The Software and Information Services Sector in Argentina: The Pros and Cons of an Inward-Oriented Development Strategy

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ABSTRACT

This paper analyzes the evolution, present situation, and prospects for the Argentine software and information services (SIS) sector. Argentina has some advantages to exploit in order to make significant inroads in this sector. It has a relative abundance of well-educated people, a sizeable domestic market, and a cultural influence in Spanish-speaking Latin America. The currency devaluation of 2002 dramatically reduced costs measured in U.S. dollars. Nonetheless, SIS firms in Argentina have focused primarily on the domestic accountancy and management market, where they enjoy advantages derived from the specific requirements of the domestic regulations and their knowledge of the business culture and the needs of their local clients. This concentration in the domestic market has caused SIS firms to pay insufficient attention to some key issues for competitiveness in this sector. Hence, it is no surprise to find that they lack marketing and management capabilities and that the diffusion of quality certifications is almost null. The domestic environment also poses some obstacles, since firms often have difficulties accessing investment and working capital. Business networking mechanisms are weak, both among SIS firms as well as between them and their customers, R&D institutions, etc. Increasing the competitiveness of this sector requires intelligent public policies and actions aimed at improving the SIS firms’ capabilities and endowments. © 2005 Wiley Periodicals, Inc.

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1. INTRODUCTION

The software and information services1 (SIS) sector has been rapidly growing in recent decades. Developed countries are both the main producers and consumers of SIS. Several large firms based in these countries have consolidated dominant positions at the world level in different segments of the SIS sector (Windows, Oracle, SAP, and Symantec are some

1Information services include, among others, IT consulting, implementation services, IT training and education, processing services, IT support services, etc. (OECD, 2002).
of the most obvious examples in this regard). Nonetheless, there is room for firms from
developing countries to enter and grow in this sector, as proven by the experience of India,
Brazil, Singapore, Taiwan, Korea, Costa Rica, and others.

SIS technologies, markets, products, and business strategies are constantly evolving (see
Organization for Economic Cooperation and Development [OECD], 2002, for an overview
of the trends in the software sector). In this scenario, some firms from the “three I’s”
countries (India, Israel, Ireland) have managed to compete in export markets through truly
innovative products aimed at certain niches. However, most firms located in what Carmel
(2003) defines as “new software exporting nations” compete via costs (low wages) selling
information services. In fact, there are several strategies available for firms from developing
countries in the SIS sector, each requiring specific endowments and capabilities and having
different consequences for the dynamics of the sector (Heeks, 1999).

The objective of this paper is to analyze the strengths, weaknesses, and prospects of the
Argentine SIS sector revealed in a survey conducted in 2000–2001. The main interest of
this case study is to learn about the impacts—pros and cons—derived from following an
“inward oriented” strategy in the SIS sector (i.e., selling almost exclusively in the domestic
market), as that followed by Argentina’s SIS firms.

In this article, we will examine the strengths and weaknesses of the SIS sector in Argentina
in the light of the model proposed by Heeks (1999) to analyze the conditions that allow
developing countries to have a successful performance in this industry. SIS activities began
in Argentina in the 1970s and the sector has developed so far without any government
support, following the ups and downs of the domestic economy. Most producers are young,
locally owned, small and medium enterprises (SMEs) supplying the domestic market, but
there are also many large firms accounting for the lion’s share of that market. Though they
had good performance in the late 1990s and saw export prospects improve following the
currency devaluation of 2002, Argentina’s SIS firms have not been able to make significant
inroads in foreign markets and break away from an inward-oriented strategy.

Nonetheless, the country has some advantages to exploit that could allow a significant
change in the trajectory of this sector. First, it has a relative abundance of professionals in
areas related to SIS activities. Second, it preserves at least some of its old cultural influence
on the rest of the Spanish-speaking Latin America, a factor that could help Argentine firms
penetrate those markets, taking advantage not only of the geographical but also of the
cultural proximity to them. Third, compared with other developing countries, Argentina
has a sizeable domestic market. Finally, in Argentina there seems to be an expanding
consensus on the need to modify the country’s trade specialization pattern. Hence, since
2003, the government has granted incentives to the SIS sector in order to foster skilled
labor-intensive activities.

Our main argument is that the inward-oriented strategy adopted by SIS firms in Argentina
has hampered their ability to profit from the advantages mentioned above. Since they enjoyed
a sort of “natural protection” in Argentina’s market that allowed them to survive and expand
by exploiting their knowledge about domestic legislation and business culture and their capa-
bility to adapt to changes in those areas, SIS firms have not paid enough attention to some key
issues necessary for success in export markets. This lack was aggravated by the absence of
public support for the sector and a domestic environment that lacked cheap and easy access to
investment and working capital and other key elements for competitiveness in SIS activities.

Section 2 briefly reviews the experience of the SIS sector in the “three I’s” and in some
developing countries, and presents the conditions suggested by Heeks (1999) as necessary
for a successful performance in this activity. Section 3 presents the main results of the survey.
Section 4 discusses the impact of some key institutional and macroeconomic variables on the evolution of the SIS sector in Argentina. The main conclusions and policy suggestions are presented in section 5.

2. SIS IN DEVELOPING AND “THREE I” COUNTRIES: A BRIEF REVIEW

According to Heeks (1999), firms in developing countries usually face the following main limitations when trying to make progress in the SIS sector:

- The physical and communications infrastructure of their home countries are weak.
- Their domestic home markets are usually small (and often supplied by illegal copies), which hinders the chances of recovering the costs involved in the development of innovative products.
- Access to finance is seldom easy and interest rates are often high, while mechanisms such as venture capital are almost unknown.
- Local firms rarely have strong marketing capabilities.
- The diffusion of stringent quality standards is usually very limited.

