Collaborative Relationship Analysis Between Dairy Farmers and Dairy Processing

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ABSTRACT: This exploratory and descriptive study tested one application of the IMP Interaction Model developed by the International Marketing and Purchasing Group (IMP Group) researchers. The sample with 83 dairy farmers and 28 respondents from milk processing companies revealed, with a statistical significance level of 0.05, that geographical concentration and information exchange (technical and administrative) constructs contribute for buyers and sellers collaborative relationship. This result leads to conclude that logistics systems and the adoption of both process and information technologies are essential for Brazilian milk production chain competitiveness. In addition, IMP Interaction Model has been proved to be efficient in showing the main constructs contribution for development and maintenance of collaborative relationships between buyers and sellers.

Keywords: *Collaborative relationship, Supply Chain Management, Dairy Farmers, Dairy Processing, Interaction Model, IMP Group.*

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1. INTRODUCTION

With increasing competition, collaborative relationships between business buyers and sellers have become an important strategic and organizational research topic (Ford et al., 2003; Anderson and Narus, 1990; Dyer and Singh, 1998). According to Rocha and Luce (2006), these studies are characterized by their competitive environment dynamic nature (Teece et al. 1997; Handfields and Nichols, 1999; Barney and Hesterly, 2004, Brown et al., 2006; Dyer and Singh, 1998) and long-term perspective to ensure that investment and systems integration are economically viable (Cooper and Ellram, 1993) and, by value creation competition (Brandenburger and Nalebuff, 1996).

Among many theoretical efforts to understand the complex relationship between buyers and sellers, the IMP Interaction Model developed by IMP Group's researchers has emerged as the most appropriate instrument to address the relationship between buyer and seller (Metcalf et al., 1992).

Within this context, it became opportune to explore the IMP Interaction Model constructs and indicators. Therefore this study has the following research question: Under the perspective of dyadic relationship (Anderson et al. 1994; Harland, 1996) and considering the milk production chain, are managers from rural producers and processing companies at fresh milk business in Brazil, collaborating in some kind of Collaborative Relationship Model? The research objective was to test the IMP Interaction Model (IMP Group, 1982, Metcalf et al., 1992) efficiency, after proper adaptation to the Brazilian context, and thereby to promote academic and scientific advances into Administration field.

The milk's production chain research choice of was due to its high capacity to create new jobs and income for rural population, as well as for the milk nutritional role in a developing country. According to Embrapa (2012a), Brazil has more than one million and one hundred thousand dairy farmers and has been creating 3.6 million rural employments. The Brazilian dairy agribusiness accounts for 40% of the jobs in rural areas. The Brazilian milk production, in 2009, occupied the fifth position as the largest international producer with revenues of approximately R$ 29 billion of reais. The U.S. is the world's largest milk producer (Embrapa, 2012b). Moreover, the Brazilian economy openness to foreign trade, since the 1990's, has pressed the milk's production chain to manufacture products with higher quality at lower costs.

This article is structured as follows: the next section presents the conceptual framework and discusses collaboration relationship model aspects and rationale for further theoretical and empirical analysis. Section 3 presents methodology. Sections 4 and 5 show results and discuss them. Section 6 describes the main conclusions and research contributions, and presents suggestions for further studies.

2. CONCEPTUAL FRAMEWORK AND HYPOTHESIS

In manufacturing companies, products and technology systems are important factors to determine the nature of the relationship between buyers and sellers. In general, sales and purchase managers in industrial environment emphasize collaborative relationships to obtain benefits, such as improved quality and reduced costs. These benefits are achieved through adaptations and specific investments in supplier companies to meet particular product buyer requirements (Ford, 1984).

In order to better understand collaboration and its relationship with the adaptations to allow buyers and sellers companies obtain benefits (in quality and costs), the IMP Interaction Model developed by researchers IMP Group (1982) has identified four constructs (or latent variables): product or service, information exchange, financial exchange and social exchange. However, the financial exchange construct was not operatationalized by the IMP Interaction Model (IMP Group, 1982; Metcalf et al., 1992), since it permeates all other constructs.

Nevertheless, the Brazilian basins of rural milk consist of producing companies with different sizes and technological capabilities. Additionally they are often geographically distant from processing companies (Consoli and Neves, 2006). Geographical concentration between business buyers and sellers is an important issue in logistics systems (Christopher, 1999; Dornier et al. 2000; Novaes, 2001). Furthermore, studies such as Squire et al. (2009) and Lee (2000) show geographical concentration's importance in the relationship between buyers and sellers, supporting the inclusion of the geographical concentration construct in the IMP Interaction Model (IMP Group,1982).

