How to save the occidental manufacturing sector

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Abstract

Many indicators point at serious crises weakening the manufacturing segment in most occidental countries. Focusing the Brazilian industry, this paper analyzes the various decline indicators, debates the origin, causes and development of the crisis and presents the numerous solutions given in past crises to increase the manufacture productivity and competitiveness.

Keywords: Manufacturing decline, competitiveness indicators, industrial crisis

Introduction

It is not a consensus, but many Brazilian economists, researchers, consultants and businessmen men, as well as business associations and unions, believe that Brazilian manufacturing sector is facing a very serious crisis. In European and in many Latin-American countries, similar malaises are felt. It is not the first crisis that has hurt Brazilian industry in the last fifty years, but this one is different, since it is specific to manufacture, while the primary and tertiary sectors, agribusiness and services, are doing fine.

The objective of this paper is to examine the indicators and the indications pointing at an eventually deadly crisis in occidental and specifically in the Brazilian manufacture and to describe what this segment has done in the past and could do in the future to overcome its troubles and restore its competitiveness.

To be or not to be ... in a crisis

Crisis should not be confounded with economic depression. This has a clear definition: a sales reduction during two consecutive trimesters. Crisis, in the meaning used in most texts, is a strong and persistent reduction of activities due to structural, not conjunctural causes, threatening the existence of the sector (Bhattacharyay – 2009).

Indicators used to signal a crisis are the following:

- reduction in domestic and export sales
- production decrease
- profitability decrease
- reduction in GNP participation
- reduction in productivity
- diminution of investment

- unemployment increase
- reduction in number of hours worked
- smaller use of productive capacity

Indications of a crisis are more felt than measured:

- lack of enthusiasm from entrepreneurs
- lack of dynamism, research, innovation
- slow adoption of new technologies
- stagnation in product design
- low intensity of technology in manufacture

Not all the categories of manufactured products have shown the same degree of vulnerability. The branches more affected in Brazil are labor-intensive: toys, garments, shoes and leather articles, furniture. But capital-intensive industries have also suffered, the textile, for instance. The silk industry disappeared. The pharmaceutical chemistry died, since home-made drugs cost twice as much as the imported ones. Most items bought in shops are made in other countries, while, formerly, they were made in Brazil. Many items, like mobile phones, tablets, computers, even when labelled: "Made in Brazil" are only mounted locally, with imported components. (McKinsey Global Institute – 2006).

Other industrial areas suffer on account of a worldly capacity excess, the case of siderurgy, which exhibits a 500 million tons yearly excess. Some dumping, hurting local plants, is unavoidable.

Some Brazilian industrial producers continue doing well, especially the manufacturers of transportation equipment – automobiles, trucks, tractors and agricultural vehicles, planes (IBGE – 2013).

Brazilian industries related to the agricultural sector – especially the sugar cane supply chain and the meat chain – continue to benefit from natural competitive advantages – soil, sun, rain – and from the high prices of commodities (CNI – 2013).

Some data which analysts have used to cry wolf follow (IEDI – 2013a, 2013b e 2013c):

1. Decrease in Brazilian manufacture production

   The present level of production in Brazilian manufacture is smaller than in 2008, before the recent world banking crisis. In other words, it has not grown in four years, even through the automotive chain, which has a weight of 20% in this indicator, has grown some 30% in the period. The fall of production has occurred in almost all sectors, with few exceptions.

2. Decrease in Brazilian export of manufactured goods

   There has been a decrease in export of Brazil manufactured goods and an increase in imports. The commercial balance of Brazilian manufacture (exports minus imports) shows a growing deficit in these last four years. It grew exactly 10% last year. Imports of clothes have grown from 23 thousand tons to 78 thousand a year between 2002 and 2011. Their participation in domestic use jumped from 2% to 9% in the same period.

3. Decrease in Brazilian manufacture participation in the Gross National Product

   Brazilian GNP grew up till 2001. From that year on, it fell. It is today only 14%, as against 25% and 61% for the two other sectors.

4. Decrease in productive investments

   An important indicator of progress is the proportion of investment to the GNP. It has been in the range of 18% or 19% in the last ten years in Brazil, as against the 25%

considered necessary to promote growth and technological advances.

5 Businessmen intention to invest

Recent surveys (December 2012) indicate that 80,6% of businessmen and executives consulted plan to produce for the domestic market, while only 4,7% mentioned exportation as a priority.

6. Productivity sluggishness

Focusing the Brazilian manufacturing sector, productivity grew only 0.6% per year between 2000 and 2010, as against 6.9% in Taiwan, 6% in Czech Republic, 5.2% in U.S., 4% in Finland and 1.2% in Spain, according to the Brazilian National Industrial Confederation (CNI – 2013).

7. High unemployment level

Though official unemployment level was only 5% in December 2012, for the whole economy, in the six major Brazilian urban centers, the workers' unions indicated that manufacture unemployment reached an 18% level. (IEDI – 2013a, 2013b e 2013c). Methodological differences explain the discrepancies. Official data consider employees persons who work, even through not officially registered in a company. In many services, low qualified employees work without an official "work card". Persons in this situation do not register as unemployed in official census. Besides, a substantial proportion of employed people are actually underemployed and, considering the nature of the job and their qualification, strongly underpaid.

