Journal of Evolutionary Studies in Business JESB

Volume 3, Number 2, 151-182, July-December 2018 doi:10.1344/jesb2018.2.j050

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From the Import-Substituting Industrialization to Internationalization in the Machine Tools Industry in Brazil: The Case of Romi

Abstract

This paper aims to describe Romi's business history in order to contribute to the discussion and improve the understanding of how Brazil, with strong industrial growth during the import substitution process, but with low technological development, generated companies that exported technology-intensive capital goods, and also started these firms' internationalization process. Romi started out as a small business, an automobile repair shop, at the beginning of the twentieth century. In the 1960s, the company was already one of the largest lathe producers in the world. Today, it is still an important machine tools producer in Brazil with subsidiaries in several countries around the world.

Keywords: Industrialization; Capital Goods; Machine Tools; Brazil

Introduction

Industrialization has been the most powerful factor in the process of accelerating economic growth. The industrial sector has had a dynamic impact on other sectors of the economy, especially on the social and institutional environment.

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Received 05 Dec 2017 - Accepted 11 April 2018

Journal of Evolutionary Studies in Business JESB
Volume 3, Number 2, 151-182, July-December 2018 doi:10.1344/jesb2018.2.j050

The mechanical industry has a special role since its development supports other industrial sectors' expansion as well, that is, its products are intended to equip other sectors through the supply of machinery and equipment. The most common form of technical improvement in the industrialization process is through technological changes, especially the development of machines to build machines. Therefore, the development of the mechanical industry is fundamental in the industrialization process.

There is a debate in the economic history literature about the industrialization period in Latin America. Authors from the ECLAC[1] tradition think that import-substituting industrialization (ISI) would be the path to economic modernization and development. In their opinion, industrialization is a means of overcoming poverty and reducing the gap between rich and poor countries and boosting independence through self-sustaining economic growth with inward-looking development (Prebisch 1949; ECLAC 1951). Tavares (1964) first formulated ISI as a dynamic process; however, his formulation was based on ECLAC texts and ideas from the beginning of the 1950s, with three basic ideas: a) tendency towards external imbalance is inherent in industrialization on the periphery; b) Latin America's industrialization consists of import substitution generated by external deficits; c) the process promotes a change in the imports' composition, but does not reduce their volume. The industrialization process should be accompanied by diversification in the peripheral economies' productive structure, the domestic market's size, and the ability to import. In the 1960s, criticism about industrialization's anti-export bias emerged within ECLAC, proposing export reorientation to improve allocative efficiency and reduce external restrictions (Prebisch 1961; Bielschowsky

[1] The Economic Commission for Latin America (ECLA) is one of the United Nations' Economic Commissions and was funded in 1948 to study Latin America's economic development. In 1984, the Economic Council changed its name to the Economic Commission for Latin America and the Caribbean (ECLAC).

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2000, 44). In the 1980s and 1990s, Latin American industrialization received its greatest criticism in the face of the period's problems. The ISI would have promoted low technological development and unequal growth in Latin America between 1965 and 1984. Compared with the rest of the world, Latin America's economic development process would have added insufficient technical progress, with a low relative participation in the production of capital goods, engineers, scientists, and scientific publications (Fajnzylber 1983, 1990).

According to more recent literature, such as Taylor (1998) and Haber (2008), the import substitution process resulted in a closed, technologically backward, and inefficient industrial development, that is, the inward-looking development model resulted in economic system distortions.

The history of the company Romi contributes to this discussion and improves the understanding of how Brazil, with strong industrial growth during the import substitution process, but with a low aggregate technological development, generated companies that exported technology-intensive capital goods, and also started these firms' internationalization process. Romi started out as a small company, an automobile repair shop, at the beginning of the twentieth century. In 1960, the company was already one of the largest lathe producers in the world. Today it is still an important machine tools producer in Brazil with subsidiaries in several countries around the world.

The next section describes the industrialization and capital goods industry by investigating the Brazilian economy's evolution between the 1930s and the 2000s. The third section outlines this study's empirical contribution to business history. It shows Romi's growth and internationalization. Original primary sources, mainly collected from the Romi Historical

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Documentation Center and São Paulo's Board of Trade, were used in the research. The last section summarizes the paper's main conclusions.

Industrialization and the capital goods industry in Brazil

Brazil's GDP grew at about 7% annually from 1940 to 1980 but slowed down to only 2.5% from 1980 to the 2000s (Bacha and Bonelli 2005). This rapid GDP growth until 1980 was led by the manufacturing sector (manly from the 1930s), which grew by 9% annually between 1945 and 1980. The industrial growth cycle coincided with the GDP trend in the post-war period up until the 1980s (Serra 1982).

The first period had an accelerated industrial production growth of 9.7% annually from 1947 to 1962. In the period from 1956 to 1961, in the context of the Target Plan (Plano de Metas) in Jucelino Kubitschek's government, the rate accelerated to 11%. In the second period, between 1962 and 1967, growth slowed down to 2.6% annually. This led to João Goulart's democratic regime change and Castelo Branco's military dictatorship from 1964. After institutional reforms during the first military government, the industry's growth accelerated again (about 13% annually from 1968 to 1973), a period known as the Brazilian economic miracle during the Costa e Silva and Medici governments. A new phase of economic slowdown occurred between 1973 and 1980, even with the Geisel government's (1974-1979) Second National Development Plan (II Plano Nacional de Desenvolvimento Econômico) and subsequent implementation of large investment projects. The growth rate was about 7%, but higher than the historical average (Serra 1982, 20-44).

After the 1970s oil crisis and the expansion of ISI with external debt, Brazil was in a condition of financial crisis at the beginning of the 1980s. The return of democracy in the country in 1985 was coupled with external debt and high inflation. In the 1980s, the Brazilian GDP grew by 2%

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less than the historic average, and the period became known as the lost decade. After several failed price stabilization plans, the 1994 Real Plan solved the inflation problem in the country. Cardoso's government (1995-2002) expanded the dismantling of state-owned companies built throughout the military government with ISI. In the 1990s, the economy grew at almost the same rate as in the 1980s, around 2.5% (Bacha and Bonelli 2005, 165-167).

Table 1 outlines Brazil's ISI between 1929 and 1964. The table shows total imports, imports by industrial sector, and industrial output's growth rates. Despite an 8.5% drop in the industrial output's growth rate, imports dropped sharply (57.6%) and all industrial sectors' imports declined between 1929 and 1932. According to Celso Furtado, due to the 1929 crisis, Brazil's economy shifted from a dynamic to an inward-looking, since the coffee defense policy maintained effective demand and the level of employment in the economy's other sectors. At the same time, the crisis was responsible for an external imbalance that grew with the exchange rate devaluation (which raised imported goods' prices) and, therefore, internally-created income put pressure on domestic producers (Furtado 2000).

The Great Depression in Brazil coincided with domestic market growth, as the industrial sector grew by 57.8% and imports slightly recovered between 1933 and 1938 (despite the 57.3% import growth in the period, 1932 registered the lowest import levels in history). There was a significant import substitution with an increase in industrial production and a 33% drop in imports between 1929 and 1938 (FGV 1969, 29).

