Brazilian Competitiveness on International Trade

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Abstract

In recent years, Brazil benefited from foreign trade expansion and its exports of goods grew by 16.5%. If this strong growth trend keeps up for the next years, today’s bottlenecks may have a negative impact on the competitiveness of the country’s products in the global market. This is especially critical for one of the main “green fuels” producers in a scenario where the demand for this energy source grows due to rising oil prices and environmental concerns. Based on a survey that collected data from 250 Brazilian exporters, this study focuses on the constraints that reduce the competitiveness of exports. This study differs from previous ones in that it considers the professionals directly involved with export activities and evaluates different aspects, including logistics, operations, taxes, legal, bureaucratic and informational ones. Results show that the most important constraints strongly affect costs and delivery reliability.

Introduction

Brazil’s share of foreign trade has been growing year after year, but despite the country’s economic significance, its foreign trade volumes answer for a mere 1.1 percent of global merchandise exports (23rd place in the world ranking) and .6 percent of commercial services exports (35th place), according to World Trade Organization data (WTO, 2005).

This project aims to develop and apply a method to identify and quantify the main aspects affecting Brazilian exports’ competitiveness. Before developing the methodology, we attempt to identify the main aspects associated with the exportation process, including flows,
procedures, laws, regulators and taxation. An extensive review of the domestic literature, based on governmental websites and other research reports, allowed preparing a comprehensive guide to the Brazilian exportation process, which stands as a byproduct of the study. This understanding of the Brazilian exportation process drove a search for bottlenecks in the domestic and international literature and allowed identifying a series of constraints that have been categorized into nine groups. We then developed and applied a methodology capable of selecting the main bottlenecks and measuring the impact of each set of bottlenecks on exports performance.

Next, the article provides a theoretical review of export bottlenecks, discusses the development of the investigation method, provides information on the selected sample and presents the main results, discussions and conclusions of the study.

Theoretical Framework

The purchase and sale of goods and services across nations can be observed since the age of the great navigations, but it was in the 18th Century that its theoretical foundations were laid in the form of the law of comparative advantages as proposed by David Ricardo. According to Ricardo, in order to achieve efficiency gains and minimize costs, countries should export those items they produced most efficiently and import those where they were less efficient relative to other participants in foreign trade (CASSOL; ALPERSTEDT; LEITE, 2004).

But it was since the second half of the 20th Century that foreign trade relationships grew significantly, as Table 1 shows. According to Ruiz (2004), this rise has to do with the constant development of information technology and of means of communication and transportation. But factors such as saturated domestic markets and the search for better profit margins can also be associated with it.
Trade openness has a series of advantages and disadvantages; one topic is the link between foreign trade and economic development, although the World Trade Organization claims that no empirical evidence exists of such a link. Another point lies in a country’s trade balance: where positive, it creates a currency inflow that can be used to pay debt in the same currency with no foreign exchange effects. For a country such as Brazil, with US Dollar-denominated foreign debt equivalent to 21.4 percent of GDP (BACEN, 2006); the bigger the trade surplus, the better.

Brazil’s performance has been improving year after year, but, according to the World Trade Organization (WTO, 2005), Brazilian goods exports still answer for a mere 1.1 percent of world exports (placed 23rd in the world ranking of goods exporters) and .6 percent of services exports (35th place in the world ranking of services exporters). As for imports, Brazil is responsible for .7 percent of world goods imports and .9 percent of services imports, placing 28th in both rankings.

In terms of total traded volume, Brazil answers for .91 percent of all goods and services imports and exports.

Therefore, given foreign performance mismatched with the country’s economic relevance, it is important to determine the reasons that prevent Brazilian exports from growing, with the following questions in mind:

- What economic factors influence Brazil’s performance in exports?
• What factors have a negative influence on Brazil’s performance in exports?

• Are some factors more influential than others? How so? What are they?

• How to represent these factors?

Factors with an Impact on Exports Performance

A review of the Brazilian and international literature enabled identifying a series of factors impacting exports performance.

Although all of the factors considered here derive from an extensive literature review, no study was found that investigated them all. The reason seems clear: to avoid tiring respondents and causing them to lose motivation (CARNEIRO; DIB, 2006).

