

Entrepreneurial Firms and Cluster Competitiveness

Institutions and Public Policy Determinants

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Abstract

Focusing on the information technology cluster in Brazil, Latin America's largest economy, and a high-tech municipality (Campinas) the researchers examined the role of governmental institutions and their interaction with business and academe to foster competitiveness. Despite a high quality infrastructure and an excellent workforce, most public sector initiatives are not specific to SMEs or to the needs of companies located in Campinas. Factors like (1) the lack of a governance structure to coordinate policies in support of SMEs, (2) the absence of sufficient public resources to support innovation and bring new products to market, and (3) the inaccessibility of research centers for small firms hinders the growth and development of Campinas as a dynamic IT cluster. The researchers propose 15 specific actions to improve the competitiveness of SME technology firms in Campinas and in the cluster.

Introduction

Focusing on SME competitiveness in Brazil, Latin America's largest economy, and within its most dynamic higher value-added sector—information technology—the researchers will identify, analyze and evaluate the environment and dynamics of cluster-based industrial competitiveness within the context of the role of governmental institutions and public policy. The researchers undertook quantitative and qualitative assessments aimed at answering the following questions: (1) What are the federal and state-level policies and practices that advance (and impede) cluster competitiveness? (2) What are the firm-level operations and actions SMEs can take to boost their competitiveness within clusters? What specific measures can federal and state governmental institutions implement to support SMEs in high value-added clusters? (3) In addition to advancing academic knowledge in the field of clusters and state-level industrial competitiveness, the researchers will provide an outlook for SME cluster competitiveness in Brazil in the IT sector and present policy options for consideration by government at both the federal and state levels.

Theoretical, Practical, and Policy Significance

The role of economic agents in the promotion of local development has grown in importance during the last decade. In this arena, nations and locales compete intensively for investment, particularly foreign direct investment. Policy competition for FDI (foreign direct investment) is intense, whether it is between countries across the world (Mexico vs. India), within a region (Argentina vs. Brazil), or in-country (e.g., Jalisco vs. Nuevo León, Mexico).

Small and Medium-Size Enterprises

The new economy poses daunting challenges for SMEs. Whether based in developing or industrialized nations, these enterprises must rapidly adapt to survive, let alone thrive, as globalization—including trade, investment, and financial liberalization—bring relentless pressure upon them.

As trade and investment barriers have been lowered, competition has increased exponentially. Large emerging markets, such as Brazil, cannot maintain competitiveness largely as commodity producers. Moving up the value chain with more knowledge- and technology-intensive products, Brazilian firms need to draw upon local companies with high value added capabilities; and to achieve the multiple benefits of agglomeration, as mentioned earlier, the large companies and their suppliers are increasingly migrating to industry-specific clusters, such as the ceramics cluster in Santa Catarina and the aeronautics cluster in São José dos Campos.

Examining SME competitiveness and the role of clusters and value chains, Haar and Meyer-Stamer[1] found that contrary to common belief, smallness can be a virtue, and the new global economy also presents notable opportunities for SMEs. To begin with, technology is the great “leveler”—accessible and generally affordable to firms of all sizes across a wide spectrum of industries. Additionally, smallness allows SMEs greater flexibility, latitude, and speed in responding to both threats and opportunities. For *entrepreneurial* SMEs from developing or industrialized nations, a globalizing business environment and the continuation of market liberalizing and reform measures aimed at their domestic business environment will provide more benefits than costs.

As firms—particularly small and medium-size enterprises (SMEs) that represent approximately 90% of private employment worldwide¹--and nations face increasing competition due to globalization and accompanying market liberalization (and increased consumer demand), greater attention has focused on *clusters* as a significantly important policy option.

Brazil provides a case example for studying SMEs and cluster competitiveness. Besides the sheer size of the Brazilian economy (the 6th largest in the world), it is an emerging market that has attained macroeconomic consolidation, including a stable foreign exchange market, reduced sovereign credit risk, and manageable inflation. It has achieved progress in fiscal affairs (witness its Fiscal Responsibility Law), posts strong export performance, investor confidence and a continuing pattern of reform of its institutions, including administrative and judicial procedures.

¹ This is particularly true in Latin America (Spencer and Gomez, 2001) where the informal sector plays a very large role in the national economy.