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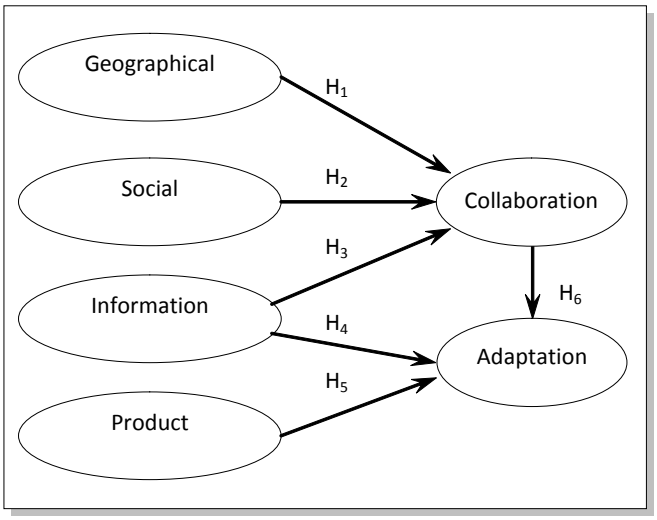
Thus, in this study, a new construct was included in the model: Geographical concentration. The proposed Collaborative Relationship Model and its effect on Adaptation are shown in Figure 1. These processes routinized can trigger a series of rules and responsibilities between buyers and sellers, which, in turn, can result in adaptation (or investments).

Figure 1: Collaborative Relationship Model - Adapted from Interaction Model (IMP Group, 1982)
Source: Metcalf et al. (1992)



The main theoretical foundations that support constructs and logic relationship between constructs and the established hypotheses are presented in the following pages.

Geographical Concentration and Collaboration

For industrial or processing companies geographical concentration, of their suppliers and consumers (Novaes, 2001), is an important element of process production. It imposes an intrinsic value-added to the product. Adding more value is obtained when the product is subjected to various stages of production process, until you reach the end consumer. Additionally, sales companies positioned in geographically distant locations can have their operation limited to regional cultural environments, with different process technologies and work rules (Ford, 1984; Dornier et al., 2000).

Buyers and sellers geographical concentration helps to reduce sales cost (Kotler, 2000). However, factors related to industrial policies, environment preservation and land prices can generate an opposite effect, ie, dispersion.

One effective and efficient logistics system may eliminate unnecessary time and costs from the production process, and add place value (local delivery), time value (delivery speed), quality (as the product specification) and information (related to the product traceability) to the buyer (Novaes, 2001).

Collaborative relationship between buyers and sellers can contribute to lower logistics costs and add value to supply chain member companies (Lee, 2000), thus creating benefits for all partners (Jap, 2001). Thus, it is expected that:

H1: The geographical concentration is positively related to collaboration relationship between buyers and sellers.

Social Exchange and Collaboration

Collaboration, according to IMP Group (1982), is a product of the contact or existing social ties between buyer and seller. Social exchange can be defined as a group of agents (individuals or organizations) linked by a set of social relationships such as friendships and affiliations to overcome communication barriers (Gulati, 1998).

In daily contacts, business members can solidify personal relationships and friendships. Companies with social ties with its partners can reduce uncertainties, solve short term problems more easily and, consequently, have a higher chance to develop long-term collaborative relationships. Social ties are not easy to be copied by competitors, due to the obstacles and the long time required in the social development ties process (Lovelock and Wirtz, 2006).

The interaction process degree involved in trade between seller and buyer can generate collaboration. Cannon and Perreault (1999) relate collaboration process with the extent to which both parts work together to achieve a common goal. Collaboration may include some flexible rules, in accordance with the other party, about the company's focus on achieving individual goals, in order to preserve the business relationship (MacNeil, 1980).

In general, many sales and purchases are not formalized or follow legal criteria. Relationships are based on mutual trust. Building trust is a social process and is based on personal experience (Ford et al., 2003). Thus, it is expected that:

H2: The social exchange is positively related to collaboration relationship between buyers and sellers

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Information Exchange and Collabor

Various information content aspects are involved in the relationships between buyers and sellers. Technical, commercial and economic information and organizational issues dominate information exchanges. Information can be communicated between the parties by electronic means, such as: Electronic Data Interchange (EDI), Efficient Consumer Response (ECR), Vendor Managed Inventory (VMI), or by personal communication channels, such as: electronic mail (email) or phone (Chopra and Meindl, 2003).

