

**Título do trabalho:** The History of Metal Leve S.A. and its leadership in the Brazilian auto parts industry: 1950-1996

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**Abstract:** Narrative of the life history of Metal Leve from its creation in the beginning of the 1950's to growth, success and leadership in the Brazilian auto parts industry, and up until the 1990's problems related to competition from multinationals and changes in the international trade policy that brought its denationalization.

The Business History case follows Alfred Marshall's evolutionary conception of firms and their life cycle and is analyzed against the background of the Brazilian economy and its automobile industry, as well as the world automobile industry.

**Key words:** Business History; auto parts; Metal Leve S.A.

**Resumo:** Narrativa do ciclo de vida da Metal Leve desde a sua criação no início da década de 1950, passando pelo crescimento, sucesso e liderança na indústria brasileira de autopeças, e culminando nos problemas relacionados com a concorrência de multinacionais e mudanças na política de comércio exterior dos anos 1990 que trouxeram sua desnacionalização.

O estudo de caso da empresa brasileira emprega uma abordagem marshalliana da firma e seu ciclo de vida e tem como pano de fundo a economia brasileira e sua indústria automobilística, bem como a indústria automobilística mundial.

**Palavras-chave:** História de empresas; autopeças; Metal Leve S.A.

**Área da Anpec:** área 3, História Econômica

**Classificação JEL:** N86

# **The History of Metal Leve S.A and its leadership in the Brazilian auto parts industry: 1950-1996**

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## Introduction

Metal Leve (ML) figures as an unsuccessful business case in the fall out from liberalization, which was particularly disruptive for Brazilian business activity in the auto parts sector, such that even iconic national businesses ended up being denationalized.<sup>1</sup> The account that follows aims to explain Metal Leve's prolific growth and abrupt decline, culminating in the sale of the shares of the tight-knit group - or of their descendents - that had controlled it since its foundation to a foreign company in 1996.<sup>2</sup>

In this way, Metal Leve's case is emblematic of business in a peripheral country in the era of globalization. During the decades of import substitution industrialization, ML was recognized for its national business excellence, achieving international recognition in the 80s as a supplier to foreign companies through its exports, only a few years later to be denationalized, faced with an adverse situation in the 90s. Ownership and control were given over to a large German auto parts firm that had already taken part in the early phases of its history.<sup>3</sup> The case contains nuances that give it marked characteristics and interest in its own right, while also marking it out as representative of the development and transformation of the auto parts manufacturing sector and automobile industry in Brazil and the world.

The narrative's construction follows an evolutionary conception of business history inspired by Alfred Marshall's writing. His idea of life cycle of firms gives due attention to the accumulation of capabilities and solutions to problems in the different areas of business activity, such as production and technology, workforce qualification and training, the firm's internal organization, its relationship to the market, as well as financing its operations. The evolutionary conception stresses that the quality of solutions is related to the configuration of elements inside and outside the company that change over time as a result of the action of the firm and other agents, moving away from ideas of equilibrium in favor of an organic growth trajectory in which growth itself brings with it new problems. The incapacity to keep introducing effective solutions may indicate ossification and decay, that is, entering decline in the business life cycle (Marshall, 1961, chapter XI §5 and chapter XII §6; Kerstenetzky, 2010: pp 573-5).

Five phases were identified in the company's life and in its relationship with its environment: the first phase is the birth of the company in the immediate post-war years; the second is marked by the establishment of the car industry in Brazil followed by the crisis and the slowdown in the Brazilian economy; the third phase is characterized by the return of growth with the cycle of expansion and reversal, starting in 1968 through to the end of the 70s; the fourth corresponds to the issues and contradictions of the troubled 80s; the fifth and final phase is marked by the opening of the economy and globalization, which led to the the company's sale. It is worth noting here that if the firm still exists as a result of acquisition by another company, from the viewpoint of a business history focusing on business capabilities, it is reasonable to think of the end of the life cycle.

Exemplary as the company was, the case raises age-old questions about protectionism and efficiency. Did the company become complacent under the auspices of protectionism? Were the workings of global competition different from those at home?

## Birth and the first phase (1950-1956): a particular historical context

In the first decades of the 20th century, fluctuations in international trade linked to the world wars

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<sup>1</sup> Cofap and Varga are further comparable cases.

<sup>2</sup> This chapter drew on material from my master's thesis on the History of Metal Leve (Kerstenetzky 1985) for the company's history up to 1978. I still feel indebted to Jacob Frenkel, who advised the master thesis work, and grateful for the company's support which enabled many interviews with company's members, and free access to data and archives. For the more recent phases of the business history case I thank Sergio Mindlin, who gave me access to José Mindlin's personal archive and kindly accepted to be interviewed twice. I am also grateful for the comments and suggestions by Werner Baer, Eduardo Pontual, and also by Celia Lessa Kerstenetzky.

<sup>3</sup> The acquisition initially involved other buyers, such as Cofap, but the latter ended up being sold to Mahle. These details do not feature in this account.

and the Great Depression brought about alternating periods of ease and difficulty of importation, resulting in the emergence of a set of industrial companies that operated precariously and was eventually able to translate into effective units of industrial production. In the specific case of auto parts manufacturers, the fleet of vehicles in circulation, produced abroad but eventually assembled in Brazil, as of 1919, required maintenance and replacement of parts worn by use and precarious road conditions. National piston production could take place in periods of difficulty in importation by using sand-casting moulds and overhauling machines to make pistons. The resulting product was high in cost, poor quality and small in scale.

The development of production capacity from this fragile base depended on the evolution of foreign trade. The 1929 crisis and later, World War II, were favorable to the appearance of auto parts manufacturers in Brazil. In 1941 there were five manufacturers, which rose to 30 in 1946 and 250 in 1952. Import liberalization after World War II threatened this precarious production, which managed to proliferate due to fast depletion of exchange reserves accumulated during the war. The context of alternation manifested itself yet further with the new interruption of normality in foreign trade due to the Korean War in the early 50s. Alternation of ease and difficulties for imports allowed the fleet to grow and also for production capacity to take root through the importing of equipment – not without moments of real threat to businesses, owing to its unpredictable nature and changes in economic policy guidelines, as can be noted in the early days of ML's history.

Metal Leve had its origin in a previous company called Motorit, a piston ring manufacturer, set up in 1941, with Samuel Klabin, A. Buck and Ludwig Gleich as its partners. With import liberalization after the war, the plant was transformed into an overhauling business, unable as it was to compete with imported rings. Machinery in good condition from the war effort was imported from the US and Switzerland. The firm's difficulties in obtaining pistons led to the idea of producing them inside the company. Gleich, who had emigrated from Germany before the war, had been an overhauler in Berlin, and came to the attention of Ernst Mahle, a German piston manufacturer, through old clientele ties. The future of auto parts production in Germany was still uncertain in that post-war phase, whereas Brazil had distinct advantages in its fleet, bauxite reserves and water power (Penna, 2014). José Mindlin, who was a lawyer for Motorit, prepared the certificate of incorporation and looked to his friend Luiz Camillo de Oliveira Netto, Managing Director of the Banco de Crédito Real in Minas Gerais, who could not make the loan, but who recommended Walther Moreira Salles, then Loan Portfolio Manager at Banco do Brasil. The latter granted a loan of Cr\$400.000,00, which it is worth mentioning reflected a 70% debt ratio<sup>4</sup> in the new company's first annual balance sheet. Luiz Camillo networked further to ease the necessary bureaucracy and Mahle's way. So, Mahle immigrated to Brazil and became a partner in the new company, bringing on board his production capabilities, German machinery and operators, thus establishing from the outset a high level of technical qualification. As partners, there remained Buck, an Austrian Jew-turned-Brazilian citizen and Gleich's partner in Motorit, who was in charge of company finances and the running of the company, Samuel Klabin, José Mindlin and Luiz Camillo, as well as Gleich, and finally Mahle, who received a 10% share in the company for his technological contribution. Two years later, Abrahão Jacob Lafer, who was related to the Klabin family, and Aldo Franco joined the board. The company of 50 white and blue collar workers was set up in Rua Independência in the Cambucí neighborhood of São Paulo City, on a plot of 2,800m<sup>2</sup>, where the office, foundry and machining operated, in a first production line made up of German machines with a production capacity of 220,000 pistons per year.

