



Hybrid governance complementary to contract manufacturing: a study case

Governanças híbridas complementares aos contratos de manufatura: um estudo de caso

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Abstract: This work aims to present governance forms complementary to contracts in the transactions of a brand-owner company (OEM) using the conceptual framework of hybrid governance according to the theoretical approach of the New Institutional Economics. This case study was conducted through interviews with product development, procurement, and manufacturing managers. We measured their perceptions on the coordination of electronic manufacturing service (EMS) suppliers through complementary mechanisms to contracts. We found that the agreed-upon contracts have proven insufficient to govern the transactions due to the uncertain business environment and high investments in specific intellectual property assets and brand. The analyses conducted show that the electronics manufacturing service transactions are coordinated by mechanisms complementary to contracts through a hybrid governance structure of relations of trust, mutual influence, and leadership.

Keywords: Contract manufacturing; Hybrid governance; Consumer electronics industry; Transaction cost economics; Supply chain management.

Resumo: Este trabalho tem por objetivo mostrar as formas de governança complementares aos contratos de uma empresa dona de marcas (OEM) utilizando os princípios teóricos da Nova Economia Institucional para o desenvolvimento dos modos de governança híbrida. Foi realizado um estudo de caso, sendo entrevistados os gerentes das áreas de desenvolvimento de produtos, suprimentos e manufatura para medir suas percepções a respeito da utilização de mecanismos complementares aos contratos para a coordenação dos fornecedores de serviço de manufatura eletrônica (EMS). Verificou-se que, devido aos investimentos em especificidades de ativos de propriedade intelectual e de marca, assim como às incertezas relacionadas ao ambiente de negócio, os contratos se mostraram insuficientes para governar as transações. As análises realizadas permitiram mostrar que as transações de fornecimento de manufatura eletrônica são coordenadas por mecanismos complementares aos contratos, através de um modelo de governança híbrida formado por confiança, mutualismo e liderança.

Palavras-chave: Manufatura contratada; Governança híbrida; Indústria eletrônica de consumo; Economia dos custos de transação; Gestão da cadeia de suprimentos.

1 Introduction

Industrial electronic firms that hold recognized brands (OEMs) have been opting to outsource important shares of their production to electronic manufacturing firms (EMSs) that supply them with components, engineering, manufacturing and distribution services. The growth of this practice has led EMSs to acquire increasing capabilities as highly specialized providers of commoditized electronic products, thereby reducing costs and sharing risks across the

industry. These manufacturing-focused supply chains have been replacing centrally-corporate controlled vertical industries. The full transfer of manufacturing to subcontractors has caused significant changes in the relationships among firms and in the production organization structure, insofar as it requires greater cooperation and interdependence among industrial enterprises (Furlanetto, 2002; Sacomano & Truzzi, 2004).

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Contracts in the electronics manufacturing industry primarily involve the contractual relationship between OEMs and EMSs. OEMs are holders of recognized brands of electronic products and focus on product development, sales and marketing, and hire the EMSs for the complete manufacturing of their products.

This type of production organization has been defined in different ways: global value chains (Gereffi et al., 2005); turnkey production network (Sturgeon, 1997); modular production networks (Sturgeon, 2000); virtual production networks (Sturgeon, 1998); global production networks (Ernst & Kim, 2002); and international production networks (Ernst, 1997).

Companies outsource much of their production so as not to have to bear the technical, administrative and financial burdens of fixed capital related to the activity (facilities and equipment), which allows them to focus on innovation and realize greater flexibility. In this system, the production is exempted from large-scale capital investment, thereby enabling innovative firms to concentrate its resources on developing new products and services (Andrade, 2004; Gomes, 2003).

Sturgeon (1997) point out a paradigm shift in industrial organization, from the centralized corporate model to production networks, which led to an inexorable expansion of the internal structure to external economies, and was enabled by the interaction between firms. Given these changes, the coordination of manufacturing activities, before restricted to the plant boundaries, stretches its domains to the chain of subcontractors.

This article aims to analyze the use of the hybrid governance structure to coordinate manufacturing agreements between a global company that owns brands of consumer electronics (OEM) and its EMS provider through the hybrid governance approach proposed by Ménard (2004).