Constant exchange of technical and commercial information often creates trust between both parties, thus leading to improve collaboration between them (Morgan and Hunt, 1994). In recent years, relationships between buyers and sellers has changed from unpleasant to close and friendly (Kotler, 2000), although it is not a common sense that collaboration would be considered important for competitiveness. In many companies still remains the prevailing idea that buyers and sellers should keep distance from each other and concentrate in doing business individually (Brown et al. 2006; Barney and Hesterly, 2004, Dyer and Singh, 1998).

IMP Group (1982) supports that information exchange formalization is important. The degree of formality depends on the businesses characteristics and size and may affect the interaction process nature and relationship as a whole. Thus it is expected that:

H3: The information exchange is positively related to collaboration relationship between buyers and sellers.

Information Exchange and Adaptation

Technical and commercial information exchange help in creating a collaboration environment, such as product development and production plans between buying and selling companies (IMP Group, 1982). Simchi-Levi et al. (2003) reported that technology systems investments, that enable companies to share information, can reduce the inventory, improving the forecast accuracy and decreasing stored items facilities, as well as to reduce product costs.

However, according to the Institutional Isomorphism Theory (DiMaggio and Powell, 1983), in some cases, companies do not necessarily invest in business models to explore new opportunities; in electronic tools to integrate and improve communication channels or in managerial skills training and process technologies to improve quality and reduce costs, because these are better or more efficient, but because adopting them becomes a key factor for obtaining legitimacy in a productive sector. According to this theory, a company that does not incorporate some administration tools, at least superficially and in a ceremonial manner, will be considered outdated and may lose customers (Motta and Vasconcellos, 2002). Thus, one would expect:

H4: The information exchange is positively related to buyers and sellers willingness to make adaptations (or investments).

Product Importance and Adaptation

In industrial companies, product is the main element in exchange. As a result, product characteristics are significant in the relationship between buyers and sellers. Companies such as Volkswagen spend more than 50% of its sales in procurement activities (Hender and Heizer, 1999). In order to reduce the supply uncertainty, enterprises with a high percentage spent on purchases focused on a smaller number of suppliers, made adjustments (or investments) in exchange information integrated systems and managed training in purchasing and sellers companies (Chen et al., 2004).

Adaptation (or investments) of specific assets depends on the characteristics, standardization, complexity and product importance perceived by buyers and sellers to improve the joint competitive advantage (Metcalf et al., 1992).

In this sense, the relational view, suggested by Dyer and Singh (1998), has connections or integration between companies as the central point to the competitiveness (Anderson et al. 1994; Harland, 1996). For Dyer and Singh (1998). Competitiveness can be obtained when buying and selling companies invest in specific assets, exchange knowledge, combine resources and use informal mechanisms based on trust, collaboration and commitment. Thus, it is expected that:

H5: The product importance is positively related to buyers and sellers willingness to make adaptation (or investments) in assets and managerial training.

Collaboration and Adaptation

Adaptation (or investments) in the assets form or managerial capabilities are easier decisions to be made if there is collaboration between buyers and

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sellers (IMP Group, 1982). Collaboration facilitates between different integration processes, reduces financial risks of investing in production and, consequently, increases the competitiveness improving chances for success (Dyer, 1996). Collaboration is often seen as a pre-condition for investment in actitivities that consider critical long-term aspects for wich and it is difficult to predict costs, revenues and market behavior.

With increasing competition between groups or chains of companies rather than between individual companies (Handfield and Nichols, 1999), collaboration has emerged as an important element in competitiveness (Dyer and Singh, 1998; Ford et al. 2003) for process integration between buyers and sellers.

Buyers and sellers which collaborate can: create task forces to solve specific problems, set up working groups to design a new product or allow the seller to use the acquiring company research facilities. Such joint activities represent substantial gains in quality and cost savings for both partners. Thus, it is expected that:

H6: The collaboration is positively related to buyers and sellers willingness to make adaptation (or investments) in assets.

3. METHODOLOGY

To operationalize the collaborative relationship model shown in Figure 1, initially, an exploratory and descriptive study was made in order to understand more deeply the collaborative relationship model structure between dairy farmers and dairy milk producers. To do so, from the scales and measures used by the IMP Interaction Model (IMP Group, 1982; Metcalf et al., 1992) it was developed an interview roadmap or guide which was applied in four dairy processing companies and two milk producers, having purchasing managers and farmers as respondents, respectively.

