
FRAMING SUSTAINABILITY IN AGRO FOOD CHAINS: FROM MYSTICISM TO ACTUAL PRACTICE

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Abstract

The objective of this perspective paper is to propose an analytical framework for the study of sustainable agro-industrial systems. Different from the prevailing literature, the study analyzes sustainability by its systemic character in which different economic agents are organized to produce and deliver sustainable goods to the ultimate consumer. Built on New Institutional Economics assumptions and inspired by the concept of *netchains* (Lazzarini et al, 2001), the paper introduces the concept of *netsystem*: a strictly coordinated agro-system in which horizontal and vertical transactions play a key role and in which the institutional environment plays a strategic role.

Key words: sustainability, coordination, institutions

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1. INTRODUCTION

The issue of sustainability is comprehensive: companies, institutions in both private and public sphere, Non-Governmental Organizations (NGO) as well as all individuals participating in our society are in some way involved in this discussion. The issue is also complex, for in addition to dealing with interdependent dimensions – social, economic, and environmental –, it is not restrained by geographic limits. Despite these characteristics, the current debate on sustainability may be described as having a focused scope in which “sustained practices” are discussed under the company and/or individual’s own point of view. Quite the opposite, this article argues that the study of sustainability is in need of a more systematic consideration.

The idea of a systematic approach to sustainability is not new in the literature. Among the references for the study of sustainability, one may find the seminal idea proposed by The Brundtland Commission (1987)¹, which asserts that development is sustainable when it supplies present needs without compromising the capacity for future generations to attend to their own needs. The fundamentals of the so called sustainability tripod² are implicit in this argument highlighting that people, the environment and companies’ profits need to be accounted under the auspices of a new production system. In line with this reasoning, sustainability requires planning, which allows for it to attend to social, environmental and economic demands. Similar to the above statement, the present paper claims that the search for sustainability requires a systematic logic. Although the theme of sustainability has been studied deeply by many researchers, few have advanced toward proposing a workable, systematic analytical framework.

Particularly in the case of food production, the application of a systematic logic to sustainability can be associated to the Agro-Industrial Systems (AGS) approach (Zylbersztajn, 2000). According to this approach, coordination aspects take on a strategic role in order to guarantee the delivery of a particular good to the consumer. The analysis involves examining the value in the supply chain since the production until the consumption of “agrifood products”, taking into account the governance mechanisms adopted by economic agents, the contractual relations established along the value chain and the institutional environment that permeates and encourages these relations. Inspired by such discussion, the present article develops a specific approach in which different economic agents are organized to produce and deliver “sustainable goods” to the ultimate consumer.

Hence, the objective of this essay is to propose an analytical framework for the study of sustainable agro-industrial systems. More than that, the aim is to frame sustainability in a more pragmatic model which could help to make the concept more concrete and less fluid. In order to accomplish this task, the authors combine two branches of the literature: (i) the institutional analysis of productive chains (Coase, 1937; Williamson, 1985, 1996; Zylbersztajn, 1995; Zylbersztajn; Farina, 1999), and the concept of *netchains* (Lazzarini et al,

¹ Report generated by the World Commission on Environment and Development, “Our common future”–Norway, 1987

² “*Triple bottom line*”: People, Planet, Profit.

2001). As a distinct feature, the study highlights the role of institutions (North, 1991; Barzel, 1997) as a strategic variable in the delineation of sustainability, allowing for legal issues (legislation) and informal aspects (beliefs, costumes, taboos, etc.) to be predominately present in the analysis.

This paper is different from "*Green Supply Chain*" approach³, which does not take into consideration the institutional environment as the key variable for examining the efficiency of productive systems, being much more focused instead on the impact the environment exerts on processes and products in the supply chain. Given the relevance of the institutional environment to sustainability analysis, the present article claims that the theoretical prerequisites offered by the New Institutional Economics (NIE) are more suitable for the study of efficiency of sustainable productive systems.

This essay is composed in three sections apart from introduction and final considerations. Section 1 presents the theoretical fundamentals. Section 2 presents the netsystem model and its main variables. Section 3 offers empirical evidence. The study is concluded by proposing points for future research.

2. THEORETICAL FUNDAMENTS

It is well known that sustainability is an extremely large-ranged, complex and diverse concept. One may find more than 100 definitions for the terms "sustainability" and "sustainable development" (Bieker et al., 2002; EMRGNC, 2003). On the other hand, the word "sustainability" has been used more frequently in recent times, and is often interpreted differently by different individuals (Bieker et al., 2002; Lozano, 2008; Marrewijk, 2003).