The history of the founding of the company brings out the exceptional nature of a high-technology industrial company in a peripheral country. There were clear opportunities, skills were present and, to some extent, they followed in the footsteps of service providers-turned-industrial companies, with greater or lesser technical difficulty. Thus it is that, in Metal Leve's case, circumstances and personal ties were decisive. The difficulties and uncertainties of a German firm in the post-war years along with former clientele ties between Gleich and Mahle helped solve the technical problem. At a time of strong fluctuations in the trade balance, not only was financing solved with arguments for the benefits of

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<sup>4</sup> Measured by the debt divided by the total liability of the company's balance sheet.

industrialization, but also with personal ties. Moreover, personal and community ties brought together a group of partners and their families for the whole of the company's history in a consensus-based management style in which robustness, caution, competence, but also mutual trust were present. It is also worth noting that, in the last years of national company control, the survival of these relations was evaluated negatively, as it took its toll on the restructuring of the business.<sup>5</sup> We will come on to this later.

Getting back to the story, Ernst Mahle ended up returning to Germany still in the 50s and selling his share in the company. The relationship with the German manufacturer - and after with his firm - proceeded in a sequence of three assistance contracts, which were renewed until 1975. It is worth saying in advance here that the relationship ended due to the condition imposed by Mahle GmbH for the signing of the fourth contract, of a stake in Metal Leve's capital.<sup>6</sup> ML chose to put an end to the relationship and to allocate the sums that formerly went on royalties to a technology centre, replacing assistance by an increased push for their own development. The centre was financed with a loan from FINEP, and Mahle GmbH, demonstrating its intentions in relation to the Brazilian market, bought the Brazilian piston manufacturer, CIMA, in 1978. We will also return to this later.

A detail of the market prospects of the then-new company relates to the fact that pistons are parts requiring high manufacturing standards and precision to the scale of thousandths of a millimeter. Metal Leve, with German technological backing and through its own development, had for much of its existence only one minor competitor supplying to automobile manufacturers (OEM),<sup>7</sup> CIMA, and few other rivals in the market for replacement of the fleet's worn parts (the so called aftermarket), so that it covered significant parts of the market. In the mid-50s, for instance, it made up something around 75% of installed capacity in piston manufacture. The situation only began to change with the arrival of foreign companies at the end of the 60s and, even then, slowly. It is worth pointing out that ML never lost its position as the largest-ever manufacturer and supplier of its products to automobile assembly plants in Brazil.

A distinctly conservative management style spans the company's history, figuring in the company's memory from an episode from its early years (Campos and Pinto, 2007; Kerstenetzky, 1985). In March, 1951, having produced 100,000 pistons, a study carried out by suggestion of the Banco do Brasil revealed that a second production line would allow ML to meet the demand of the piston market, doing away with imports, which could be banned through CEXIM<sup>8</sup> controls based on the principle of the existence of a similar national product. The second line was ordered, but, soon after, fear that conflict from the Korean War might once again interrupt overseas supplies led the government to suspend import controls in April, 1951, which made Ford suspend a Metal Leve order of 150,000 pistons. CEXIM accepted import license applications until it was convinced there was sufficient national piston production, again refusing piston import licenses in January, 1952. This left Metal Leve in dire straits until all the imported pistons were sold, and the company had to turn to different banks for help. The episode remained in the company's history as a lesson in caution, an example of which, with consequences for the future, is the financial management of the company, which operated throughout its history with growth financed by internally-generated resources and a very low level of debt, as we shall see later in the story.

Aside from this extraordinary episode, the market offered remunerative prices and profitability, which were reflected in a reduction in the high initial debt levels, in continual decline after the import liberation episode was digested, until reaching a level of around 15% of the company's liabilities in the mid-50s.

To conclude with an assessment of this initial phase of Metal Leve's life cycle, the replacement market and the protection mechanisms, together with technical quality, the almost total lack of competition and the prices charged allowed the company to reduce its debt level (from 70% initially to 15% in the mid-50s) and at the same time to grow at very high rates, in such a way that production capacity increased fivefold. These were the years of greatest profitability in the company's

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<sup>5</sup> Vassalo (1996).

<sup>6</sup> According to an interview given to *Indústria Brasileira* (Campos e Pinto, 2007), José Mindlin replied that the stake was not impossible, but that it could not be imposed.

<sup>7</sup> Original equipment manufacturer.

<sup>8</sup> A Banco do Brasil division that administered import controls.

history. During the following phases, profits declined with the development of the market represented by purchases of automobile manufacturers, who started to manufacture vehicles in Brazil, and as foreign competitors entered the market. Even so, we will see that the company could face the threat of competition from foreign companies until the abrupt turnabout in the 90s completely changed the situation.

### Industrialization and Brazilian automobiles

The industrializing stance the country had been adopting during the 50s became official with the Target Plan of Juscelino Kubitschek's government, in such a way that we can identify the beginning of the company's second phase after the establishment of the automobile industry in Brazil in 1956. The auto parts market started to expand, supplying to the Brazilian automobile industry, in addition to the auto parts replacement market.

In the conception of the Brazilian automobile industry's policy, the choice was made for a non-vertical structure, with the recommendation to manufacturers to subcontract for parts supply. Economic policy guidelines established progressive nationalization targets and conditions favorable to importing equipment and parts that complemented national production.<sup>9</sup> As a result, parts manufacturers, having emerged in a turbulent, precarious environment, not only had their place guaranteed, but were also transformed by the presence of demanding buyers, who brought with them an expanding and more predictable market (the OEM). It is significant that the resultant industrial structure represented a peculiar experience of small, flexible parts manufacturers. Given the smaller dimensions of the market and of auto manufacturing, it was impossible to fully enjoy typical economies of scale of the sector at that time. Varied and flexible production remained a national trait throughout the sector's history. International experience, by contrast, showed a greater degree of vertical integration. In the extreme case of the United States, for example, automobile manufacturers produced their own pistons at that time.

The predictability was linked to the fact that demand for vehicles had become more in tune with the Brazilian macroeconomic evolution, even more so because there followed a period with relatively few big external shocks from foreign trade. Furthermore, the new phase of industrialization promoted an internal dynamics of investment, income generation and consumption. Transformations included the creation of financing mechanisms for durable goods. A complete cycle of growth and slowdown can thus be seen in the Brazilian economy and in its automobile industry, with expansion in 1956-1962 and recession in 1963-67, and likewise for Metal Leve, in what I am calling the second phase of its life cycle.

In 1957, Metal Leve was able to produce 1,200,000 pistons per year, which represented three quarters of national capacity. Of its competitors, only CIMA also sold to manufacturers, but its capacity was only 140,000 pistons per year. Other manufacturers had an individual capacity of no more than 40,000 units and only supplied distributors or retailers, when they didn't produce for their own use, as in the case of overhaul services.<sup>10</sup>

Concerning the implantation of the automobile industry, Metal Leve presented a number of expansion projects to the GEIA.<sup>11</sup> The first, which was approved in August 1956, involved the installation of a fourth production line with a capacity for 500,000 pistons. It not only increased capacity by 42%, but also allowed interruption in the use of the old production lines for repairs. The equipment was imported from Mahle for the sum of DM 999,337.84, financed over five years at 6% interest per year. The second project involved specific lines for the production of large pistons that had been produced on existing lines, causing a great deal of wear and loss of quality due to the high content of silicon in its alloys. The increase in capacity took in 120,000 pistons annually for tractors and trucks, 1,200 pistons for ship and rail engines and 25,000 pistons for General Motors, in addition to 500,000 pistons corresponding to one

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<sup>9</sup> There is no space here to detail the measures, but the literature on Brazilian industrialization is abundant and well-known. See, for example, Baer (2014).

<sup>10</sup> According to CIMA's investment project approved by GEIA (resolution no. 40), which would enlarge its capacity by 150%. Incidentally, by contrast, CIMA did not manage to get the financing and in 1960 applied with another project seven times smaller in value.

<sup>11</sup> The Executive Group for the Automotive Industry, a government agency set up by the government to advance the sector's implantation.



more line of light pistons. The equipment was also imported from Mahle, for the sum of DM 2,514,894.00, and with the same financing conditions as before. The third project, which was approved in September 1958, referred to the installation of induction furnaces to complement those already in use, with the aim of preparing alloys in the factory, in order to avoid difficulties obtaining them at home & overseas. The project also included enlargement of production capacity of pins and forging presses. The equipment, once again, was imported from Mahle, under the same conditions, for the sum of DM 1,186,790.00. The three expansion projects approximately tripled the existing stock of machines and installations at the end of 1955 (Kerstenetzky, 1985).