This preliminary study results provided the basis for the first version of the data collection instrument (questionnaire). This first version was submitted to a pre-test, along with two other respondents of different processing companies and two dairy farmers. After a series of changes, a questionnaire composed of 10 blocks was defined. The first and second blocks referred to the company's data and respondent. Blocks 3 to 8, composed of 39 indicators (or measures) referred to the constructs: Geographical concentration with four indicators, Information Exchange with seven indicators, Social Exchange with seven indicators, Product Importance with six indicators, Collaboration with nine indicators, and Adaptation with six indicators. In these blocks, the respondent was asked to mark with an 'x' in the assertive in accordance with their degree of agreement on a scale ranging from Strongly Disagree (DT = 1) to strongly Agree (CT = 6). Finally, blocks 9 and 10 referred to the supplementary information and the distance in km from the processing company and farmers and communication information between milk mills and producers.

Afterwards a sample, composed by four major milk processors was selected by accessibility. Respondents with technical and management roles from different plants were chosen. These four processors had plants located in various districts of the São Paulo State. Based on recommendation of these milk processors, farmers were chosen as respondents, who were also located in the milk basins or under their sphere of influence.

For data analysis, a structural equation modeling technique was used to assess the hypothesized relationships between the latent variables (or constructs): geographical concentration, information exchange, social exchange, product importance, collaboration and adaptation.

Partial Least Squares Path Modeling (PLS-PM) was used as an estimator of structural equation modeling. The PLS-PM has the following characteristics: estimation is based on Partial Least Squares; allows the use of small samples (Smith and Langfield-Smith, 2004), assumes normal distribution and the use of interval scales (Jöreskog and Wold, 1982), is able to include reflective and formative measures indicators simultaneously and is more recommended for prediction than explanation. The relative strengths between variables can be inferred by the factor loadings.The model measurement can be obtained by GoF (Goodness-of-Fit) indices, defined as the geometric mean of the average communality and average R2 (coefficient of determination) [GoF = √((Communality) x (R^2))], as suggested by Tenenhaus et al. (2005) and Hair et al. (2005), respectively.

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4. RESULTS

During the 2010 year, a sample of 122 questionnaires or respondents was obtained. Of this total, due to filling problems, 11 were excluded, leaving 111 questionnaires fit to be used, of which 28 from milk processing companies and 83 from farmers.

4.1 SAMPLE DEMOGRAPHIC PROFILE

The sample represented by 111 respondents exhibited the following demographic profile:

a) processing companies: 75% of companies were considered large and processed between 1.5 million and 6 million liters of milk a day, 25% were considered medium-sized and processed an average of 200 thousand liters of milk a day, 89.3% of respondents were male, 37.7% of respondents were between 41 and 50 years old and 17.9% more than 50 years old, and 92.9% are higher educated.

b) dairy farmers: 36.6% of respondents produced 200 liters of milk a day, 30.1% from 201 to 500 liters of milk a day and 32.5% produced above 500 liters of milk a day; 92.8% of respondents were owners, 62.7% had milk production as the main economic activity, 91.6% were male, 50.6% were between 31 and 50 years old and 30.1 % more than 50 years old, 63.9% had only high school education.

c) geographical concentration between producer and the plant: 62.3% of respondents were located within 100 km, 21.7% between 101 and 120 km and 16% over 120 km away. For 82% of respondents, the average distance between the ideal processing company and producer was up to 100 km. The main communication means used between producers and processing companies were: telephone and personal visits in the first and second place, respectively. Other media such as internet, e-mail, letters and newsletters were also cited, but were considered infrequently answers.

4.2 MEASURES AND SCALES VALIDATION

To validate measurements and scales, the first step was the analysis of the data to make decisions on which factor loadings would be worth considering in the study. According to Hair et al. (2005), for a larger than 100 respondents sample, factor loadings greater than 0.50 are considered to have practical significance. Nevertheless, Hair et al. (2005) recommend that the load factor should exceed 0.7 for the factor chosen to explain 50% of the variance (Hair et al. 2005; Fornell and Laker, 1981).

Thus, items with factor loadings less than 0.5 were removed and the internal reliability, composite reliability and average variance extracted were recalculated. After several re-evaluation rounds, 17 items of 39 indicators were considered appropriated. Those indicators were distributed in four reflective constructs (or latent variables): geographical concentration, information exchange, product importance and collaboration, and the adaptation construct, as formative.