The theme of sustainability applied to the organizational universe is commonsense considering the role organizations must play in searching for sustainable development. Some authors define a sustainable company as one which attends its direct and indirect stakeholders' needs without compromising its ability to attend to future stakeholders needs (Dyllick; Hockerts, 2002).

As soon as the sustainability debate gained momentum, several different management models were created to incorporate sustainability dimensions, giving origin to the field of "corporate sustainability". The *triple bottom line* model developed by John Elkington became the most popular of all (Elkington, 2001; Barbieri; Cajazeira, 2009; Dyllick; Hockerts, 2002). In general terms, a company implementing corporate sustainability is said to be subjected to a number of challenges. These range from acquiring the necessary cooperation of workers to the difficulty involved in managing some aspects of the supply chain (Marrewijk, 2003), passing through all the regulations and market pressures that come from GrSCM models ("*Green Supply Chain Management*") (Srivastava, 2007).

It is at this point that this specific research is inserted. How has the sustainability of organizations been treated, considering not only their individual practices but also the entire set of relations established among them along a productive system? Even more specifically, how is this theme treated in the agro-industrial systems scope?

In order to advance in the analysis, we seek inspiration in two branches of the literature: the study of agrifood production chains and its vertical relations (section 2.1) and

³ According to Beamon (1999), the concept of the "*Green supply chain*" aims to consider the eventual and/or immediate environmental impact on processes and products of a production chain.

the analysis of horizontal and vertical interactions in a complex production system (section 2.2).

2.1 New Institution Economics and the coordination of vertical relations

The application of the ideas from the New Institution Economics (NIE) in order to comprehend sustainable agro-industrial systems is appropriate since the concept of transaction costs get incorporated into the analytical framework. Transaction costs encompass the costs of measuring the transacted attributes, the costs of protecting property rights and the costs of monitoring the compliance of established agreements (North, 1991). In this aspect, the analysis of contractual relations between the agents of the sustainable chain, the study of the institutional environment, and the investigation of governing and reputation mechanisms are considered vital for the comprehension of coordination structures that can minimize transaction costs and as a consequence, guarantee higher economic efficiency.

Transaction Costs Economics (TCE) is a branch of NIE that operates the concept of transaction costs and analyses the organizational world from a contractual point of view. In order to accomplish this, the relations between the agents must be analyzed in view of the contracts, which in reality means, to conceive the companies and economic relations not only as functional optimizers of the use and exchange of production factors but also as contractual entities. Asset specificity is considered the key variable of the TCE model. An asset is said to be specific to a transaction when there is loss of value in distinct applications for which the asset had been initially designed. The more specific the assets involved, the higher the possibility for opportunistic contractual breaches, being that specificity results in potential income (quasi-rent) that can be captured in the transaction. (Williamson, 1985; Klein et al., 1978).

In light of the above discussion, we may associate the idea of sustainability with the concept of asset specificity. Investments in sustainable assets (or sustainable modes of production) present a potential loss of value if the product is not transacted as a “sustainable good”. In this case, there is the possibility of capturing value, depending on the opportunistic behavior of the parties involved in the transaction, with the consequent efficiency loss in the economic exchange. Proposition 1 below formally presents this idea:

Proposition 1: Sustainability may be interpreted as an asset specificity within a particular supply chain.

Since sustainable practices are considered specific assets, the examination of coordination structures adopted for the governance of transactions along the sustainable production chain is of great importance for its efficiency analysis. It is expected that the agents will establish formal or informal contracts to create safeguards against the capture of any resulting potential income. Besides contractual forms of governance⁴, the coordination by means of the company’s fiat power can also be a coordination mode used by agents to minimize transaction costs related to the trade of sustainable products. Hence, contracts and vertical integration (i.e., company) are coordination mechanisms that can be adopted as an

⁴ Williamson (1996) argues that contractual (hybrid) forms of governance are those represented by neither markets nor hierarchies

option to the market transaction, with the goal of reducing transaction costs (Williamson, 1985, 1996) in sustainable agro-industrial systems.

In addition, understanding how economic agents protect the rights over “sustainability” becomes essential to comprehend the generation of value and how agents organize themselves for the appropriation of such values. Problems of distribution and the capture of value are at the root of conflicts and disputes among economic agents, proving to be a source of inefficiency (Barzel, 1997; Caleman, 2010). The informational aspects – more specifically the costs of measuring the sustainability level of transacted assets – are crucial to the efficient allocation of property rights. According to Barzel (1997), the difficulty in defining the rights in a transaction is related to the multidimensional character and the variability of the transaction attributes⁵, thus opening opportunity for value capturing. In the case of sustainable assets, this problem is even more emblematic.

