GOVERNANCE STRUCTURES AND INNOVATION:
THE CASE OF THE BRAZILIAN COFFEE ROASTING & GRINDING INDUSTRY

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Abstract

This study contributes to the New Institutional Economics by showing that firms adopting a mixed governance structure are more innovative than those adopting single structures. Going beyond Grandori and Furnari’s approaches (2008, 2010), which demonstrate that there is a relation between internal governance structures and innovativeness, this paper also incorporates an external framework, in which we posit that the innovation process involves a combination of interactions between a firm’s internal and external governance structures. We test our model based on data from a survey of 214 Brazilian Coffee Roasting & Grinding (R&G) firms. To determine the combinations of elements we used the Qualitative Comparative Analysis (QCA) software fs/QCA, version 2.0 (Ragin, 2008).

Keywords: Governance structure, Innovativeness, coffee roasting & grinding.

INTRODUCTION

In this paper we explore, in a predictive way, the rather overlooked relationship between governance structure and the rate at which firms innovate (henceforth innovativeness). Recent approaches from the Economics of Organizations literature associate a firm’s rate of innovation with that firm’s internal organizational structures (Coombs & Metcalfe, 2005; Grandori & Furnari, 2008, 2010).

In this paper we aim to explain firm innovativeness through the combination of governance structures that are both internal (e.g. pay for performance, quality control programs and processes, strategic planning, shared information and values, teamwork) and external (e.g. relations with suppliers and customers) to the firm, and identify which of these allow the greatest scope for developing innovation.

To build our model, we draw on the New Institutional Economics literature, and to test it we examine data from a survey of 214 Brazilian coffee roasting and grinding (R&G) firms. We predict that a firm’s degree of innovativeness is higher if it uses a mix of governance structures (internal and external) rather than singular structures. To ensure precision in our theory and analysis, we focus our attention on firms’ product innovativeness, although we later discuss how our model can be generalized to broader domains of firm innovation.

To empirically ascertain the validity of our theory, we combine elements across the two domains of governance through the Qualitative Comparative Analysis (QCA) software fs/QCA, version 2.0 (Ragin, 2008). We do find support for Grandori and Funari’s (2008; 2010) propositions regarding internal governance, but ultimately we contribute to the literature through our finding that firms leveraging plural forms of governance are more innovative. Essentially, a firm’s external relations are theoretically proposed and empirically found to be complementary to those theorized by Grandori and Funari.

We first develop our background by explaining the elementary precepts of Design Combinatorial Analysis and Transaction Cost Economics. We then theorize about the governance structures—internal and external—that can influence firms’ innovativeness, and develop formal hypotheses. We next outline our methodology, which leverages not only a quantitative analysis of the aforementioned survey, but also explores case samples that describe the qualitative aspects of our proposed governance model. We conclude by discussing implications for theory and practice.

GOVERNANCE STRUCTURES AND INNOVATION
Innovativeness is a key factor in determining whether a firm is likely to succeed or not. Over the years, many studies on innovation (and entrepreneurship) have limited themselves to describing cases involving innovation, or simply developing descriptive and prescriptive traditional models of competition (Rumelt, 1987). More recent approaches have advanced our knowledge on the subject by formally examining the relationship between governance structures and a firm’s capacity to innovate (e.g. Coombs & Metcalfe, 2005; Grandori & Furnari, 2008, 2010).

Inspired by the work of Grandori & Furnari (2008, 2010), we seek to identify and theorize about possible sets of internal and external governance structures which, when combined, offer the potential for even greater levels of innovation. In our study, the term “governance structure” is defined to include not only the notion of “cost avoidance”, as defined in traditional theories of organizational economics such as Transaction Costs (Williamson, 1996)—wherein an order is established to reduce potential conflicts and opportunistic behavior—but also the concept of “value promotion”, in which case governance mechanisms can amplify a firm’s capacity to coordinate complex tasks (Mesquita & Brush, 2008), as well as increase learning through better knowledge transfer (Lorenzoni & Lipparini, 1999; Mesquita, Anand, Brush, 2008). Given the domain of our theory, and a need for parsimony, we exclude from our model an analysis of the determinants of governance structures as moderated by the level of innovation. Instead, we focus on the impact of combined governance structures on product innovation, defined as the quantity of new products launched as well as the quantity of changes in existing products, in areas including roast blend, roasting and grinding patterns, and packaging, over the past 5 years.

More recently, Grandori and Furnari (2008, 2010) advance this earlier literature by developing a predictive model that more directly associates the degree of innovativeness with the specific qualities of the governance structures adopted by the firm. Specifically, they describe not only those internal governance structures that enable better performance, but also predict how these structures can be combined to generate superior results in terms of innovativeness and productive efficiency.

To more precisely examine the relationship between innovativeness and internal governance structures, Grandori and Furnari conceptualized the "Combinatorial Approach to Design." Specifically, they define a firm’s internal governance structures as the organizational elements that integrate a collection of practices adopted by the firm and are separated for types of governance mechanisms. For instance, monetary incentives reflect payment for performance. In turn, bureaucratic elements include rules and formal plans for labor division. Moreover, community elements represent knowledge, values, and common culture.

The authors note that firms may adopt different strategies to organize their internal production; for instance, they may combine two or three of these main categories (monetary incentives, bureaucratic, and community elements) into plural forms, or they may adopt a set of practices related to only one of these categories, or similar types. In the latter case, similar types of bureaucratic organizational elements comprise a set of mechanisms composed solely of one of the governance structures—planning, command, and/ or formalization (Grandori & Furnari, 2010). In turn, plural forms imply a combination of structures, such as rules (bureaucratic elements) in combination with training programs, teams (community elements), or monetary incentives such as pay for performance (market elements).