The social exchange construct was excluded from the revised model because of low internal reliability measured by Cronbach's alpha (value of 0.25), considered below acceptable, which is 0.6 (Hair et al., 2005). The adaptation construct, although the value of Cronbach's alpha were 0.51, after a careful model analysis, was considered acceptable, as it does not endanger the measures reliability.

The statistical results of these 17 indicators such as: mean, standard deviation, individual factor loading, squared loading, residual variance, α (Cronbach's alpha), AVE (Average Variance Expected) and CR (Composite Reliability) are shown in Table 1.

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Table 1 - Summary of conducted interviews

Construct	Scale Item	Mean	S.D.	Loading	Squared loading	Residual variance
Geographic Concentration α = 0,62 AVE = 0,72 CR = 0,84	GP1 Transportation costs represent an important factor in the decision to choose partners	3,89	1,72	0,89	0,79	0,21
	GP2 We have different procedures for partners who are close to my business	3,34	1,73	0,80	0,65	0,35
Information Exchange α = 0,89 AVE = 0,70 CR = 0,92	IE1 Information received from partners are easily understood	4,57	1,20	0,84	0,70	0,30
	IE2 The information sent by my partners are understood	4,53	1,23	0,88	0,77	0,23
	IE3 The existing communication channels meet the needs of my company	4,71	1,22	0,87	0,75	0,25
	IE4 The information exchange has improved over the last two years	4,79	1,17	0,74	0,54	0,46
	IE5 Contacts with my partners occur frequently enough	4,63	1,45	0,87	0,76	0,24
Collaboration α = 0,79 AVE = 0,55 CR = 0,86 R2 = 0,54	CO1 My partners always meet the goals of the proposed investment	4,18	1,27	0,76	0,58	0,42
	CO2 We have joint incentive procedures	4,50	1,39	0,63	0,39	0,61
	CO3 There is a joint manual of rules and conduct	4,47	1,82	0,72	0,52	0,48
	CO4 Our goals and objectives are shared with our partners	4,37	1,39	0,81	0,66	0,34
	CO5 There is sense of team among our employees and our partners employees	4,18	1,55	0,77	0,59	0,41
Product Importance α = 0,76 AVE = 0,81 CR = 0,89	PI1 The quality of milk is the most important variable in the relationship with my partner	4,89	1,24	0,87	0,76	0,24
	PI2 My company is rewarded for the quality of the milk it produces	4,39	1,50	0,92	0,85	0,15
Adaptation α = 0,51 AVE = 0,50 CR = 0,75 R2 = 0,41	AD1 I am willing to invest in my partner's equipment	4,25	1,25	0,65	0,43	0,57
	AD2 My partner has invested in equipment to improve our relationship	3,85	1,64	0,65	0,42	0,58
	AD3 My partner has invested in training to improve our relationship	4,32	1,65	0,80	0,64	0,36
$\overline{(AVE)} = 0,656$ $\overline{(R^2)} = 0,475$ GoF (Goodness-of-Fit) = $\sqrt{(0,656 \times 0,475)} = 0,558$						

Note: The questionnaire adopted the Likert scale from 1 to 6 (Strongly Agree to Strongly Disagree)
Source: Survey data

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In general, as can be seen from Table 1, most indicators had factor loadings above 0.7, except the following: CO2, AD1 and AD2, that presented factor loadings equal to 0.63, 0.65 and 0.65, reflecting 39%, 43% and 42% of explanation, respectively. Although these indicators are below 0.7, they have practical significance since they are superior to 0.5 (Hair et al., 2005).

Construct´s descriptive analysis, reliability and convergent and discriminant validation are described below.

a) in the construct descriptive analysis, respondents showed that information exchange fosters collaboration, since answers were consistent on the side of the scale. Considering geographical concentration and collaboration, respondents had a neutral perception or indifference. In terms of product importance, respondents indicated that product (milk), as well as technical and commercial information exchanges create a favorable environment for adaptation (or investments). Among various investments made by the partners, the most common were those related to technical and managerial training.

Therefore, most of respondents agreed that collaboration was important to support projects execution, involving investments in assets and training.

b) internal reliability items measured by the Cronbach's alpha (α) were larger than 0.6, except for adaptation construct, that reached 0.51, and below the recommended minimum level of 0.6 for exploratory research (Hair et al., 2005). Despite the unfavorable outcome, this construct was maintained due to the belief: i) that it would present a more favorable performance in subsequent analyses, ii) there would not be an ideal cutoff value that could arbitrate for any indicator conception (Hair et al., 2005; Pereira, 1999) and; iii) the exploratory research nature.