Because sustainability is a value generated by economic agents within a particular set of transactions, it is essential for the analysis of the efficiency of a sustainable agro-industrial system to discuss the set of guarantees involved in the exchange of property rights over sustainable assets. Sustainability being a broad concept with high measurement costs, the delineation of property rights is not a trivial issue and, for that, institutions play a relevant role. The institutional environment encompasses all the regulations, protocols and legislation with which a sustainable product must conform. Accordingly, the institutional environment might be considered as an endogenous variable in a sustainable system as it qualifies the specificity of sustainability itself⁶. This aspect is described in Proposition 2.

Proposition 2: The transaction of ‘sustainability’ is highly dependent on the quality of the institutional environment in a way that institutions become a key variable to value the specificity of sustainability.

Since sustainability can be regarded as a specific asset and institutions can be understood as an endogenous variable, the next step is to understand how sustainability can be successfully transacted along a productive chain.

The comprehension of the dynamic of agro-business systems can be developed from the concept of the Agro-industrial Systems (AGS). The study of AGS adds institutional environmental aspects, such as support institutions, to the production chain approach, not being exclusively focused on the sequential transformation of the products (Zylbersztajn, 2000). Within the AGS framework, coordination becomes a strategic driver to achieve efficiency. The efficiency of the coordination can be understood as the ability to transmit stimulus, information and power control along the production chain. The effectiveness of establishing such flow of information and stimulus assures the harmony for the coordination to be applied.

Still more specific than the Agro-industrial System approach is the concept of “strictly coordinated systems” proposed by Zylbersztajn and Farina (1999). Strictly coordinated systems offer the existence of such a strict coordination wherein we find implications of the emergency of productive subsystems with more agility in adapting to economic changes to

⁵ Considering sustainability as an asset, it is involved a set of potential variability like the more or less environmentally friendly, socially acceptable and economically viable.

⁶ In line with this reasoning, sustainability is a dynamic phenomenon and thus the long term becomes the appropriate horizon for analysis. As such, the institutional environment cannot be considered as a given variable.

the environment. The inducing factors for strictly coordinated systems can be identified by finding specific transaction characteristics that prevail along the whole chain as well as the existence of competitive pressure imposed by other coordinated subsystems.

In general terms, new quality standards required by public policies, specific legislation, consumer's rights and alterations in the consumer's demands regarding quality, sanitation and product conformity lead to an increase in specific investments carried out by the agents of the chain, thus elevating the costs associated with coordination. The formation of groups with clear and specific purposes is then necessary to cope with the high costs of such coordination. (Zylbersztajn; Farina, 1999). In the present paper we propose that the logic of a strictly coordinated subsystem is appropriate to the study of sustainable systems, given the need for an effective coordination to assure the production, processing and distribution of food by means of sustainable practices. This leads to Proposition 3:

Proposition 3: Sustainable products might be transacted along strictly coordinated systems in order to achieve the aim to produce and to deliver "sustainability" as a specific asset attribute.

2.2 Netchains – an inspiring concept for the study of sustainable systems

The concept of *netchains* (Lazzarini et al, 2001) results from the fusion of the concepts of "*supply chain*" and "*network*". Both concepts explore the importance of interdependent relations among companies: *supply chains* represent sequential relations organized vertically; a *network*, on the other hand, is comprised of the horizontal relations between companies of a same segment. In general, a *netchain* encompasses a web of relationships that allows for the transference of knowledge and the creation of value.

When thinking about the complexity of AGS and the design of the relations inside a production chain, we find the applicability of the concept of "*netchain*". The relations in an AGS are not only sequenced vertically – interactions between component industries, production, processing and distribution – but also organized horizontally, for instance, through farmers' associations. The relation between a coffee producers association, the fertilizer industry and a coffee roasting company is an example of a *netchain*.

Because a *netchain* is associated to vertical and horizontal ties, the creation of value is related to these two dimensions. In the supply chain management, value can be created: (i) by optimizing production and operations; (ii) by the reduction of transaction costs (choice of governing structures starting from the identification of attributes of existent transactions along the chain); (iii) by the possibility of measuring the transacted product performance or its attributes. On the other hand, when it comes to approaching the networks, the main value sources are: (i) the social structure (which may or may not lead to cooperation); (ii) the learning process (individual learning *versus* collective learning); (iii) aspects that are external to the network (direct or indirect externalities).