Furthermore, when trying to enter into foreign markets, firms from developing countries must face additional obstacles such as:

- Uncertainty about the compliance with quality standards, schedules, etc. and lack of confidence about their technical capabilities.
- The lack of detailed knowledge about foreign customers’ requirements.
- Linguistic and cultural barriers, little knowledge of the business culture and norms in foreign markets, etc.

Firms wishing to prosper in this sector must adopt strategies that fit with their endogenous capabilities and the endowments and assets of their home country. At the same time, they must try to circumvent the limitations posed both by their own history and the lack of certain skills. The government may help this process through different measures, both by trying to strengthen local technological and innovative capabilities and infrastructure, as well as by contributing to solve some market failures that constrain the development of the SIS sector.

In fact, there have been successful experiences of firms from developing countries in this sector. Firms from Asia, Latin America, and Eastern Europe have acquired dominant positions in their home countries and enter developed countries’ markets. Some large American and European SIS firms have made foreign direct investments in some developing countries to adapt their products and services to the cultural, linguistic, and institutional features of the regional markets.

Different entry strategies may be observed. A first dividing line separates those countries whose firms have mainly followed “inward-oriented” strategies (i.e., Brazil, South Korea, etc.) from those where “export-oriented” strategies have been dominant (i.e. India, Ireland, Israel). The second dividing line depends on whether local firms or foreign corporations’ affiliates have played a dominant role in the development of the SIS sector.

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Among “export-oriented” strategies there are different modes of competition. While Indian firms have mainly competed on the basis of low wages and the provision of information services (including the so-called “body-shopping” activities), Israel’s firms have developed significant innovative capabilities in some niche areas such as anti-virus, software security and protection and encryption technologies. Several large American and European firms have chosen Ireland as a base for serving European markets.

Though SIS firms in developing countries and the “three I’s” have been largely oriented towards the export of services, there are cases where the export of software products has played a larger role. These exports may take place through different channels. While, in Ireland, they mostly involve adapting and “localizing” American software products to the needs of different European markets, in Israel local firms export locally developed products. India has experienced an upsurge of “offshore” software development activities.

While in Ireland foreign corporations, are clearly dominant, in Israel or India they are not. However, in the latter countries local firms have different kinds of ties with their counterparts in industrialized countries that include subcontracting arrangements, joint ventures, strategic alliances, etc.

Different strategies require different conditions, different assets, or both in order to be implemented successfully. For instance, in the case of Ireland, having an English-speaking population played a major role in the decision of American software companies to install affiliates in that country, but the public policies aimed at attracting foreign direct investment through tax incentives were also a major driver for those decisions. Neither factor in isolation would have led to the observed massive arrival of foreign investments in the SIS sector.

While counting on a relatively abundant endowment of skilled personnel with low wages has been a clear precondition for the success of the Indian strategy, strategies such as those followed by Israel’s firms require high-skilled personnel, domestic research capabilities, and sophisticated local customers (in the case of Israel, notably the Army).

Table 1 summarizes the main features of the different strategies followed by the “three I” countries in the SIS sector, and also includes information about Brazil and Argentina.

<table>
<thead>
<tr>
<th>Country</th>
<th>Market orientation</th>
<th>Nature of SIS provided</th>
<th>Type of firms</th>
<th>Key assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>Export</td>
<td>Services (body shopping-outsourcing)</td>
<td>Domestic &amp; foreign</td>
<td>Low wages English-speaking professionals</td>
</tr>
<tr>
<td>Ireland</td>
<td>Export</td>
<td>Products (adaptation-localization)</td>
<td>Mostly foreign</td>
<td>Access to the European market English-speaking professionals Public policies</td>
</tr>
<tr>
<td>Israel</td>
<td>Export</td>
<td>Products (innovative)</td>
<td>Mostly domestic</td>
<td>High-skilled professionals R&amp;D capabilities</td>
</tr>
<tr>
<td>Brazil</td>
<td>Inward</td>
<td>Products &amp; services</td>
<td>Mostly domestic</td>
<td>Army’s demand Large domestic market</td>
</tr>
<tr>
<td>Argentina</td>
<td>Inward</td>
<td>Products &amp; services</td>
<td>Mostly domestic</td>
<td>See below</td>
</tr>
</tbody>
</table>
Each of the “three I” countries have followed a strategy well suited to take advantage of their respective key assets. Although Brazil’s objective of making a significant inroad in world markets was not attained, the large dimension of its domestic market allowed for the development of a large SIS sector.

Heeks (1999) also identifies some key general factors beyond the kind of strategy adopted for developing countries’ firms to be competitive in the SIS sector. They include microeconomic or enterprise elements such as:

- Identification of demand-growth markets and synergies.
- Ability to compete via costs or service innovation.
- Good marketing.
- Access to investment and working capital.
- Access to programming, analysis, and management skills.
- Access to information technology.
- Networking mechanisms, both intra-firm as well as with other software firms, potential or actual clients, etc.

At the same time, public policies play a key role in areas such as:

- Finance (access to working and venture capital and tax incentives).
- Education and training.
- Research and development.
- Intellectual property rights protection.
- State procurement.
- Infrastructure (telecommunications, Internet, etc.).