This work is theoretically justified by the use of the theory on hybrid governance and contract complementarity in the consumer electronics manufacturing industry, which differs from its most common application in agroindustrial systems, as seen in most of Brazil's scholarly production.

From an empirical viewpoint, the work contributes to the study of complementarities in contract manufacturing in a highly competitive environment marked by uncertainty and rapid obsolescence of products, such as that of consumer electronics. Despite its recognized economic importance, contract manufacturing is rarely addressed as an object of study in entrepreneurial and academic research. Thus, this work can provide insights to better understanding the coordination of electronic manufacturing contracts.

Besides this introduction, this work is divided into six other sections. Section 2 presents the theoretical framework of the study. The next discusses the

methodology of the research. Section 4 characterizes the contract manufacturing transactions according to the principles underlying transaction cost economics. Section 5 presents the hybrid governance mechanisms in the case studied. Section 6 concludes.

2 Hybrid governance modes

Under the New Institutional Economics (NIE) framework, a production organization is understood in terms of its capability to efficiently reduce transaction costs because of its need to adapt to an institutional environment. The structures used to reduce these costs are called governance structures, the object of study of transaction-cost economics (TCE)—a wing of NIE focused on the microinstitutions governing economic transactions. According to Williamson (1986), a transaction cost is a cost incurred in negotiating, obtaining information, monitoring performance, drawing up contracts and ensuring their enforcement. Considering the transaction as its unit of analysis, the TCE framework seeks to identify whether the transaction's characteristics are in line with the governance structures that support it. To that end, it takes into consideration three attributes of transactions that affect the governance modes: (i) asset specificity; (ii) uncertainty; and (iii) frequency (Williamson, 1991).

TCE considers that companies adopt governance structures with the main objective of reducing the transaction costs involved in their activities. Conventional modes of governance are hierarchy and market, and there are various intermediate forms, known as hybrid governance structures.

Few studies have been initially developed on the intermediate forms of governance between hierarchy and spot market transactions, since they have focused on hierarchy as an alternative to market-based governance structures. Williamson (1991) posited that these intermediate forms of transaction governance are the most common, referring to them as hybrid governance structures.

Subsequent work developed in the 1980s and 1990s contributed to distinguishing between hybrid and hierarchical governances, which generated increased interest in the development of contracts and the different mechanisms of hybrid coordination.

In hybrids, the interaction between the parties is conducted through contracts. As understood by Williamson (1986), this type of agreement has a private and bilateral ordering organization, with hybrid forms located on a continuum of organizational governance with intermediate characteristics between market and hierarchy.

Ménard (2004) advanced in the identification of the diversity of intermediate contractual forms (hybrids). Ménard notes that hybrid models go beyond the standards set by bilateral relations, involving many

parties, which develop mechanisms that function as informal authorities, also called private ordering or private governance, complementary to established contracts, and safeguarding specific investments from opportunism behavior and the business environment from uncertainty. These mechanisms are flexible and less costly in the resolution of contentious disputes than the legal formalism.

A situation of specific assets with uncertainty faces the threat of ex-post opportunism, which most contracts can neither anticipate nor monitor, because despite the great quantity and complexity of existing clauses, there is the problem of contract incompleteness (Ménard, 2002). Thus, contracts have to be enforced by additional mechanisms. Such new provisions can be formal or established through mutual commitments, trust and reputation, and are used to resolve disputes arising from relationship problems, in order to ensure stability and minimize the hazards of opportunism derived from highly specific assets. According to Ménard (2004), the decision of adopting a hybrid governance mechanism obeys the logic of reducing the transaction costs of the activities in which the participants of the arrangement are involved.

Ménard (2005) also points out that companies adopt hybrid forms because they have the expectation to get returns from their investments in complementarity. Mutual dependence generates profits and benefits to the parties, and the mechanisms developed within hybrid arrangements can protect income and preserve the stability of the agreements made ex-ante, through the partner selection, and ex-post through governance mechanisms.

Organizations develop hybrid arrangements because of the advantages borne from the working relationship with partners willing to share risks and complementarities, as well as invest in mutual dependence. When deciding about the degree of dependency to which they are willing to submit, they establish mechanisms to ensure specific investments and determine how to divide the revenues.