Grandori and Furnari (2008, 2010) assert that a combination of different types of practices is most efficient at promoting innovativeness. That does not mean that firms in this category have coherent organizational strategies, but rather that heterogeneity between structures may lead to a combination that results in the desired performance. This occurs because the organizational forms, according to the authors, should be understood as
interconnected systems of practices or attributes, adding weight to the notion that the plurality of governance structures would show better results for firms (would induce higher levels of innovation) than those known as single types. Plural forms, specifically, highlight that organizational components are interdependent and reinforce one another, in which case a given organizational practice would synergize and enhance the effectiveness and value of other interconnected practices.

The body of empirical evidence shows that combinations of monetary, bureaucratic, and community (plural) structures demonstrate high innovation performance and efficiency at all levels and under all circumstances. Plural forms thus tend to generate high performance for innovation.

The internal governance structures and prevailing practices adopted in the research are displayed in Figure 1.

**Figure 1: Internal governance structures and their variables**

<table>
<thead>
<tr>
<th>GOVERNANCE STRUCTURES</th>
<th>PRACTICES IN EACH TYPE OF STRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MONETARY INCENTIVES</td>
<td>Payment according to individual performance</td>
</tr>
<tr>
<td></td>
<td>Payment according to team performance</td>
</tr>
<tr>
<td></td>
<td>Payment according to firm performance</td>
</tr>
<tr>
<td></td>
<td>Outsourcing</td>
</tr>
<tr>
<td>BUREAUCRATIC</td>
<td>Career plan</td>
</tr>
<tr>
<td></td>
<td>Strategic planning</td>
</tr>
<tr>
<td></td>
<td>Quality control program and process</td>
</tr>
<tr>
<td></td>
<td>Performance evaluation system</td>
</tr>
<tr>
<td>COMMUNITY</td>
<td>Shared information and values</td>
</tr>
<tr>
<td></td>
<td>- Shared rooms;</td>
</tr>
<tr>
<td></td>
<td>- Socialization area;</td>
</tr>
<tr>
<td></td>
<td>- Frequency of socialization</td>
</tr>
<tr>
<td>Communication channel</td>
<td>- Informative bulletin board, newspaper, radio etc;</td>
</tr>
<tr>
<td></td>
<td>- Communication system for employees or clients to make suggestions or offer new ideas;</td>
</tr>
<tr>
<td></td>
<td>- Professionalization incentives.</td>
</tr>
<tr>
<td>Teamwork</td>
<td>- Frequency of board of director’s meetings ;</td>
</tr>
<tr>
<td></td>
<td>- Frequency of management or supervision meetings ;</td>
</tr>
<tr>
<td></td>
<td>- Frequency of meetings of the production team;</td>
</tr>
<tr>
<td></td>
<td>- Training and group dynamics.</td>
</tr>
<tr>
<td>Shared decision making</td>
<td>- Who makes the planning for the following year;</td>
</tr>
<tr>
<td></td>
<td>- Who participates in the choice/development of new brands, blends, packaging;</td>
</tr>
<tr>
<td></td>
<td>- Agreements or partnerships with stakeholders to develop products or processes.</td>
</tr>
</tbody>
</table>

Based on the above, we submit that: **Hypothesis 1: Innovativeness is greater in firms that adopt a plural internal governance structure (monetary and/or bureaucratic and/or community) than in those with a singular structure.**

Collaboration between firms is increasingly understood to enhance innovativeness (Coombs & Metcalfe, 2005). What is less well understood is how these collaborations operate in combination with internal structures, which is the element we add to the initial approach by Grandori and Furnari (2008, 2010). Mesquita and Lazzarini (2008, p. 12) explain “**Thus, buyer and supplier may jointly develop a new product or adjust the attributes of existing products (the architecture of components, the functionality of the overall design, and so on).**”

An extensive body of research has emphasized that interactions with other organizations
provide information, knowledge, and complementary resources in various forms. The key to accessing such resources lies in the nature and qualities of the governance structures across these firms (e.g. Coombs & Metcalfe, 2005; Grandori & Soda, 2006).

Williamson made significant contributions on the understanding of relations between buyers and suppliers, which we borrow to frame our logic. He proposes three easily-identified external governance structures in transactions that we believe are conducive to innovation: market, hybrid forms, and hierarchy (vertical integration). These governance forms correspond to particular institutional frames, which differ in terms of mechanisms for ascertaining behavior, such as monitoring activities, incentives, and distinct types of control devices. Each of these mechanisms in turn differ in regards to the capabilities involved, and entail distinct levels of flexibility and adaptability (Pondé, Fagundes & Possas, 2009).

According to Williamson (1985), the market is the main governance structure for non-specialized transactions, usually involving casual contact. It is most appropriate for transactions characterized by discontinuous and impersonal relationships among agents, involving the simple transfer of ownership of a good or service as well as low asset specificity—when the object of exchange is likely to be transacted in alternative deals with a similar value. For these reasons, this governance form includes incentive mechanisms provided by price and high flexibility, given that each party can easily associate or dissociate with other partners on similar terms.