During the Second World War period (1939-1945), import substitution intensified. Unlike the 1930s, the industry had diversified in the 1940s, with capital goods domestic production and machinery and equipment imports growing by 150% between 1933 and 1938 (Table 1). Total imports fell by 11.6% due to the war, which limited external demand (necessary to generate

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foreign currency to purchase imports) and created import difficulties with other countries at war. Industrial production grew by 40.1% between 1939 and 1945. During this period, the Brazilian industrial sector began substituting machinery and equipment imports more intensively (a 52% drop between 1939 and 1945) and Romi played a significant part in this process, as we shall see in the following sections.

Table 1. Brazil – Import Growth Rates by Industrial Sector, Total Imports, and Industry Output Index (Quantity- Based), 1929-1964, (percentage)

Industries	1929-1932	1933-1938	1939-1945	1946-1952	1953-1961	1962-1964
Industrial sector imports						
Non-metallic minerals	-64.9	-18.3	66.1	184.4	-80.8	-16.8
Metallurgy	-68.6	77.0	18.7	54.7	55.4	-42.7
Machinery and equipment	-80.6	150.3	-51.8	434.3	-21.1	-52.2
Electrical materials and communication	-71.1	64.9	-52.4	378.2	-42.8	-52.2
Transportation equipment	-91.9	394.4	-38.8	455.6	-65.5	-46.7
Wood	-31.6	63.3	48.8	17.2	-28.7	-7.6
Furniture	-92.3	165.7	-57.9	-32.8	-69.6	
Paper	-25.1	65.8	4.0	61.4	-24.6	-62.8
Rubber	-54.8	-88.4	-93.8	1,296.6	-96.7	-47.8
Leather	-77.1	-77.6	15.9	-13.3	-96.1	70.5
Chemicals	-30.0	41.1	1.9	332.7	-4.7	-31.0
Pharmaceutical and plastic products	-67.7	10.0	52.6	321.9	-76.4	-4.6
Textiles	-72.7	9.4	-75.5	327.6	-79.9	-36.2
Clothing and footwear	-72.0	4.6	15.1	23.7	-57.4	242.8
Food products	-64.5	6.3	-26.2	160.8	-18.5	41.1
Beverages	-81.9	70.8	113.7	-37.8	-59.2	-21.7
Printing and publishing	-62.2	-2.4	200.9	32.0	10.3	2.3
Miscellaneous products	-61.0	-20.8	148.5	37.4	41.8	-23.2
Total imports	-57.6	57.3	-11.6	185.7	-11.9	-15.0
Industry output index	-8.5	57.8	40.1	82.1	135.9	13.9

Source: author's calculations from FGV, IBRE/CCN. 1969. *Estrutura do Comércio Exterior do Brasil, 1920/1964*, vol. 1, 22, 25, 29, 30, 31, 37, 38, 39, 44, 45, 48, 60, 61, 63, 71, 72, 75.

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The period from 1946 to 1952 reflected the post-war economic conjuncture. Dutra's government promoted exchange rate system changes that significantly impacted ISI. The 1946 exchange rate policy was a fixed exchange rate (18 cruzeiros per dollar), and this rate was overvalued. After a foreign exchange reserves slump, exchange controls were introduced in 1947 (quantitative control for imports), maintaining the exchange rate fixed and overvalued. This system changed in 1948, when the control happened under the previous import licenses' regime. This new system would remain until 1953. The higher exchange rate favored imports until 1947, and subsequently the licenses favored essential products imports (Fishlow 1972, 42-47). Between 1946 and 1952, imports grew by 185.7% and industrial production-by 82%. There was a decrease in non-essential consumer goods imports (leather, clothing, footwear, and beverages) but an increase in capital goods and intermediate goods imports, which were essential for industrial investment in that period (Table 1). Therefore, there was no capital goods industry stimulus, but a non-imported products substitution (Fishlow 1972, 47).

Industrialization accelerated fast from 1953 to 1961 due to the Target Plan (1957-1961). It was the most intensive import substitution period, with a 12% total import decrease and a 136% industrial output increase. Multiple exchange rates were implemented in the period, which were active measures to encourage balance of payments and industrialization equilibria. Another measure was to create incentives for the flow of foreign capital. Instruction 113 of the Superintendency of Currency and Credit (Superintendência da Moeda e do Crédito), a monetary authority, in 1955 allowed machinery and equipment imports without exchange coverage. Although the fastest growing sectors were those linked to the automobile industry, there were no incentives for capital goods production (which would be observed in the 1960s) (Fishlow 1972, 48-53). In the early 1960s, ISI was showing signs of slowing down. Industrial output

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increased by only 14% and total imports decreased by 15% between 1962 and 1964. Despite the deceleration, the capital goods sector made progress in import substitution as a result of the Target Plan's investments maturity.

As a result of ISI, Brazilian economic growth promoted changes within the industry, as shown in Table 2. In 1939 consumer goods accounted for about 70% of the manufacturing industry's value, food (23.3%) and textiles (21.8%) being the largest contributors. In 1980, food products accounted for 10% and textiles for only 6.4%. The intermediate and capital goods industries increased their relative shares between 1939 and 1980. For example, machinery and equipment, electrical materials and communication, transport equipment, metallurgy and chemicals had impressive growth between 1930 and 1980 (Table 2). Thus, in the 1970s Brazil had the highest proportion of capital goods in Latin America and close to Western Europe's (Serra 1982, 6).

The capital goods industry in Brazil is related to repairing machines and equipment parts, mainly agricultural machinery. The origin of this industry is ancient, possibly dating back in the colonial period. It is impossible to specify a date, but it was at the end of the nineteenth century that small workshops, with turners, carpenters, blacksmiths[2], machinists, and others worked in cities or villages, which had an urban or rural artisan center. Thus, it seems this industry's origin is related to export-led growth, especially with coffee in southeastern Brazil (Leff 1968; Erber et al. 1974; Lago et al. 1979; Marson 2017).

In the 1920s and 1930s, the machinery and equipment firms experienced changes in their output. Most companies founded in the 1920s produced industrial machines, indicating the diversification in the industry, unlike those founded in the previous period, which mostly served the agricultural sector. In the 1920s firms produced machines for weaving, ceramics, bakery,

[2] A phenomenon similar to what occurred in the United States in the nineteenth century, where blacksmiths' contribution to the economy appears to have been important, though belittled by scholars (Atack and Margo 2017).

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footwear, pottery, stamping, pasta and bread manufacturing, metallurgy, the textile industry in general, glass factories, motors, and steam boilers.