Last, but not least, a “national vision” is also needed (i.e., of the desirable specialization and competitive pattern for the SIS sector in each country), which should aim not only at fulfilling the general basic conditions for a successful performance but also at taking advantage of the specific assets and endowments possessed by each country.

In the next sections, we will show that Argentina followed an inward-oriented strategy that limited the SIS sector’s ability to expand, and that the basic conditions that Heeks deems as necessary to be successful in this sector are largely absent so far. However, in our judgment, the country has potential and mostly unexploited key assets that may allow for a more vigorous development of its SIS sector. At the end of the paper, we will suggest what these key assets may be and what kind of strategy could be based on them in order to foster the SIS sector in Argentina.

3. THE SIS SECTOR IN ARGENTINA

During the import substitution industrialization process in the 1970s, there was already an incipient activity in the SIS sector in Argentina. The first study on this sector was undertaken in the mid 1980s (SECYT, 1987). At that time, nearly 70% of the domestic market was supplied by imported software, but about 300 local firms engaged in the provision of SIS. Access to skilled human resources and knowledge about specific features of the local fiscal and accountancy regulations were the main advantages of local firms. Their main limitations lay in the relatively small size of the domestic market, the lack of R&D and marketing capabilities, and the obstacles to accessing to financial support (see also Correa, 1990).
Some years later the situation had not changed much. When the economically turbulent “lost decade” ended in the early 1990s, about 300 SIS firms were in business, employing nearly 4500 people. Two-thirds of the local market was supplied by imports, and exports were negligible (Correa, 1996).

The significant structural reforms that took place in Argentina in the early 1990s (such as trade liberalization and privatization) led to a sharp increase in imports of goods and services, a boom in FDI inflows, and rapid economic growth between 1991 and 1998. Under these circumstances, one might expect that a more vibrant SIS sector would have emerged. The analysis presented in the next sections will shed light on the extent to which this transformation has taken place.

3.1 Methodology

The data presented in next sections are based on an e-mail survey of 510 firms conducted in 2000–2001. Ninety-eight responses (19.2%) were obtained. To reach as many SIS firms as possible, we sent the questionnaire to all members of the country’s sectoral associations. We also made a search through the Internet and other media to identify SIS firms not affiliated with any association.

We discussed the contents of the questionnaire with the main sectoral chambers and sectoral experts. To ensure that our survey would yield results that could be compared with previous work, we also examined surveys conducted among SIS firms in other countries—especially Brazil—and surveys undertaken previously in Argentina. The questionnaire included 30 questions aimed at learning about issues such as: size and patterns of corporate ownership of SIS firms; sales; exports and employment, clients’ profiles; programming tools; hardware platforms; marketing channels; types of products and services offered; specialization areas; intellectual property concerns; innovative activities; quality systems; linkages with universities, suppliers, etc.; favorable and unfavorable competitiveness factors; and public policies’ impacts.

3.2 The Argentinean SIS Sector: Size and Profile

According to our estimates based on the above-mentioned survey, the SIS sector’s sales grew 40%, and employment levels increased by 43% between 1998 and 2000, a recessive period in the Argentine economy. This growth was due to growing local demand for SIS and efforts to address the Y2K problem.

By 2000, the surveyed firms employed about 6,400 people and had US$ 630 million in sales. By making certain assumptions about the market structure of the sector, we estimate that the annual turnover of the nearly 500 firms in the Argentine SIS sector reached around US$ 2,000 million (0.7% of the GDP) and that these firms employed approximately 15,000 people (Table 2). Sectoral experts confirmed the plausibility of these estimates.

The SIS firms employ highly skilled personnel: 45% of the employees of the surveyed firms were university graduates, while 37% were technicians and university students. Nearly 70% of those employees with graduate and post-graduate degrees prepared for informatics-related careers. Nonetheless, the proportion of employees with post-graduate studies was very small (4%, half of which corresponded to informatics careers).³ In comparison,

³Four firms, three of which are foreign owned, employed 40% of the personnel with post-graduate degrees.
Brazilian firms have on average three employees with post-graduate degrees, a figure that more than double that of Argentina (Weber, Nascimento, da Silva Marinho, & Durski, 2000).

Software products constituted nearly half of the surveyed firms’ sales, and service activities made up the rest. Local products represented about 36% of software products’ sales. The share of imported software (more than 60%) in the domestic market was not very different from what had been observed in previous (above-mentioned) studies.

The Argentine SIS sector is still strongly inward-oriented. Exports are made by a small number of firms and constitute a negligible share of the sector’s revenue. Only six of the few (20) firms that exported in 2000 had an exports/sales ratio above 10%; only three enterprises exported for more than US$ 1 million. The low level of exports was due to microeconomic factors (e.g., the type of products and services offered by local firms and poor quality control and marketing capabilities) and elements related to the environment in which the firms operated (e.g., high labor costs fueled by an overvalued exchange rate, lack of access to finance, and the absence of public policies supporting SIS’ exports). More is said about these issues in following sections.

How does the Argentina SIS sector compare with those of other countries? Table 3 shows that, in sales and export performance, Argentina is well behind India, Israel, Ireland, Singapore, and even its smaller neighbor, Uruguay. While exports are also very low in Brazil and Korea, their domestic sales are much higher than Argentina’s, partially compensating for the absence of exports.

### 3.3 Age, Size, Nationality and Recent Performance of SIS Firms

Most Argentine SIS firms are young. The surveyed firms were, on average, 11 years old. Sixty-five percent were established after 1990, and very few were created before 1980. The latter often provide hardware and telecommunications equipment and associated information services. In spite of being a minority within the sector, the firms that were established before 1990 accounted for more than two-thirds of the SIS sales in 2000.