The investments above included the capacity to produce aviation pistons for Pratt and Whitney engines, which Metal Leve developed from unofficial drawings. In 1965 a technical assistance contract with United Aircraft Co. was signed for access to technology and its improvements and, after, ML was granted approval for aviation pistons by the Federal Aviation Agency, the first such non-American company to get it. With this, ML, which already sold pistons to the Brazilian Air Force, began exporting to the US, to the replacement market and to the Lycoming and Continental Motors factories (later Teledyne Continental Motors), executive airplane manufacturers. Demands made by the FAA in the approval process raised manufacturing standards not only for aviation pistons but for all production lines.

In the same period Metal Leve also diversified into bearings manufacture, another part for vehicle engines. As early as 1953 Ford had suggested that ML start to make them, recommending Clevite,<sup>12</sup> its American supplier, to get the necessary technology, but difficulties resulting from the period of recessive economic policies between 1954 and 1956 interfered with the plan until the following year. The equipment was imported from Clevite, with whom a technology transfer agreement was also signed. Approval to import the equipment was given by SUMOC<sup>13</sup> in 1956, and in 1957 the bearings project was approved by GEIA. The financing was done with Eximbank, to the sum of US\$1,250,000, with 5.5% interest per year, to be paid off over 7 years.

In one aspect of the diversification a mistake was found: the bearings chosen were of the Babbitt kind, made of lead antimony (or white alloy). 2,657,000 bearings were produced in the first year, more than the one-shift production capacity of 2,400,000. Of these however, 1,857,000 were for the aftermarket and, in the two following years, there were no sales to the automobile manufacturers, which were ordering copper lead bearings (red alloy). In fact, only 17% of the bearings used in the assembly lines in 1958 were Babbitt.<sup>14</sup>

Metal Leve thus began to make red bearings through a non-continuous process called PAP, the patent for which was acquired together with Clevite from a German company. But the casting process was very limited in terms of the production scale. On the other hand, installation of a continuous production line of copper lead bearings would mean an investment of US\$1.5 million, which at that point was too much for the company, as was the production scale. The solution was to adopt another recent production process, sintering.<sup>15</sup> Advantages included greater flexibility in terms of scale, lower initial investment; only in theory the process produced less resistant copper-lead bearings, compared to die-cast red bearings. The solution took the form of another project approved by GEIA, with financing of US\$469,000 from Eximbank. The capacity of the sintered line was 1,440,000 bearings and 2,400,000 bushings per year.

Unlike in the US, the sintered product became the basic material for Metal Leve bearings and bushings, with the improvement of the production process in the company, giving rise to patenting and resulting in a high quality product. Only in the 80s would Metal Leve install a continuous production line of red bearings, after increasing capacity with two more sintering lines.

Two other manufacturers presented projects to GEIA for bearings production. The first was the São Paulo Retífica, owned by the driver, Chico Landi, which serviced customized engines, thereby not representing a threat. The company Sinterosa, by contrast, could, with the proposed expansion, reach the

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<sup>12</sup> A subsidiary of the American manufacturer Cleveland Graphite Bronze co.

<sup>13</sup> Superintendência da Moeda e do Crédito, the body in charge of exchange rate management.

<sup>14</sup> According to Sinterosa's (a competitor) project, submitted to GEIA and approved in 1959.

<sup>15</sup> A process in which copper-lead deposited in a fine powder forms a solid mass with steel strips by using electric ovens filled with exothermic gas.

capacity of 2,400,000 parts per year between bushings and bearings. The project involved association with the American firm Johnson Bronze, one of three large American manufacturers,<sup>16</sup> which came on board as co-owner of half of the increased capital, such that Sinterosa would be able to gain access to foreign technology and to become a significant competitor.

Another aspect of Metal Leve's capacitation was the in-house machinery production. In 1960 machines were already produced for replacement and improvement of the production process. In 1966 a machine factory was set up, initially with imported projects, to produce chamfering, automatic broaching machines, and copying lathes. Although clearly signaling technological progress, this development is not unknown in this line of business, because machine tools are produced by assembly of parts.<sup>17</sup> With time the company worked out its own projects for manufacturing lathes, saws and semi-automatic milling cutters. Proof of production quality can be found in the fact that Metal Leve exported six beveling machines to Clevite at US market prices. At the end of the 60s, manufacturing had reached 200 new machines, in addition to the overhaul or modernization of approximately 80 units.

The OEM piston market expanded until 1962. After this year, the Brazilian economy entered into a recession, with the car industry taking part in the slowdown. As ML provided almost all piston and bearing supplies to car manufacturers, except for the sporadic or localized, though notably reduced, sales by competitors,<sup>18</sup> the company's sales accompanied the general movement of the automobile industry. ML piston sales followed the heating up and the slowdown of the cycle, rising to 180,000 pistons monthly at its peak, falling to 60,000 units in the crisis. In reality, the fluctuations could be more severe than they were in automobile production, as was the case when a small industry upturn in 1965 due to a reduction in excise tax hiked orders to 230,000 pistons, because automobile manufacturers also decided to stock up again. Sales fell again in 1967.<sup>19</sup> The bearings market, on the other hand, as part of a less explored market, could expand until 1964, only then starting to fluctuate.

In the aftermarket, on the other hand, piston sales remained stagnant during the phase, which can be explained by the improvement in highways, the renewal of the fleet and product quality, as they increased the interval of engine overhauls. In the case of the bearings replacement market, there was continuous growth until 1963, by import substitution, which Metal Leve had already done so for pistons at an earlier stage.

Export efforts began in 1962, to Latin American countries. These markets had potential due to the fact that these countries imported rejects from developed countries. However, problems of foreign currency availability in the region meant that exports only became significant in the next decade. In this phase, the successful shift towards the international market took place in the American aircraft pistons market in the way mentioned above. This shift broadened later to include parts from other means of transport, such that the American market became the company's main export market.

As for the financial area, this phase brings lower profit margins for the company than the previous one, because the company sold to automobile manufacturers, which hold significant bargaining power. The debt level, which had gone down to extremely low levels (around 15% at the end of the previous phase), grew with the high investments related to GEIA projects to 49% in 1962, later declining to levels fluctuating around 35% at this phase. These are not high levels, especially if we take into account the major efforts of expansion, quality improvement and diversification. From 1962 investments and the debt level went down, with fluctuations, even with lower profit margins than before.

As regards technology, Metal Leve's relationships with foreign firms effectively provided it with access to technology with independence (even if technological achievements can also be attributed to ML's efforts to develop its technological capabilities). The contrast with Sinterosa makes this clear: Metal

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<sup>16</sup> The other two were Clevite itself and Federal-Mogul.

<sup>17</sup> i.e., a machining line can produce parts for machine-tools like those on the production line. The same technical base is involved.

<sup>18</sup> From board meeting minutes and interviews carried out in the 1980s.

<sup>19</sup> This episode is viewed, in 20th century literature about manufacturer-supplier relationships, as manufacturers using their bargaining power to shift the burden of fluctuations in demand to auto parts suppliers in the form of storage, opportunity and idle capacity costs, which is done by means of the relationship with manufacturers being based on the proportion of total purchases and not on fixed quantities (Grote, 1971).

Leve's competitor in the bearings market needed to cede half of its control to a foreign company to have access to technology. We must not be fooled by ML's success in its initial relationships with foreign piston and bearings firms: other experiences of relationship with foreign firms to obtain technology for diversification in the next phase were not as successful as ML's first experiences, as we will see below. Relationship with foreign companies aiming at technological capacitation is not a simple matter, as it frequently involves partnership with control among the factors that attract the foreign firm's interest.

#### Resumption and maturity: diversification, technological autonomy and exports

The company's third phase once again followed the movement of the Brazilian economy, starting with the upturn from 1968 that followed public investments and a spurt in the construction industry. Again in this phase, the automobile industry was one of the drivers of national growth.

The automobile industry was reorganized by the entry of Ford, General Motors and Chrysler into the Brazilian passenger vehicle manufacturing market and by company mergers. The industry started to take on features of international competition, with product differentiation, which was lacking in the implantation phase. Income concentration, transformation of consumption patterns and financing as well as incorporation of families into the market place were part of the process. Incentives to exports and to external capital inflows, along with the easing of foreign liquidity through access to foreign loans contributed to strong expansion until 1974, when economic growth slowed. The automobile industry, which grew on average by 26% between 1967 and 1974, began growing by 6% from 1974 to 1978. Among the limiting factors were the rise in inflation, external restriction, rising international oil prices and their global consequences and an end to stimulus as represented by new consumption patterns with income concentration.