Table 2. Brazil - Manufacturing Industries' Value, by Industrial Sector, 1939-1980, (%)

Industries	1939	1949	1959	1970	1975	1980
Non-metallic minerals	5.3	7.1	6.6	5.9	6.2	5.8
Metallurgy	7.5	9.4	11.8	11.6	12.6	11.5
Machinery and equipment	-	2.1	3.4	7.1	10.3	10.1
Electrical materials and communication	5.4	1.6	4.0	5.4	5.8	6.4
Transportation equipment	-	2.2	7.6	8.0	6.4	7.6
Wood	3.2	4.2	3.2	2.5	2.9	2.7
Furniture	2.1	2.2	2.2	2.1	2.0	1.8
Paper	1.5	2.2	3.0	2.6	2.5	3.0
Rubber	0.6	1.9	2.9	1.9	1.7	1.3
Leather	1.7	1.3	1.1	0.6	0.5	0.5
Chemicals	6.6	5.3	8.6	10.0	12.0	14.7
Pharmaceutical products	2.7	2.8	2.5	3.4	2.6	1.6
Perfumery, soaps and candles	2.3	1.6	1.4	1.5	1.2	0.9
Plastic products	-	0.3	0.9	1.9	2.3	2.4
Textiles	21.8	19.6	12.0	9.3	6.1	6.4
Clothing and footwear	4.8	4.3	3.6	3.3	3.8	4.8
Food products	23.3	20.5	16.4	13.5	11.3	10.0
Beverages	4.3	4.5	2.9	2.3	1.8	1.2
Tobacco	2.3	1.4	1.3	1.3	1.0	0.7
Printing and publishing	3.5	4.0	3.0	3.7	3.7	2.6
Miscellaneous products	1.1	1.6	1.8	2.1	1.9	2.2
Support activities	-	-	-	-	1.3	1.7
Total manufacturing industries	100.0	100.0	100.0	100.0	100.0	100.0

Source: author's calculations from IBGE, 1990. *Estatísticas históricas do Brasil: séries econômicas, demográficas e sociais de 1550 a 1988*, 386.

In the 1930s there was a wider diversification in the production of machines for various industrial sectors and in that period the production of machine tools (such as lathes) began (Marson 2017). With the Second World War, the supply of capital goods from the European and North American markets to Latin America declined. Thus, in this period there was a development in the metal-mechanic industry by means of copying machines installed before the war. As can be seen in Graph 1, equipment imports substitution deepened in the post-war

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period. From the beginning of the 1950s, domestic equipment production was higher than imports. The local capital goods industry provided over 60% of domestic industrial equipment demand in 1949 (Leff 1968, 8).

From the 1950s, the main sources of capital goods demand were industrialization and government enterprises (Erber et al. 1974, 16). Although demand from the government sector has been central to the capital goods industry, Brazilian equipment production did not receive any tariff protection until the 1960s (Leff 1968, 132-156; Bergsman 1970).

The Brazilian private firms[3] in the capital goods industry were competitive with foreign firms in the 1960s (Leff 1968). The result of the national industry's growth has gone the "economic groups," business organization of legally independent firms, operating in several industrial sectors with great market power, under the control of familiar groups (Leff 1978). The economic groups' purpose was to satisfy the internal market, although not always taking advantage of the economies of scale. Another characteristic of the economic groups was the close relationship with the government, with the Latin American industrialization policy strategy in their favor (Valdaliso and López 2007, 390-391). In Brazil, this relationship will appear in the Target Plan between 1957 and 1961, and especially in the Second National Development Plan between 1974 and 1979[4] (Lessa 1998). The only slowdown in Brazil's equipment production was in the early 1950s and 1960s (1962-1966), following the results of the Brazilian economy between 1947 and 1970. The periods of economic growth were during the Target Plan (1957-61) and the so called Brazilian Economic Miracle (Graph 1).

[3] For details on the importance of the Brazilian private industrial enterprise between 1950 and 1980, see Cunningham (1982).
[4] For details on government policies for the capital goods industry in Brazil, see Lago, 1979, chap. VI, and Almeida, 1983, chap. 3.

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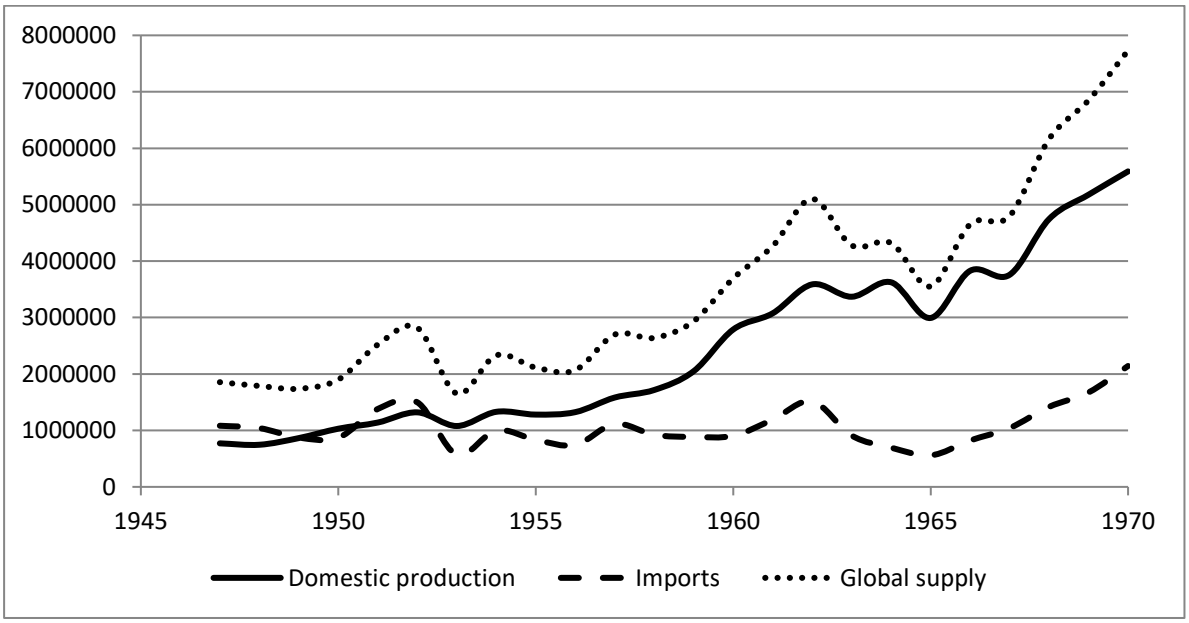
Graph 1. Brazil – Domestic Production, Imports, and Global Supply of Equipment, 1947-1970, (thousand cruzeiros from 1965/67)



Source: author's calculations from Erber et al. 1974, 28.

In the early 1980s, there was a drop in Brazil's machinery and mechanical equipment production. Between 1984 and 1987 there was a recovery, but production did not return to the pre-1970s levels. Machinery and equipment production experienced a continuous downward trend between 1988 and 1993. After a small recovery, production kept decreasing again from 1995 until 1999. Brazil's machinery and equipment industry crisis in the 1980s and 1990s became obvious when compared to the machines imports evolution. The exchange rate appreciation between 1994 and 1999 due to the Real Plan promoted a significant imports increase and a clear deterioration of the importance of domestic production to the total supply of machinery (Graph 2).