The structure of the sector is very heterogeneous, with a small group of large, and mostly foreign owned firms having the lion’s share of the local market. Although most firms sold

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**TABLE 2. The SIS Sector in Argentina**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Surveyed firms (US$ million)</th>
<th>Sectoral turnover (US$ million)</th>
<th>Relative share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software products</td>
<td>323.2</td>
<td>973</td>
<td>49%</td>
</tr>
<tr>
<td>local products</td>
<td>109.9</td>
<td>346</td>
<td>17%</td>
</tr>
<tr>
<td>foreign products</td>
<td>199.3</td>
<td>627</td>
<td>32%</td>
</tr>
<tr>
<td>Information services</td>
<td>323.4</td>
<td>1,017</td>
<td>51%</td>
</tr>
<tr>
<td><strong>Total sales</strong></td>
<td><strong>632.6</strong></td>
<td><strong>1,990</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td>Employment</td>
<td>6,400</td>
<td>15,000</td>
<td>-</td>
</tr>
<tr>
<td>Exports</td>
<td>14.4</td>
<td>35</td>
<td>-</td>
</tr>
</tbody>
</table>

---

*Two-thirds of surveyed firms’ exports were made by the local affiliate of a German transnational corporation.*
TABLE 3. The SIS Sector: An International Comparison for the Latest Available Year (US$ Millions)

<table>
<thead>
<tr>
<th>Country</th>
<th>Turnover</th>
<th>Exports</th>
<th>Exports/Turnover ratio</th>
<th>Employment</th>
<th>Number of firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>5,700</td>
<td>4,000</td>
<td>70%</td>
<td>410,000</td>
<td>1,250</td>
</tr>
<tr>
<td>Ireland</td>
<td>6,245</td>
<td>5,907</td>
<td>94%</td>
<td>18,300</td>
<td>679</td>
</tr>
<tr>
<td>Israel</td>
<td>1,500</td>
<td>700</td>
<td>47%</td>
<td>20,000</td>
<td>300</td>
</tr>
<tr>
<td>Brazil</td>
<td>8,038</td>
<td>40</td>
<td>&lt;1%</td>
<td>n.a.</td>
<td>2,500</td>
</tr>
<tr>
<td>Uruguay</td>
<td>180</td>
<td>60</td>
<td>33%</td>
<td>2,500-3,000</td>
<td>150</td>
</tr>
<tr>
<td>Argentina</td>
<td>1,340</td>
<td>35</td>
<td>&lt;3%</td>
<td>15,000</td>
<td>500</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>n.a.</td>
<td>50</td>
<td>n.a.</td>
<td>3,500-4,000</td>
<td>150</td>
</tr>
<tr>
<td>Chile</td>
<td>125</td>
<td>15</td>
<td>12%</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Singapore</td>
<td>1,660</td>
<td>476</td>
<td>29%</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>China</td>
<td>3,000</td>
<td>n.a.</td>
<td>n.a.</td>
<td>100,000</td>
<td>2,000</td>
</tr>
<tr>
<td>Korea</td>
<td>6,000</td>
<td>96</td>
<td>&lt;2%</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

Note. The estimates of this table include the provision of information services and the sales of local software. We have tried to exclude, as far as it has been possible using the available data, the sales of foreign software. Nonetheless, given the heterogeneity of the sources, it is possible that the definition of the SIS sector in each country may slightly differ, a fact that may hinder, to some extent, the comparability of the figures. From Weber, et al. (2000) and Bastos Tigre & Junqueira Botelho (1999) for Brazil; NASSCOM for India; Tallon & Kraemer (1999) for Ireland; Israel Association of Software Houses for Israel; Computerworld Chile (1999) and Baeza Yates (1995) for Chile; MIEM (1999) for Uruguay; Caprossoft for Costa Rica; Coe (1999) for Singapore; Zhang (2000) for Korea and China; and our own estimates for Argentina.

less than US$ 2 million in 2000, foreign firms accounted for 66% and firms with more than 50 employees had 86% of the sales of the SIS sector (Tables 4 and 5). At the same time, 80% of the firms that responded to our survey were SMEs, and 85% were locally owned.

TABLE 4. Sales, Employment, and Exports of the Surveyed Firms, 2000

<table>
<thead>
<tr>
<th>By origin of capital</th>
<th>Sales US$ million</th>
<th>Share (%)</th>
<th>Employment Number of employees</th>
<th>Share (%)</th>
<th>Exports US$ million</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign firms</td>
<td>415.1</td>
<td>66</td>
<td>2,702</td>
<td>42</td>
<td>10.5</td>
<td>73</td>
</tr>
<tr>
<td>Local firms</td>
<td>217.4</td>
<td>34</td>
<td>3,697</td>
<td>58</td>
<td>3.9</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>632.6</td>
<td>100</td>
<td>6,399</td>
<td>100</td>
<td>14.4</td>
<td>100</td>
</tr>
<tr>
<td>By size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large&lt;sup&gt;a&lt;/sup&gt;</td>
<td>544.2</td>
<td>86</td>
<td>4,598</td>
<td>72</td>
<td>10.1</td>
<td>70</td>
</tr>
<tr>
<td>Medium&lt;sup&gt;b&lt;/sup&gt;</td>
<td>74.5</td>
<td>12</td>
<td>1,340</td>
<td>21</td>
<td>3.9</td>
<td>27</td>
</tr>
<tr>
<td>Small&lt;sup&gt;c&lt;/sup&gt;</td>
<td>13.9</td>
<td>2</td>
<td>461</td>
<td>7</td>
<td>0.4</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>632.6</td>
<td>100</td>
<td>6,399</td>
<td>100</td>
<td>14.4</td>
<td>100</td>
</tr>
<tr>
<td>By main activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local products&lt;sup&gt;d&lt;/sup&gt;</td>
<td>112.3</td>
<td>18</td>
<td>2,082</td>
<td>33</td>
<td>10.8</td>
<td>75</td>
</tr>
<tr>
<td>Foreign products&lt;sup&gt;e&lt;/sup&gt;</td>
<td>231.9</td>
<td>37</td>
<td>1,164</td>
<td>18</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Information services&lt;sup&gt;f&lt;/sup&gt;</td>
<td>288.3</td>
<td>46</td>
<td>3,153</td>
<td>49</td>
<td>3.6</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>632.6</td>
<td>100</td>
<td>6,399</td>
<td>100</td>
<td>14.4</td>
<td>100</td>
</tr>
</tbody>
</table>