In the automobile industry, the exports responded to stimuli of tax exemption, tax credits and drawback of import taxes on inputs, so that they were expanded in proportion to overall production – 2.5% in 1973, 7% in 1974 and 8.7% in 1978 (Guimarães and Gadelha, 1980). Another trend was the growth in the number of small vehicles after 1974, while the recovery in 1968 featured medium and large vehicles and the substitution of gasoline for diesel in commercial vehicles.

Reflecting the more general movement of the Brazilian economy and of the automobile industry, Metal Leve's revenues grew at a rate of 20% per year in pistons and 24% in bearings between 1968 and 1974, decelerating to 13% per year in pistons and 4% per year in bearings by 1978. The company's market share remained high, at around 68% for pistons and 74% for bearings, in value, for the period 1973-78.<sup>20</sup> Market-share data compiled by the company for the years 1974-75, in number of parts, indicate a higher share in the market – around 83% for pistons and about 96% for bearings.<sup>21</sup> What is significant here is that the company's share confirms, according to any criterion, the almost monopolistic situation observed in previous phases.

This phase was marked by the entry of foreign auto parts manufacturers into the Brazilian market. In 1968 Volkswagen attracted KS, the other large German piston manufacturer alongside Mahle, offering it half of its piston acquisitions. In the bearings market, Johnson Bronze was bought by Federal Mogul in the US, and started to use the new brand on its products in Brazil from 1971. The loss ML suffered as a result was not significant in this period. An exercise comparing ML's sales data for automobile manufacturers and their automobile production shows where there is evidence of other piston suppliers to automobile manufacturers. It was found at VW (to be expected because of their invitation to KS), at GM after 1972 and at Toyota. The latter, which at that time was making a small number of commercial vehicles, was the only one not being supplied at all by ML. The data clearly show that ML was the only supplier to Ford, Fiat, FNM/Fiat Diesel, Mercedes Benz and Scania at this time.<sup>22</sup>

In terms of bearings supplies to car assembly plants, competitors were even less significant:

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<sup>20</sup> Estimates based on data from the economic census of 1975, annual industrial surveys and sales data supplied by Metal Leve (Kerstenetzky 1985).

<sup>21</sup> The company's estimates used data from its main competitors through an exchange of information.

<sup>22</sup> The comparison (Kerstenetzky 1985) serves more for these general indications than for market share, given the rough character of the estimate of the piston OEM market, based on the number of vehicles manufactured and on the number of cylinders of each of them and not on piston acquisitions from the assembly plants.



Johnson Bronze/Federal Mogul, which could have been a major competitor, ended up not giving the subsidiary in Brazil the necessary support to make it a presence on a par with its headquarters. In Argentina, by contrast, it took up a place similar to that of Metal Leve in the Brazilian market. These results may be a consequence of ML's reaction to the entry of competitors, making long-term agreements with car manufacturers (both for pistons and bearings), in exchange for favorable conditions. The economic slowdown in 1974 may have reinforced entry barriers, as the minimum scale of light piston production at the time was of 500,000 pistons per year.<sup>23</sup> Later, in 1977, one of the largest bearings manufacturers in the world, Glyco, presented a project to the CDI (Conselho de Desenvolvimento Industrial) and set up a small capacity factory in 1978.

Competitors' penetration into the aftermarket was faster than into the assembly market. KS adopted the strategy of making kits including other parts besides pistons and of offering a time frame of 180 days for payment to compete with ML's products, which were to be paid for in 60 days. M L responded by putting together their kits with their and Cofap's products, without increasing the deadlines for payment. All in all, KS's entry brought about more losses to Cima and to other smaller-scale manufacturers.<sup>24</sup>

To defend its aftermarket share, ML developed different strategies to deal with the range of buyers' size and market fragmentation.<sup>25</sup> Regional representatives were replaced by regional offices, large-scale clients received frequent problem-solving visits, the company used its size to demand exclusivity from distributors, and dispersal and relative insignificance of small dealers or repair shops were solved by sending technical booklets and offering local technical courses and factory visits, to establish contact and to raise awareness among mechanics of the importance of the quality of spare parts, which would be demonstrated by company products. The first of these courses was given already in 1964, and with time the duration was extended from 2 to 12 hours.

Export development, begun in the previous period, grew in this decade, going from 0.5% revenue in 1968 to 21% in 1978 in the case of pistons and, with bearings, from 0.01 to 7.4%, growth having been continuous from year to year. As mentioned previously, the main export market was the US, absorbing from 60 to 80% of exports, depending on the year, the product and if in value or quantity.

The American market presented special market opportunities for Metal Leve and other auto parts manufacturers' exports due to the American automobile industry's having developed with an extraordinary degree of verticalization in auto parts manufacturing. This was partially explicable by each manufacturer's scale and (in the case of pistons and other engine components) little concern about fuel consumption, which dominated until the oil crisis and the entry of Japanese automobiles into the country. The export opportunities emerged when the competition from Japanese automobiles forced American manufacturers to concern themselves with more modern engine designs, leading to a decline in the verticalization of the industry. After 1976 the American piston market went on to be disputed by Mahle and KS with branches being set up. The European markets, on the other hand, had different structures, with smaller fleets, more auto parts manufacturers, and less verticalization.<sup>26</sup> Additionally, Metal Leve did not pursue markets served by Mahle due to contractual commitment, while technical assistance was in place, which is to say until 1978, after which ML began to openly pursue the European market, developing samples and carrying out product quotations for manufacturers.

At this point, it is worth detailing the end of the relationship with Mahle. It had been transformed over time because of the capabilities progressively developed by ML, which were reflected in the different terms in the three technology transfer contracts signed with the German firm. Foreign markets represented the main reason for the emerging questions between the two companies in this phase: ML was becoming increasingly present in foreign markets, and Mahle was already developing its internationalization process.

The first contract, signed with Ernst Mahle himself, remained in force until 1968, giving ML

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<sup>23</sup> Considerations based on interviews at ML carried out in the 80s.

<sup>24</sup> Based on interviews.

<sup>25</sup> The units that make purchasing decisions in this market are not, generally, individual car owners, but a diversity of professionals and entrepreneurs as the automobile mechanics, retailers and owners of large fleets.

<sup>26</sup> Which means less potential market related to deverticalization.

access to Mahle's piston-making processes and patents, its developments and to the use of the Mahle brand in Brazil. German technicians were responsible for the technical knowledge of process engineering and training the workforce, until they could be complemented or substituted by Brazilian engineers and technicians trained in the factory. The relationship included a training period of Brazilian staff in the German factory. In this way, ML absorbed the production process technology and stayed abreast of its developments. In exchange, ML gave Mahle preference to participate in future business ventures it would realize in the country and remunerated it with 2% of pistons revenue.

In 1968 a new contract was signed, this time with Mahle GmbH, because the German firm had been restructured, going from owners running the firm to a more complex structure of ownership by a foundation and a management company (Lippert et al., 2014). In this agreement, Metal Leve was obligated to share results obtained perfecting production techniques, albeit through remuneration to be agreed on by the companies, while Mahle pledged not to go into partnership or supply technical assistance to other firms in Brazil or even to set up business until two years after the end of the contract, except if ML had decided not to renew it. Remuneration went down to 0.8% of revenue after indirect taxes.

A centre for research and development was set up in 1970 to centralize activities that were not directly linked to production, to develop ideas put forward by management, and to make studies into rationalization of technical problems and cost reduction. After the first few years in which the centre carried out studies into the rationalization of processes and operations, experimental projects gained importance from 1973.

Metal Leve's exports started to cause problems with Mahle from 1971. The contract with Mahle only mentioned the companies' exports between Brazil and Germany, which should have been done exclusively through the partner company. Mahle feared a move by ML on its international market, and consequently began to put pressure on ML to have a share in its capital, the Brazilian market, and even in the management of its pistons division as compensation for the threat it represented. Furthermore, Mahle complained that the licensing fee was small compared to R&D costs. ML sensed Mahle wanted to come to Brazil.

ML gave six months notice of their intention to rescind the contract in 1974, and discussions to settle the differences gave rise to a third contract, this time concerning 'technological cooperation', with ML and Mahle taking part in joint R&D projects and both covering the costs. Regarding results leading to industrial property rights, the parties to the contract would have the right to free use. The other export commitments related to exports and non-entry of Mahle into the Brazilian market were maintained.