Lazzarini et al. (2001) identify three types of interdependent relations within a *netchain*: diffused ("*pooled*"), reciprocal and sequential. The first is the closest to the agents' independence, being sparse and indirect, presenting weak social links and "structural holes"⁷. The sequential type of interdependence is related to the concept of "*supply chain*" and

⁷ "Structural holes" are defined as the lack of connection or gaps between people or groups of people inside a network (Burt, 1997).

involves a sequence of activities and actors engaged in such activities. Finally, the reciprocal type of interdependence is closer to the approach of “*networks*” and involves mutually dependent agents, which implies that the actions of one individual can interfere in others’ activities. In this instance there would be found co-specialized knowledge.

To each type of interdependence different methods of coordination are associated. The interdependence type called diffuse (“*pooled*”) has the standardization as its governing structure. Mutual adjustment is related to reciprocal interdependence, where problems are solved in a group not with the help of a central planner. Some level of central control is the model adopted by sequential interdependence. Lazzarini et al. (2001) conclude that each organization will present different types of interdependence, according to the complexity of each organization.

Reinforcing the relevance of the concept of *netchain* for the study of complex systems, Zylbertstajn (2005) highlights that besides mechanisms of vertical coordination, it is important to observe the horizontal mechanisms as well, keeping in mind that complex arrangements suggest the existence of sophisticated vertical coordination mechanisms associated with horizontal ones. In this regard, the study of the *netchain* seems to be a powerful tool in the comprehension of sustainable agro-industrial systems.

The vertical dimension of coordination in sustainable agro-industrial systems relates to the idea of strictly coordinated systems as described in Proposition 3. A strictly coordinated system is necessary due to the high asset specificity involved in the transactions. The horizontal dimension of coordination, in turn, relates to the existence of collective actions organized by farmers in order to produce sustainable goods. The horizontal coordination is a necessary condition when the production of sustainable products occurs in large-scale, aggregating the production efforts of different producers. The horizontal coordination is important because it is a way to avoid value dissipation due to bad environmental practices in a given production region. This idea is formalized in the proposition below:

Proposition 4: Regarding a large-scale, sustainable AGS, the stability of the value chain assumes the existence of horizontal coordination (collective actions organized by producers).

Proposition 4, in combination with Propositions 2 and 3, shapes the concept of *netsystem*. A *netsystem* is a strictly coordinated sustainable agro-system in which horizontal and vertical transactions play a key role and in which the institutional environment plays a strategic role. Within the *netsystem* framework, the comprehension of sustainability as a specific asset (proposition 1) and the proposal of understanding institutions as an endogenous variable (proposition 2) represent the main theoretical contribution to fill up the gap of the concept of *netchain* in order to study sustainable AGS.

It is important to note that the coordination of simultaneous vertical and horizontal transactions with the objective of producing sustainable products is not a simple task. A *netsystem* tends to be inherently unstable since the asset specificity (sustainability) can make room for all sorts of opportunistic behaviors. In this sense, we should expect some kind of centralized coordination. The proposition below explicitly considers this aspect, emphasizing the importance of creating a point of convergence between the agents that integrate the *netsystem*.

Proposition 5: The stability of a sustainable AGS stems from the convergence of interests of the coordinators agents (vertical and horizontal).

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3. NETSYSTEMS: AN ANALYTICAL FRAMEWORK FOR THE STUDY OF SUSTAINABILITY

The *netssystem* of a sustainable agro-industrial system includes a group of transactions vertically and horizontally organized, coordinated by means of formal and relational contracts. A *netssystem* represents a “buyer-supplier” system which is strictly coordinated and in which the institutional environment plays a strategic role. The institutional environment is strategic in the sense that besides specific assets (sustainable assets), there exists a complete set of regulations, protocols and legislation that characterizes sustainability.

A *netssystem* is not only a strictly coordinated system – possessing specificity as the key variable and the institutional environment as an exogenous variable – or a *netchain* – which has an operational logic in which chain actions by agents can either represent, or not, specific assets and which does not take into consideration the institutional environment. *Netssystem* is a framework that encompasses these two approaches as a unique one, besides considering institutions as a key variable.

Figure 1 presents 2 distinct examples: “*netssystem*” (A) being represented by the bold line and “*netssystem*” (B) being represented by the dotted line.