The restructuring of the Latin American economies coupled with commercial and financial opening favored firms' internationalization in the 1990s. An internationalization process based on import-substituting industrialization took place between 1980 and 1990 in sectors that had

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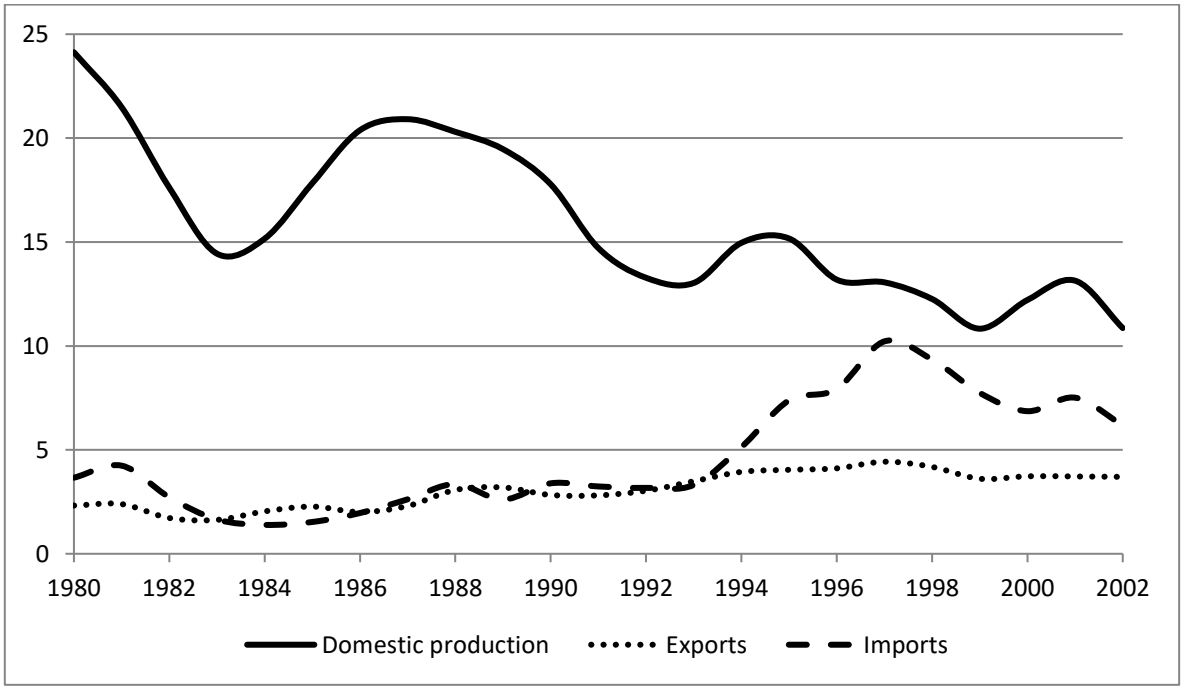
product design capabilities or adaptation and process advantages such as auto parts, metalworking, steel, and textiles (Chudnovsky and Lopez 1999, 12, 20). The Brazilian multinationals were prominent in the domestic market in the 1970s, with a focus on export efforts. These companies began a new cycle in the late 1980s and early 1990s, developing international strategies for expanding their activities (Cyrino and Barcellos 2006, 227). The new multinationals' expansion from Brazil, India, China, South Africa, and Mexico altered the global corporate context in the 2000s. As previously noted, this new wave of internationalization was motivated by competitive domestic market pressure, combined with strategies to expand and diversify sales, markets, and products (Santiso 2008). As will be seen in the next section, Romi was one of the companies that took advantage of internationalization during this period.

Graph 2. Brazil – Domestic Production, Machinery, and Mechanical Equipment Imports and Exports, 1980-2002, in constant 2002 US$ billions



Source: author's calculations from Vermulm 2003, 11.

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Romi's growth and internationalization

Romi's growth, 1930s-1980s

Américo Emílio Romi started his own business as a workshop. Romi began operations in Santa Barbara in 1929 with an auto workshop, which produced parts and began receiving orders for farm equipment pieces.

The origin of machinery and equipment production in Brazil was linked to the local or regional economic development process. The economic development process in São Paulo state's interior in the early twentieth century where Romi's workshop was established is an example of the interconnection between local agriculture and the process of industrial growth and development. The local agro-industrial activities made possible the emergence of business to meet the machinery industry demand.

In the 1940s, Romi's development strategy took a new turn. Due the Second World War's import interruptions, Romi decided to specialize their production. After achieving success in the field of land cultivation agricultural machinery such as plows, seeders, and others, Romi expanded its production to the most universal industrial machinery: the lathe.

Romi took the opportunity of an applicant industrial machinery market and specialized in machine tools production. The specialization in a specific market segment and the development of more intensive products with modern techniques favored Romi's evolution.

Romi has followed the market's evolution. Along with this evolution, the firm was modernizing and adapting to more complex conditions and technical administration. Romi managed to keep the market adapting to their conditions through constant technical innovation improvements in the production process and their products, making it the leading machine tools producer in Brazil.

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The machine tools market, applicant core Romi, is briefly analyzed here. Machine tools are included in the mechanical and industrial classification. They are machines that are intended to produce new machines by mechanical movement, a set of tools. Lathes, grinders, planers, milling machines, boring mills, drills, saws, shears, presses, and other tools are classified as machine tools. The lathe is one of the oldest tools invented by men that cuts, files, or polishes pieces of wood, metal, or other material machines. As there are several types of lathes, it can be used in a small machine shop, or in a complex industrial organization.

Romi launched its business by producing farm machinery and in 1941 started lathe production as well. The machine tools industry has origins in Brazil, with companies continuously producing this type of engine in the 1930s. Before this period, companies produced some machines for personal use.

It is difficult to identify who Romi's customers were over the years, but we can make some generalizations to better understand the lathe market characteristics in Brazil. Its principal customers were the auto parts industries, the tooling (using the lathe in production machines), and the maintenance sectors (such as glass or porcelain cement, using lathe in simple maintenance). Thus, Romi's lathe production served both markets- customers requiring less complex lathes and customers requiring lathes for specific purposes. The market Romi served over this period was composed of diversified customers, requiring a relative degree of technological complexity in the products manufactured by the company (Marson 2017, 133-178). In the 1950s, Romi was already an important company in the lathe market in Brazil. We have lathe production data for Brazil between 1955 and 1970 and Romi's market share ranged from 61% in 1955 to 32% in 1970[5].

[5] The market share was derived by comparing Romi's lathe production relative to Brazil's total production (Vidossich et al. 1974, 18-21)) with data between 1955 and 1970 (Table 3).

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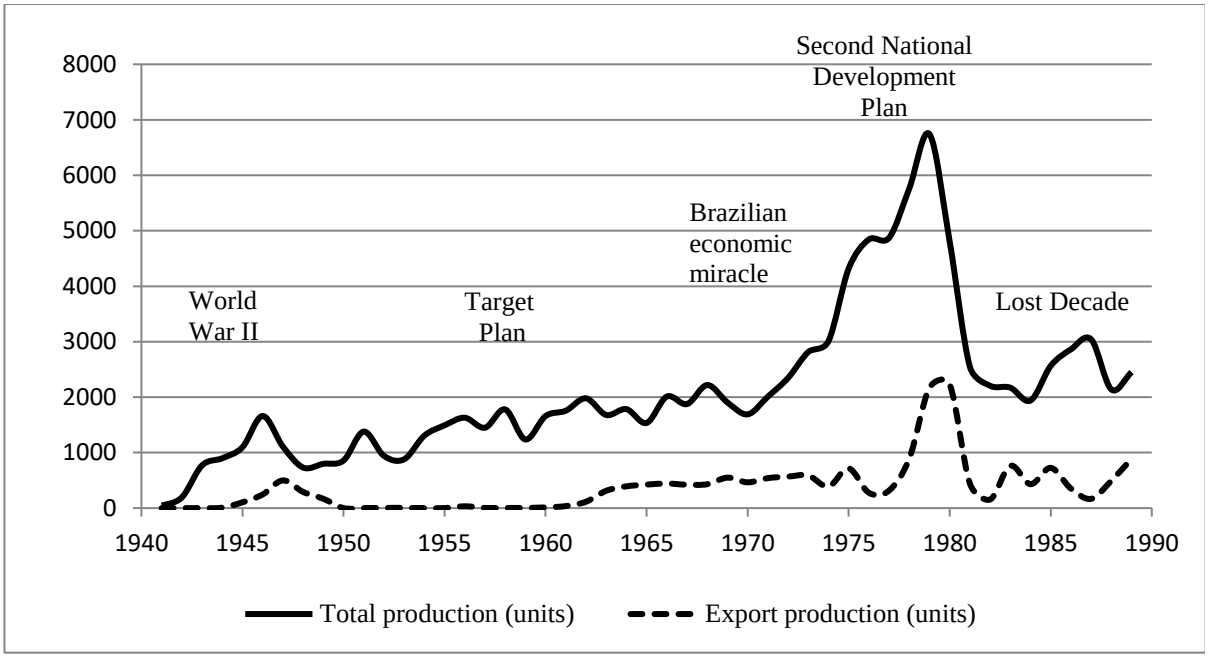
Graph 3 shows Romi's total lathe production and exports between 1941 and 1989 linking the evolution of lathe production with Brazil's main economic cycles- the Second World War (1939-1945), the Target Plan implemented by Jucelino Kubitschek (1956-1960), the Brazilian economic miracle (1968-1973), the Second National Development Plan (1975-1979), and the lost decade of the 1980s.