Renewal discussions were fruitless and the last contract between Mahle and ML expired in 1977. In May 1978, Mahle bought Cima, thus entering the Brazilian market. In this year, they also set up in the US with capacity to produce 1,200,000 pistons per year.

ML restructured its R&D activity, creating a technical management team which brought together quality control and R&D. R&D started to have a say in decision-making and mobilization of resources, like the other management areas. The main modification was the setting up of a technology centre in a building of its own in 1978, complete with chemical, metallurgical, electronic and photoelastic laboratories, and 57 staff members, 19 with engineering doctorates, masters or degrees. The centre was financed by FINEP.

As for bearings, ML also had access to advanced technology through technical assistance contracts, with progressive technology absorption. The relationship went on to patent exploration contracts with revenue-based payments which decreased over time. Here the peculiarity was the transformation that took place with the licensing company Clevite, which, having been bought by Gould inc., a company whose main product was batteries, started to be overtaken by European manufacturers. In the 80s Clevite was sold by Gould, thereby pursuing an edge in technology again as far as bearings were concerned.

Meanwhile, other international bearings manufacturers became interested in partnerships with ML, which, however, thought this would end up bringing Gould to Brazil. High profit margins and precarious entry barriers suggested caution. The relationship with Gould did not have high costs, reinforced the relationship with Ford and, above all, ML judged it could follow technological

developments on its own. In fact, it accumulated patents in bearings manufacture, and installed the whole range of lines it needed for bearings, such that it appeared that it could do away with foreign sources to achieve cutting-edge technology. However, this did not happen. The main technological efforts ended being placed on piston research as a result of the problems and the end of the relationship with Mahle.

In this phase, ML's move towards diversification began. Around 1972 the company was in a solid financial situation and prospects for the Brazilian economy were good. ML had successfully gone public, and had easy access to financial sources. There were advocates in the company both in favor of diversification (to reduce the risks associated with a sector prone to the entry of foreign companies) and in favor of investment concentration in traditional areas (no need to seek new knowledge). There were even those who advocated speculation with raw material stocks. The idea of concentrating resources in what "we know how to do" seemed to win the day: if we exclude a juice manufacturing business in the North-East of Brazil, Marau, which benefited from tax incentives and had good export prospects, the diversifications were still concerned, in one way or another, with the firm's areas of knowledge. This bears out Penrose's (1959) proposition of diversification occurring on the same technical base or in the same market area. Moreover, ML sought to enter into partnership with foreign companies to gain access to technology in the diversification process.

Ex-cell-O Metal Leve Máquinas was set up as a spin-off of ML's machinery manufacturing capabilities. It partnered Ex-cell-O co., a cutting-edge American machine tool manufacturer, with 36 factories around the world. ML had the controlling stake in the subsidiary and Ex-cell-O co., 40%. However, the American firm showed little interest in the enterprise, a problem which added to its inexperience in passing on technology and to ML's lack of experience in the machinery market. As a result, projects took a long time to develop, when, ideally, pre-existing projects would have been adapted to clients' needs and, without a costing system, sales prices were frequently inadequate. The factory operated with a high idle capacity, low competitiveness, and was unable to cover its costs. ML ended up accepting Thyssen Hueller's proposal to take over the subsidiary, with Metal Leve keeping a 30% stake. This enabled it to stay in the sector with technological support, albeit losing its majority stake.

Metal Leve Gould, on the other hand, was founded in 1974 to manufacture sinterized products, (that is, products made out of iron and steel powder, replacing cast and forged components), and to supply clients not only from the automotive sector but also from the office machinery, electronics and refrigerator sectors. This can be understood in terms of the good relationship with Gould inc. discussed above.

The turn of the 80s saw the end of this phase in the firm's life. It is marked by the worsening of problems in the Brazilian economy caused by balance of payments problems related to oil and capital goods imports. These problems had already manifested themselves after the first oil crisis in 1973, and were tackled by the government still at this phase with a policy of deepening import substitutions between 1974 and 1978, so that the economy kept growing. Followed by a second oil crisis in 1979 and rising international interest rates, the problems ended up resulting in the so-called "lost decade" of the 80s, with stagflation in 1981-3, succeeded by fluctuations in economic activity and a gradual worsening of inflation for the remainder of the decade. The fluctuating pace of production was the result of the increasingly ephemeral results brought by stabilization plans and Brazilian exports favored by the upturn in economic activity of developed countries.<sup>27</sup>

In this context of growing difficulties faced by the Brazilian economy, we can identify Metal Leve's fourth phase. Nonetheless, the firm kept on growing, such that it was not affected in a simple way by greater economic problems.

### Golden Years?

ML's fourth phase was even qualified as the golden years (Faldini, 2005). The period, however, contains contradictory developments, not only in terms of the firm, but also in the contrast between its performance, the difficulties of the Brazilian economy mentioned above and its action facing the challenges brought about by the great transformations under way in the world economy and automotive

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<sup>27</sup> Hermann (2005).

industry. We can say in advance that ML achieved great things from the viewpoint of a company from a peripheral country, but that they were not enough to prepare it for the times of global competition that would mark the following phase.

ML understood well enough the questions of reorganization of the world automotive industry and sought to adapt to the transformations, which made it clear to the company that it was not enough anymore to master the production process and to produce a good product.<sup>28</sup> In the past, orders for parts came with their specifications, reflecting the fact that automobile projects were completely developed by automobile manufacturers. The change under way pointed to the need for parts manufacturers' involvement along with the automobile manufacturers in the development of automobile projects, bringing with it new technological challenges. Joint development also made parts manufacturers the chosen supplier for the model on a global scale, raising their business challenges, insofar as the production scale was concerned. Thus, in addition to diversification and exports begun in the previous phase, which were ongoing, efforts to internationalize were undertaken, with the direct investment overseas, at the end of the decade.

As mentioned, the decade saw a long period of stagnation for the Brazilian economy. That the Brazilian automotive industry remained particularly stagnated can be seen in the fact that it only managed to surpass the vehicle production of 1980 in 1993. To make matters worse, the lag in relation to foreign manufacturing grew, because American and European parent companies, pressured by Japanese competition, were busy trying to adapt to the new competition, and their Brazilian subsidiaries remained out of the dispute.

For the auto parts sector, exports became the outlet for the use and expansion of its production capacity, so much so that it made up for the prevailing stagnation in the decade. A number of companies in the sector made their presence felt on the international market, particularly after 1982. Metal Leve was one of them and stood out among them, gaining a lot of ground in the American market, including quality recognition, as evidenced by the Caterpillar certificate of guaranteed quality supplier, a distinction obtained at that time by only 50 out of 4500 suppliers. Exports to the United States represented half of overseas sales. In the European market, their presence was also felt but comparatively less favorably, for the reasons outlined above.

Metal Leve exports grew year after year, with few exceptions,<sup>29</sup> and direct overseas investment began more towards the end of the decade, linked to a specific order from an American client who requested for a plant to be installed in the US, as we will see below. However, hikes in demand caught the company unawares, unable to meet all the national and international orders. The period from 1985 to 1987 showed, one after the other, an increase in demand owing to an upturn in the American economy and the Cruzado Plan,<sup>30</sup> leading the firm to operate in full capacity for three years. In the dramatic year of 1986, installed capacity was not enough to meet all the demand, such that the firm was obliged to reduce its exports. The limitation of capacity faced with the hike and the difficulty in pressing ahead with the growth in exports was not limited to Metal Leve; it happened with the whole auto parts sector.<sup>31</sup>

The conjunction of transformations in world industry with the period of insufficient manufacturing capacity appears in an episode revealed in the minutes of an executive management meeting in 1986, about the appropriateness of responding to a call from General Motors, to develop together the Saturn model, which appears as a pilot of a new form of structuring and adaptation of GM to the trends under way. The question under discussion concerns their capability of, should they beat the competition, becoming an exclusive production supplier of the model, given the commitments already undertaken. For this reason, one of the executive managers is against responding to the call. The discussion develops around the importance of the opportunity and another executive manager even suggests responding to the call, but making it clear that the company cannot be the only supplier. The proposal is not considered acceptable because the call is explicit on this point. The discussion moves on to the idea that staying in this line of business means answering the calls. The incapacity that emerges in the discussion does not

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<sup>28</sup> Kerstenetzky (1985).

<sup>29</sup> Metal Leve Annual Executive management report, various years.

<sup>30</sup> A heterodox plan to fight inflation in 1986.