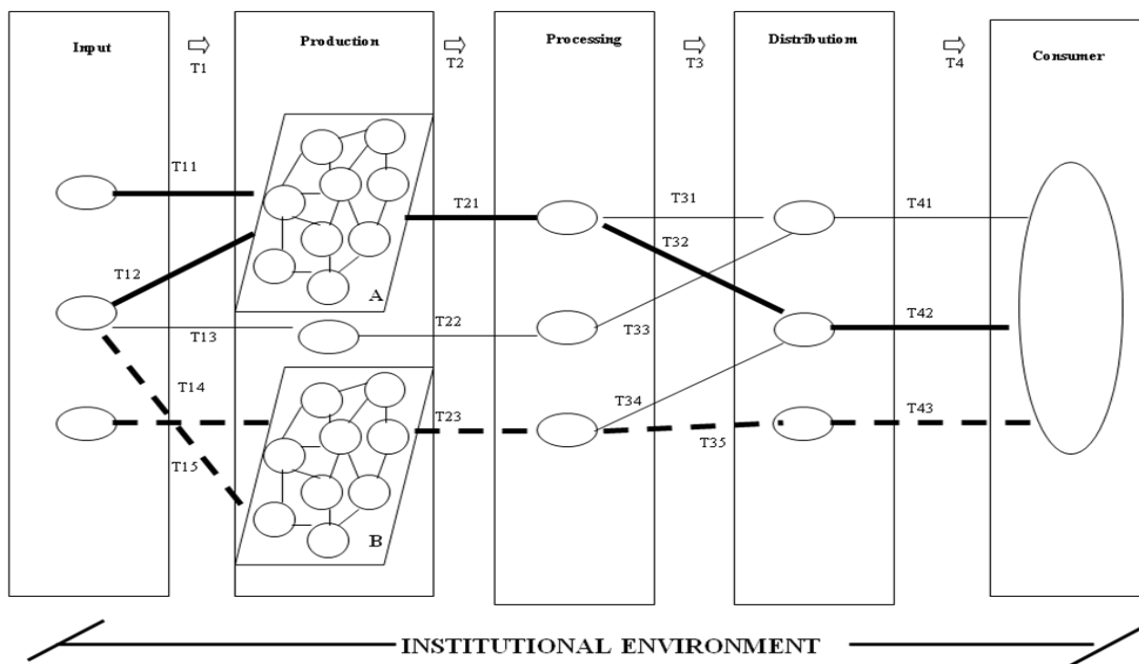


Figure 1 – Netssystem analytical framework

Each one of the *netsystems* is organized in a way to deliver value to the final consumer, involving different agents along its production chain and organizing the production in networks of distinct relations. For each of the *netsystems*, (A) or (B), specific features of the institutional environment are present. An example of the singularity of the institutional environment can be seen by means of the differences between the rules and legislation for organic food production and those for “Good Agriculture Practices” or even those for “Good

Animal Production Practices”. The empiric cases treated in the next section give an example of this statement.

Furthermore, different types of coordination and guarantees will be associated with each *netsystem* depending on variability and measurement capacity of the attributes involved in the transactions and the degree of interdependence between agents in horizontal relationships. Based on these facts, figure 2 presents the summary of the analysis of the “*netsystem*”: vertical coordination (strictly coordinated systems) and horizontal coordination (networks) using institutional environment and specificity as variables for analysis.