The hybrid system has the advantage of enabling specific investments, which can be performed between partners without losing the advantages of autonomous decisions, while allowing an advantageous pooling of resources in uncertain corporate environments.

According to Ménard (2004), hybrid arrangements are shaped by separate legal entities which, through a mutual agreement, share or exchange technology, capital, goods and services. Included in this category are networks, subcontracting systems, franchising, joint ventures and various forms of partnership and cooperation between firms.

Hybrid arrangements, according to Ménard’s model (2004), may be more or less formal, occupying a spectrum that extends from the trust to authority, as shown in Figure 1: Along the y-axis are the governance

costs, and along the x-axis are the investments in asset specificity (k). Note that the governance costs are established according to the specific assets. Hence, the higher the specific asset, the greater the cost of governance, and the more centralized the coordination form is, approaching the hierarchy mode.

Trust is the closest model of market relations. Decisions are decentralized and coordination is “loose”, performed by means of mutual influence and reciprocity between the parties. On one level, trust can promote cohesion and ensure a certain degree of coordination, justified by the need to maintain the continuity of the relationship.

At the other pole of the spectrum of hybrid governance lies the formal mode of governance, closer to what is known as an integrated company. While the parties remain independent and still competing in some segments of their activities, a significant portion of their decisions is coordinated by an autonomous entity, which functions as a private bureau, with some attributes of hierarchy.

The model based on formal government relies on two basic aspects: ensured autonomy of the parties and, at the same time, the transfer of some decisions to a separate entity, on a consensual basis, to coordinate the actions of the arrangement.

Between the polar forms “trust” and “formal governance”, there is a coordination mechanism based on a relationship supported by leadership and by the relational model of interdependence, called mutualism. The coordination through mutualistic interactions is stronger than that based on trust: it is established through formal rules and conventions built between the parties in order to prevent the risk of opportunism, and endorsed through the recognition of complementary competences and relationships resulting from recurring contacts.

The leadership mode arises when a company exerts its authority over its partners, because it either holds specific competencies or occupies a key position in the sequence of operations. This type of system maintains some symmetry between the holders of rights of

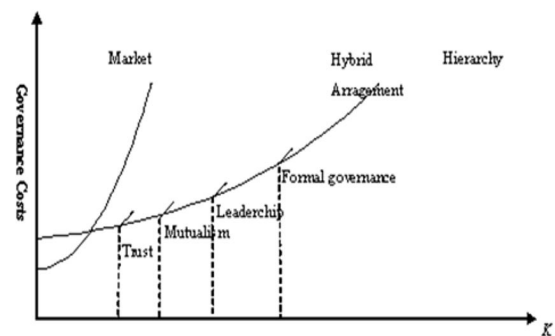


Figure 1. Typology of hybrid organizations. Source: Ménard (2004, p. 369).

property rights and retains, at least formally, some independence in the decisions of the economic actors.

Although none of the above-mentioned forms of coordination structures typify the hybrid coordination in isolation, but they can be combined to solve the key problem of the contractual relationship, namely: how to save contractual transaction costs between autonomous parts and reduce the chances of opportunism.

In general, hybrid arrangements exist because the partners need to develop the most suitable form of coordination for investing in the mutual dependence between the autonomous structures. The challenge faced by the parties is to decide on the degree of interdependence, centralization and formalization of governance mechanisms between legally independent organizations.

3 Methodology

According to Sykuta (2005), the research grounded in NIE was and has been widely studied, giving evidence of validity to the theory and stressing the importance of observation and empirical analysis, which play a central role in the methodological development of the theory. Ménard (2001) posits that the NIE methodology is influenced by three simultaneous aspects: (i) theory, i.e., a set of issues and concepts built to explore the phenomena relating to analysis; (ii) models developed from the theory, able to generate predictions about the phenomena studied; and (iii) tests to verify the behavior of the facts according to plan.

In his studies on the NIE, Sykuta (2005) has emphasized the use of methods that branch out in at least two directions, with the transaction as the unit of analysis.

The first is comparative analysis, which identifies the rules and norms of the game, and studies their impact on organizational performance, by comparison points. According to Zylbersztajn (1995), discrete comparative analysis entails a contrast between alternative forms of organization, from production realization via the market to pure vertical integration.