Thus, in general, indicators that formed the constructs were considered acceptable as a single factor (or one-dimensional).

c) in the convergent validity, as assessed by average variance extracted and composite reliability, all constructs scored above the recommended values of 0.5 and 0.7, respectively (Hair et al., 2005). The average variance extracted is a measure of convergent validity and reflects the overall amount of variance in the indicators explained by the latent construct, since the composite reliability is a measure appropriate to assess the construct internal indicators consistency. The composite reliability, as well as the Cronbach's alpha (α), determine the indicator adequately measure the construct (Hair et al., 2005).

d) the discriminant validity, measured by cross-loads, was observed in all cases, as the square roots of the average variance extracted were higher than the correlation between constructs, denoting that indicators were more strongly related with their respective constructs than with any other construct in the model (Tenenhauss et al., 2005). Table 2 shows the correlation values between constructs, and, in the diagonal, the square root of the average variance extracted.

After the validation of the indicators and constructs, model fit and statistical significance were analyzed.

Table 2: Correlation between constructs and the square root of the average variance extracted (diagonal)

CONSTRUCTOS	1	2	3	4	5
1. Adaptation	0,71				
2. Collaboration	0,57	0,74			
3. Geographical concentration	0,16	0,3	0,85		
4. Product Importance	0,4	0,61	0,19	0,90	
5. Information Exchange	0,6	0,68	0,01	0,54	0,84

Source: Survey data

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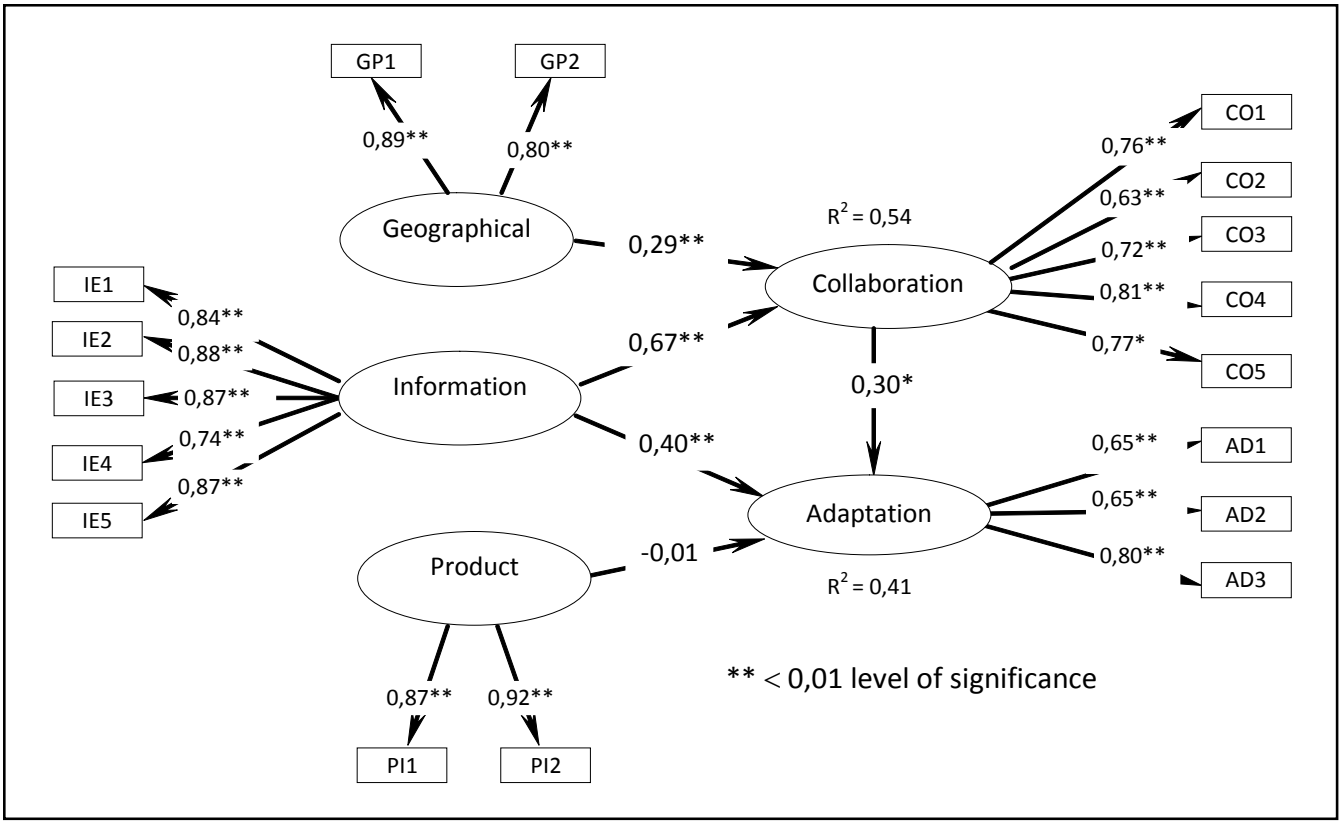
4.3 EVALUATION OF STRUCTURAL RELATIONS OF THE MEASUREMENT MODEL