Nine factors have been identified:

1) Macroeconomic

2) Marketing

3) Idiosyncratic

4) Logistic

5) Bureaucracy

6) Legal

7) Tax

8) Informational

9) Institutional
**Macroeconomic Factors:** bottlenecks associated with the aggregate behavior of the economy as concerns production, income generation, use of public resources, price behavior and foreign trade. This comprehends items relative to: monetary policy, such as credit and interest-rate regulations; purchasing power, that is, a market’s financial capacity; national GDP; balance of payments; exchange rate; inflation; and trade, tariff, and international freight agreements and foreign trade-promotion policies.

**Marketing Factors:** in the process of internationalization, firms must determine whether the market they are about to enter is attractive and decide on the marketing strategy that best meets the conditions of the new target-market. As such, an early step lies in assessing a market’s attractiveness by identifying barriers against entry, the bargaining power of suppliers and buyers, the presence of substitute goods and the level of domestic competition (PORTER, 1979a). Firms must then align their marketing strategies, making adjustments to products, promotions, prices and distribution channels (Kotler, 2000, p. 401). Finally, it is important to determine how to meet pre- and post-sale needs. We therefore use this category to hold items relative to constraints firms face in any of those respects.

**Idiosyncratic Factors:** by definition, organizations have unique characteristics and functions. These resources and routines are uneven across firms and regarded as a source of their performance; thus, firms with superior resources will have superior returns (PETERAF, 1994). But profits generation is association with how difficult it is for the competition to appropriate those same resources and how sustainable they are in the long run. Grant (1991) argues that the latter arises from (1) highly complex imitation and migration, (2) low imitation speed, (3) low rates of depreciation / obsolescence of the analyzed units. But even highly sustainable and exclusive resources lose return over time, so that firms must pursue renovation and innovation. Therefore, this category gathers aspects relative to firms’ unique and internal resources. These may be: physical, such as plants, production capacity, input,
equipment; human, such as skilled technical and managerial labor, administrative vision, consultancy; and organizational, such as internal routines and the performance of areas and processes.

Logistic Factors: as defined by the Council of Logistics Management (2004), logistics is “...a part of the supply-chain management process that plans, implements and controls the direct and reverse flow and the efficient and effective storage of goods, services and related information, from the point of origin to the point of consumption, in such a manner as to meet consumer needs.” As such, logistics-related factors must be taken to comprehend factors associated with secondary packaging, transportation, freight handling, and storage procedures, and the availability of the supporting infrastructure for those activities.

Bureaucratic Factors: bureaucracy is deemed to be a series of procedures that prevent effective and efficient execution of routines. Weber, however, has a different concept of the term and uses it in reference to organization by means of “previously established written standards and regulations” to achieve maximum organizational efficiency. Therefore, bureaucracy involves organizing the behavior and performance of human resources by means of standards, communications, the division of labor, authority hierarchy, and activities specialization. Still, bureaucracy may be dysfunctional in aspects such as standards internalization, excessive formalism and documentation, depersonalization of responsibilities, conformity with ineffective routines, and authoritarianism. As a result, bottlenecks associated with procedures, standards, documentation and tasks segregation are included in this group.

Legal Factors: The doctrine of Montesquieu assigns three vital functions to the State, one of which is to establish “rules for general and impersonal rights that all must abide” (FILHO, 2001, p.153). These rules of conduct that the State imposes on its citizens, who in turn agree to them, giving them legitimacy, are the Law. The Law is important for democracy and
governability. But, on occasion, the Law may be: questionable, juxtaposed, unclear and difficult to understand, subject to frequent change; not applicable to market practices. Therefore, the legal factors category includes legislation-related bottlenecks with a bearing on foreign trade in general.

*Tax Factors:* The State is a sovereign entity that, in the exercise of its sovereignty, requires citizens to provide the funds it needs to survive. Under the principle of competencies, the power to establish and levy taxes is divided among the Union, the States and Federal District, and Municipalities, thereby decentralizing political power. But this very same decentralization mechanism generates tax-related complexities insofar as it allows for different tax rates. Furthermore, the Brazilian tax load is one of the world’s highest, at around 40 percent of national GDP. Thus, this category comprehends bottlenecks associated with taxes, with taxpaying complexities, and with the burden on exports.