The second direction includes case studies. They are particularly important to the analysis of the update and the general rules of the game, and also to the study of institutional arrangements. Case studies are particularly important to the NIE, given their ability to analyze the determinants and consequences of organizational and institutional changes.

Ménard (2001) draws attention to the importance of the case study for research grounded in the NIE framework. For this author, the case study with an explanation under the lens of the theory is instrumental in understanding and measuring the variables analyzed in individual cases in order to make that theory amendable to test.

Based on the above-mentioned methodological parameters, this work presents itself as a case study of the contract manufacturing transactions of a global company that holds recognized brands of consumer electronics. We use discrete comparative analysis to distinguish between the hybrid forms of governance through their attributes. The work can be seen both as qualitative applied research, since it seeks to identify the occurrence of factors predicted by theory, and also as quantitative, insofar as it scales the power of governance mechanisms.

The governance modes herein addressed focus on the models of hybrid coordination complementary to contracts proposed by Ménard (2004). We ascribed specific attributes (trust, mutuality and leadership) to each governance mode observed to distinguish them for purposes of understanding and comparing the dynamics of transition through the various forms. These attributes have been translated into semi-structured questions (see Appendix A) to assess the perception of the company executives surveyed about the presence of different modes of governance in the transactions carried out. To measure their perceptions, we used the following metrics: None = 0; + = Weak; ++ = Moderate; +++ = Strong.

Chart 1 shows the governance modes—trust, mutuality and leadership—, their relevant parameters and attributes observed in the interviews.

4 Typification of manufacturing transactions

In order to characterize the transactions and measure the perception of the manufacture contractor (OEM), we interviewed executives managing product specification (Technology Administration) and supply (Supply Chain Administration), since both areas are involved in the requirements and monitoring of supply contracts. From the Technology Administration we interviewed its engineering manager, and from the Supply Chain Administration the global procurement manager and the manufacturing manager.

Chart 2 illustrates the transactions between the studied OEM and its manufacturing partners (companies A, B and C).

4.1 Asset specificity




- i) **Site specificity:** refers to transactions that must be performed in defined locations, close to major consumption centers of OEM brands. Notably, these are logistics aspects including storage locations, distribution stations and transport routes;
- ii) **Physical asset specificity:** equipment for processes, assembly, component insertion,

Chart 1. Attributes of governance authorities.

Unit of analysis	Governance modes	Determinant parameter	Measured factors
			Attributes
Contract manufacturing transaction	Trust	Reciprocity	<ul style="list-style-type: none"> • Reputation • Loyalty • Communication • Negotiation • Responsiveness • Incentive • Informality • Confidentiality
	Mutualism	Cooperation	<ul style="list-style-type: none"> • Relatedness • Sharing • Collaboration • Compensation • Agreement • Complementarity • Adequacy • Availability
	Leadership	Authority	<ul style="list-style-type: none"> • Imposition • Centralization • Coercion • Control • Coordination • Dirigisme • Complexity • Prescription

Source: Authors.

Chart 2. Transactions of the manufacturing contracts.

Contractor	Transaction	Contractee
OEM (Owns brands of printers, notebooks and PCs)	cabinets, keyboards and peripherals  (Accessories)	A
	motherboard and hard disk assembly  (Subsystems)	B
	Mounting of notebooks/tablets/smartphones  (complete systems)	C

Source: Authors' field survey.

special tooling and facilities, such as the environmentally controlled rooms for assembly and storage of components, and investments in information systems for engineering, supplies and manufacturing; Knowledge-asset specificity: project

iii) Knowledge-asset specificity: project teams, development and engineering of product and process, patents, information and investment in intellectual property;

iv) Dedicated assets: equipment and lines dedicated to a specific product line;

v) Brand specificity: certification in quality management, environment and security; and approval of products as for safety, quality and corporate image;

vi) Time specificity: relate to transactions whose value depends, above all, on the time it takes to be processed. In contract manufacturing transactions, temporal specificity is concerned with both time-to-market (TTM)—the expected

time for an innovation or product to reach the market—, and time-to-volume (TTV) —the time it takes to reach the volume demanded by the brand consumers.

Chart 3 scales the strength of specific investments present in the studied manufacturing transactions, where the knowledge, brand and temporal investments are highlighted for receiving the Strong option (+++) in the perception scale adopted.