In Williamson’s view, both asset specificity and holdup influence the configuration of governance structures. As he points out, the most complex structures (from a market relationship to vertical integration) would be those with greater investments in specific assets, because while these assets may translate into a greater chance of creating value, they also increase the probability of losses due to opportunism. Our point of departure from Williamson’s transaction cost view of inter-firm relations is that he assumes that the interface between level of asset specificity and the corresponding efficient organizational structure occurs through a singular form.

Some empirical studies seem to corroborate our conjecture. For instance, Ménard (2004) describes the quasi-vertical integration of a number of subcontractors; the existence of franchise networks; the formation of complex strategic alliances, such as production, technology, and business joint ventures; and multiple forms of consortia and contractual relationships (Ménard, 2012). Addressing plural forms such as franchises, some authors (March, 1991; Parmigiani, 2007) argue that these enable gains in the transfer of encoded knowledge and the development of tacit knowledge, fundamental to innovation. In the case of joint ventures, they can promote cooperation between two or more firms and encourage them to develop new products and processes (Coombs & Metcalfe, 2005). For example, a firm may acquire the green coffee raw material with different specificities, according to its present and projected branding strategies (commodities, gourmet, origin, fair trade, etc.).

Based on our theoretical reasoning and some initial corroborative empirical evidence, we believe that firms can present combinations of plural governance structures, involving the simultaneous adoption of two or more organizational forms, in order to merge incentive, control, monitoring, and flexibility mechanisms. This initial empirical evidence is not surprising; external plural governance structures can offer alternatives for firms to transfer, combine, and even co-create resources that enable them to innovate.

Our reasoning is depicted in Figure 2, below.

**Figure 2 – External governance structures and their variables**

<table>
<thead>
<tr>
<th>Governance structures</th>
<th>Supply chain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Upstream</td>
</tr>
<tr>
<td><strong>Vertical integration</strong></td>
<td>Produces inputs internally.</td>
</tr>
<tr>
<td><strong>/hierarchy</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hybrid forms</strong></td>
<td>Purchases inputs from different</td>
</tr>
</tbody>
</table>
We submit that: **Hypothesis 2: Innovativeness is greater in firms that adopt a plural external governance structure (market and/or hybrid forms and/or vertical integration) than those with a single structure.**

If internal and external governance structures can separately influence the innovation process, the next question is whether combinations of these structures can further improve the firm’s ability to innovate. According to Metcalfe (1995), the answer to this question would be affirmative, because the innovation process involves different activities performed by different actors both inside and outside the organization.

Gundling (2000), in *The 3M way to innovation: balancing people and profit*, defines innovation as a process which includes new ideas and implementations or actions that result in improvements, gains, or profits. New ideas can arise from several sources, occur by chance or luck, or can even happen when different economic agents present distinct views (Barney & Clark, 2007).

Such ideas or inventions need to be elaborated, reflected, refined, and confronted with other ideas or distinct pieces of knowledge, either known to the agents involved or discovered during the process. This sequential set of activities enables the organization to incorporate the new ideas into its operations and present the market with new solutions. There are rare cases in which an idea is born ready for consumption, but in general the basic raw material of innovation—the ideas—undergoes an initial evaluation by a number of people and then enters a development process that can last months or even years.

This view of innovation challenges and draws attention to the myth created around the theme—many people believe that innovations are the result of a stroke of genius, are absolutely new, and arrive fully-formed and ready to market. However, because innovation is an essentially human process, one has to differentiate it from the “light bulb” of new ideas. Innovation requires organizing various activities to be carried out by different agents, and is therefore unlikely to result from a single task or isolated job; instead, it should be considered an interpersonal process (Metcalfe, 1995).

Innovation requires oversight, and innovative organizations constantly identify opportunities for process improvements, but also for new businesses, new ways to approach the market, new product forms, and new service alternatives. There exists a long and complex sequential chain of events between invention and innovation, more so than simple linear models can represent (Swann, 2009). Moreover, the flow of this process does not always present a single, pre-determined path (Metcalfe, 1995). The process of innovation should not be understood as a unidirectional relationship that travels from basic to applied science, but rather as a multi-dimensional systemic process comprising a multitude of mutual relations as well as multi-directed initiatives that result from the exchange of information and resources, management, processes, and procedures.

Granovetter (2005) also emphasizes the relevance of the social structure and the ties established between actors in the innovation process. The multitude of ties across various realms of a network influence not only the flow of knowledge but also the quality of its transfer, greatly multiplying the possibilities of bringing different resources and skills together. Starting with the notion that firms have distinct sets of resources, skills, and knowledge (Foss et. al., 2007), interaction and cooperation between firms can allow the sharing of such heterogeneous asset endowments. This enables greater innovation, especially for small and medium-sized firms, which have some disadvantages such as more limited access to credit and resources. Working together allows them to combine distinct and complementary resources in order to jointly achieve higher rates of innovation in products.

<table>
<thead>
<tr>
<th>Market</th>
<th>Suppliers via contract.</th>
<th>Via contract.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Purchases inputs from different suppliers on the spot market.</td>
<td>Sells products to different customers via spot market.</td>
</tr>
</tbody>
</table>
than could be obtained individually (Mesquita & Lazzarini, 2008).

Thus we have as our main hypothesis: **Hypothesis 3: Innovativeness is greater in firms that combine internal and external plural governance structures.**

The following section presents the methodological procedures and proxies that we used in this study to identify and empirically analyze the relationship between firms’ innovativeness and their internal and external governance structures.