*Informational Factors:* Information systems are computerized systems intended to collect, process, transmit and disseminate information to users. Such systems help simplify processes by replacing paper files with their electronic counterparts, facilitating turning data into information, simplifying the location of files, and reducing storage space. But for these benefits to be realized, systems must be implemented in such a manner as to meet users’ needs in a simple and didactic way, with high processing capacity and easy maintenance. Based on this description, bottlenecks in this group are those associated with the information systems involved in the exportation process.

*Institutional Factors:* Institutions are forms of social organization whose main purpose is to control the conduct of individuals and social routines. Institutions may be of different natures, but this study will focus on those, whether public or private, involved with the foreign trade process. The highlighted institutions determine and provide the means that best serve to
execute processes and activities associated with exportation and importation. Therefore, problems that reflect a lack of skill, ethics or organization on the part of the institutions directly involved with foreign trade, that is, SECEX, SRF, BACEN, banks operating foreign exchange transaction, and other Consenting Agencies, have been considered as institutional factors.

*Moderating Variables (Affecting the Level of Impact Caused by the Identified Factors)*

The literature review also showed that certain variables change the impact of the described factors on exportation performance, including:

*Firm Size:* The literature indicates a difference in how exporters of different sizes perceive the various bottlenecks, but researchers have not come to a consensus on this point. Mayo (1991) pointed out that small firms are more prone to tolerate unethical procedures when their financial health is at stake. Small and mid-sized firms were also more sensitive to constraints created by bureaucracy, lack of incentives and trade barriers (BARKER; KAYNAK, 1992). Leonidou (1995a) also identified lack of managerial dedication, lack of export financing, low staff qualification to operate in the foreign trade process, trouble offering post-sale services, and tariff and non-tariff trade barriers as bottlenecks that firms of different sizes perceive differently. Katsekias and Morgan (1994) in a survey with Canadian firms, found no conclusive results on the fact that larger firms show higher exports levels, even though they have more resources, capacity and scale available. They also failed to obtain statistical significance for the fact that small businesses perceive greater difficulty collecting information and communicating it to foreign markets and adapting products to them, as well as logistic constraints. Based on all this, it is important to determine whether this factor is relevant to how the researched bottlenecks are perceived.
**Exportation Experience:** Firms with greater experience exporting appear to be less uncertain towards exportation, as they are better aware of the mechanisms available. For them, pricing and access to financing are the most troublesome items (KATSEKIAS; MORGAN, 1994). Out of the 24 constraints on exports Leonidou (1995a) researched, one third show different results across firms with different levels of exposure to exportation, as follows: different consumer habits, language and communication issues, trouble offering competitive prices, staff unskilled in the exportation process, lack of managerial dedication to exportation, lack of export financing, lack of marketing information on the target-market. Ortega (2003) found that firms with greater exportation experience tend to regard the firm’s internal constraints as the most difficult, while those with less experience regard marketing-related factors as most critical. As such, this is an interesting variable to include in the analysis.

**Industry:** Industry affects the firm internationalization process (TRIMECHE, 2002) and, as a consequence, how exporters perceive bottlenecks. Still, this aspect has been little explored. Leonidou (1995b) found that securing appropriate representation in the target-market is more complex for consumer-goods makers, but only one of the 24 researched bottlenecks showed a difference. The Brazilian survey done by the National Confederation of Manufacturers in 2002 also found evidence of industrial differences in terms of international freight, access to export financing, perception of the tax bureaucracy, trouble recovering tax credits, and access to exports-promotion services. As a result, investigating the impact of this moderating variable is also important.

**Freight-type:** Freight-type is listed in the COPPEAD Logistics Studies Center’s 2004 Logistics and Foreign Trade Survey as a factor that influences the perception of foreign trade players. According to the survey report, exporters using bulk freight and containers show different logistic needs; the former need heavy output loading/unloading infrastructure, as they work with low-margin, high-volume goods; the latter require agility, low damage levels
and on-time delivery. Bulk products are usually agricultural, while those shipped in containers are more expensive, lower-volume goods. The survey comprehended 101 firms, either exporters or importers, and was descriptive, as the sample was not probabilistic. Because the sample found differences in how these two groups perceive the matter and this is a probabilistic study, we decided that it would be interesting to investigate whether or not this is a generalized view.