The result are shown in Figure 2.

Figure 2: Revised Model



Note: Model estimated by SmartPLS software version 2.0 M3 (Ringle, Wende and Will, 2005) and significance was estimated by bootstrap with n = 111 and 2000 repetitions.

Source: Survey data

Regarding the model fit, it was observed that the coefficient of determination (R2) for collaboration and adaptation were 54% and 41%, respectively. Cohen (1977) considers 26% as meaning a large effect for the behavioral sciences knowledge area.

For the GoF (Goodness of Fit), because communality equals AVE in PLS-PM (Partial Least Squares-Path Modeling), Fornell and Larcker (1981) proposed a minimum value of communality equal to 0.5. Substituting the values of R2 suggested by Cohen (1977) and the communality suggested by Fornell and Larcker (1981), minimum value for GoF = [GoF= √(0,5 x 0,26)] equals to 0.36. (Wetzels, Schröder and Van Oppen, 2009). In this study, a GoF equal to 0.558 was obtained, which exceeded the value of 0.36, thus, showing that the model demonstrated a good fit compared with the specified minimum.

The statistical significance of the model and the hypotheses tested are shown in Table 3.

Therefore, the Collaborative Relationship Model, adapted from IMP Interaction Model (IMP Group, 1982; Metcalf et al.,1992), endorsed the hypothesis H1, H3, and H4 , at significance level $\alpha \leq 0.01$. The hypothesis H6 was also validated, at statistical significance level $\alpha \leq 0.05$. The original model H2 hypothesis shown in Figure 1 was excluded from the revised model because it presented low internal reliability. This internal reliability measured by Cronbach's alpha was equal to 0.25. The hypothesis H5 was not validated at the established significance level.

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Table 3: Coefficients of structural models of collaborative relationship revised

STRUCTURAL RELATIONSHIP	STRUCTURAL COEFFICIENTS	STANDARD ERROR	t VALUE	HYPO THESIS	DECISION
Geographical Concentration - Collaboration	0,29	0,07	4,26	H1**	Validated
Information Exchange - Collaboration	0,67	0,06	11,65	H3**	Validated
Information Exchange - Adaptation	0,40	0,14	2,97	H4**	Validated
Product Importance - Adaptation	-0,01	0,13	0,05	H5	Not validated
Collaboration - Adaptation	0,30	0,13	2,40	H6*	Validated
(*) < 0,05: level of significance (t > 1,96); (**) < 0,01: level of significance (t > 2, 58)					

Source: Survey data

5. DISCUSSION

To allow a better understanding, the results discussion has been divided into three parts. The first is related to the validated assumptions. The second refers to the not validated assumptions and the third, to the excluded constructs.

a) Validated hypothesis: H1, H3, H4 and H6

As a result of Brazilian international competition process, which began in 1991, there has been a merger of processing units in the milk production chain, in the search for efficiency gains. This has led to a reduction of suppliers´ base, without reducing the amount of collected volume. This has provided a reduction in the collection cost (Carvalho, 2010). As the Brazilian dairy basins are located in geographically dispersed areas, processing companies have made investments in technologies for bulk milk collection at strategic points of dairy farming, to ensure product quality and reduce transport costs.

In this sense, integration of milk production chain through technical information exchange has an important role for competitive advantage: improvements in quality of milk, better specifications for animal feeding, easy access to controls on spending, revenue, inventory position and training meetings. Farmers minority still do not has Internet access or familiarity with administrative aspects of the processing companies. These small producers are under pressure to modernize, so as to not be excluded from the production chain.

The modernization process has also led farmers and managers of dairy processing companies to adopt information technology in order to manage and track the milk from milking to the final consumer as well as to use process and storage technologies so as to avoid contamination, besides getting a product according to the specified quality. However, among farmers, there is a concern to leased specific equipment such as tanks and cooling units, from processing or private financing companies (Peroni, 2009).