Why the Information Technology Cluster?

Although Brazilian commodity exports have grown significantly during the past decade, manufactured goods remain the nation's dominant export (e.g., 75% of Brazilian exports to the U.S. are manufactured goods). Even in the agribusiness area, higher value-added sectors, such as IT, contribute to Brazil's competitiveness. Therefore, this knowledge-intensive sector merits special attention in analyzing Brazilian cluster development and the nation's competitiveness at both the national and subnational levels.

One important fact about the economic structure of the IT industry is its low concentration, meaning that thousands of companies (predominantly SMEs) are responsible for the majority of value generated within this industry [2].

The software industry, one of the most vibrant "arms" of the Brazilian IT industry, is quite relevant in global terms, with revenues over US\$ 10 billion and annual growth of 11% on average. Such economic vigor brought some software companies into the spotlight – with high quality, innovative solutions as their main features – but that was not enough to cast these companies into the global arena [2].

When it comes to increasing the competitiveness of Brazilian IT firms, the development of clusters is perhaps the most ubiquitous solution developed by all spheres of the public sectors. The Porto Digital² (Digital Harbor) cluster, located in the northeast state of Pernambuco, and the IT cluster of Santa Rita do Sapucaí, in the state of Minas Gerais, are unquestionably successful initiatives developed by the public sector.

Despite the fact that some Brazilian IT clusters of Brazil are not as recent as these ones, they still can be considered as vigorous as their younger counterparts. The IT cluster of Campinas, located in the state of São Paulo, is perhaps the best illustration of this situation.

Why São Paulo State and Campinas?

The state and local government have played a major role in strengthening the competitive environment for SMEs located in Arranjos Produtivos Locais (APLs) [Local Productive Arrangements—a euphemism for "clusters"], so that they can expand their markets globally. Another project plans to implement five high tech industrial complexes in the state of São Paulo – one of them in the city of Campinas – whose objective is to create an appropriate environment for research and technology transfer among firms and supporting institutions [3,4].

The telecommunications cluster of Campinas, the second largest city of the state of São Paulo, is the biggest agglomeration of this sector in Brazil. While companies like IBM, Hewlett-Packard, Lucent and Motorola have production units in the city of Campinas, they have spawned hundreds of technology-based SMEs.

Much of the success of this cluster, however, comes from the excellent universities and research centers based in Campinas. UNICAMP (The State University of Campinas), founded in 1996, is consistently ranked among the top universities of Brazil. According to Quandt[5] "UNICAMP has developed an interdependent relationship with industry since its inception. Its emphasis in areas such as physics and electrical engineering has been paralleled by the development of a local telecommunications industry". Incamp, the incubator of technologically-based firms of UNICAMP, has been supporting the development of new enterprises in Campinas. Other incubators of high-

² For more information about Porto Digital, visit <http://www.portodigital.org/>.

tech sectors are also based in Campinas. By the end of 2003, around 35 enterprises were supported by local incubators.

Another key supporting institution is CPqD, a huge research center founded in 1976 by Telebrás, the former State-owned telecommunications monopoly. Since the privatization of telecommunications in Brazil, CPqD has become a foundation and funded and developed a wide array of competitive products such as the phone card, digital transmission systems, and optical transmission equipment. Information technology, microelectronics, telecommunications, opti-electronics and advanced chemistry are considered the most important industries in Campinas, represented mainly by SMEs [6].

Campinas is also the headquarters of SOFTEX³, a non-governmental organization whose objective is to foster the export of Brazilian software. SOFTEX agents support software companies all over Brazil, working together with private and public sectors (government, universities, research centres) in all their levels.

The administration of the city of Campinas has also been engaged in some local initiatives like the “condomínios”, areas where companies with common interests agglomerate and share their expertise, equipment and products.

Federal Support Mechanisms

Although cluster development remains largely within the purview of state and local government, federal support mechanisms can play a significant supportive role.

Incentives to the development of APLs are widely focused on supporting SMEs located in agglomerations. The federal government, for instance, recently added the APLs to the national industrial policy agenda, aiming not only to increase the competitiveness of the small and medium-sized enterprises, but also to increase the share of these firms in Brazilian foreign trade. [7].