We emphasize the specific investments in information and technological knowledge involved in the transaction. The specific investment in information and knowledge can be classified as follows: (i) information passed on about the products; (ii) information about the processes; and (iii) specific investments in intellectual property (IP). In the first case, only the information necessary for the production is retransmitted, with a strong control of this procedure. For more complex products, the specific investments in knowledge and information increase. Hence, as the organization-specific knowledge and information becomes more complex, its coordination mechanisms shift to formats with greater need for authority control and complementarities.

4.2 Uncertainties in contract manufacturing supply transactions

Aspects of uncertainty are related to the internal and external environmental factors influencing the transaction. Whereas internal uncertainty arises from the characteristics of the operations, markets and products, uncertainty can also arise due to the inability to control conditions that are external to the company.

One relevant aspect in the consumer electronics industry—and major trigger of uncertainty—is the product lifecycle. A number of new generation electronic products have a life cycle of six to twelve months, with their time-to-market (TTM) becoming shorter, and their growth phase extraordinarily fast,

reaching sales (and production) volumes much higher than those previously recorded in the market of more conventional electronic products. Next follows a brief period with some fluctuation in demand, often accompanied by a very strong competition. Finally, the decline phase is characterized by an end of product life in a very short time.

The uncertainties inherent in the standard of business in consumer electronics contract manufacturing are reported in Chart 4, which shows a significant **Strong** perception (+++) of the demand-related uncertainty.

4.3 Frequency

The contract manufacturing market is characterized by a high recurrence of transactions, rapid obsolescence of products, constant innovations and changes in consumption patterns, all of which requiring a considerable number of contract additions. Each contract addendum triggers expectations based on mutual dependence, relationship history and reputation, with new expectation levels being imposed on manufacturing service providers.

Chart 5 lists the average frequency of transactions between the OEM and its partners, and the type of contract used for managing the information flow in the companies surveyed.

5 Mechanisms of hybrid governance in contract manufacturing

Next we present the results of the interviews about the strengths of the attributes of trust, mutualism and leadership.

The relationship between the OEM and its partner is managed through a supplier qualification and approval program, which sets the minimum criteria for the provision of a product or service with the quality level required. The program begins with the selection of suppliers in the market. Once they meet

Chart 3. Specific investment.

Company	Locational	Physical	Knowledge	Dedicated	Brand	Temporal
OEM	+	++	+++	+	+++	+++

Legend: None= 0; Weak= +; Moderate = ++; Strong= ++++. Source: Authors' field survey.

Chart 4. Uncertainty factors.

Uncertainty factors	OEM
Demand	+++
Development of required competence	++
Time to reach market volume	+++
Time to reach launching point	+++
Logistics and delivery deadline	++
Achievement of product and process requirements	++

Legend: None= 0; Weak= +; Moderate = ++; Strong= ++++. Source: Authors' field survey.

the entry criteria, they are integrated to a program of development and approval of suppliers.

The OEM-supplier relationship goes through several levels of qualification, depending on the supplier’s compliance with the requirements of the contractor, in a relationship scale ranging from purely commercial to strategic, in the form of alliances.

Charts 6, 7 and 8 present the results of the survey conducted with the engineering (E); procurement (P) and manufacturing (M) managers about the presence of hybrid governance mechanisms to coordinate the contracts with companies A, B and C.

5.1 Trust

Parameterized by reciprocity, the trust mechanism coordinates the selection of suppliers through basic criteria for contracting operational services and through day-to-day information. Trust enables a better flow of activities and a faster achievement of goals at a lower cost, thereby providing a more effective management.

In addition to the selection of partners, trust enables the coordination of routine operations, the establishment of informal arrangements and the adaptations necessary for the good terms of the transactions. The mutual trust established between the EMS and its respective OEMs makes it possible to

Chart 5. Average frequency of transactions.

Company	Type of Contract	Average frequency of transactions
A	Formal Contract	15 days
B	Formal Contract	30 days
C	Formal Contract	30 days

Source: Authors’ field research.

Chart 6. OEM’s perception of trust as a form of governance.

