a scenario of concentration of income and production only in large properties. Such concentration is harmful because it can generate losses for the processor itself, contributing to intensifying a situation of dependence on one side of the transaction and not interdependence between agents, opening even more space for opportunistic behavior, higher transaction costs and the emergence of

new competitors in the market. This configuration confirms what Jank et al. already predicted in 1999, stating that the low performance of a certain segment can compromise the results of the system as a whole, justifying the deepening of this phenomenon observed in the study.

5. Conclusions

This article aimed to understand how governance structures and the search for value protection influence transaction costs in the relationship between dairy producers and processors in Paraná. To achieve this objective, in the study it is observed that in search for value protection, the hybrid governance structure based on informal agreements manages to adapt to environmental uncertainties, yet it is not sufficient to protect the economic rights of the agents. Thus, in the absence of formal contracts to guarantee a minimum standard price to be paid for milk and the availability of information in the transaction, agents become exposed to higher measurement costs. These costs arise from the agents' effort to protect value, especially for producers to negotiate in search for better prices for higher-quality milk, formalized information and guarantees that the agreed price will be fair for both sides of the transaction.

For this reason, it was considered that, if the hybrid structure can be efficient when only its alignment with transaction attributes through TCE is observed, it can still present inefficiencies and considerations on MCE. Considering measurement and availability of information on the dairy AGS in Paraná, this study demonstrated that although the hybrid structure is able to reduce transaction costs according to the alignment proposed by TCE, measurement costs arise due to agents' efforts to protect property rights. Therefore, the absence of legal rights can lead to withdrawal of producers from continuing in the transaction with the same processor, or even at the limit to the departure of a significant portion of small producers from the dairy activity.

In summary, as theoretical implications, it is observed that transaction costs by TCE and MCE are configured in different ways in this AGS. To TCE, transaction costs justify the hybrid structure due to the alignment with transaction attributes. To MCE, it is suggested that the transaction in the dairy AGS can be costlier, given that the information is necessary to protect economic rights. Thus, it is supposed that even if the hybrid structure, in TCE, is adequate due to the alignment with transaction attributes, MCE can explain why even in this structure, agents still need guarantee mechanisms. These mechanisms are long-term relation, normative instructions, informal agreements and legal apparatus in an attempt to protect value, given the information problems.

Moreover, as empirical implications, the study showed that producers become more dependent from processors in terms of information sharing. This situation can influence transaction costs (specially measurement costs to protect economic rights) associated with value appropriation by processor, who may have more advantages in transaction. Because they do not have formal contracts and because the price of the milk is mostly given only by market analysis, many producers face difficulties in negotiating. These, in turn, are exemplified as problems to negotiate for better quality prices, to reinvest in the property and to ensure that they are receiving a fair value according to the quality of the milk offered.

It is noteworthy that this study focused on the coordination of transactions at the micro institutional level – governance and guarantee mechanisms in transactions. Even so, it is observed that the macro institutional environment, portrayed here by the regulation of NI 76 and 77, is relevant as a guarantee mechanism, providing parameters for milk quality. Data do not support the statement that such normative instructions influence changes in governance

structures, since milk quality parameters, in effect since 2019, only give greater reliability to the measurement process and change the milk classification – in relation to the former regulation - NI 51/2002 (Brasil, 2002); nevertheless, they do not imply an increase in asset specificity, which remains at medium level in the cases studied. In addition, the hybrid governance structure, with the use of informal contracts between agents, has been present in this AGS for years and has been maintained even after the change in current regulations. Thus, new studies are suggested, to evaluate, at a macro institutional level, the influence of NI 76 and 77 on shifts in governance structures in dairy AGS in Paraná, before and after their update and effect.

Finally, as limitations, conducting interviews remotely due to the conditions imposed by the COVID-19 pandemic limited the possibility to in-depth interviews and also hindered access to micro and small producers, in addition to the difficulty of accessing medium and large producers from other regions in Paraná. For future studies, researchers can: a. identify how the measurement process and information sharing can be improved to guarantee value protection to milk producers and processors; b. discuss the efficiency in the use of formal and informal contracts, considering opportunism and the risk of value appropriation, based on discrete comparative analysis; c. discuss the impacts of informality in the dairy AGS; d. discuss the impact of NI 76 and NI 77 on the governance structures before and after their update and effect.

Acknowledgements

This work was carried out with the support of CAPES, *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* – Brazil, which we would like to thank. We would also like to thank the Academic Writing Center (*Centro de Escrita Acadêmica*, CEA) of the State University of Maringá (UEM) for assistance with developmental editing.

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Received: September 09, 2022

Accepted: February 25, 2023

JEL Classification: B15; D23; K1; Q10.