<sup>a</sup> 50 employees or more. <sup>b</sup> Between 10 and 50 employees. <sup>c</sup> 10 employees or less. <sup>d</sup> Local and foreign firms whose main activity in the SIS sector is the development of software products in Argentina. <sup>e</sup> Local and foreign firms whose main activity in the SIS sector is the commercialization of foreign software products in Argentina. <sup>f</sup> Local and foreign firms whose main activity in the SIS sector is the provision of information services (customized software, implementation of software packages, consultancy, etc.).
TABLE 5. Turnover Levels of the SIS Firms in Argentina

<table>
<thead>
<tr>
<th>Turnover</th>
<th>Level</th>
<th>Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than US$</td>
<td>1 million a year</td>
<td>46</td>
</tr>
<tr>
<td>Between US$</td>
<td>1 and 2 million a year</td>
<td>22</td>
</tr>
<tr>
<td>Between US$</td>
<td>2 and 5 million a year</td>
<td>13</td>
</tr>
<tr>
<td>Between US$</td>
<td>5 and 15 million a year</td>
<td>10</td>
</tr>
<tr>
<td>More than US$</td>
<td>15 million a year</td>
<td>9</td>
</tr>
</tbody>
</table>

Firms whose main activity is the provision of information services\(^5\) account for nearly half of the sector sales and employment levels (Table 4). A small group of firms that sell foreign packaged software products contribute with 37% of the sector’s sales. Several companies that are mainly dedicated to developing software products account for 18% of the sales and 33% of the sector’s employment.

Different types of firms performed differently. Firms selling foreign software products or providing information services increased sales the most. The largest firms grew more than the SMEs, and foreign firms grew more than local ones (Figures 1, 2, and 3).

3.4 Customer’s Profile

The main customers of the Argentine SIS sector are large firms, which account for two-thirds of the sector’s sales (Table 6). Large firms and the government sector contribute more than 80% of the sales of large and medium SSI firms.\(^6\) These customers acquire mostly foreign software products and information services related to the implementation and customization of complex software packages.

Home users are not too relevant as customers for the SIS sector.\(^7\) The government is a large buyer of SIS, but purchases almost exclusively from medium and large firms. Many SMEs have reported difficulties in becoming suppliers of the government. Often tenders for the provision of SIS to the public sector are open only to a “short list” composed exclusively of foreign firms.

In contrast, the main customers of the small SIS firms are SMEs, which account for 50% of the sales of that group of firms. Given the fact that SMEs in Argentina have been deeply affected by the recession that began in 1998, it is not surprising to find that small SIS firms’ performance was worse than that of medium and large firms between 1998 and 2000. While SMEs’ customers are key for those firms that sell packaged products, large customers are more relevant for those companies specialized in professional services.

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\(^5\)As it is well known, most firms in this sector are engaged both in products as well as in services markets. In this paper, we classify surveyed firms according to the kind of activity that is their main source of incomes (i.e., local software products, foreign software products and information services).

\(^6\)Medium-sized firms were defined as those that have between 10 and 50 employees. Firms with less than 10 employees were defined as small, while big or large SIS firms are those that have more than 50 employees.

\(^7\)The low share of home users in the sales of the SIS sector is mainly due to the high piracy levels that exist in that segment of customers. Besides, home customers mostly, if not exclusively, buy foreign software products.
Figure 1  Total turnover by type of firms, 1998–2000.

Figure 2  Total turnover by size of firms, 1998–2000.

Figure 3  Total turnover by origin of firms, 1998–2000.
TABLE 6. Turnover Structure by Type of User

<table>
<thead>
<tr>
<th>Type of SIS firms</th>
<th>Type of user</th>
<th>Local products (%)</th>
<th>Foreign products (%)</th>
<th>Information services (%)</th>
<th>Big firms (%)</th>
<th>Medium-size firms (%)</th>
<th>Small firms (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home users</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>SMEs</td>
<td>16</td>
<td>29</td>
<td>37</td>
<td>3</td>
<td>15</td>
<td>17</td>
<td>55</td>
</tr>
<tr>
<td>Large firms</td>
<td>66</td>
<td>55</td>
<td>50</td>
<td>77</td>
<td>66</td>
<td>74</td>
<td>32</td>
</tr>
<tr>
<td>Government</td>
<td>16</td>
<td>16</td>
<td>7</td>
<td>19</td>
<td>18</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

3.5 Programming Tools and Platforms

Visual Basic is the most used programming language, used by nearly two-thirds of the surveyed firms. HTML and Java, which are mostly oriented towards Internet applications, are used by 58% and 48% of the surveyed firms, respectively. Among object-oriented languages, Java is widely used, while few use Smalltalk. C++ is used by 38% of the firms. The largest SIS firms use the most modern languages, presumably because they have access to a larger pool of skilled personnel.