Contracted Product		Trust Dimensions																								Dominant Perception
		Reputation			Loyalty			Communication			Negotiation			Reciprocity			Incentive			Informality			Confidentiality			
		E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	
A	Cabinet	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	Keyboard	+	+	+		+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+
	Peripherals	+	+	+			+	+	+	+	+	+			+		+	+	+	+	+	+	+			+
B	Motherboard	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	and	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	Hard disc																									
C	Notebook	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	Tablet	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	Smartphone	+			+			+	+	+					+						+	+	+	+	+	+

Legend: Weak = +; ++ = Moderate; +++ = Strong. Source: Authors’ field research.

reduce the risk of failures and unforeseen contingencies while planning production and shipments.

Chart 6 shows the tabulated results of the interviews with the OEM executives, about their perception of the trust dimensions. The “Dominant Perception” column indicates the predominant strength measured for each company: company **A: Strong; B: Moderate; C: Moderate.**

5.2 Mutualism

Parameterized by cooperation, the mutualism mechanism coordinates joint actions and activity planning. Mutualistic coordination is stronger than that based on trust. It is established by rules and agreements between the parties and based on the recognition of complementary competencies.

Chart 7 shows the tabulated results of the interviews with the OEM executives, about their perception of mutuality. The “Dominant Perception” column indicates the predominant strength measured for each company: company **A: Moderate; B: Strong; C: Strong.**

5.3 Leadership

Parameterized by authority, the leadership mechanism coordinates brand management, innovation and property rights. Operating through the prescription of practices and of control, this mechanism establishes contractual requirements, coercive forms and penalties for breach of agreements.

Chart 8 shows the tabulation of the results of the interviews with the OEM executives, about their perception of the leadership dimensions. The “Dominant Perception” column indicates the predominant force

measured for each company: company **A: Moderate;**
B: Moderate; C: Strong.

- Company (A) is an accessories supplier, jointly coordinated by three modes of governance, with a “strong” presence of trust;
- Company (B) is a subsystems supplier, coordinated by three modes of governance, with a “Strong” presence of mutualism;

5.4 Consolidation of results

Chart 9 consolidates perceptions of OEM executives on the intensity of governance mechanisms:

Chart 7. OEM’s perception of mutualism as a form of governance.

		Mutualism dimensions																					Dominant Perception			
Contracted product		Relatedness			Sharing			Collaboration			Compensation			Agreement			Complementarity			Adequacy				Availability		
		E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	E	P	M		E	P	M
A	Cabinets, keyboards & peripherals	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
B	Motherboards and hard discs	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
C	Notebooks tablets & smartphones	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Legend: Weak = +; Moderate = ++; Strong= +++. Source: Authors’ field research.

Chart 8. Assessment of the OEM’s perception of leadership as a governance structure.

		Leadership dimension																					Dominant Perception			
Contracted product		Imposition			Centralization			Coersão			Control			Coordination			Dirigism			Complexity				Prescription		
		E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	E	P	M	E	P	M		E	P	M
A	Cabinet, keyboard & peripheraalss	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
B	Motherboards and hard discs	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
C	Notebooks, tablets e smartphones	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Legend: Weak = +; ++ = Moderate; +++ = Strong. Source: Authors’ field research.

Chart 9. The strength of hybrid governance mechanisms.

EMS	OEM’s perception		
	Trust	Mutualism	Leadership
(A) Accessories	Strong	Moderate	Weak
(B) Subsystems	Moderate	Strong	Moderate
(C) Complete systems	Moderate	Strong	Strong

Source: Authors’ field survey.

- Company (C) is a complete systems supplier, coordinated through by three modes of governance, with a “Strong” presence of mutualism and leadership.

Results confirm the prediction of the theory that both uncertainty and the specific investments determine the hybrid mode of governance of an arrangement.

It is denoted that the three coordination modes are present in the analyzed transactions, acting together and at different intensity levels (Predominance). As uncertainty and knowledge and information-based asset specificity increase as a function of the product to be manufactured, the means of coordination shift to formats with greater demand for centralization and control, transiting from trust to the intermediate mode of mutualism, and finally to leadership.

6 Conclusions

The various mechanisms of hybrid coordination under which contract manufacturing transactions occur in the consumer electronics industry make up the axis of this analysis. The analysis considered that aspects concerning a convergence of interests, the set of information exchanged, the performance monitoring system and incentive and coercion mechanisms are all seen as crucial to understanding the complementary mechanisms that supplement contracts.