**METHODS**

To empirically examine the theoretical model proposed above, we conducted a survey of firms in the coffee roasting and grinding industry. We conducted individual surveys by telephone, and the interviewer filled out the questionnaire during the conversation. Our choice of survey method was primarily driven by the difficulty in obtaining the required quality of input from secondary sources. In addition, telephone interviews allowed us to obtain information from a greater number of companies spread over a broader geographical area (Richardson, 1999).

Our database comprises a list of member companies of the Brazilian Coffee Industry Association (ABIC), which represents 77% of the country’s coffee roasting and grinding firms as measured by production volume. We extracted a sample of 214 firms, totaling 55% of the database.

We structured our questionnaire in three main sections: characterization of respondents, product innovations, and forms (internal and external) of governance structures. During the preparation of the questionnaire we consulted with industry experts to ascertain the relevance of the study to the reality of the sector, as well as the respondents’ understanding of the issues presented. Subsequent to the preparation of the questionnaire, we conducted pre-tests and made any necessary adjustments.

After completing the data collection, we tabulated the data and applied Qualitative Comparative Analysis (QCA), using the fs/QCA software, version 2.0. Our choice followed that taken by Grandori and Furnari (2008, 2010). QCA uses the inference of Boolean algebra and was chosen for this study because it allows us to relate firms’ internal and external governance structures with innovativeness. To identify structures that most affect innovation, this method identifies sets of firms with high performance and associates the combinations of attributes from Boolean algebra, which allows for the logical reduction of numerous conditions causal to a limited set of configurations that lead to the result (Fiss, 2011).

**Measures**

**Product innovation:** an evaluation of the quantity of brands launched and the quantity of changes in products in terms of blend, roasting and grinding pattern, and packaging over the past 5 years that still remain on the market. Our proxy is the sum of the number of new brands launched and/or brands with changes in blend, grinding and roasting pattern, and packaging in the past 5 years that are still on the market divided by the quantity of firms studied, if is greater than averaged the firm is considered innovative and encoded as dummy variable 1, if not encoded as dummy 0.

**Internal governance structures:** To measure these three structures (monetary, bureaucratic, and community incentives), we identified four predominant organizational practices, which result in a single question or more, depending on the level of complexity involved. These scales were also dichotomized into dummy variables. To identify the elements of coordination for each firm (the structures of internal governance) we adopted the following procedures: i. Measurement of the intensity of adoption of practices for each firm, (plus the quantity of practices adopted); ii. Sum of the quantity of practices adopted by all firms, divided by the number of respondents; iii. Comparison between the practices of each
firm and the sample average. We classified firms with values greater than or equal to the average of the sample as "1", because they presented that governance structure in a predominant manner (high intensity).

**External governance structures:** we divided the measurement into upstream variables, focusing on two main inputs (green coffee and packaging), and downstream variables, the sale of roast and ground coffee. For each relationship, respondents provided the percentage of production, in order to detect plural forms present in relationships, purchases, and sales that used every external governance structure—the spot market, hybrid forms, and vertical. We dichotomized the variables as 0 or 1, where "0" represents the absence and "1" the presence of a given structure.

After treating variables related to governance structures, we performed an analysis using Qualitative Comparative Analysis (QCA).

**RESULTS AND DISCUSSION**

The presentation of the empirical results is divided into four parts in order to facilitate understanding: 1) sample characterization; 2) internal governance structures; 3) external governance structures; 4) relationship between the two governance structures.

**SAMPLE CHARACTERIZATION**

Of the companies surveyed, 115 are small and produce up to 250 bags of coffee per month, 43 are medium (up to 500 bags per month) and 56 are large, averaging more than 500 bags per month. 78% of firms have a strong presence on the regional market, 11% participate on the national market, 9% on the local, and only 2% sell on the international market. On average, companies in the sample have operated in the marketplace for 38 years, with 70% having been in operation for more than 20 years; the oldest company was founded in 1917. Of the companies surveyed, 93% are family-owned, with administration mostly also centered on the family.

Most firms, 94%, have a single plant where they carry out their entire production; another 4% produce a portion in their own factory and outsource the rest. The main types of coffee produced, in order of importance in terms of sales percentage. It is observed that traditional coffee accounts for the greatest share for 94% of the firms, but gourmet and superior coffee occupy second rank in sales for 19% and 12% of the firms, respectively. Besides coffee, 13% of the firms produce and/or sell other products, such as food, green coffee, filter coffee machines, and supplies.

Most of the small and medium firms surveyed produce on average 2 or fewer brands. The large firms produce on average up to 4 brands. Each brand can differentiate with respect to blends, roasting and grinding patterns, and packaging. Moreover, some large firms were found to have up to 15 brands and more than two dozen packaging models.

Regarding the launch of new brands in the past five years, small firms introduced the most new brands, blends, roasting and grinding patterns, and packaging. Other changes in packaging, such as design, color, and materials, were more introduced by large firms.

The firms in the sample were also asked about innovation processes. 58% made changes to their production process over the past five years. Of this set, 58% were carried out by firms new to the market, 28% by small, 13% by medium, and 17% by large firms. Specific examples given cited were: automated machines; non-polluting / eco-friendly roaster; reusable packaging; cold-powered grinder.

Other features, such as internal organization and external relations, will be discussed below.