The main concern is that the relationship between the milk production chain members should be collaborative rather than marked by distrust, rooted in a mindset to gain unilateral rather than mutual gain, as cites Christopher (1999).

In this sense, information exchange on an ongoing basis, can contribute to the establishment of trust and commitment between buyers and sellers. As trust increases between buyers and sellers, the degree of uncertainty decreases, thus facilitating investments in specific assets or milk production adaptations. Nevertheless, argues Williamson (1985), the more specific the asset, the greater are the risks and adaptation problems and therefore, the higher are the transaction costs.

What were evident in this study were the reliance on collaboration with information exchange on an ongoing basis, and the farmers´ geographical concentration in relation to processing companies. The collaborative relationship between buyers and sellers is of fundamental importance for the investment realization to the joint pursuit of competitive advantage.

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b) Hypothesis not validated: H5

Milk production chain modernization has also led to changes in herd management practices, milk production and structural change of milk collection, with a significant increase in bulk and refrigerated transport, significantly improving product quality and reducing transportation costs (Dornelas, 2000).

The modernization of the production chain resulted in large milk producers able to dominate almost every production chain step, and consequently better equipped to meet standards and conduct jointly. Moreover, large farmers have closer relationship with processing companies and can increase production scale which is essential, since the milk unit profitability, as every commodity, is generally low. Small farmers gradually are being eliminated due to low production scale, incapacitating then to take on milk mechanical collection and storage in cooling tanks so as to produce milk with high levels of quality and cost performance comparable to the large producers (Caixeta Filho et al., 2001). Farmers included in the modernization process began to adopt technological innovations based on capitalist dynamics, making the milk a product with similar characteristics in terms of quality and price, independently of the producers.

c) The social exchange construct: excluded from the model

With the modernization, a closer approximation of the processing companies with farmers happens through communication by telephone or technician visits specialized in animal production and administration. It also enabled the third-party transporters, also known as freighters or dairy man, phasing out the milk collection. These third-party collectors were responsible for informing the volume and the collection of samples for analysis. They were the suspicion targets on the part of producers (Peroni, 2009). New characters insertion in the dairy production process also introduced new habits. Traditional links and personal relationships have been replaced by a purely commercial relation, reducing the social contacts importance, ie, mechanized farms are now seen as efficient production companies.

6. CONCLUSION AND FURTHER RESEARCH

Considering results and theoretical and empirical discussions, it can be concluded that the IMP Interaction Model (IMP Group, 1982; Metcalf et al., 1992) exposes relevant constructs and indicators to the development and maintenance of collaborative relationships between buyers and sellers, applicable to different lines of business.

The search for increased competitiveness has led more companies to form partnerships, focusing on a smaller number of suppliers. In this approach, the competitive dynamics are continually changing management aspects, requiring new management skills, information sharing and communication technologies, and innovative production processes. The IMP Interaction Model can be an important tool for efficient companies to understand the competitive dynamics nature and behavior and to make appropriate management decisions.

Moreover, the IMP Interaction Model can contribute to: a) compare results between Brazilian companies and companies from other European countries, as the group of researchers from IMP Group (2012) has developed numerous studies involving the IMP Interaction Model, applied at different branches of activities, b) add to the academic collection of theoretical and empirical studies that relates collaboration with adaptation (or investment), thus reducing the knowledge gap, since the development in the academic area of the collaborative relationships, has been going at a slower speed than their practices in the business environment, c) explore models developed for the processing industry and, mutatis mutandis, to use it for another type of industry, in the case of this study, the dairy industry and; d) disseminate the use of Structural Equation Modeling and PLS Estimation Method, useful for research with a small amount of respondents to solve one of the main problems of Brazilian research: the sample size is usually small.

It is also noting that the approach used in this study was exploratory in that the model was reviewed from the theoretical data. To replicate this study it is important to make a confirmatory character. Moreover, in the cross-sectional it was taken design research only one sample of respondents. In a cross-sectional survey design, the first difficulty lies in explaining the relationship between cause and effect, given the low probability of eliminating all external factors that could have caused the observed relationship.

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Finally, for future research, it is suggested to include the dairy cooperatives into the collaborative relationships model studies. Cooperative organizations, as an economic structure that enables risk reduction and value added for farmers, offer opportunities to explore the collaborative structural relationships model between farmers and milk processing companies.

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