**Exports Performance:** We looked into how to measure exports performance. The literature regards performance as a multidimensional construct of complex measurement. It depends on stakeholders’ view on the meaning of performance, on the analytical unit, on the measurement period and on the variables used to represent it. (CARNEIRO; DIB, 2006). This study chose to analyze historic performance, with the exports of small, mid-sized and large business as analysis units. Because the purpose of the study is to investigate the impact of factors on Brazil’s foreign trade, the concept of performance used is the government’s, measuring foreign trade with the following indicators: volume and FOB worth of Brazilian exports, annual rate of change of the FOB worth of exports, FOB worth-to-GDP ratio, FOB Brazil-to-FOB worldwide ratio. As the survey will be done with businesses, the last two indicators cannot be used. In addition, the fact that these indicators are relative to Brazil’s GDP and global exports renders them subject to factors this study does not account for, which again justifies not using them. But because the five variables are correlated, they should yield similar results.

A simplified measurement, instead of a more complex and careful selection of data may increase the error in analytical models because of the weakly represented performance construct. But the selected variables do represent the view we intend to measure. Therefore, in light of the measurement constraints, this study uses the percentage of sales derived from exports to represent the exportation performance construct.
Development of the Questionnaire

Based on the literature review, we identified 172 bottlenecks, 26 of which associated with marketing aspects, 15 with macroeconomic ones, 17 with internal ones, 31 with logistics, 36 with bureaucracy, 11 with legal aspects, 9 with tax aspects, 9 with informational aspects and 18 with institutional aspects.

The first draft of the questionnaire was divided into ten sections, one for each of the factor groups mentioned above and one with census questions. They were placed at the end of the questionnaire because by then respondents would be better aware of the purpose of the study and more open to answering them (SEKARAN, 2000).

All 172 bottlenecks were transcribed in such a way as to not form sentences more than 20 words in length and associated with the Likert 5-point scale: “not a problem”, “small problem”, “problem”, “major problem” and “critical problem”, after the suggestion of Wanke, Fleury and Hijjar (2005); for the sake of convenience, a sixth choice — “not applicable” — was also included in anticipation of cases where respondents were unfamiliar with the bottleneck in question or had no opinion about it. We decided to use an ordinal scale because this is the scale that best represents constructs (PEDHAZUR; SCHMELKIN, 1991) and because the scale had already been tested in a previous study.

In order to validate understanding of the questions, identify bottlenecks that the literature does not point out and make sure that the variables were correctly associated with their sections, we held a workshop with representatives from the exports departments of 10 firms operating in Brazil, the president of exporters association PROCOMEX, a representative from the Applied Economics Research Institute and Fundação Getulio Vargas professors, who all made several suggestions to improve the questionnaire, including the elimination of three questions.
Despite these improvements, it a questionnaire with 169 questions was clearly not feasible. We then mounted an additional effort to reduce and integrate questions. To this end, another workshop was held with the authors and six Production and Operations professors from Fundação Getulio Vargas’s São Paulo Business School (FGV EAESP). The changes due to this second workshop include reducing the number of questions to 67, mainly by consolidating similar questions, and changes to the labels of the five Liker scale points to “no impact”, “reduced impact”, “moderate impact”, “significant impact” and “critical impact”.

The survey pre-test involved inviting 25 exporting companies, 12 of which agreed to participate. The people in charge of Foreign Trade at these firms were instructed to complete the questionnaire, simulating as faithfully as possible the planned process for the full survey. Upon returning the completed questionnaires, the respondents were interviewed by phone, at which time we attempted to identify opportunities to improve the survey process and the questionnaire. The suggestions received include sending an introductory email to potential respondents to publicize the survey, changes to the email invitation and offering respondents early access to the results of the survey.

At this point, the questionnaire and the process were considered ready for deployment.

**Sample and Data Collection**

The survey sample was based on the data bank of the Catalog of Brazilian Exporters maintained by the National Confederation of Manufacturers (CNI - “Confederação Nacional da Indústria”). This data are available over the Internet at http://www.brazil4export.com, but not in aggregate form; as a result, we contacted CNI to obtain the data in electronic file format. The database includes contact information for the exporters; corporate name, address, telephone number, fax number, e-mail, name of the CEO and name of the contact person for
exports-related matters. It further lists the main products each company exports and annual foreign sales in US Dollars.