**INTERNAL GOVERNANCE STRUCTURES**
Characterization of the internal governance structures of the firms interviewed

In terms of monetary incentive structures, we found that of the four practices analyzed, individual performance pay was the most common among the firms studied (64%), and the main area incentivized is the commercial (sales). The second most common practice was performance pay (7%) related to general positive results by the firm during the year (revenue, profit). Among firms adopting this practice, generally 100% of employees receive a share of the profits. In contrast, team performance is only emphasized in 1% of the firms. Outsourcing of some activities is found in the commercial or service areas (9%), or in the R&D department (4%). Such departments are present in 34% of the firms interviewed, mainly focused on developing new blends and roasting and grinding patterns.

Because the practice of individual performance pay was more widespread, the way this was measured within the bureaucratic structure was of greater relevance than other measures. 53% of respondents indicated that the measurement of individual performance was the most relevant, with the main form of measurement being individual goals set for individual employees. To measure firm performance, respondents cited billing and establishment of overall goals the most, whereas only 27% of the firms interviewed used career plans. Because most of the firms in the sample are small and family-run, many have flatter command structures (few hierarchical levels) and a lower level of formalization of jobs and salaries, hindering the establishment of career plans.

Asked about the formalization of production processes and activities undertaken by the company, 22% of respondents reported using defined processes. However, the programs related to quality developed by ABIC5 were the practices most commonly adopted in the bureaucratic structure, and almost all respondents reported some of the programs.

95% of the firms use the Purity Label, but only 32% use the Quality Control Program (QCP). According to some respondents, a major reason for the low level of adhesion is the high cost of implementing the QCP. 14% of respondents reported using other programs and certifications, such as Cafés do Brazil (ABIC for export), CODEAGRO, ISO 9000, ISO 22000, Biodynamic Institute (IBD), UTZ Kapes, Specialty Coffee Association, Origin, Fair Trade, and Rainforest Alliance. Finally, 80% of the firms interviewed employ specialists in the production process, as tasters or consultants (making or maintaining blends) and roast masters.

The second practice with a high rate of adoption in the bureaucratic structure was the planning of activities and strategies of the firm for the forthcoming year (81% of firms). In most cases, the family owners of the firm are in charge of this planning.

Regarding the practice in the community structure known as shared decision-making, we observed that many of the firms’ strategic decisions are focused on the owners, which shows a low level of shared decision-making with other employees and stakeholders. This can also be seen in responses to the question of who participates in the selection and development of new products, brands, blends, and packages. 81% of the sample responded that decisions about new products are taken by members of the family owners.

The proxies and results used to measure the sharing of information and values were: i. Shared workspace in 75% of firms surveyed; ii. 30% of firms offered social space such as: lounge, TV, leisure area (with barbecue, games), employee clubs (soccer field, fitness center), cafeteria; iii. Social Gatherings: 58% held social events for staff at least once a year.

We also inquired about communication channels in the firms. 58% use bulletin boards or an internal newsletter providing news and relevant information. 87% have some kind of system or form of communication where employees can present their suggestions for improvements and new ideas. Smaller firms cited informal daily conversations or direct contact with the board and meetings with staff, a factor of the greater intimacy in the smaller setting.
To communicate with customers, firms relied primarily on the contact phone number provided by the company (0800 and SAC) or electronic means (email and website), and secondly on contacts between sales representatives and customers at points of sale and product tastings. Professional incentives are only found in 35% of the firms interviewed, with special encouragement aimed at technical courses geared to the area of production, offered by institutions such as ABIC, Sindicafé (Coffee Industry Union), Senai (National Industrial Apprenticeship Service), and Sesi (Industry Social Service). Few respondents provide scholarships or stipends for colleges and MBAs, besides courses for administrative areas.

Moreover, the aspect of teamwork remains undeveloped by respondents, as already shown through the low rates of pay for team performance. Training and group dynamics sessions are offered by only 26% of respondents, most of which invest in training for handling production machinery and equipment, mainly during the implementation of new machinery. Some respondents, however, cited seminars for employees about job security, integration, and dynamics offered by the human resources department, and organized visits to coffee farms.

Another proxy used to measure teamwork was the frequency of meetings between the board of directors, management, and the production area. Respondents stressed that these meetings take place almost daily in those three levels (28% in the directors, 26% in management, and 27% in the production area), and often occur informally throughout the day. Note that in the directors level the monthly frequency of meetings was the first case most often cited (36% of respondents).

Analysis of the results of internal governance structures: Boolean logic

After we characterized the firms, we entered the three governance structures analyzed (monetary incentives, bureaucratic, and community) into fs/QCA 2.0 software to identify which structure(s) of governance or their combination promoted greater innovation in firms. The resultant Truth Table is shown as Table 1.

<table>
<thead>
<tr>
<th>Monetary</th>
<th>Bureaucratic</th>
<th>Community</th>
<th>Frequency</th>
<th>I</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>30</td>
<td>0</td>
<td>0.6333</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>35</td>
<td>0</td>
<td>0.4857</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>35</td>
<td>0</td>
<td>0.4285</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>0.3636</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>11</td>
<td>0</td>
<td>0.3636</td>
</tr>
</tbody>
</table>

Each row in the Truth Table indicates a combination of structures, where 1 means the presence of a particular governance structure and 0 indicates its absence. The frequency column shows the number of firms that had combinations on each row, and the consistency of innovation related to the different combinations of governance structures, to indicate those with greater relevance. The column for innovation in software (I) is completed only after controlling for frequency below 3 cases and consistency above 0.75, according to Ragin (2008).