Almost all firms develop software products for personal computers and many of them only offer software products for PCs. The Windows environment is dominant. Eighty-eight percent of the firms developed products for Windows NT, a fact that is consistent with the finding that most SIS firms are oriented towards business customers (see below). Not surprisingly, large and medium-sized firms are the main providers of SIS for mainframes, AS/400, and workstations. Few firms are oriented towards less conventional platforms such as industrial equipment and consumer devices. On the other hand, nearly half of the surveyed firms develop software products for UNIX-type operating systems, particularly Linux, Solaris, and HP-UX.

3.6 Quality Standards and Marketing Capabilities

Large firms tend to adopt better quality standards than SMEs. Nearly 60% of the surveyed large firms make strategic plans that are periodically updated, set quality goals, and measure quality indicators in a systematic way. In contrast, only around 30% of SMEs undertake those practices regularly.

Only 16% of the surveyed firms have earned quality certifications, a very low percentage in comparison with other developing countries. For instance, a survey of Brazilian firms in 1999 showed that 26% of them had a quality certification in 1999 (Weber, et al., 2000). Expectedly, due to the high costs involved, quality certifications are more common in large firms than in SMEs.

Though most firms employ two or more marketing channels, they prefer direct contact with customers. Consultancy activities are a means of getting new contracts. In turn, subcontracting is nearly nonexistent. The key role played by the direct contact with the customers is consistent with the highly inward-oriented strategies of local SIS firms. Nonetheless, some firms have opened commercial offices abroad, trying to reproduce the network of contacts they have developed locally.
3.7 Competitive Advantages and Disadvantages

The customers of the local software developers are mostly located in banking, retail and wholesale trade, health care, telecommunications, and public administration. In all these sectors, firms developing software concentrate on making products for accountancy and enterprise management solutions. These products are oriented towards domestic SMEs that cannot afford to buy expensive software packages provided by large international software firms such as SAP, Peoplesoft, and others. Moreover, there are highly country-specific features of local legislation in accountancy rules, fiscal and labor regulations, and other laws that give advantage to the domestic software providers. Though the software packages offered by large international providers may be adapted to meet the local requirements, the customization costs are far beyond the budget of most domestic SMEs.

This advantage of the local software developers may become a constraint when they try to sell their products abroad. The same factors that hinder local customers from using foreign software packages hinder Argentine software developers from penetrating foreign markets. Furthermore, in foreign countries, Argentine firms lack the knowledge about the “business culture” and the personal contacts that are key advantages in the domestic market.

When asked about their main strengths and weaknesses, most local firms answered that their main strength was their ability to adapt to the specific requirements of their customers. The lack of scale of their production and the inadequacy of their marketing channels were their primary weaknesses.

When asked, many local SIS firms declare that they are able to offer a highly diversified set of products and services. This may reflect great flexibility in meeting varied demands; on the other hand, it could suggest that the local market is too small to support a strategy of specialization. The latter may be the case particularly for small SIS firms, which try to attend diversified demands in order to keep on the market. Nonetheless, this range of activities may retard future development of this sector, since these firms are losing the potential gains that may be derived from following business strategies that focus on developing "core" specialization areas.

Furthermore, the sort of “natural protection” that local SIS firms used to enjoy due to the idiosyncrasies of the local market is gradually eroding because:

- Large international software providers are increasingly entering into the “top” of the SMEs market by offering less expensive packages suited to the needs of that kind of firms.
- Many foreign firms (especially from Spain) are competing via prices in the SMEs segment with packaged products.
- Technological changes, such as software updates through the Internet and technical support via call centers, are eroding the localization advantages enjoyed by local firms.
- Several local firms have been acquired by Transnational Corporations (TNCs), whose affiliates tend to prefer foreign software packages (see Stamm, 2000).

The market for local SIS firms could eventually grow since most domestic SMEs need to upgrade their informatics structure. However, that growth may have limits since SMEs have been going through a difficult restructuring process during the last decade and face severe economic and financial problems.

Given the limits faced by local SIS firms when trying to sell business software products abroad, we may conclude that specialization in the SIS market does not look very
promising for Argentine firms. Even if previous studies have stated that Argentina has competitive advantages for developing SIS for certain market niches (edutainment, applications for health care systems, industrial automation, public administration and agricultural production, etc.), our survey does not show any trend towards specialization in any of these areas by local SIS firms.

Furthermore, local firms rarely make true “innovations”; of the firms responding to the survey, only one built its market success on its innovation capability. They concentrate on improving and adapting their products to new technologies and platforms or on widening the range of application of their products. The lack of more ambitious research activities is the result of different factors: (1) the relatively small size of the domestic market poses an obstacle for making innovative activities, since their costs should be difficult to recover; (2) local firms have very few linkages with R&D institutions, universities, or consultancy firms; (3) domestic demand, especially that of SMEs, does not seemingly induce SIS firms to significantly upgrade their innovative and learning capabilities.