This data bank is based on exporters for the 2004-2005 period registered with Foreign Trade Operations Department (DECEX – “Departamento de Operações de Comércio Exterior”) of the Ministry of Development, Manufacturing and Foreign Trade (MDIC – “Ministério do Desenvolvimento, Indústria e Comércio Exterior”). The criteria for inclusion into this data bank are: (i) minimum 100 thousand US Dollars average annual exports in 2004-2005 and (ii) completion, by the firm of minimum contact information (corporate name, address and telephone/fax numbers). Based on this filter, the referencing system records firms responsible for over 90 percent of Brazilian exports in 2004-2005, totaling 10,245 companies. These amount to one third of all Brazilian exporters, of which the 50 percent smallest answer for less than .2 percent of exports. The base also represents 91.2 percent of all products exported during that period, so that the base is highly representative of the Brazilian population of exporters.

The negative aspect of using this data bank lies in its relative ambiguity. In addition to invitations returned because of non-existent email addresses, it is estimated that a significant portion of the email addresses found in the bank do not actually lead to firms’ Foreign Trade contact person.

As mentioned earlier, the invitation to participate was sent by email. Questionnaires were made available to respondents by means of the Sphinx questionnaire formulation and sending software. The program stores completed questionnaires and tabulates the data, which is made available on a Web server and can be remotely accessed.
At the end of the survey, 258 questionnaires had been returned, for a total of 2.5 percent of the sampled universe. Considering the previous comment on the ambiguity of the database, this percentage of answers may be considered appropriate for this case.

**Data Treatment and Analysis**

The data gathering process returned 258 questionnaires. Five of these were discarded for excessive missing observations — less than 40 percent of the questions on exportation process bottlenecks had been replied to — and six were discarded for lack of variation in each individual’s responses — standard deviation across variables under 0.5. The data were then subjected to two treatments. First, the dimensionality of each of the nine bottleneck groups was tested with exploratory factorial analyses. The factors originated in the first step were then assessed for reliability and convergent validity.

In the first treatment, the variables in each group of bottlenecks were subjected to exploratory Varimax orthogonal rotation factor analysis. The nine factor analyses had KMO measure of sampling adequacy over .9 and Bartlett test of sphericity significance (p< .1%), indicating that the factorial solutions found were adequate. Variables with factor load of .5 or less were eliminated for their low correlation with the factor. Logistic bottlenecks were divided into two factors, lack of infrastructure and lack of skilled services providers. Internal bottlenecks also divided into lack of resources and lack of awareness of the exportation process. Variables relative to bureaucratic aspects were grouped into customs-clearance process and documentation complexity. All other bottleneck groups were shown to be one-dimensional.

We then ran a confirming factor analysis on the twelve factors to determine the validity and reliability of the metrics. The measuring model displayed good adjustment level; only the Tucker-Lewis Index (TLI) was a little below the reference standard, as seen in Table 2.
Table 2 - Adjustment indexes of the measurement model

<table>
<thead>
<tr>
<th>Model</th>
<th>Hexadimensional</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-square</td>
<td>2843</td>
<td><em>.</em></td>
</tr>
<tr>
<td>Degrees of Freedom</td>
<td>1530</td>
<td><em>.</em></td>
</tr>
<tr>
<td>RMSEA</td>
<td>0.059</td>
<td>&lt;0.08</td>
</tr>
<tr>
<td>CFI</td>
<td>0.9</td>
<td>&gt;0.9</td>
</tr>
<tr>
<td>TLI</td>
<td>0.8</td>
<td>&gt;0.9</td>
</tr>
<tr>
<td>IFI</td>
<td>0.9</td>
<td>&gt;0.9</td>
</tr>
<tr>
<td>Normed Chi-square</td>
<td>1.86</td>
<td>&lt;2</td>
</tr>
</tbody>
</table>

The model proved itself valid and reliable. Extracted variance was in excess of 50 percent for all factors, indicators showed significant factor loads — at .1 percent —, and high correlation with their latent variables. According to Shook et al. (2004), significant and high factor loads and extracted variance over 50 percent are evidence of convergent validity. The constructs also proved different from one another; the squared interconstruct correlations were lower than the variances, Fornell and Larkin (1981) recommend. Finally, use of Cronbach’s alpha as a measure of reliability is inappropriate where the number of variables per construct is very high. (PEDHAZUR; SCHMELKIN, 1991, p. 94). Therefore, we calculated each construct’s compound reliability and they were all shown to be reliable over the reference figure of .7 suggested by Hair et al. (1998, p. 489). Table 3 shows the twelve factors identified and their respective extracted variances, compound reliability and squared interconstruct correlations.
# Table 3 – Validity and Reliability of Exportation Bottlenecks