Table 1 shows the combinations of internal governance structures that led to high innovation capability in some firms. Note that these combinations generated in the Truth Table do not show consistency above 0.75 for this sample after we removed frequencies below 3 cases. However, based on Table 3, we can observe that the combination monetary * incentive * bureaucratic * community demonstrated greater consistency and generated high innovation in the firms presenting with this combination. The consistency observed with a frequency of 30 firms is 0.63; in other words, 63% of the firms presenting this combination of internal governance structure demonstrated high innovation.

This result corroborates our own hypothesis 1 because the firms that adopt an
**internal plural governance structure** exhibit greater innovativeness. This result corresponds to 9% of the total sample, but if we consider only firms with high innovation, this combination would represent 23%. Firms with high innovation are those that demonstrated product innovation greater than the overall average of the sample. Table 1 also shows other combinations of governance structures that promote high innovation at lower consistencies.

The second best internal governance structures present the community structure only: consistency is 0.48 and the frequency is 35 firms. We note that the frequency is higher than the other two governance structures (35 rather than 30), but the consistency is lower (0.48 to 0.63). This means, in terms of the percentage, a decreased causal relationship. This result may indicate that the community structure is one of the most important for innovation, presenting the strongest causal relationship. Thus, more than half of the firms that adopted the single community structure do not present high innovation, corroborating Grandori and Furnari’s findings.

In addition, the production systems of coffee roasting and grinding firms do not need a large number of people, which reduces the hierarchical levels and the number of people and departments. This facilitates constant communication and interactions among employees and managers, which offered respondents opportunities for them to offer suggestions and new ideas. However, practices such as teamwork are barely present in these firms, and decisions are still centered on the owners. Capacity building and training of employees also occur less frequently.

Thus, we note that the **monetary incentives** and **bureaucratic governance structures** showed a weak causal relationship with innovation. But they are necessary, because, according to Grandori and Furnari (2010), in low complexity firms and in low-uncertainty sectors (traditional and not technology-intensive) such as the subject of this study, innovation begins to enter into the routine, and therefore the overall governing architecture should be improved through rules and incentives.

The third best internal governance structures present a mix of the monetary and community structure: consistency is 0.42 and frequency is 35 firms. We note that when the monetary structure is added, the number of firms remains static (35), but consistency is somewhat reduced (0.48 to 0.42). This means, percentagewise, a decreased causal relationship. This result is noted by Grandori and Furnari (2010) for structures of large firms.

Therefore, based on our analysis, which highlights the causal conditions attached to a particular outcome, we can infer that the combination of internal governance structures (monetary incentives, bureaucratic, and community) lead firms to demonstrate greater innovation, but that internal governance structures alone do not generate an ideal consistency.

**EXTERNAL GOVERNANCE STRUCTURES**

The upstream transactions we analyzed were the purchase of major inputs like green coffee and packaging, and the downstream transactions were the sale of roasted and ground coffee. The governance structures studied in these three transactions were: i. Market; ii. **Vertical integration;** and iii. **Hybrid forms.**

First, we will present the practices adopted by the companies interviewed. Next we present an analysis of the relationship between external governance structures and innovation.

**Characterization of external governance structures of the firms interviewed**

Of all the respondents, 81% buy green coffee from individual producers, followed by cooperatives (53%), individual producers (77%), brokers (52%), exporters (30%), and other types of suppliers such as auctions and warehouses (10%). Most of the respondent firms (51%) employ between 1 and 20 suppliers. Of these, 10% cited having 10 suppliers. Some roasting firms (6%) produce all the green coffee they process. However, the main governance structure cited was the market (93% of the respondents had some percentage of market
structure), because respondents can find raw quality coffee for a good price on the spot market. Furthermore, the price volatility of green coffee often precludes the signing of contracts between producers and roasting firms, insofar as producers can get better prices for their product without them.

In the case of packaging, the external governance structure adopted by 97% of respondents is the spot market. The firms interviewed mostly have 1 or 2 suppliers (72%); the highest number found in the sample was 7 suppliers, which paints a different picture than that of green coffee. The most prominent reason for this structure is the possibility of choosing suppliers on the market who offer packaging that meets the needs of the firm at suitable prices—it is more economical for the firm to buy than to produce its own packaging. Furthermore, respondents cited great difficulties in switching suppliers if necessary.

The most important distribution channels for the firms interviewed are retail (supermarkets or grocery stores), and the food service or hotel and catering industry. External governance structures via the spot market were most common among the respondents. The reasons cited for this choice are the same: economies of scale in using the market, namely the ease of finding raw material at any desired time.

### Analysis of the results of external governance structures: Boolean logic

The three external governance structures analyzed were the spot market, vertical integration, and a hybrid form. The products studied were: i. Upstream: green coffee and packaging; ii. Downstream: roasted and ground coffee.

The solutions generated by the software are shown in Table 2. After applying cutoffs for frequency and consistency, we observed that no single combination was consistent (i.e., greater than 0.75). This result shows that external governance structures alone do not generate an ideal consistency.

<table>
<thead>
<tr>
<th>Vertical green coffee</th>
<th>Market green coffee</th>
<th>Hybrid green coffee</th>
<th>Vertical packaging</th>
<th>Market packaging</th>
<th>Hybrid packaging</th>
<th>Vertical coffee</th>
<th>Market coffee</th>
<th>Hybrid coffee</th>
<th>Frequency</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>0.6000</td>
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<td>1</td>
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<td>0</td>
<td>0</td>
<td>1</td>
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<td>1</td>
<td>1</td>
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<td>16</td>
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<tr>
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<td>0</td>
<td>1</td>
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<td>0</td>
<td>27</td>
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</tr>
<tr>
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<td>1</td>
<td>0</td>
<td>11</td>
<td>0.3636</td>
</tr>
</tbody>
</table>

The main combination presented involved governance structures through the market. This situation can be explained, according to Williamson, by low levels of asset specificity, because as emphasized by interviewees, both green coffee and packaging are easily found on the spot market with the attributes needed to develop the firms’ innovative products. Moreover, both green coffee and packaging are assets with a low measurement cost, meaning their quality and attributes are easily verified by buyers (Barzel, 2002).