Despite high GDP and industrial production growth rates during the Target Plan and the economic miracle, there was a large increase in Romi's lathe production only during the Second National Development Plan (production in 1979 was 2.4 times greater than the last year of the economic miracle-1973).

Graph 3. Romi's Total Lathe Production and Exports, 1941-1989



Source: author's calculations from *Romi's Historical Documentation Center* database.

The greatest expansion of lathe production was caused by a strong domestic market demand, such as large government investment projects in the 1970s. However, earlier on the domestic market was not strong enough, and Romi began exporting in 1944, first to Argentina, then to

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other Latin American countries. Before the end of the 1940s, exports were extended to other continents as well. Exports were important for Romi between 1945 and 1949 and represented 45% of the company's production in 1947. From 1943 to 1947, lathe exports generated more revenue than domestic sales. However, starting 1947 domestic cost increased and without an exchange rate adjustment, exports fell. The company again exported lathes in bulk from the 1960s until the end of the 1970s. The following table shows Romi's lathe production for internal and external markets between 1941 and 1989.

Table 3. Romi's Lathe Production for Domestic and Foreign Markets, 1941-1989, (Current Dollars)

Year	Total production (units)	Total production ($)	% Domestic market (units)	% Domestic market ($)	% Exports (units)	% Exports ($)
1941	46	24,029	100.0	100.0	0.0	0.0
1942	193	101,902	100.0	100.0	0.0	0.0
1943	770	521,610	100.0	100.0	0.0	0.0
1944	899	739,109	99.1	99.1	0.9	0.9
1945	1,098	797,250	90.5	90.4	9.5	9.6
1946	1,660	1,147,990	69.0	81.7	14.8	18.3
1947	1,110	1,015,294	55.0	56.1	45.0	43.9
1948	731	897,807	60.2	66.9	39.8	33.1
1949	798	871,711	78.9	80.9	21.1	19.1
1950	857	1,540,663	100.0	100.0	0.0	0.0
1951	1,379	2,383,155	100.0	100.0	0.0	0.0
1952	942	2,091,711	99.6	99.6	0.4	0.4
1953	880	1,067,229	99.5	99.4	0.5	0.6
1954	1,306	1,568,483	100.0	100.0	0.0	0.0
1955	1,492	1,764,560	100.0	100.0	0.0	0.0
1956	1,629	2,807,718	98.0	96.7	2.0	3.3
1957	1,449	2,668,022	99.8	99.6	0.2	0.4
1958	1,779	2,398,312	99.8	99.9	0.2	0.1
1959	1,237	2,736,298	99.7	-	0.3	-
1960	1,659	3,337,082	99.2	-	0.8	-
1961	1,756	3,809,352	97.9	-	2.1	-
1962	1,979	6,845,183	94.2	-	5.8	-
1963	1,679	5,817,626	81.4	-	18.6	-

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Year	Total production (units)	Total production ($)	% Domestic market (units)	% Domestic market ($)	% Exports (units)	% Exports ($)
1964	1,784	4,510,915	78.0	83.0	22.0	17.0
1965	1,535	4,961,979	72.4	80.3	27.6	19.7
1966	2,011	6,949,129	78.0	83.4	22.0	16.6
1967	1,875	5,090,365	77.5	78.4	22.5	21.6
1968	2,219	5,866,493	80.6	81.1	19.4	18.9
1969	1,905	7,693,854	71.2	85.0	28.8	15.0
1970	1,690	7,290,803	72.5	83.6	27.5	16.4
1971	2,009	9,079,272	73.1	85.8	26.9	14.2
1972	2,346	15,031,350	75.8	91.7	24.2	8.3
1973	2,814	22,543,556	79.1	92.6	20.9	7.4
1974	3,009	28,070,709	87.1	92.7	12.9	7.3
1975	4,317	50,198,560	83.4	89.4	16.6	10.6
1976	4,843	60,900,944	94.3	93.0	5.7	7.0
1977	4,872	62,621,325	93.5	94.7	6.5	5.3
1978	5,762	76,352,719	84.5	91.6	15.5	8.4
1979	6,740	89,789,754	67.8	83.1	32.2	16.9
1980	4,800	66,927,050	53.6	70.0	46.4	30.0
1981	2,547	52,697,318	82.7	83.3	17.3	16.7
1982	2,205	39,699,291	93.0	92.3	7.0	7.7
1983	2,171	22,672,640	64.9	73.4	35.1	26.6
1984	1,939	25,741,230	77.8	82.8	22.2	17.2
1985	2,564	48,438,270	71.7	90.2	28.3	9.8
1986	2,862	79,290,518	87.7	96.5	12.3	3.5
1987	3,042	96,968,300	94.5	98.2	5.5	1.8
1988	2,139	86,640,465	76.9	93.9	23.1	6.1
1989	2,450	85,069,952	63.7	92.9	36.3	7.1

Source: Romi's Historical Documentation Center database and author's calculations.