The OEM (contractor) and EMS (contractee) make investments in specific human, locational and intellectual property assets, thereby generating interdependence – which leads the parties to develop complementarities and seek a steady reduction of the impact of uncertainties through performance monitoring and information exchange in an effort to obtain the greatest possible efficiency in the application of shared resources.

The transaction-related attribute of asset specificity increases with the technological complexity of the product being manufactured, notably the investments in intellectual property, patent protection and transfer of complex information, which alone would be sufficient justification to maintain the manufacture of more complex products (innovative) in the internal ambit. Otherwise, the rapid cycle of the business —encompassing the lifetime and launch of a product, the achievement of market volume and demand variations—would attach a significant degree of uncertainty to the business of consumer technologies. Moreover, the need for cost savings, economies of scale, flexible operations, mobility in the location of production and distribution facilities, allied to the availability of specific competencies in manufacturing, led the OEM to hire the manufacture of its products from a network of specialized suppliers (EMS), even at the risk of exposing its intellectual property assets and patents to opportunistic behavior.

It should be noted that various features observed in the electronics assembly market can reduce transaction costs—particularly the high frequency of transactions, which act to significantly reduce the costs incurred in obtaining information and drafting contracts. From the point of view of asset specificity in manufacturing processes, the modular architecture of products and the flexibility of processes through the application of information technology resources greatly reduce the specific investments in contract manufacture because some production activities can be programmed and reprogrammed as needed to meet the supply requirements of various contracts, thereby reducing specificity.

The manufacturing supply contracts in the analyzed transaction are employed to control the more formal aspects of the contractual relationship. However, they are rather limited in terms of an efficient management of resources coming from specific investments and of the treatment of contingencies, adjustments and uncertainties present in contract manufacturing transactions. This explains why managers of contract manufacturing, for reasons of convenience and necessity, implement hybrid governance models complementary to contracts (trust, mutuality and leadership). These modes of governance result in a faster flow of information insofar as the organizational interfaces are coordinated by reputation, trust and reciprocity. This allows adjusting the production plan in response to unforeseen circumstances, as well as making the necessary adaptations in product volumes, production capacity and distribution and supply plans, thereby giving greater flexibility to reprogram manufacturing processes and draft contractual amendments, as well as providing more efficiency to manage the transactions involved in the manufacturing of consumer electronics.

Finally, it is necessary to note that the requirements of flexibility and quick adaptation, common in contract manufacturing, call for an intense agility in informal adjustments and autonomy, which explains the absence of the formal authority mechanism provided for in Ménard’s model (2004).

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Appendix A. Questionnaire applied to the OEM contractors.

None Poor Moderate Strong

Trust

1. Extent to which the good reputation of the contractor reduces the uncertainty of a new contract.
2. Degree of existing relationship of loyalty (contract renewal).
3. Frequency of information exchange with the contractee.
4. Degree of importance of negotiations in the relationships with contractees.
5. Degree of effort to meet demands.
6. Degree of encouragement given to the supplier for the achievement of goals.
7. Degree of obligations negotiated and not formalized in a contract.
8. Scope of the obligation of confidentiality.

Mutualism

1. Extent to which the information exchanged depends on specific knowledge (technical or commercial, for example).
2. Sharing of action planning.
3. Collaboration in the design of new products and processes.
4. Conflict resolution through negotiation.
5. Reciprocal compensation (adaptability / recognition / mutual adjustment).
6. Degree of complementarity of the competencies between contractor and contractee.
7. Joint decision about performance standards.
8. Degree of availability to meet the transaction's requirements.

Leadership

1. The contractor's influence and power are important in imposing contractual conditions.
2. The contractor centralizes decisions on changes on a contractual basis.
3. Degree to which the contractor uses the contract in case of any problems.
4. The contractor controls the resources necessary to perform the contract (tooling, design, testing, etc.).
5. The contractor coordinates the technical guidance / information necessary to perform the contract.
6. The contractor directs the mechanisms of control / monitoring of the contract.
7. The degree of complexity of the supply relationship (high technological standards, processes, project and business requirements).
8. The influence of the contractor's power and size in improving the contractee's performance standards