4. THE IMPACT OF THE MACROECONOMIC AND INSTITUTIONAL ENVIRONMENT

According to the surveyed firms, the Argentine macroeconomic conditions and institutional environment have both positive and negative impacts on the development of the SIS sector. The high quality of the domestic human resources is the advantage most mentioned by surveyed SIS firms. Moreover, the use of information technologies has substantially grown, in both the public and the private sector. However, even if Argentinian diffusion of information and communication technologies is above the Latin American average, other countries such as Uruguay, Brazil, Chile, and Mexico show comparable or even better indicators.

On the other hand, labor costs were deemed relatively high. They were higher than those of some countries of the European periphery (Portugal, Greece, Ireland) that surpass Argentina as locations for developing export-oriented SIS activities since they are closer to the main markets and they belong to the European Union. However, with the huge devaluation of the peso in 2002, labor costs are now much lower than before and should help increase the price competitiveness of local SIS firms.

While Argentine graduates in informatics-related careers may be well trained, there are few university departments that have a staff of full-time professors and treat research on a par with teaching activities (Perazzo, Delbue, Ordoñez, & Ridner, 1999). Since wages are very low compared with those in the private sector, universities have difficulties attracting high-quality personnel. Furthermore, university careers do not seem to foster entrepreneurial attitudes among their students, a factor that may be hindering the upsurge of new firms.

There are very few post-graduate courses, and their quality is often assessed as mediocre. Since budget restrictions have long prevented the creation of a wide program of grants to fund studies abroad, it is no surprise that only about 30 persons with doctoral degrees were working in the Argentine SIS firms in 2001. The lack of postgraduate professionals is an obstacle for undertaking high-level consultancy or research activities.

8According to Perazzo, et al. (1999) Argentina has advantages to make inroads in these activities due to (1) a relatively high cultural level, at least by Latin American standards; (2) domestic markets for these activities may reach significant dimensions, especially in agricultural and health applications, as well as in edutainment; (3) information technologies are rather well diffused in the public sector, compared with Latin American standards; (4) the lack of linguistic barriers may facilitate the penetration in other Latin American countries.
The scarcity of high-level personnel is a major limitation to developing innovative activities and ensuring the quality of academic training. Moreover, if the local demand for professionals in this area continues to increase and the “brain drain” that has been taking place in the last years does not stop, it is foreseeable that in the medium term there could be a deficiency in the supply of professionals for local SIS firms (and not only of those with high-level skills).

The telecommunications infrastructure presents additional problems. Even if the telecommunications infrastructure has substantially improved over the last decade, local firms deemed telecommunication costs high. Though these costs were reduced with the peso devaluation, the quality of service may have declined due to the higher costs of importing components and equipment for telecom companies. These increasing costs may delay further technological modernization of the communications infrastructure.

Another negative factor is the lack of access to finance. SIS firms, particularly SMEs, have difficulties accessing the formal financial system (since they are not only small, but are often young and produce intangible goods). They lack financing alternatives, since the stock market is weak and venture capital is almost unknown. Public policies aimed at easing SMEs’ access to credit have been in place for many years, but they have not addressed the specific needs of SIS firms mentioned above. The situation has worsened since 2001, given that the difficulties that arose in the Argentina’s financial sector after the foreign debt default and currency devaluation have closed access to formal financial mechanisms.

Given the difficulties for credit access, some local firms wishing to expand their operations look for funds abroad. At least two firms that have taken this step ended up selling their majority stake to foreign owners. This is not necessarily bad news insofar as the management remains in local hands and domestic development activities are preserved.

Formal research and development activities by private firms are rare, while those undertaken by universities are weak and are not likely to have any commercial impact. The government created some initiatives to fostering R&D activities in private firms in the mid 1990s (Chudnovsky, 1999), but they have had only a marginal effect. In this sense, SIS firms consider the domestic market as too small to recover the high cost of undertaking innovative activities.

Which public policies do SIS firms think would help to foster the SIS sector most? Since firms state that the tax burden most hinders their operations, it comes as no surprise that fiscal incentives have been the policy measure they request most.

In contrast, the firms did not feel that policies aimed at facilitating access to foreign markets were effective. This may be evidence that SIS firms seem not to be worried about the inward-orientation of the sector (though this attitude may have begun to change after the devaluation). Policies geared at fostering entrepreneurship, such as incubators, have also been judged as hardly relevant by the surveyed firms.

Finally, software piracy levels are above the Latin American average. This is more due to the low level of enforcement of the domestic laws, rather than to the absence of regulations about software piracy. Firms that distribute foreign software products are the most worried about this situation.

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9The problem of access to finance is common to all SMEs in Argentina.

10In fact, this is not something unusual for this sector, since the same has happened even with some successful European firms.

11According to the Business Software Alliance, piracy rates in Argentina amounted to 62% in 1998–1999 (the respective figure was 80% in 1994–1995), against 36% at world level and 59% in the Latin American average.
5. CONCLUSIONS AND POLICY SUGGESTIONS

Our survey on the SIS sector in Argentina shows that there are a small number of large, and mostly foreign owned, firms that have performed very well in recent years. They sell foreign software products and provide information services to the public sector and large domestic customers. Compared with SMEs, these firms have better access to human resources and finance, have more advanced quality management systems, and use more sophisticated programming tools. However, they seldom undertake innovation activities and rarely export their products and services from Argentina. On the other hand, small and medium SIS firms survive primarily through inward-oriented strategies, profiting from the “localization advantages” that come from their knowledge and ability to adapt to local regulations, customers’ requirements and business culture.

Our findings show that the Argentine SIS sector lacks most of the conditions that Heeks (1999) considers key to successful performance. The Table 7 summarizes the comparison between Heeks’ conditions and our findings about the Argentina’s case.