<table>
<thead>
<tr>
<th>Factors</th>
<th>Reliability</th>
<th>Extracted Variance</th>
<th>Squared Interconstruct Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customs-clearance Process (1)</td>
<td>0.89</td>
<td>0.6</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12</td>
</tr>
<tr>
<td>Documentation Complexity (2)</td>
<td>0.86</td>
<td>0.7</td>
<td>0.3 0.0</td>
</tr>
<tr>
<td>Lack of Financial and Operating Resources (3)</td>
<td>0.80</td>
<td>0.6</td>
<td>0.2 0.1 0.0</td>
</tr>
<tr>
<td>Inadequate Information Systems (4)</td>
<td>0.85</td>
<td>0.6</td>
<td>0.4 0.2 0.0</td>
</tr>
<tr>
<td>Lack of Skilled Services Providers (5)</td>
<td>0.81</td>
<td>0.5</td>
<td>0.3 0.2 0.1 0.2 0.0</td>
</tr>
<tr>
<td>Lack of Infrastructure (6)</td>
<td>0.90</td>
<td>0.6</td>
<td>0.3 0.2 0.1 0.2 0.5 0.0</td>
</tr>
<tr>
<td>Institutional Aspects (7)</td>
<td>0.92</td>
<td>0.5</td>
<td>0.7 0.3 0.3 0.5 0.3 0.3 0.0</td>
</tr>
<tr>
<td>Lack of Awareness of the Process (9)</td>
<td>0.90</td>
<td>0.7</td>
<td>0.1 0.1 0.4 0.0 0.1 0.1 0.1 0.0</td>
</tr>
<tr>
<td>Legal (9)</td>
<td>0.95</td>
<td>0.8</td>
<td>0.4 0.4 0.1 0.3 0.2 0.2 0.4 0.1 0.0</td>
</tr>
<tr>
<td>Marketing (10)</td>
<td>0.88</td>
<td>0.5</td>
<td>0.1 0.1 0.5 0.0 0.1 0.1 0.1 0.7 0.1 0.0</td>
</tr>
<tr>
<td>Taxes (11)</td>
<td>0.83</td>
<td>0.7</td>
<td>0.1 0.1 0.1 0.1 0.1 0.2 0.1 0.0 0.3 0.0 0.0</td>
</tr>
<tr>
<td>Macroeconomic (12)</td>
<td>0.86</td>
<td>0.6</td>
<td>0.3 0.2 0.2 0.2 0.2 0.2 0.4 0.1 0.4 0.1 0.1 0.3 0.0 0.0</td>
</tr>
</tbody>
</table>

Given the reliability and convergent and discriminant validity of the proposed metrics, additive scales were computed to represent each construct. Each construct’s variables were added together and divided by the number of variables.

Once computed, the mean scales were compared to determine whether the different levels of importance were assigned to each bottleneck group. To this end, we investigated whether intercepts existed among the 99 percent confidence mean intervals (Table 4). The absence of intercepts allows stating with 99 percent confidence that all means were statistically different, which allows categorizing them in decreasing order.

Macroeconomic aspects — such as trade barriers, absence of export incentive programs, and interest rates — were the main bottlenecks in the exportation process. Taxation, legal aspects, lack of freight infrastructure and institutional aspects come next, also with significant importance. Difficulties associated with the customs-clearance process, the lack of skilled
services providers, producing the required documentation and the inadequacy of SISCOMEX and the Federal Revenue’s or Consenting Agencies’ systems were perceived as being of moderate significance. Finally, constraints associated with marketing strategy, lack of resources and lack of awareness of the exportation process were seen as the least important and lowest-impact bottlenecks in exports performance.

The literature review shows that the importance of each bottleneck can be influenced by the firm’s size, industry and exporting experience. As such, the scales were subjected to variance analyses. The first investigated whether the importance of each bottleneck type varied with form size. The number of employees was used as proxy for size. Snedecor’s Anova/F-Test was significant at 5 percent for lack of resources, legal aspects and macroeconomic aspects, indicating that size influenced at least one of the means. Lack of financial and operating resources had strong impact on micro and small businesses, but was moderate for mid-sized and large ones (Table 5). Legal and macroeconomic aspects appeared to be problematic for firms of all sizes, but large businesses were significantly less affected.