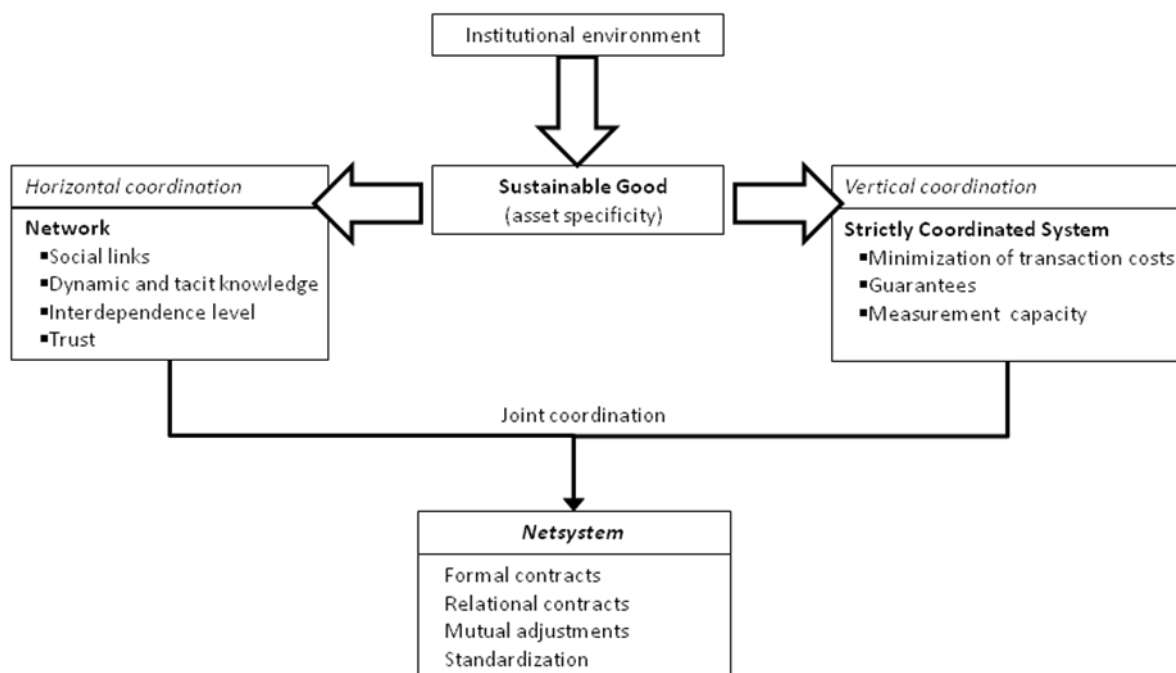


Figure 2 - Summary of the “*netsystem*” analysis

4. ILLUSTRATIONS

Some pieces of empiric evidence, which aim to illustrate the analytical framework proposed in this research, are presented here.

4.1 Organic Beef Cattle (ABPO/JBS)

The relation between the Association of Organic Livestock Suppliers⁸ from Pantanal⁹ and an animal slaughtering and meat processing industry (JBS) is an example of *Netsystem*.

In the case analyzed, the final product is organic cattle meat commercialized under the coordination of the national and international slaughterhouse industry and it presents a company’s specific label. Organic livestock activity occurs in private farms certified by independent companies, specialized in auditing organic food processes¹⁰. Similarly, animal slaughtering in the market is also subject to professional certification.

⁸ Associação Brasileira de Pecuária Orgânica – ABPO (Brazilian Association of Organic Livestock).

⁹ Pantanal is a Nature Reserve in the southern part of the state of Mato Grosso do Sul, Brazil.

¹⁰ Such companies are accredited by international institutions

The Association of Organic Livestock Suppliers negotiates contract terms for supplying the raw materials to the industry; however, contracts are established individually between the farmers and the industry. The contractual terms establish the duration of relations between the parties (usually lasting 3 years), the price to be paid (5% to 10% above the price of the average market price) and the criteria for classification of the slaughtered animal (weight, age and fat layers). In general, farmers and the industry maintain a long-term relationship, establishing formal long lasting contracts.

The farmers participating in the association, which was founded in 2001, have a long term relationship amongst themselves and share the production challenges in a region of difficult access, subjected to floods and with several specific issues related to the singularity of a fragile ecosystem with great biodiversity. The farmers and local communities also have historical connections (properties are usually managed by several generations of the same family) and share habits and customs of the so-called “homem pantaneiro” (*Pantanal man*). This being the case, organic livestock production in the Pantanal reserve appears to be a strategic option in promoting environmental sustainability in the region, because by means of an economic activity compatible with the local specificities, people are dignified and the region is rewarded with economic development (Caleman, 2005).

Considering the institutional environment of this *organic meat netsystem*, it is possible to clearly observe the production rules, including specific legislation¹¹, as well as formal guarantees (contracts) and informal guarantees (cultural and historical values). In addition, the existence of audited stamps by third parties is present in this partnership due to the informational asymmetry and the transaction costs. These considerations are summarized in Table 1.

Table 1: “Organic Beef Cattle Netsystem”

SCS (Strictly coordinated system)	Network
Strategic Variables	
High specificity Difficult measurement Clear property rights	Strong links Co-specialization Trust
Coordination mechanisms	
Formal contracts	Mutual Adjustments Relational Contracts
Coordinating agents	
Slaughterhouse Industry (JBS)	Brazilian Association of Organic Livestock (ABPO)

4.2 Good Livestock Breeding Practices – Beef Cattle (ASPMP / Carrefour / Embrapa)

A second example involves the relationship between the organized cattle farmers in the Brazilian state of Mato Grosso do Sul – Associação Sul-Mato-Grossense de Produtores de Novilho Precoce (ASPMP) (*Association of beef cattle breeders of Mato Grosso do Sul State, in Brazil (ASPMP)*) – and a supermarket chain (Carrefour).