Romi has followed the market's evolution and has provided more advanced machinery and equipment to satisfy businesses' needs. Until 1960, the company produced 22,000 lathes and exported 1,380. In the 1960s, Romi became one of the largest lathes manufacturers in the world, only behind the Soviet Union's state enterprise, exporting to 41 countries, including developed countries like the United States. Romi's export production was small in the 1950s. However,

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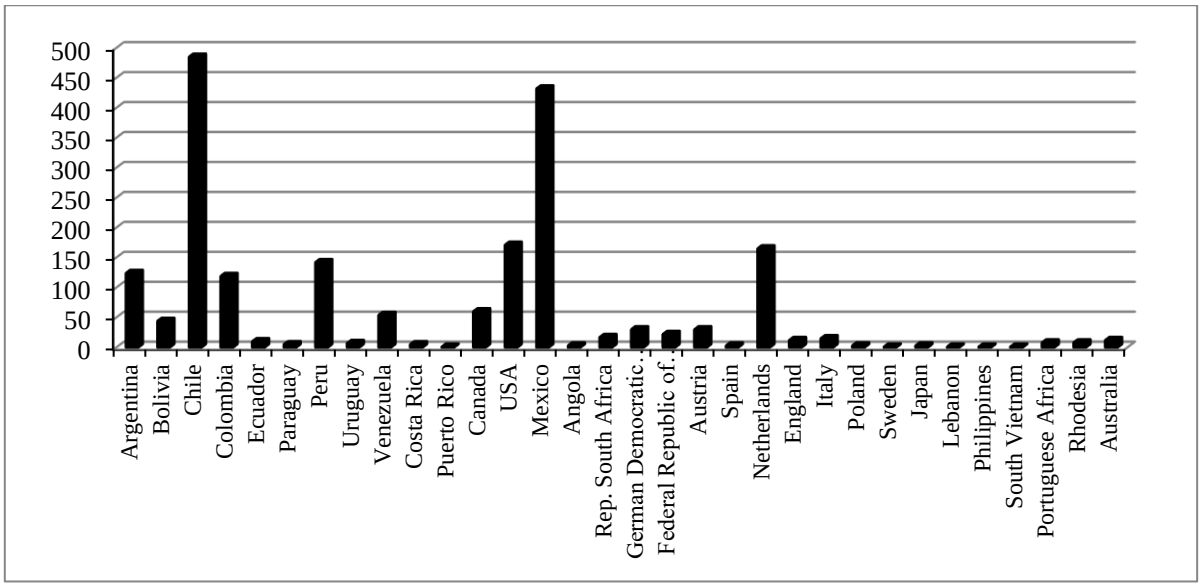
exports started to grow again from the early 1960s. We have data on the precise export destination country for the period 1962 to 1967. Graph 4 below shows these countries.

Graph 4. Romi's Lathe Exports by Country, 1962-1967 (Units)



Source: author's calculations from *Romi's Historical Documentation Center*.

Between 1962 and 1967, Romi largely exported lathes to Latin America (mainly Chile and Mexico) and the United States and Europe (mainly the Netherlands) (Graph 4). In the early 1970s, Romi's share of exports as a percentage of total lathes output fell again. Since 1976, the trend has been upward reaching a peak of 46.4% in 1980. Despite the oscillation in the 1980s, the share of exports remained high in 1989 (Table 3).

Romi has evolved over the years adapting itself to the lathe market conditions. The company developed from a small workshop producing agricultural machinery to the largest machine tools producer in the country and one of the most important producers in the world in the 1960s. Before addressing the subject of Romi's internationalization, the next section will outline the change in its business structure.

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Romi's changing structure

The profits of Romi's industrial and commercial activity explain the changes in its equity since Emílio Romi founded it as an individual business in 1929 until the company's transformation into Máquinas Agrícolas Romi Ltda. (a limited liability company) in 1938. The company's equity increase in 1938 was carried out with Américo Emílio Romi's resources and the entry of new members. Late in 1954, the business was transformed into Máquinas Agrícolas Romi S.A. (a joint-stock company). In 1955, the incorporated company's origin was real estate capital, land, and buildings belonging to Américo Emílio Romi that were being leased by the company. In 1956, the equity's development took place with the company's own reserves and a revaluation of the company's assets. Thus, by the end of the 1950s and the early 1960s company's ownership was entirely in the Romi family. Only in the early 1960s did the company open to foreign investment in order to modernize its production to meet a more extensive and complex market; however, the administrative control still remained in the family (Marson 2017, 165-169).

Graph 5 shows the evolution of Romi's equity between 1930 and 1980 (at constant prices). As we can see, in the 1940s (from 1943) Romi had the first equity growth (Table A.1 in the Appendix). However, it was only in the 1950s that the company increased its equity substantially, becoming a leader in the specific machines and equipment sector. Most interestingly, this growth occurred during Getulio Vargas' government and before Juscelino Kubitschek's government and the Target Plan, which began in 1956. The substantial expansion of Romi's equity was between 1953 and 1956. Between 1957 and 1960, Romi's equity declined in real terms, increasing only in 1961 at the end of the Target Plan investments' maturity.

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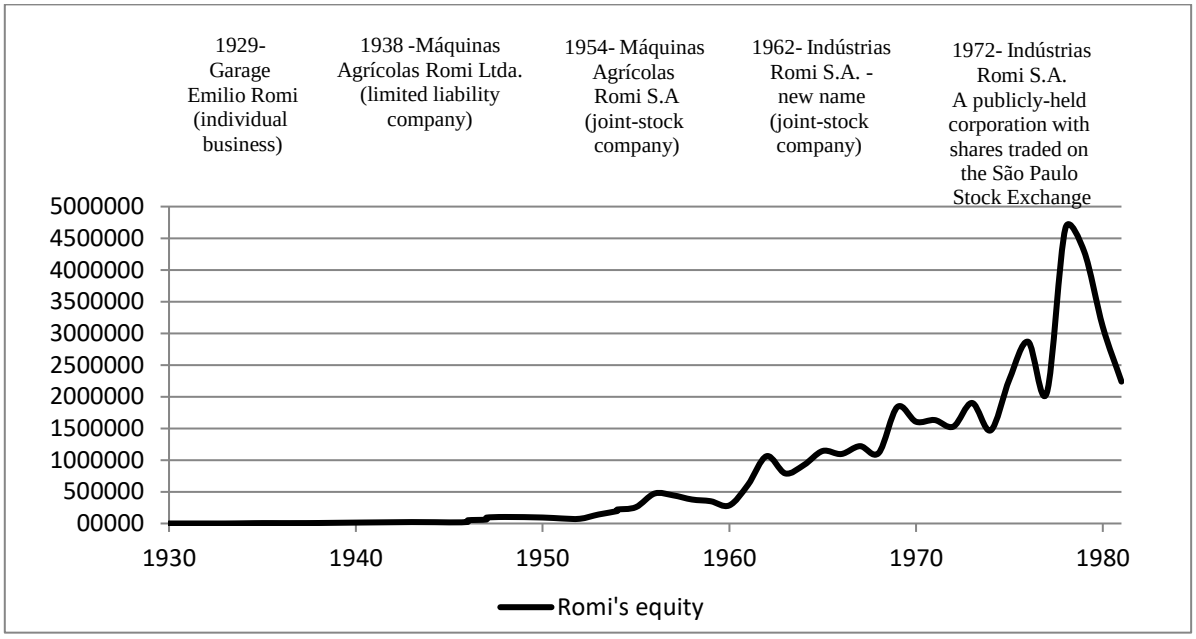
Graph 5. Romi's Equity, 1930-1981 (in 1961 constant prices, thousand cruzeiros)



Note: The equity's values were deflated by Malan et al. (1977, 516) between 1930 and 1943 and IPA origin - prod. Industrial - FGV index between 1945 and 1981.
Source: *São Paulo's Board of Trade* and author's calculations (Table A.1 in the Appendix).

After a decline between 1963 and 1965, equity rose once again to a new level with the economic miracle between 1968 and 1969. After an oscillation in the early 1970s and after Romi became a publicly-held corporation with shares traded on the São Paulo Stock Exchange in 1972, equity rose sharply between 1974 and 1978, a period of large investment by the Brazilian government during the Second National Development Plan. Since 1979, equity declined again, reflecting the slowdown of Brazil's economy in the 1980s, but Romi's equity structure had already reached a very high level in that period.