<table>
<thead>
<tr>
<th>Factors</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>99% CI Lower</th>
<th>99% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macroeconomic (12)</td>
<td>230</td>
<td>3.80</td>
<td>0.93</td>
<td>3.64</td>
<td>3.96</td>
</tr>
<tr>
<td>Taxes (11)</td>
<td>234</td>
<td>3.63</td>
<td>1.23</td>
<td>3.42</td>
<td>3.84</td>
</tr>
<tr>
<td>Legal (9)</td>
<td>239</td>
<td>3.54</td>
<td>1.11</td>
<td>3.35</td>
<td>3.72</td>
</tr>
<tr>
<td>Lack of Infrastructure (6)</td>
<td>157</td>
<td>3.49</td>
<td>1.05</td>
<td>3.27</td>
<td>3.71</td>
</tr>
<tr>
<td>Institutional (7)</td>
<td>185</td>
<td>3.32</td>
<td>0.94</td>
<td>3.14</td>
<td>3.50</td>
</tr>
<tr>
<td>Customs-clearance process (1)</td>
<td>170</td>
<td>3.31</td>
<td>1.03</td>
<td>3.10</td>
<td>3.52</td>
</tr>
<tr>
<td>Lack of Skilled Services Providers (5)</td>
<td>223</td>
<td>3.05</td>
<td>1.02</td>
<td>2.87</td>
<td>3.23</td>
</tr>
<tr>
<td>Documentation Complexity (2)</td>
<td>242</td>
<td>2.98</td>
<td>1.01</td>
<td>2.81</td>
<td>3.15</td>
</tr>
<tr>
<td>Inadequate Information Systems (4)</td>
<td>223</td>
<td>2.93</td>
<td>0.97</td>
<td>2.76</td>
<td>3.10</td>
</tr>
<tr>
<td>Marketing (10)</td>
<td>207</td>
<td>2.60</td>
<td>0.94</td>
<td>2.43</td>
<td>2.77</td>
</tr>
<tr>
<td>Lack of Financial and Operating Resources (3)</td>
<td>212</td>
<td>2.59</td>
<td>1.08</td>
<td>2.40</td>
<td>2.78</td>
</tr>
<tr>
<td>Lack of Awareness of the Process (9)</td>
<td>211</td>
<td>2.14</td>
<td>1.08</td>
<td>1.94</td>
<td>2.33</td>
</tr>
</tbody>
</table>
Table 5 – Comparison of means by firm size

<table>
<thead>
<tr>
<th>Scale</th>
<th>Size**</th>
<th>Mean</th>
<th>Size</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Resources</td>
<td>Micro</td>
<td>3.2</td>
<td>Small</td>
<td>3.1</td>
<td>0.0</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>3.1</td>
<td>Mid</td>
<td>2.4</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large</td>
<td>2.2</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mid</td>
<td>2.4</td>
<td>Mid</td>
<td>2.4</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large</td>
<td>2.2</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Legal Aspects</td>
<td>Mid</td>
<td>2.4</td>
<td>Large</td>
<td>2.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>Micro</td>
<td>4.0</td>
<td>Small</td>
<td>3.8</td>
<td>0.2</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mid</td>
<td>3.6</td>
<td>0.4</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large</td>
<td>3.2</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>3.8</td>
<td>Mid</td>
<td>3.6</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large</td>
<td>3.2</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Macroeconomic Aspects</td>
<td>Mid</td>
<td>3.6</td>
<td>Large</td>
<td>3.2</td>
<td>0.4</td>
<td>0.02*</td>
</tr>
<tr>
<td></td>
<td>Micro</td>
<td>3.9</td>
<td>Small</td>
<td>4.1</td>
<td>-0.2</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mid</td>
<td>3.7</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large</td>
<td>3.6</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>4.1</td>
<td>Mid</td>
<td>3.7</td>
<td>0.4</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Large</td>
<td>3.6</td>
<td>0.5</td>
<td>0.004*</td>
</tr>
<tr>
<td></td>
<td>Mid</td>
<td>3.7</td>
<td>Large</td>
<td>3.6</td>
<td>0.0</td>
<td>0.8</td>
</tr>
</tbody>
</table>