We observed that the relationship between the roasting firms surveyed and their suppliers and customers is an impersonal one, characterized chiefly by the transfer of ownership of a good or service and encouraged by pricing mechanisms and high flexibility, because one party can easily find other partners on similar terms. These characteristics are typical of the market, so the sharing of resources and knowledge is not highly valued by many respondents.

However, we also note that the combination vertical green coffee * market green coffee * market packaging * vertical roasted and ground coffee * market roasted and ground coffee * hybrid roasted and ground coffee presented a consistency of 0.60, although the frequency of this combination was 5 firms.
The second and third combinations, in terms of consistency, are respectively:

- **vertical green coffee * market green coffee * market packaging * market roasted** — consistency of 0.56 and frequency of 16 firms;
- **market green coffee * market packaging * market roasted and ground coffee * hybrid roasted and ground coffee** — consistency of 0.40 and frequency of 27 firms.

We observed that the two combinations share plural external structure governance. With a consistency of 0.56, the plural structure “vertical green coffee * market green coffee” has a greater influence on innovation capability than the plural structure “market roasted and ground coffee * hybrid roasted and ground coffee”, with a consistency of 0.40, even though the latter showed higher frequency.

These results corroborate our hypothesis 2 and the literature on innovation. This is especially true for the combination market green coffee, market packaging, market roasted and ground coffee, with a frequency of 63 firms but a consistency of just 0.38. These empirical results show the important of external relationships for firms’ innovation, and point the way to increasing innovation in this sector.

The survey also questioned how companies updated their knowledge about the industry. In order of importance, 56% of firms highlighted mass media such as television, internet, and radio as the main sources of information. In second place were trade associations related to the sector, followed by suppliers and the monitoring of the competitors’ strategies.

**INTERACTION BETWEEN INTERNAL AND EXTERNAL GOVERNANCE STRUCTURES**

Aiming to relate the interaction between internal and external governance structures, we now analyze the relationship between the two. The Table 3 shows the Truth Table derived from our analysis of the relationship between internal and external governance structures.

<table>
<thead>
<tr>
<th>Monetary</th>
<th>Bureaucratic</th>
<th>Community</th>
<th>Vertical green coffee</th>
<th>Market green coffee</th>
<th>Hybrid green coffee</th>
<th>Vertical packaging</th>
<th>Market packaging</th>
<th>Hybrid packaging</th>
<th>Vertical coffee</th>
<th>Market coffee</th>
<th>Hybrid coffee</th>
<th>Frequency</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>1</td>
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<td>1</td>
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</tr>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>0.570</td>
</tr>
</tbody>
</table>

Table 3 presents the four combinations which generate a high rate of innovation and consistency above 0.75, after frequencies below 3 were removed. These results show that combinations of internal and external governance structures increase innovation, indicating that the two structures in this case are complementary. These combinations represent 8% of the total sample and 22% of innovative firms. The combinations were:

\[
\text{Innovation} = (\text{monetary} \ast \text{bureaucratic} \ast \text{community} \ast \text{vertical green coffee} \ast \text{market green coffee} \ast \text{hybrid green coffee} \ast \text{vertical packaging} \ast \text{market packaging} \ast \text{vertical coffee} \ast \text{market coffee} \ast \text{hybrid coffee})
\]

Table 3 – Truth Table: Internal and external governance structure
coffee) + (~ monetary *~ bureaucratic * community *~ vertical green coffee * market green coffee *~ hybrid green coffee *~ vertical packaging * market packaging *~ hybrid packaging * vertical coffee * market coffee * hybrid coffee ~)

The combination monetary * bureaucratic * community * vertical green coffee * market green coffee * market packaging * market coffee presented the consistency closest to 1.00; in other words, the four firms presenting this combination show great innovation. We noted that it is a plural structure, with both internal (monetary * bureaucratic * community) and external governance (vertical green coffee * market green coffee).

Table 4 shows the empirical results from our software. The software analyzed the data and removed the governance structures which are absent from the four combinations or which present a weak relationship with innovation. The main combinations are shown in Table 4.

<table>
<thead>
<tr>
<th>Combination</th>
<th>Raw coverage</th>
<th>Unique coverage</th>
<th>Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monetary Incentives * Bureaucratic * Community * Market green coffee *~ Hybrid green coffee *~ Vertical packaging * Market packaging *~ Hybrid packaging *~ Vertical coffee * Market coffee *~ Hybrid coffee</td>
<td>0.1097</td>
<td>0.1097</td>
<td>0.9000</td>
</tr>
<tr>
<td>Monetary Incentives *~ Bureaucratic * Community *~ Vertical green coffee * Market green coffee *~ Hybrid green coffee *~ Vertical packaging * Market packaging *~ Hybrid packaging *~ Vertical coffee * Market coffee * Hybrid coffee</td>
<td>0.0365</td>
<td>0.0365</td>
<td>0.7500</td>
</tr>
<tr>
<td>Monetary Incentives * Bureaucratic * Community *~ Vertical green coffee * Market green coffee *~ Hybrid green coffee *~ Vertical packaging * Market packaging *~ Hybrid packaging *~ Vertical coffee * Market coffee * Hybrid coffee</td>
<td>0.365</td>
<td>0.365</td>
<td>0.7500</td>
</tr>
</tbody>
</table>