<sup>31</sup> From the newspaper, Estado de São Paulo, October 3rd, 1986.



relate to technical competence, but to production capacity, which is one of the dimensions of the firm's reduced scale faced with the industry's new challenges.

As a consequence of the capacity shortage, by the middle of the decade Metal Leve assumed the need to accelerate the growth of production capacity again. However, in the years following the hike, market stagnation prevailed again in Brazil, and we find in the press signs of negative expectations concerning investments and dismay among auto parts manufacturers. Accordingly, we find in Metal Leve's Annual Executive management reports, for a number of years reference being made to investment projects consisting of equipment rationalization and modernization. In the annual report of 1987, concerning 1986, ML still complained of instability, of late delivery of ordered equipment, and announces that investments were reduced and that the company is ready to effect additional revisions to its plans. In the context of the prevailing stagnation of most of the decade, rationalization and modernization investments make sense, but the Saturn episode points to vulnerability in an important question of competition in sectors of activity typical of the second industrial revolution, which is the strategic availability of idle capacity through investment ahead of demand, so as to compete for market shares deftly. In this way, if in the times of the Cruzado Plan, the hike in demand caused by the plan was tackled by resorting to a third production shift, with the advantage of saving on overtime pay, ML was not able to meet all the export demands in 1986. Only in the beginning of 1989 we find again resolute statements of capacity growth, in the annual management report and in press interviews with José Mindlin, who incites other entrepreneurs to invest regardless of the political situation – it was a presidential election year, and Lula was one of the candidates. Mindlin defends the position that there are no alternatives to investing in the country. At least for Metal Leve, the thrust of growth came to the fore again. In agreement with this attitude, the Annual Report of 1989 also mentions ML's acquisitions of companies, which is where we pick up again below.

ML's diversifications at this phase evolved in two ways. Attempts at diversification that were closer to the company's main line of business and capabilities were enhanced. Those that were complementary to its line of business and capabilities, however, did not develop vigorously, and ML ended up ridding itself of them at this phase or the next. Occasionally, partnerships were dissolved, with ML taking over when capabilities and line of business were similar, and withdrawing from the ventures when they were complementary.

Metal Leve Controles Eletrônicos was set up in 1984, in order to venture into the area of microelectronics and IT, more specifically into the manufacture of programmable logic controllers, with a view to supplying products and services in the industrial control and factory automation market. As part of the same move, ML took up a majority stake in a partnership with the American firm Allen-Bradley, creating Metal Leve Allen-Bradley Sistemas Industriais Ltda and Lógicos Sistemas de Controle Industrial, the former acting in the area of electromechanical industrial control products and the latter representing commercially these products and those of Metal Leve Controles Eletrônicos. The company divested itself of its three subsidiaries in the next phase in 1992, alleging that the company Rockwell, which had taken over Allen-Bradley, did not want partnerships anymore, but only wholly-owned subsidiaries. Apparently, ML had to choose between ending the business or branching out alone.

The machinery factory in partnership with Thyssen Hueller, created in the previous phase, was sold to the partner, so that ML withdrew from the field of special machinery manufacturing, alleging it had other investment priorities in the management report of 1989.

Other investments in the form of acquiring companies or establishing partnerships took place within the ambit of the auto parts sector. The Metalúrgica Mogi-Guaçu, which was the result of a partnership with Mahle in 1981, was among those directly linked to the company's key area. ML went in with machining technologies, and Mahle, with casting.<sup>32</sup> It represented diversification in the direction of cast-iron components such as ring carriers, drive camshafts and cylinders. The partnership was lasting, continuing until ML was denationalized.

In another development linked to its original core business, in 1989, ML bought out Imperial Clevite's part in its subsidiary of sinterized products set up during the previous phase under the name,

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<sup>32</sup>This confirms what José Mindlin said in interviews that the end of the contracts left no hard feelings.

Metal Leve Gould. The subsidiary became known as Metal Leve Produtos Sinterizados Ltda. Also in the same year, ML bought the company, Bimetal, a small bearings and bushings maker, located in Rio de Janeiro, which was controlled by the American firm, Federal Mogul. Even if the plant was not a significant acquisition in terms of state-of-the-art technology, the acquisition marginally strengthened ML's presence in bearings and bushings manufacture.

These diversifications and moves in previous diversifications ended up leading to a direction to the growth that eliminated, over time, initiatives not strictly connected to the auto parts sector. Machinery and electronics, strategically thought out and linked to the company's activity though they were, in the end revealed a change in focus and an outflow of resources and energy, and were later discontinued.

Particularly significant was the foreign direct investment, not only as it represented a watershed in the effort to internationalize, but also for the technological content involved, definitively proving ML's potential to follow trends of transformation in the world automotive industry. It stemmed from the development of an articulated piston for high-capacity diesel engines developed in the company's technology center. ML's product had a competitive edge over those developed by Mahle and KS, with the advantages of having a longer working life, of being smaller, lighter and less polluting, surpassing them in the occasion of a call to supply Caterpillar in the US. Other manufacturers also later adopted this ML piston, including Volvo and Cummings. The materialization of the foreign direct investment in Orangeburg, North Carolina, took place in response to Caterpillar's demand for just-in-time supply. The factory's installation began at the end of 1988, with a US\$10 million investment project and projected capacity of 230,000 pistons per year. In addition to the pistons factory, ML set up an American extension of the Brazilian technology center in Ann Arbor, with this proximity to manufacturers enabling it to discuss their needs and, close to developments, to pass them on to the production chain.

In Europe, the strategy was to set up subsidiary companies to stimulate ML's exports. Direct investment on the continent was considered at the end of the decade, with the creation of the European Union in mind. Portugal was considered a possible location, but the discovery that the EU would not set up trade barriers to the continent meant the move did not go ahead.

In this way, it was a phase of consolidation of quality and acceptance of the company's products, with worldwide reach. In the Brazilian market, it was able to protect itself against the entry of foreign firms, which still offered reduced threat to its stake of the market.. And so began its adjustment to the new age of world industry, not only through exports, but also direct investment. ML proceeded with relatively high profits initially, with more modest results, however, in later years of the decade.

The main contradiction in Metal Leve's development in this phase, referred to in the beginning of this section, can be seen in its overall difficulties in promoting production capacity growth.<sup>33</sup> The subsidiary Thyssen Hueller was meant to be strategic for the expansion of the parent company's production capacity, but it was unable to meet Metal Leve's needs – there were problems of cost and delivery time in the middle of the decade, marked as it was by a shortage of idle capacity. In any case, the diversification begun with Excell-O and continued with Thyssen Hueller never became an effective source of machine supply for Metal Leve. Nor were other Brazilian capital goods firms considered a good supply option by Metal Leve.<sup>34</sup> Neither was importing the equipment, because this option was affected by the difficulties of the Brazilian economy with external credit due to debt negotiations. ML again resorted to internal reform and manufacture of machines as a partial solution that, as we saw before, was a characteristic of the sector. But Metal Leve lagged in this respect when compared with international competitors.

The investment needs of the decade were also thwarted by difficulties in internally generating the necessary funds. Metal Leve became aware of a circular problem involving revenue and production capacity: revenue should grow in order to finance capacity growth, and capacity should grow in order to produce more revenue. This had to do with the problem of scale that revealed itself to ML in this phase: as competition progressively acquired international dimensions, firm size became critical for

<sup>33</sup> The appraisal that follows in these two paragraphs is based on a set of executive board minutes from 1986.

<sup>34</sup> In one of the minutes of the executive management meetings in 1986 an executive mentioned that BNDES had a different opinion in this respect. However, the fact that Metal Leve was the user of the machines gives their opinion more weight.

competitiveness. The problem of scale was also felt in the production cost of samples for new orders from automobile manufacturers as well as in the expenses related to R&D activities, because both activities are backed by revenues from current activities. To exemplify, Mahle and Metal Leve were developing at the time a similar number of samples, but these represented a much heavier weight for ML than for Mahle. It is worth adding that Metal Leve's subsidiaries could have been part of the solution for the issue of size, revenues and internal generation of financial resources, but their meager returns implied that they were not able to financially participate in the growth process.

The company's history was transformed quickly from the turn of the decade. The change came from abroad with globalization (though still under stagnation in the Brazilian economy), with trade opening accentuating the long-term weakening of traditional frameworks which, in the beginnings of Brazilian automobile manufacturing, reserved the auto parts assembly market for Brazilian manufacturers. The company and the sector were swept up in a whirlwind of national changes with very little formulation of development planning. ML and other such companies depended on capabilities acquired until then to navigate unfamiliar waters.