Inter-governmental groups and agencies that fund and undertake research (e.g. FINEP – www.finep.gov.br) and economic planning (e.g. IPEA – www.ipea.gov.br) are some of the federal institutions that foster the development of APLs.

SEBRAE (www.sebrae.com.br), a non-profit organization that receives significant support from the federal government, is very active in APLs policies and activities.

Most important, however, has been BNDES (Banco Nacional de Desenvolvimento Econômico e Social)—and entity that has been in the vanguard of national economic development. BNDES programs related to IT and telecom include the Fund for the Technological Development of Telecommunications (FUNTTEL) that supports the technological innovation process. The Program for the Development of the National Software and Related Services Industry (PROSOFT) aims to develop a national software and related services industry to compete effectively in both national and international markets.

Finally, the Brazilian congress passed a Law of Innovation (2004) that, as implemented, is organized around three axes: to provide a suitable environment for strategic partnerships between the universities, technological institutions and businesses;

³Portuguese acronym for Brazilian Society for the Promotion of Software Exportation. For more information, visit SOFTEX website: <http://www.softex.br>

to encourage the participation of science and technology institutions in the innovation process; and to encourage innovation in businesses.

Taken together, the federal initiatives outlined above strengthen and augment state and local activities and initiatives tied to the development and expansion of clusters.

Research Methodology

The proposed methodology and work plan were designed to answer the critically important research questions. In terms of research design, the research team first collected information about 700 potential companies among local institutions (unions, associations, commercial registry, etc.). After a selection process in which these companies' size, economic activity and location were analyzed, around 250 new economy SMEs became the primary option of our study. These companies' activities comprised the information technology, telecommunications, and biotechnology sectors.

The three major lines of inquiry that comprise the proposed study were:

- (1) What are the federal and state-level policies and practices that advance (and impede) cluster competitiveness?
- (2) What are the firm-level operations and actions SMEs can take to boost their competitiveness within clusters?
- (3) What specific measures can federal and state governmental institutions implement to support SMEs in high value-added clusters?

An online questionnaire was structured to (1) have a brief description of survey respondents and their organizations; (2) get respondent's feelings about conditions for competitiveness of new economy SMEs; (3) understand respondent's perceptions about their companies. The online questionnaire, available on surveymonkey.com, was pre-tested twice in order to optimize response time and number of questions. Twenty-five questions comprised the ultimate version of questionnaire, which used to take about 15 to 25 minutes to have it answered.

Requests to answer the survey were sent by e-mail to representatives of all 250 new economy SMEs selected. Around one hundred company representatives never responded to the message or reported that their companies closed their doors. Fifty refused to answer the questionnaire, and approximately 100 accepted to complete it. After several phone calls and new requests by e-mail, 58 people completed the questionnaire.

Interviews followed the survey stage. In addition to new economy SMEs, this next stage in field research included several other actors which play a fundamental role in the cluster's future: research institutes, associations, incubators, local administration, research agencies and the leading university (UNICAMP).

Forty-eight interviews were conducted with new economy SMEs and representatives of the institutions listed above. A semi-structured script contained 5 questions regarding (1) the role of public sector in the MRC (Metropolitan Region of Campinas), (2) the role of support institutions, (3) ease of capital access, (4) what public

sector should do to improve local, new economy SMEs competitiveness, and (5) what new economy SMEs should do to improve their competitiveness.

Overall, 50 people were interviewed, and over 60 hours of conversation were generated--- almost 1,100 pages of transcript recordings. Consolidated results of both questionnaires and interviews are presented in the following pages, in four specific subsections. Although it is easy to identify who was interviewed in some institutions, their names were not mentioned in the next section.

Research Results

The following analysis is a condensation of all comments and information gathered along interviews with almost 50 people related to the new economy sector (companies, associations, incubators, research agencies, local administration).

Tax Burden

The high tax burden imposed by governmental levels in Brazil is a problem common to all people and companies. This is no different in the new economy sector. While the federal government did institution pro-innovation laws, beginning in 2005, interviewees claimed they were either not familiar with the specific provisions of the laws or were but never made use of the laws.