*equal variances not assumed
** size: micro < 9 employees
small 10 – 99 employees
mid 100-499 employees
large >500 employees

We then investigated whether industry — agriculture, extraction, transformation, other — had influence on the importance of bottlenecks. Only Snedecor’s Anova/F-test for the lack of awareness of the exportation process scale was significant at 5 percent. Transformation industries (Table 6) understood that bottlenecks relative to lack of experience and awareness of the exportation process, and the absence of an exporting culture had moderate effect on exportation performance, while the other industries assigned little relevance to these points.
Table 6 – Comparison of means by firm industry

<table>
<thead>
<tr>
<th>Scale</th>
<th>Industry</th>
<th>Mean</th>
<th>Size</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Awareness of the Exportation Process</td>
<td>Agriculture</td>
<td>2.0</td>
<td>Extraction</td>
<td>2.2</td>
<td>-0.2</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Transformation</td>
<td>3.2</td>
<td>-1.0</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1.9</td>
<td>-3.9</td>
<td>0.8*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Extraction</td>
<td>2.2</td>
<td>Transformation</td>
<td>3.2</td>
<td>-1.0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>1.9</td>
<td>0.3</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Transformation                             | Other         | 1.9  | 1.4           | 0.0   |                 |                 |

*equal variances not assumed

The last ANOVA series assessed the importance of bottlenecks according to exportation experienced, treated as five ranges of years’ experience exporting — 0-4, 5-8, 9-14, 15-23 years and 24 years or more. The only variance analysis that showed a significant difference (p<5 percent) among exporting experience ranges was the one for the lack of financial and operating resources (Table 7).

Table 7 – Comparison of means by firm experience with exports

<table>
<thead>
<tr>
<th>Scale</th>
<th>Export Experience</th>
<th>Mean</th>
<th>Size</th>
<th>Mean</th>
<th>Mean Difference</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Resources</td>
<td>0-4 years</td>
<td>2.6</td>
<td>5-8 years</td>
<td>3.0</td>
<td>-0.4</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>9-14 years</td>
<td>2.5</td>
<td>0.0</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15-23 years</td>
<td>2.6</td>
<td>0.0</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;24 years</td>
<td>2.2</td>
<td>0.4</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9-14 years</td>
<td>2.5</td>
<td>0.5</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15-23 years</td>
<td>2.6</td>
<td>0.4</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;24 years</td>
<td>2.2</td>
<td>0.8</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-8 years</td>
<td>3.0</td>
<td>&gt;24 years</td>
<td>2.2</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>15-23 years</td>
<td>2.6</td>
<td>-0.1</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;24 years</td>
<td>2.2</td>
<td>0.3</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

Based on the literature review, we identified 67 bottlenecks in the Brazilian exportation process, in the areas of logistics, taxes, legal, bureaucratic, institutional, informational, macroeconomic and internal. Exploratory and confirmatory factor analyses allowed grouping these bottlenecks into twelve different factors: macroeconomic aspects, taxation, legal aspects, lack of infrastructure, institutional aspects, customs-clearance process, lack of skilled
services providers, complex documentation, inadequate Federal Revenue and Consenting Agencies systems, marketing aspects, lack of financial and operating resources, and lack of awareness of the exportation process.

Analysis of the data revealed two important points. The first concerns the bottlenecks exporters deem most critical. Macroeconomic, tax and legal characteristics, and the lack of logistics infrastructure were perceived as the worst constraints, all problems that fall under the Federal government’s purview. This fact may be used to influence public actions and investments with an aim to improving Brazil’s performance in exports.

An additional output of the study is the fact that eight of the twelve exportation bottlenecks have similar effects on firms of different sizes, in different industries, and with different experiences in exports. Only the lack of financial and operating resources had greater aspect on smaller firms and less experienced businesses; legal and macroeconomic aspects were shown to be more severe for large companies, and lack of awareness of the exportation process was pointed out as a problem for transformation industries. Based on this, we may argue that steps taken to reduce or eliminate the bottlenecks found will improve productivity and performance in exports for all Brazilian firms, although financing, training and legal reform actions aligned with the size, industry and experience of firms are required.

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