### Decline and denationalization

The fifth and final phase of ML's history starts with the trade opening that brought Brazil into line with the globalization process of 1989-1990, and which stimulated the competitiveness of international companies. However, before the depth of globalization's effects had become clear, the beginning of the phase brought on difficulties of another order for ML and Brazilian auto parts manufacturers as a whole. Following the problems of the previous decade with the Brazilian economy and its automotive sector came the US recession caused by the recessive impact of the Gulf War (Zimmerman 1998), which affected the US automobile and truck market - ML's main export market.<sup>35</sup> In 1990 the company still made profits, helped by exports to other markets such as the European market. In fact, ML managed to raise exports to US\$54 million in the same year. Nevertheless, in 1991 ML's accounts showed losses for the first time since the founding of the company. From then on until 1996, ML's performance in terms of profits was negative practically every year, despite the upturn in American and Brazilian automobile manufacturing after 1992 and the increase in the company's sales. The only profitable year was 1994, but even so profits were modest. These results and the assessment of the group that directed and controlled the company throughout its history of the poor chances of reversing the situation ended up leading to the sale of their shares in 1996.

Globalization affected auto parts manufacturers particularly severely. Global competition started to go beyond product quality and reliability, involving systemic questions relating to the world organization of the sector and to the way automobile manufacturers restructured themselves to compete in markets that came to be part of a global logic.<sup>36</sup> With the opening of the Brazilian economy in the 1990s, the auto parts manufacturers' situation was transformed suddenly: in an attempt by foreign automobile manufacturers to modernize Brazilian subsidiaries, and with the new dynamics of competition, there was no time, with few exceptions, to restructure auto parts manufacturing companies adequately to the new environment. The decline in protection represented by the reduction of tariff barriers led to an increase in imports. Automobile manufacturers benefited from the reduction in import tariffs on their inputs - auto parts - much more so than on their products, and also from the chance to import parts in proportion to their exports. Added to this, later, in 1994, there was the exchange rate valuation from the Real Plan. The makeup of the sector underwent a radical change with a reduction in the number of auto parts manufacturing firms,<sup>37</sup> due to company closures, mergers and acquisitions, and downsizing of levels of hierarchy in companies.

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<sup>35</sup> The American automobile production was already under a slowdown which combined the effects of the penetration of Japanese automakers with a cyclical short-term decline of the sales in the American market, after a four-year period of brisk sales in the second half of the 80's (Wong, 1990).

<sup>36</sup> The many aspects involved in this transformation will not be detailed here and can be found in Arbix et al (1997). Only those most directly relevant to ML's case will be dealt with.

<sup>37</sup> According to *The Study on the Competitiveness of Brazilian Industry*, the number of auto parts manufacturers fell from 2000 in 1989 to approximately 1200 (p. 268). The year of publication is 1993.

In this phase, ML went on making investments and pursuing the strategy of internationalization, with the focus on the North-American market. In 1991, in a joint venture with the second biggest piston manufacturer in the world, KS, it bought the bearings factory Bohn Bearing in Greensburg, Indiana. It increased its presence in this market further in 1992 by opening its second American diesel piston factory in Sumter, South Carolina, with a capacity for 230,000 pistons per year, and by raising its production capacity in Orangeburg to 600,000 pistons per year. It also increased its export efforts to other markets, gaining new clients, such as Renault and Mitsubishi in their respective countries of origin. Exports continued with some fluctuation, keeping around the level of US\$ 54 million attained in 1988, but rising to US\$ 68 million in 1994.

In the two previous phases we saw how the entry of foreign competitors took place in the Brazilian market, with consequences still limited to specific markets. In the case of bearings, foreign manufacturing did not prosper and the actual entry of competitors only came to pass in the 90s. In the case of pistons, Mahle and KS occupied markets slowly, so that real competition was gradually forming. Mahle, in particular, focused on especially profitable markets of the replacement segment, like that of a diesel pistons model for Mercedes-Benz vehicles, which had been a hit for ML sales and profitability and which was being lost to the German firm. Complementing the strategy, Mahle installed a modern factory in Brazil.

If in the 1980s losses to competitors were small, in the face of liberalization and globalization, ML's business destabilized. National bearings markets, which showed the largest profit margins, began to be served by imports at lower international prices, drastically affecting ML's profitability. Two years of losses were necessary for ML to realize there were structural problems in its operation. During the initial moments of difficulty, some company members defended the position that it was solid in terms of production, and that the troubled environment was to blame for the opposite results. Such a position, though mistaken, was comprehensible as it had been conceived over many years of high inflation permeated by stabilization plans that included price freezing and subsequent hikes. The effect on the quality of financial statements and on entrepreneurial calculations was to disturb the whole Brazilian economy – and certainly to keep foreign capital at a distance.<sup>38</sup> In the specific case of ML, the difficulties were aggravated by the fact that the company did not produce any separate verification of results of operations for business units, so that bearings margins were mixed up with the lower piston margins. Much less did ML know the operational cost for each of its products, so that some of them contributed to the company losses without the possibility of using objective criteria to discontinue them. ML's continued role and culture of meeting the whole range of national needs for products also contributed to less favorable results, in such a way that this possibility of phasing products out was not considered.

In 1993 however, even before the Real Plan stabilized the price system and made it easier to check product profitability, two years of negative results gave ML's board warning of problems in the way it was doing business and made it begin a restructuring process.

Parallel to the restructuring process, ML began to negotiate a partnership with Mahle in pistons, as it was clear to ML that there was at least a hard problem to solve, which was its lower production scale compared to that of competitors. This problem had different facets. Firstly, ML's smaller size in relation to its foreign competitors put it at a disadvantage in terms of costs. This disadvantage did not refer to the day-to-day production operation, but to the smaller dilution of the costs of R&D and producing samples for new orders through revenue. Thus, although Metal Leve had the competitive capability to develop new products, as demonstrated by the episode of the articulated pistons for Caterpillar in the 80s, development costs weighed more heavily on its lower revenue. Secondly, internationalization and following trends in the world automotive industry demanded much greater investment than the company could finance. Not only was it necessary to deepen its presence in markets where it was already, but also to enter into Asian and Australian markets. Negotiations with Mahle advanced the most, though they did not reach a conclusion - other companies approached were KS and Dana. In interviews to newspapers given in 1996, during the sale of ML, José Mindlin explained that the negotiations did not bear fruit because the controlling group did not want to become a minority, which the foreign companies were not

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<sup>38</sup> Castro(2001)



willing to consider. He also explained on this occasion that another option would be to make an investment that would literally multiply the company's production capacity. But this solution encountered a problem of circularity already known to ML's senior management since the mid-1980s that exists between increasing revenue and financing investment, making these objectives mutually dependent. Added to this was the fact that difficulties of financing such an effort to raise production capacity were increased during the 1990s by the losses.

In the context of the restructuring of ML in 1993, and regardless of the success of the partnership proposal with Mahle, the consultancy firm Consemp gave a harsh diagnosis, confirming correction measures already under way,<sup>39</sup> but pointing to other needs. Their report made clear the enormity of the task and gave a glimpse of the uncertainties inherent in putting the company back on a competitive footing. Among the recommendations, the needs for relocation, operational reengineering, change of processes and automation were most prominent. Among the short-term modifications introduced by ML was the reorganization of business units so that production costs by product family were known, involving transformations in IT, with a consequent phasing-out of products.

The restructuring made ML return to modest profits in 1994, and other measures were to be implemented and come into effect in the longer term. However, Mahle lowered its prices by 30% between 1993 and 1996, and ML had to follow suit. It is worth noting that Metal Leve, until its denationalization, remained the largest national piston manufacturer, with a large share of the market and growing sales, remaining from 1994 to 1996 with around 65% of the OEM piston market (against 23% of KS and 11.9% of Mahle) and 42.1% of the aftermarket (against 26.3% of Mahle, 16.1%, KS, 11.8% of a company called Suloy and only 3% imports).

In this way, after signs of recovery in 1994 through a small profit, losses reappeared in the following two years. What was gained in cost reduction was quickly lost with the continuation of the same trends. In 1996, the controlling group sold its shares to a group consisting of Mahle, COFAP and Bradesco.

Thus, trade opening in the context of difficulties for automobile manufacturers and their parent companies and, in particular, of obsolescence in Brazil brought about, throughout the sector, a frantic search for modernization with cost-cutting, and ML did not have time to restructure properly. Occasionally, the attempted restructuring went in the right direction, but there would be further transformations to make, among others to the production scale.