Romi's Internationalization, 1990s-2010s

Romi's machine production experienced high growth rates from 1950 to 1970. The domestic market was booming in the 1950s, but in the 1960s and 1970s, the export growth rate was higher than total machine production growth. The 1980s changed this growth trend, total machinery,

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and exports production dropped significantly. The 1990s and 2000s machine production growth deteriorated even further. Table 4 shows Romi's machine production between 1950 and 2010.

Table 4. Romi's Machine Production, 1950-2010

	Total Machine Production			*Exported Machine Production*		
Year	**Units**	**Average unit per year**	**Growth rate per year**	**Units**	**Growth rate per year**	**% Exported**
1950	8,200	1,380	10.4	1,320	0.5	16
1960	22,000	1,900	6.4	1,380	13.7	6
1970	41,000	5,100	8.4	5,000	10.8	12
1980	92,000	2,900	2.8	14,000	3.6	15
1990	121,000	1,700	1.3	20,000	2.3	17
2000	138,000	1,200	0.8	25,000	1.2	18
2008	147,000	-	1.0	27,400	-	19
2010	150,000	-	-	-	-	-

Source: author's calculations from Romi (2017b)

Romi's production growth rate is in line with the Brazilian economy's growth rate trend. Perhaps Brazilian economy's slow growth[6] motivated Romi to start investing abroad in the 1990s. With the decreasing barriers to international trade and financial regulations in the 1990s, firms in developing countries faced increased competition in their local markets. However, they were more likely to connect to international production networks because production and operations were organized according to the globalization production, that is, those years were the era of productive globalization (Fleury and Fleury 2011, 25).

Romi's internationalization process is linked to the export movement the company started in the 1940s. Through exports, Romi partnered with companies in the international market through technology transfer. The internationalization process was originated with the exchange of technology and exports. For exports, Romi used distributors, a choice that lowered business risk. In addition, subsidiaries abroad were necessary due to the specific machines and

[6]Globalization's impact on the Brazilian economy in the 1990s was complex and mixed. For a good approach on the subject, see Baumann (1996).

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equipment market in which the company operated. Although Romi did not have foreign production before the 1990s, the company needed to provide technical assistance services to sell its machinery and equipment. Thus, "overseas subsidiaries, then, were basically for warehousing, pre-sale, sale and technical assistance. The company had these subsidiaries in the US, Argentina and Uruguay markets and was implanting another one in Germany" (Veiga and Rocha 2003, 169).

Table 5 shows the evolution of Romi's business abroad. Romi's effective internationalization process occurred in the 1990s when the company began operations in the American market in Chicago.

Table 5. Romi's Business Abroad

Year	Name	City	Country
1998	Romi Machine Tools Ltd.	Erlanger, Kentucky	USA
2001	Romi Europa GmbH	Groß-Gerau (next Frankfurt)	Germany
2008	Romi Italia s.r.l.	Turin	Italy
2008	Sandretto Industrie s.r.l.,	Grugliasco and Pont Canavese (next Turin)	Italy
2009	Lazzati s.p.a. (agreement)	Milan	Italy
2010	PFG s.p.a. (agreement)		Italy
2011	Burkhardt + Weber Fertigungssysteme GmbH	Reutlingen (next Stuttgart)	Germany

Source: author's calculations from Romi (2017b)

In 1998, the company transferred its operations to Erlanger in Kentucky, a region of high machine tool producers concentration, founding Romi Machine Tools. In 2001, a subsidiary, Romi Europa GmbH, was established in Germany to support the European market's distribution network. To support the company's activities in Europe, Romi Italia s.r.l. was established in 2008 in Turin, Italy. That same year Romi acquired assets from Sandretto Industrie s.r.l., a plastic injection molding machines manufacturer, with plants located in Grugliasco and Pont

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Canavese in the Turin region of Italy. Romi continued its expansion in Italy and signed an agreement with Lazzati s.p.a., located in the region of Milan, for boring machines production, and with PFG s.p.a. for the manufacturing of Mobile Column Machining Centers. In 2010 and 2011, Sandretto and Romi launched products in Germany, France, and the United Kingdom. In that last year, Sandretto México's activities began, operating with the Romi and Sandretto brands in the country. Also, in 2011 Romi acquired Burkhardt + Weber Fertigungssysteme GmbH, a German company which has been producing machine tools since 1888 (BW 2017). All these initiatives have expanded the company's global market operations (Romi 2017b). Romi has a net of distributers located in all continents, and subsidiaries for trading and services located in North America (the United States and Mexico) and Europe (Italy, Germany, UK, Spain, France). Table A.2 in the Appendix summarizes Romi's industrial plants and sales subsidiaries around the world as of 2017.

Romi currently counts on eleven factories (nine in Brazil and two in Germany) with a production capacity of approximately 3,450 machines per year. Its main markets are machine tools (metal cutting machines), such as turning centers, computerized numerical control (CNC) lathes, engine lathes and machining centers, and plastic processing machines (plastic injection moulding machines and blow moulding machines) (Romi 2017c). Romi has about 6,000 active customers in more than 60 countries, operating in the automotive, agricultural machinery, capital goods, consumer goods, tooling, hydraulic equipment, wind energy, and other industries. About 75% of the company's turnover comprises of conventional lathe sales, CNC lathes, Machining Centers, heavy and extra heavy horizontal and vertical lathes, turning centers, and boring machines. About 15% of its revenue comes from the plastic injection molding industry (Romi 2012, 6-9).

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Conclusions

This article examined the history of Romi, an important producer of capital goods in Brazil. We showed its growth between 1930 and 1980 in the context of the Brazilian economy, and its relation with the capital goods ISI, specifically the lathe. We have seen that the main period of its growth was tied to government investment in large projects under the Second National Development Plan between 1975 and 1979. With the changes in the Brazilian economy in the 1980s and 1990s, the company had to adapt itself, aiming to promote foreign investments, when its internationalization process was effective. Romi was concerned about serving the foreign market early, intensified by the need to improve the products that the capital goods industry demanded. The companies' exports can be seen as an indicator of the production process and the product's efficiency, that is, the company is internationally competitive.

Romi's case contrasts with the literature's pessimistic view on Brazil's ISI. Romi developed characteristics to meet the external market in the face of policies aimed at replacing imports. Thus, within the domestic market's closed industrial structure, there were cases of companies that made export efforts shortly after its founding, mainly because they specialized in a technology-intensive sector and needed external contact for their development. Although Romi was an exceptional case, it shows ISI's complexity in Brazil. At the macroeconomic analysis level, it seems that this development model has resulted in little effort in the relative generation of technology. At the micro level of business history, Romi is an example of a successful company in a technology-intensive sector, such as capital goods.