Founded in 1998, the ASPMP’s initial objective was to attend to the increasing national and international markets demand for bovine meat with proof of quality and identification of origin. Currently, by means of partnerships with slaughterhouse industries,

¹¹ See law no. 10.831, December 23, 2003

supermarkets and distribution companies, the ASPNP works towards establishing better negotiation conditions for its members, by offering incentives for the breeding of high quality steers.

Among the established partnerships, a commercial alliance with the retail chain Carrefour stands out. This company commercializes beef in several Brazilian states through a special agreement “Programa Garantia de Origem (GO)” (*Guarantee of Origin Program*). The animals are slaughtered in a participating slaughterhouse using as reference for the price paid to the breeder or farmer a national index established by a research institute, adjusted for the area of Campo Grande (*capital city of Mato Grosso do Sul state*) with a variable price premium.

The alliance presents strict quality standards specified in the document “Caderno de Encargos Garantia de Origem Carrefour - Carne Bovina - Frigorífico” (*Carrefour Guarantee of Origin Standard Book - Cattle Beef - Slaughterhouse*). The quality standards range from characteristics of the product (weight, age, maturity, general condition of the animals), animal handling and transportation, to compliance with sanitation and work condition legislation. Recently, a Brazilian Governmental Research Institute (EMBRAPA) began negotiations in order to convince members of the ASPNP to also adopt Good Livestock Breeding Practices – Beef Cattle (GLP)¹². Among the main aspects of GLP, one may find human resources, environment management, rural property management and animal welfare concerns.

It is important to highlight the relevant role the farmers association plays in renegotiating contracts with partners and acquiring fiscal incentives for the young calf breeders in connection with the state of Mato Grosso do Sul. In addition, the association members receive technical assistance, updated information about the market, and technical support for the slaughtering process with the emission of reports. It is therefore noted that network externalities and standardization are not only sources of value but also a coordination form in the farmers’ network of relations. The retail chain Carrefour explicitly occupies the alliance coordination and establishes the quality standard and the pricing arrangements¹³.

In this case, the market alliance is characterized as a “*netsystem*” in which coordination is exercised by the retail sector, presenting as incentive mechanisms supply contracts, premium prices based on quality and the horizontal coordination of the farmers, which is a strong tool in contractual renegotiation. The existence, therefore, of the association and its benefits promote the advertising and adoption of GLP, consequently it is not happenstance that EMBRAPA currently works toward establishing a partnership with the ASPNP for sustainable animal breeding.

Considering the institutional environment’s role, it is clear that the sustainable production regulation is determined by an independent institution (EMBRAPA) however without the force of the law. The guarantees can be classified as informal since the parties (breeders and retailers, mediated by the breeders association) negotiate an agreement of delivery with specific criteria and standards established by the retail institution (private certification) and the relations among the farmers are marked by benefits coming from the

¹² The Good Livestock Breeding Practices – Beef Cattle (GLP) refer to a set of regulations and procedures to be observed by the farmer, the objective of which is to make productions systems more profitable and competitive, assuring the offer of safe food that originates from sustainable production systems. (www.bpa.cnpgc.embrapa.br).

¹³ Zylberztajn and Farina (1999) highlight that a strictly coordinated system implicates the existence of a coordinating agent. In this example, the role is exercised by the retail chain Carrefour

external part of the network and are not determined by historical and/or cultural values. It is observed that in this case the sustainability is a concept to be effectively adopted by all parties involved, focusing the sustainable model only on the primary level of production. There is not an interaction between GLP requirements and industrial and/or retail sustainable practices. Each agent makes an effort to adopt sustainable practices independently. There has not been established a sustainable certification stamp for “*netsystem*” although it is a long-term aspiration. These considerations are presented in table 2.

Table 2: “GLP Market Alliance Netsystem”

SCS (Strictly coordinated system)	Network
Strategic Variables	
Average specificity Difficult measurement Informal guarantees Diffuse property rights	Weak links Dynamic knowledge External factors
Coordination mechanisms	
Relational contracts	Standardization
Coordinating agents	
Retail chain (Carrefour)	Association of Beef Cattle Breeders of Mato Grosso do Sul (ASPMP)

4.3 Comparative assessment

Based on the description made on the previous sections, it is possible to draft a comparative analysis of the strategic variables and the coordination forms which characterize both cases. The aim is to identify the determining factors for a higher economic efficiency or to identify potential areas of failure.