### An assessment of Metal Leve's life cycle

Metal Leve's case provides an example of how entrepreneurs accumulate solutions and capabilities in different areas during the company's lifetime, eventually getting to a point where changes in the environment are not accompanied by new solutions, so that the cycle is closed.<sup>40</sup> This last section gathers elements from areas of capabilities in the company's history in order to piece together an explanation for the decline.

It is worth starting with management, explaining who the entrepreneur was and who we are referring to when we say anything about decisions made 'by Metal Leve'. The partners who made up Metal Leve established a practice of joint management, with the most important decisions taken by the group of managing partners, suggesting there was a collective spirit of agreement which brought with it unity and mutual confidence. Metal Leve was transformed into a publicly-traded company in 1971. Resistance from some of the partners to transforming the legal status of the company and professionalizing company management seems to have been overcome by the power invested in the board of directors to which the partners were transferred. At the end of the company's history, this board was identified as taking part in all the decisions. Thus, despite having become publicly-held, the company went on being run by its founding families, with some members of these families in executive positions, so that it could still be considered a family firm. On the positive side, this meant that the mutual unity and

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<sup>39</sup> a reduction of hierarchical levels and big layoffs.

<sup>40</sup> Remembering that, in this specific case, if the company continued to exist, management changed and its resources started to be subject to another larger hierarchy in a global corporation, justifying the idea of the end of its life cycle.

trust, and also the way of doing business continued, with lasting values in staff policy, and a vision which was not limited to short-term financial results. On the negative side, it meant maintaining deep-seated rules of financial management and little flexibility to adjust to changes in the environment.

Moving on from the observation about entrepreneurs, the problem of scale highlighted before will be combined with the firm's capabilities, areas of which, if managed differently, could perhaps have resulted in a different story from the one that took place in ML's final years.

ML's history told in the preceding pages shows that the technological area received constant and effective attention and management, having been the star and basis for the business success story. In operations, a lag in the production processes in comparison with the competition proved important in the final phase, added to which was the administrative deficiency in cost tracking. Management of the financial area however, once considered by the company as one of the bastions of its solidity,<sup>41</sup> at the end of the story had to contend with the impossible task of financing an investment of US\$100 million, which would have represented the solution for the problem of competitiveness by means of the increase in scale. In fact, this financial obstacle reproduces on a larger scale the awareness of investment needs that were greater than the financing capacity already seen since the mid-1980s.

The pieces presented above - management, technological know-how, operational problems linked to outdated machinery, the problem of scale and financial insufficiency - can be put together to explain the phase of decline in the firm's life cycle and how the history of an iconic company of Brazilian industrialization ended.

ML's decision to maintain a notoriously low debt ratio throughout its history can be understood as a self-imposed limit to growth. Such austerity originated in the remote episode of piston imports at the time of the Korean War, which meant that ML had to "go from bank from bank". An attitude of caution and financial self-restraint in relation to government plans and debt ratio was built around this episode, which was told and retold. As a result, ML did not resort to debt as a way of financing growth as much as was possible.

Self-sufficiency in investment was for the most part of ML's life provided by high profit margins obtained through protection, which allowed the company to grow in such a way as to dominate the Brazilian market.<sup>42</sup> However, these margins, which fueled exponential growth at first, decreased over the course of the company's history, which is explained by the succession of phases with change in the business environment. At birth, there were premium quality producers' margins at play in the aftermarket, with a 75% market share of national manufacturing capacity and protection against imports. Then, at the beginning of the Brazilian automobile industry, average margins fell, with a part of the sales destined to the OEM market. Next, exports grew, with international prices lower than national ones. Finally, the market was opened to international competition and all prices were international.

In terms of technology, partnerships made with Mahle and Clevite were fundamental for Metal Leve to get a head start, later going all the way from mastering the production process to developing new products. Having benefited from these good relationships, ML learned more and more to advance by its own means.

Other relationships with foreign firms also aimed at technological input and took the form of partnerships. They were strategic to company growth but were not successful like the first two. The attempt to transform capabilities developed internally in equipment manufacture into a machinery company with foreign partnership did not end well. ML had to opt to obtain equipment from other sources. The company's history again registered internal equipment manufacture, and later ML sold its participation in the subsidiary. The incursion into the IT sphere in partnership with Allen-Bradley can also be explained as a strategic investment in a source of technologically advanced equipment with numerical control and automation. With the change in the IT public policy that put an end to the market reserve for Brazilian firms, that had favored the project, the foreign partner lost interest in the partnership and the relationship ended. Because of their failure, these diversifications might appear to lack focus, but

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<sup>41</sup> See, for example, the Company's 1981 Executive Management Report.

<sup>42</sup> The explanation of Metal Leve's growth must also consider commercial and other areas and capabilities developed in the course of time.

they can be explained by the need to improve access to equipment in a country in which imports, their financing - which involves international payments and all the resulting issues - and national supply do not offer the same conditions that are presented to international competitors. Unsuccessful as they were, these efforts resulted in an outflow of resources.

Failure in attempts to solve the problem of machinery provision gains special meaning when foreign competitors set up in Brazil with more modern automatized factories. Metal Leve was also able to set up modern, competitive factories in the US, with equipment acquired there. In Brazil it adapted its production lines with numerical control, but this is not the same as installing lines which are wholly conceived with automation. It is important to note that operational deficiencies and the strategies to obtain equipment are linked to the Brazilian business environment, with its deficiencies and opportunities, and cannot be entirely put down to Metal Leve.

The nuances discussed here allow us to better qualify the importance of protection for the company's survival, in order to avoid simplistic and extreme explanations, as would be the case of attributing the elimination of the company to globalization and to sudden trade opening, or at the other ideological extreme, of gauging that the company just lived under the auspices of protection. It needs to be noted that, although protection was shown to be important, achievements in terms of exports and product development indicate that ML was technologically qualified in auto parts manufacturing, and, even in the final years of its life, the company demonstrated in many ways its capacity, receiving orders for new projects, winning new clients and obtaining certifications. As an example of this, just three months before control and ownership were transferred the firm beat international competition to supply sintered connecting rods for a new Volkswagen engine.

Next there was the problem of scale, to which we can link the financial area, which was already described as capable of promoting high levels of growth with a low debt ratio, fed by high but decreasing margins. In the fourth phase of ML's history, when the Brazilian market stagnated in the 1980s, production continued to grow through the exploration of foreign markets. But in the first half of this decade there was a lapse in expansion efforts when, in addition to the financially conservative attitude of low debt, a relaxation of the expansion policy took place: piston production capacity rose only marginally and the distribution of dividends was markedly greater than in other periods of its history, exceeding half the profits in three years and in another year almost reaching the same level, while in most of the other years as a publicly-traded company it did not surpass 30% of profit distribution and was usually well below this. The lapse came to cause difficulties a little later when installed capacity had to be completely used in the period between 1985 and 1987 and the company could not make the most of all of its business opportunities.

The episode above can even be justified by the recessive state of the national and international economies of the early 80s. Nevertheless, it can be speculated that a more aggressive expansion strategy would have been advantageous, including going from nationally protected markets to international competition through foreign direct investment earlier than Metal Leve did at the end of the 80s. This could have made the company grow faster, so that it would have become more internationalized by the 1990s, with greater revenue and capacity to finance more expansion. It could even have had repercussions from international experience on its national operative practices. Perhaps this strategy could even have benefited from the resources that were alternatively destined for diversifications that I qualified before as complimentary. This reasoning is reinforced by contrasting it with Mahle's strategy, which bought companies in many countries from the 1960s on, taking over international markets and becoming an engine of growth.<sup>43</sup>

These observations remain speculative: we do not know if companies bought or set up by ML abroad would have been successful in their battle for markets. But we do have the success of Metal Leve's American plants, suggesting that its international expansion was in the right direction. Had it been earlier and deepened, we can risk saying that it would have been a better strategy. If it had been

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<sup>43</sup> I think the comparison is valid even though the difference between the two companies in terms of age and position in the context of the international automotive industry.

successful, it would have gone towards tackling the problem of circularity between revenue and investment posed by the board in a meeting in 1986 and which was present in the 90s.

Even so, we cannot know if it would have been enough, or how much better Metal Leve's situation would have been in the 90s faced with globalization. Counterfactual reasoning puts us in a slightly more comfortable position than that of businesspeople on the spot; however, this does not change the fact that, remembering Keynes, all business activity is speculative.

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