Coverage solution: 0.1829  
Consistency solution: 0.8333

Innovation = (Monetary * Bureaucratic * Community * Market green coffee * Market packaging * Market coffee) + (Community * Market green coffee * Market packaging * Market coffee * Hybrid coffee) + (Monetary * Bureaucratic * Community * Market green coffee * Market packaging * Vertical coffee * Market coffee * Hybrid coffee);

One part of hypothesis 3 is confirmed, namely that internal and external governance structures are complementary for the innovation process, but not necessarily the two types of structures are plural forms. In the first combination only internal governance is plural; in the second only external governance is plural, in the transactions for roasted and ground coffee; and in the third, both internal and external governance structures presented plural forms.

This result may also be related to firms’ behavior in this sector; due to high competition and low trust in relationships, as highlighted in the context of the sector and external item governance structures, firms find it difficult to share information about their production process and products with other members of the chain; only 11% of respondents reported some kind of agreement with other organizations to develop new products and production processes. Four of these have agreements with advertising agencies; one with packaging suppliers; one with the Universidade Federal de Lavras (UFLA), EMBRAPA, ABIC, EMATER and the government PESQ program; one with Ital; and one with a research institute that analyzes their products.

Based on these analyses, we confirm that innovation is related to the interaction between both internal and external governance structure.

CONTRIBUTIONS AND CONCLUSION

This study contributes to the New Institutional Economics by showing that firms...
which adopt a mix of governance structures are more innovative than those using single structures. In addition, this work shows that complementarity between plural internal and external governance structures influences firms’ innovativeness. This study takes an important step forward in the literature by theorizing and empirically examining the heterogeneity of firms as well as the combinations that matter for their innovativeness.

Our empirical findings corroborate our theoretical model, which proposes that the governance structures chosen by firms can be sources of innovation. Plural governance structures—which combine monetary incentives as well as bureaucratic, community (internal structures), and external relationships with interdependent businesses—seem to offer better results for innovation. This study dealt with the worldwide coffee roasting and grinding industry, which is relevant to the Brazilian context due to the industry’s importance in the national economy. The empirical results collected from the coffee roasting and grinding firms show that many of the innovations observed were incremental in nature, and involved changes to packaging as well as the qualities and nature of blends.

The initial findings suggest that plural governance structures better promote innovativeness, whether internal or external. Although separate analysis of internal and external governance structures does not indicate great consistency (above 0.75), we note that innovative companies presented a plural governance structure. Our theory and findings further suggest that innovation is more frequent in firms presenting greater flexibility, internal and external communication patterns, and incentives to employees, but which also have employ practices to improve processes. These findings should assist firms shepherd new ideas from inception through to implementation and positive outcomes.

We also found that the complementarity between the internal and external governance structures for coffee roasting and grinding firms was significant in predicting innovativeness, because the combination between internal and external structure showed a greater causal effect than either structure individually.

Despite the economic relevance of the sector it has a comparatively low rate of innovation, since most firms adopt a single governance structure for both internal and external. While more empirical research is needed on the subject, it can be inferred that these firms’ rate of innovation could be improved if they further develop their governance structures. These results are important because they encourage firms to target their efforts at improving the rate of innovation in the industry and becoming more competitive in their markets. As a by-product, the study offers guidance to the development of public and private policies to direct the choices of governance structures for these organizations. One such example would be the development of capacity-building and training courses that allow each organization to examine its context and optimally implement the elements of various structures, and thus stimulate greater innovation.

The empirical data analyzed in this study is focused on one sector, which limits the inferences which can be made for others. A suggestion for future research would be to expand this study to other sectors. Another contribution could come from the construction of other indicators of innovation besides the one addressed by our survey (number of brands launched). Further research could also seek to understand whether the governance structures that enable greater innovation capacity also offer greater efficiency in terms of production and transaction costs—that is, whether improvement in innovation capacity within certain structures can also translate to decreased or increased costs for firms.

REFERENCES


Metcalfe, J. S. Equilibrium and evolutionary foundations of competition and technology


1 Based on this definition of innovation, this paper does not consider current innovations which were not implemented or abandoned by the firm, although these situations are considered by the OECD Oslo Manual (2005).

2 This research was funded by the Foundation for Research Support of the State of São Paulo (FAPESP).

3 QCA uses the inference of Boolean algebra and was chosen for this study because it allows us to relate firms’ internal and external governance structures with innovativeness. To identify structures that most affect innovation, this method identifies sets of firms with high performance and associates the combinations of attributes from Boolean algebra, which allows for the logical reduction of numerous conditions causal to a limited set of configurations that lead to the result (Fiss, 2011).

4 The research adopted five years as an observation period for questions of innovation due to the long life cycle of the product studied. This may lead firms to innovate less frequently (OECD, 2005).

5 ABIC promotes continuous improvement of quality, consume education, and the encouragement of innovation and integration of the supply chain. Important initiatives are the Purity Seal and Quality Seal QPC (Program and Quality Control). For more on the purity label and its influence on the organization of the industry, please see ABIC Case Study (Saes & Farina, 2007).