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Appendix

Table A.1. Romi's Equity Evolution, 1930-1981 (1961 constant prices, cruzeiros)

Years	Romi (Malan deflator)	Romi (FGV deflator)	Years	Romi (Malan deflator)	Romi (FGV deflator)
1930	74,105	-	1958	378,308,824	378,389,694
1932	68,895	-	1959	351,537,335	351,319,429
1933	67,067	-	1960	284,985,163	284,876,038
1934	3,201,333	-	1961	610,000,000	610,000,000
1935	6,196,129	-	1962	1,035,091,664	1,062,507,211
1936	5,799,517	-	1963	790,297,806	789,659,133
1937	6,406,381	-	1964	923,145,933	923,534,471
1938	7,679,104	-	1965	1,144,120,294	1,143,943,615
1943	22,286,510	-	1966	1,145,705,394	1,095,979,916
1945	17,811,573	17,269,476	1967	1,313,098,168	1,220,477,195
1946	26,001,613	23,998,392	1968	1,255,407,562	1,112,129,093
1946	55,322,581	51,060,409	1969	2,080,535,037	1,838,622,506
1947	61,801,802	61,782,647	1970	1,810,673,431	1,605,361,222
1947	92,702,703	92,673,970	1971	1,845,873,584	1,631,756,053
1948	102,782,534	102,835,886	1972	1,728,183,572	1,528,926,516
1950	94,639,338	94,521,319	1973	2,136,679,320	1,901,819,553
1951	79,661,579	79,654,224	1974	1,647,819,660	1,469,867,594
1952	74,104,938	74,360,769	1975	2,588,825,636	2,276,094,267
1953	141,235,294	141,709,422	1976	-	2,867,212,866
1954	195,203,252	195,572,214	1977	-	2,060,029,378
1954	219,603,659	220,018,740	1978	-	4,659,557,421
1955	258,635,548	257,700,617	1979	-	4,293,241,675
1956	472,924,242	472,591,250	1980	-	3,102,719,570
1957	442444717	443,637,558	1981	-	2,238,646,649

Note: The values of equity were deflated by Malan et al. (1977, 516) and IPA origin - prod. Industrial - FGV index.
Source: author's calculations from São Paulo's Board of Trade.

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Table A.2. Romi around the World, 2017

Name	City	Country	Controlled companies		
			Romi	Machine Tools Dealers	Dealers of machines for plastic
Indústrias Romi	Santa Barbara do Oeste	Brazil	x		
São Paulo ABCD	São Paulo	Brazil	x		
Ribeirão Preto	Ribeirão Preto	Brazil	x		
Rio de Janeiro	Rio de Janeiro	Brazil	x		
Belo Horizonte	Belo Horizonte	Brazil	x		
Salvador	Salvador	Brazil	x		
Curitiba	Curitiba	Brazil	x		
Porto Alegre	Porto Alegre	Brazil	x		
Bromberg Y CIA S.A.	Montevideo	Uruguay		x	
Favel Argentina S.A.	Buenos Aires	Argentina		x	x
Favel Argentina S.A.	Córdoba	Argentina		x	x
CNC Service	Santiago	Chile		x	
Maq & Herr (Máquinas y Herramientas)	Asunción	Paraguay		x	
Cormaq S.A.	Santa Cruz de la Sierra	Bolivia		x	
Interlink-18 S.A.	Lima	Peru			x
Compuengine Cia. Ltda.	Quito	Equador		x	x
Inversiones VC Tecnología S.A.S	Bogotá	Colombia			x
Herramientas Técnicas Hertec RRH, C.A	Caracas	Venezuela		x	
EB Servi Tecnologia Plástica, C.A.	Caracas	Venezuela			x
Grupo Index S.A.	Ciudad de Panamá	Panamá		x	
MR2 Representaciones S.A.	San José	Costa Rica		x	
MR2 Representaciones S.A.		Nicarágua		x	
MR2 Representaciones S.A.		Honduras		x	
MR2 Representaciones S.A.		El Salvador		x	
MR2 Representaciones S.A.		Guatemala		x	
Suplextrade Comercio Exterior Ltda.		Cuba		x	x
Inter Tools S.A. DE C. V. (Máquinas CNC)	Puebla	Mexico		x	
Krotarkmex S.A. DE C.V.	Cidad del México	Mexico			x
EM Maquinados S.A. DE C.V. (Máquinas CNC y Convencionales)	Monterrey	Mexico		x	
People Tech Machine Tool Sales & Service (Northern California & Northern Nevada)	Santa Clara	USA		x	

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Name	City	Country	Controlled companies		
			Romi	Machine Tools Dealers	Dealers of machines for plastic
Machine Toolworks Inc. (Oregon, Washington (Flat Bed CNC Lathes, Oil Country CNC Lathes))	Tukwila	USA		x	
Smith Machinery CO., INC (Utah, Wyoming, Idaho, and Montana)	Salt Lake City	USA		x	
WD Distributing (Arkansas, Oklahoma & Southern Kansas)	Kellyville	USA		x	
Romi Machine Tools, Ltd	Erlanger	USA	x		
Jones Machinery INC. (Kentucky, Southern Ohio and Southern Indiana)	Cincinnati	USA		x	
Titan Machinery Sales (Illinois, Northern Indiana and Eastern Iowa)	Lake Zurich	USA		x	
Alternative Machine Tools, LLC (Wisconsin and The Upper Peninsula of Michigan)	Dousman	USA		x	
PEAK EDM, INC. (Michigan)	Wixom	USA		x	
Northeast Precision Machinery (Eastern Pennsylvania)	Warminster	USA		x	
Rice Machinery INC. (Rhode Island, Massachusetts, Connecticut, New Hampshire and Maine)	Cranston	USA		x	
Mega Industries INC. (Canada Provinces: Ontario, Quebec, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland & Labrador)	Burlington	Canada		x	
Machine Toolworks INC. - Western Canada (Flat Bed CNC Lathes, Oil Country CNC Lathes)	Edmonton	Canada		x	
Libcor Industrial Machinery (PTY) LTD	Johannesburg	South Africa		x	
CNC Computer Numerical Control PTY LTD	Mitcham	Australia		x	
CNC Services Ltd	Auckland	New Zealand		x	
El-Ram Oils & Accessories LTD.	Afula	Israel		x	
Baranok Takim Tezgahlari Malz. Mak. Hirdavat San. T.C. LTD.STI	Konya	Turkey		x	
Solver Engineering Company	Voronezh	Russia		x	
Grosver Group LLC	Minsk	Belarus		x	
M.Koskela O.Y	Kokkola	Finland		x	
M+E Szerszámgép Kereskedelmi Kft	Budapest	Hungary		x	
CNC Invest SK S.R.O	Trencin	Slovakia		x	
NTM Sp. Z.o.o.	Gliwice	Poland		x	
Capro Werkzeugmaschinenhandel und Service Gmbh	Kemeten	Austria		x	
CNC Resitive D.O.O.	Ljubljani	Slovenia		x	
CNC Invest S.R.O.	Malešice	Czech Republic		x	

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			Romi	Machine Tools Dealers	Dealers of machines for plastic
Romi Itália SRL	Gossolengo	Italy	x		
Steiner Werkzeugmaschinen AG	Gränichen	Switzerland		x	
Burkhardt+Weber	Reutlingen	Germany	x		
Romi Europa GmbH	Groß-Gerau	Germany	x		
Eritec B.V. CNC Machines	Hengelo	Netherland		x	
Mema Machinery & Tools	Londerzeel	Belgium		x	
Romi France SAS	St Priest	France	x		
Romi Máquinas España	Barberà del Vallès	Spain	x		
Mecatool Technologies S.L. - Division de Hertec Group	Barcelona	Spain		x	
Romi Machines UK Limited	Rugby	UK	x		
Cortimetal	Águeda	Portugal		x	

Source: author's calculations from Romi (2017)