What lessons can be drawn from our study? Some authors have suggested that some countries that follow an export-oriented strategy may be locked into a low-innovation trajectory, i.e., a trajectory where the firms find it difficult to jump from cost-based to innovation-based competition (see D’Costa, 2000, for the case of India). The case of Argentina shows that “inward-oriented” strategies may also lead to the same type of “lock-in.” The same factors that help SIS firms to survive in their local environment may prevent them from developing

<table>
<thead>
<tr>
<th>Heeks’ conditions</th>
<th>Argentina’s situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of demand-growth markets and synergies</td>
<td>Lack of knowledge about foreign markets</td>
</tr>
<tr>
<td>Ability to compete via costs or service innovation</td>
<td>Improved ability to compete via costs after the devaluation</td>
</tr>
<tr>
<td>Good marketing</td>
<td>Lack of experience in innovation-based competition</td>
</tr>
<tr>
<td>Access to investment and working capital</td>
<td>Lack of marketing skills</td>
</tr>
<tr>
<td>Access to programming, analysis and management skills</td>
<td>Traditionally difficult, worsened after the banking system crisis</td>
</tr>
<tr>
<td>Access to information technology</td>
<td>Good access to programming and analysis skills, but lack of management skills</td>
</tr>
<tr>
<td>Networking mechanisms, both intra-firm as well as with other software firms, potential or actual clients, etc.</td>
<td>Good infrastructure, but difficulties in keeping up to date due to increased costs after the devaluation</td>
</tr>
<tr>
<td>Finance (access to working and venture capital and tax incentives)</td>
<td>No access to venture capital</td>
</tr>
<tr>
<td>Education and training</td>
<td>Some tax incentives may be in place soon</td>
</tr>
<tr>
<td>Research and development</td>
<td>Good formation at the undergraduate level, but lack of high level professionals (post-graduates)</td>
</tr>
<tr>
<td>Intellectual property rights protection</td>
<td>Weak R&amp;D capabilities</td>
</tr>
<tr>
<td>State procurement</td>
<td>Lack of enforcement of copyright legislation</td>
</tr>
<tr>
<td>Infrastructure (telecommunications, etc.)</td>
<td>Local firms (specially SMEs) have difficulties to enter into tenders for the provision of SIS to the public sector (“short lists”)</td>
</tr>
<tr>
<td>“National vision”</td>
<td>Idem information technology</td>
</tr>
<tr>
<td></td>
<td>So far, non existent</td>
</tr>
</tbody>
</table>
a learning process, which, in our view, is a precondition for a sustainable expansion strategy of expansion in this sector. Inward-oriented strategies, at least in countries without huge and relatively sophisticated domestic markets, seemingly have more “cons” than “pros.”

The Argentine SIS sector may continue to grow in response to local demand, but it is highly improbable that it will turn into a dynamic and internationally competitive sector if it remains attached to an inward-oriented strategy, since the domestic market is small and is not very challenging. Furthermore, the lack of access to finance, the absence of networking mechanisms, the weaknesses of the quality management, the poor marketing and R&D capabilities, and the lack of certain kinds of high-skilled personnel place limits on sectoral development that are not likely to be overcome in the near future.

Overcoming these limitations will require public policies in support of this sector and actions aimed at improving the SIS firms’ capabilities and endowments. A consensus seems to be developing within the Argentine government on the importance of fostering this sector through different kinds of incentives (mainly tax deductions). There is an opportunity, then, to adopt policies aimed at restructuring the SIS sector in order to increment its capabilities so as to successfully compete in international markets.

Fortunately, Argentina’s SIS firms seem to be aware of the need to redefine their business strategies and increase their presence in foreign markets. They know that although the peso devaluation may have temporarily improved their chances to compete via labor costs, such a strategy is not viable for a country like Argentina in the long term (since labor costs measured in U.S. dollars are expected to grow in the medium term). Furthermore, it is not indeed a very promising strategy either (as it means to keep attached to low value added activities).

Argentina has a large number of well-educated people and a cultural influence in Spanish-speaking Latin America. There are a large number of SIS firms that, in spite of the above-mentioned deficiencies, have managed to survive in a not very friendly environment during the last years, which implies that they have certain skills and capabilities that could be the basis of a new (and more outward-oriented) strategy for this sector.

An outward-oriented strategy should aim first at penetrating other Latin American markets as a way to learn how to export SIS. The U.S. market, where at least two Argentine firms are already installed, is also a potential key destination for SIS exports. To attain these objectives, domestic firms need not only to get information about the needs of those markets and incorporate modern quality systems, but also define viable specialization patterns.

A potentially promising strategy for Argentina’s SIS sector may be based on the search for specialized niche markets for which services and semi-packages could be developed, as a first step to creating packages that can be sold in different countries with different degrees of customization (see Heeks, 1999).

The government should help this process through support measures aimed at facilitating private restructuring efforts and at helping to fulfill the above-mentioned conditions for a successful performance in this sector. An environment full of incentives for young entrepreneurs to engage in this sector—e.g., dismantling red tape barriers and facilitating the access to finance—should also be a major task for the government.

Finally, in the new post-devaluation scenario, pari passu the strengthening of the domestic SIS firms, the government should explore the possibility of attracting large international SIS firms in order to install in the country their regional basis for South America. In this regard, although the cost advantage derived from the devaluation may not be sustainable in the long run, it could be useful as an initial location advantage to attract investments. Such measures could improve Argentina’s image as a potential provider of SIS as well as, in the long run, help to strengthen the development possibilities of the sector as a whole.
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