The Excellent Local Infrastructure

Campinas is considered the fifth best Brazilian city in urban infrastructure. However, this “competitive advantage” cannot solve some problems faced by local entrepreneurs. These include frequent power interruptions and the high price, quality and instability of broadband internet.

Fostering Innovation Through Research Agencies

Federal and State research play an important role for many new economy companies located in Campinas. The companies interviewed turn to research agencies frequently; however, they complain frequently about the bureaucracy (excessive paperwork requirements), unclear evaluation criteria, bias towards academic institutions, and long delays in funds disbursement for accepted projects.

Access to Credit

The majority of interviewees take a position they define as “conservative”, which means not getting loans from banks. The reason is simple---the high interest rates of Brazilian financial institutions. While the national development bank does provide financing, the minimum amount a company must request is too much money for the needs of some SMEs.

Workforce Availability

All interviewees and questionnaire respondents, without exception, praised the qualification of the local workforce, thanks to the excellent educational system of Campinas. However, despite the general satisfaction with the local workforce, some interviewees stressed that the local workforce is facing two challenging issues: (1) it is no longer abundant; and (2) employees lack some specific skills.

Fostering Innovation Through Research Institutes

Campinas has over 20 research institutes located in the city, the majority of them dedicated to IT, telecom and biotech sectors. The relationship between these institutes – the majority being run by the state or federal government – and SMEs is, however, minimal. However, lab directors interviewed stated uniformly most local SMEs do not know they exist; and those that do cannot afford when they deem to be high lab fees.

Managerial Support for Companies

Many directors and owners of companies interviewed are entrepreneurs with much technical expertise but without any experience in operating a business. Therefore, managerial support is paramount for the survival of these companies. Local entrepreneurs interviewed stress the importance of SEBRAE for their companies

Making Market Introduction Happen

Interviews with new economy companies exposed a problem which is not usually addressed by governmental spheres: the market introduction of products/services produced by these companies. Interviewees reported many cases in which innovations (some of these funded by research agencies) were not introduced to market because there were no funds dedicated to this.

The (Lack of) Coordination Among Public Sector Actors

Interviews with agents of the public sector at all governmental levels made clear that local, state and federal administration have implemented policies and actions that might help the development of new economy SMEs in Campinas and in all cities belonging to its Metropolitan Region. However, these policies and actions are not necessarily oriented specifically to the needs of SMEs in the region, since they are designed to be national in scope. The lack of a “macro policy” in Metropolitan Campinas impedes cooperation and leads to cut-throat competition for attracting new companies through a series of tax incentives or land donations. Some SME interviewees report they were “invited” by representatives of these neighboring cities to launch or move their companies there.

The Communication Problem

This absence of coordination might be in part the cause of another problem that was gradually exposed during field research. Interviewees, especially those of SMEs, seldom knew what the public sector had been doing on their behalf, in terms of tax benefits, loans, trade missions, and other opportunities.

Actions to Boost Competitiveness

Specific actions SMEs can take to enhance their ability to compete are: overcoming the barriers of sector diversity and isolation; associating or cooperating with business experts; sharing experiences with universities and research centers; and going global

As for governmental institutions, they can support SMEs in high value-added clusters in the following ways:

- 1 – Create a governance structure
- 2 – Establish a communication channel with SMEs
- 3 – Grant SMEs access to research centers at affordable prices
- 4 – Provide capital for market introduction
- 5 – Qualify people according to SME needs
- 6 – Customize managerial knowledge according to SME needs
- 7 – Provide a better infrastructure for new economy SMEs
- 8 – Curtail the competition for companies among municipalities
- 9 – Provide tax relief
- 10 – Make the process of research agencies simpler, objective and faster
- 11 – Bring the public sector closer to SMEs

Brazil is an economic powerhouse, with vast natural resources and human resources that power its growing knowledge-based industries, most of which are concentrated in the South of the country. The municipality of Campinas in the State of São Paulo is one significant example, especially in the area of information technology. This cluster has achieved great progress during the last decade; however, shortcomings in the formulation, design, and implementation of state and municipal public policies, in consort with SMEs and their associations, are clearly limiting the potential of this cluster and the firms that reside within it. It is hoped that policymakers consider this report, its research findings and recommendations for Campinas and its information technology firms to achieve their full potential.

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