It is noted that in the “organic beef cattle *netsystem*” the combination of high specificity (organic product), low measurement capability (it is difficult and/or expensive to evaluate if the consumed meat is originated from organic production – credence good), well delineated property rights (legislation) and formal guarantees (formal contracts) allows for the decrease in transaction costs. In the same way the farmer’s network is characterized by strong connections based on long-term cultural relations; reciprocal dependency allowing for mutual adjustments by means of informal guarantees (relational contracts). It is understood that this model presents stability for continuous support for a sustainable agro-industrial system.

In the case of “GLP – market alliance *netsystem*”, transactions are characterized by a medium level of asset specificity (the farmer can commercialize their product out of the market alliance without excessive money loss), and low measurement capability (it is difficult and/or expensive to evaluate if the meat consumed originated from sustainable production). The determination of property rights in transactions is not very clear (production rules and protocols are established by a “manual of best practices”) and the partnership is supported by informal guarantees (relational contracts). Furthermore the farmer’s network is characterized by weak connections based on profit generated by positive, external factors to the network, much more focused on the product standardization. It is understood that this model presents limited stability in connection with the continuation and support of this sustainable agro-industrial system. Table 3 summarizes the comparison.

Table 3: Cases comparison

	Case 1: Organic Beef “Netsystem”	Case 2: Good Livestock Practice “Netsystem”
Asset specificity	High/ credence good	Medium / credence good
Measurement cost	High	High
Rules	Well defined/ enforcement (law)	Not very clear/ low enforcement (protocols)
Guarantees (vertical coordination)	Formal contract	Informal contract
Guarantees (horizontal coordination)	Strong ties (cultural aspects)	Weak ties
Convergence of interests (coordinators)	High	Medium
Value generation	High	High
Value capture (potential)	Low	High

5. CONCLUSIONS

Based on the understanding that sustainability is a complex concept, the present paper proposes a broader, systemic look at the subject. Specifically, the paper investigates sustainability for the case of food production (i.e., Agro-Industrial Systems – AGS). In doing so, the authors introduce the concept of *netsystem analysis*.

A *netsystem* is a sustainable agro-industrial system which includes a group of transactions vertically organized (i.e., along the production chain) and also horizontally organized (i.e., among agents of the same sector), coordinated by means of formal and relational contracts. In order to build the concept of a *netsystem*, some theoretical propositions are addressed: sustainability may be analyzed as a specific asset (proposition 1); the institutional environment can be regarded as an endogenous variable in the assessment of sustainability (proposition 2); the production of sustainable agrifood products is supported by a strictly coordinated agro-system (proposition 3); horizontal and vertical transactions must coexist for a sustainable agri-food system to operate (propositions 4 and 5).

Propositions 1 and 2 are the source of our main theoretical contribution: (i) the understanding of sustainability as an asset, which is transacted and thus subject of value creation and value capture; (ii) institutional environment conceived as an endogenous variable since sustainability is a dynamic phenomenon that might be framed in a long term perspective.

Based on this analytical model, the authors investigate some empirical evidences in order to illustrate it. We developed comparative analysis of the strategic variables of two empirical cases: i) “organic beef cattle *netsystem*” and ii) “GLP – market alliance *netsystem*” The coordination forms, the determining factors for a higher economic efficiency and the identification of potential areas of failure were described.

Among other conclusions, we observed important sources for targeting sustainability, namely: (i) the existence of institutions that effectively participate in the arrangements structured within a *netsystem*, (ii) the agents` form of interaction or relationship types, and (iii) the presence of law and regulations governing the relationships between agents.

Another aspect derived from the research relates to the analysis of sustainability as a motivating factor for the production and delivery of sustainable products to final consumers. The *netsystem model* allows identifying strong links in the ways in which economic agents organize themselves, providing new movements to tackle the challenges represented by the dimensions of competition that involves collaboration (i.e., co-opetition).

Other contribution to the analysis of sustainability is to understand the *netsystem* as a strictly coordinated system which means its efficiency is closed connected to the transmission of stimuli, information and controls along the production chain. Besides that, the concept allows to check the existing level of agility to adapt to the changing economic environment and competitive strategies of firms.

Finally, we can identify a research agenda. Future studies should further examine the role of sustainability as a driver for firms' relationships along a productive system. Studies should also investigate the influence of other transaction dimensions (e.g., frequency, uncertainty and guarantees) on the coordination of sustainable systems.

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