There is, to sum it up, strong evidence that the Brazilian manufacture is suffering a crisis. Some industries, still, are doing well (transportation equipment), many are recovering or have the potential to recover (shoes, textiles, garments), but some are in deep trouble (silk, toys, machinery).

Thirty ideas to save manufacture

This part of the paper presents a list of thirty ideas to reduce costs and improve manufacture competitivity. They have been tested, used and proved in the past (Jacobs, Chase – 2011). For a long time forgotten, many should be revived. They helped Brazil to recover from the oil crisis (from 1973 to the eighties), the external debt crisis (in the eighties), the runoff inflation crisis (eighties and nineties), the "market-opening" crisis (1990) (McKinsey Global Institute – 1998), the lack-of-confidence-in-the-leftist-government crisis (2002). Why should they not help in the present manufacture crisis, which could be called: crisis provoked by lack of competitivity of Brazilian (and other countries) manufacture face to the tsunami-like invasion of imported Asian products?

To make matters worse, this crisis is, on its turn, immersed in a world financial crisis, started in 2007.

1. One main tenet of productivity increase is waste elimination. After the 1973 first outburst of the oil crisis, all countries started campaigns of waste elimination, not only in energy, but also in food, water, paper, red tape, electric light, time. Waste is defined as anything which costs something and does not bring a valuable thing to any being.
2. A second recommendation, which was much necessary in past years, is to better appraise investments. Many errors were made, like purchasing lots of unknown machines without testing them beforehand and without examining carefully the ethic, legal, technical, economical and financial feasibilities of the investment. The

eagerness to acquire up to date technology without a beforehand study was the cause of much waste. It is better, though, to postpone a purchase until the feasibilities are proven positive, than to buy a system or hardware that the company is not yet prepared to utilize in full.

3. Until 1990, almost all Brazilian manufacturing enterprises had developed some program of quality improvement. The first to be implanted was the QCC- Quality Control Circle, in the early seventies. This program, which involves employee active participation in quality improvement, substituted the never popular Statistical Quality Control attempts. The concepts of sample, average, range and chart never flourished on the factory floor. The Quality Circles, to the contrary, inspired the workers to present useful and feasible solutions. After some years, people started to ask money payments for the improvements made. The QCC were substituted by other quality projects, described ahead.
4. One of the most successful and profitable improvement program, popular among Brazilian industries in the seventies, was the Value Analysis. It consists in examining methodically each feature and characteristic of each component of each product, service or system offered by the company, in order to verify whether it adds or not value to the final product or service. Its elimination or substitution by something cheaper - without quality loss – could save (and indeed saved) many millions to many vehicles and appliances manufacturers at the times.
5. Another program that helped and still helps to save millions is better inventory management. A first important innovation was created by the IBM, a software, called MRP - Material Requirements Planning, which helped to plan and control the hundred thousand items (consumer goods, components, replacement parts) existing in supermarkets, department stores, factories, arsenals, distribution centers. It substituted human mind memory and computation capacity, helping to shoot troubles in daily operations. Later, in the seventies, a new concept, the JIT – Just in Time approach, it is, the zero-inventory attempt, was brought from Japan and soon adopted by must Brazilian manufactures, in conjunction or in substitution of MRP. The interest in this methodology was particularly intense in Brazil, where interest rates were very high at the time, turning inventories costly. Many factories discovered that the very simple concept of JPMATTI, Just-pay-more-attention-to-the-inventory, paid high dividends.
6. Related to inventory improvement, better forecast started to be implemented, using statistical methods and new softwares, like the IBM-MRP-II – Manufacturing Resources Planning, introduced in Brazil immediately after its creation in the US, in the early seventies.

   While there is some distrust, among Brazilian businessmen, concerning the usefulness of mathematics and statistics in business, new methods of coping with difficult problems have been rapidly brought from abroad and tested. For instance, the PERT-CPM method for project management, created in U.S. in 1957, was brought by a consulting firm to Brazil by 1958 and broadly used by many local engineering firms and factories by 1960.
7. Attempts to increase employee productivity through disciplinary measures were always taken. Incentives were given – like free breakfast – to workers who did not get late in the morning in spite of city jams. Absenteeism was curbed, but turnover –

just to get a few cents more next door – is extremely high. Much could be done to improve the organization climate which is definitely wrong in a substantial number of organizations.

8. While executive training is widespread in Brazil since the sixties, employees classroom training has been restricted to a few foreign companies subsidiaries. High turnover has dissuaded managers to train their employees. There is also the current belief that the "real" training occurs on the job. But many costly errors could have been avoided if, for instance, stockroom employees had been trained in elementary arithmetics.
9. Rationalization of processes is an obvious way to increase the efficiency of work. The existing process should be recorded, written in full and drawn as a flow chart (process map). The procedure should be reviewed for improvement, by elimination, recombination, substitution or technical change. Usually each employee knows only his own job and ignores what happens before and after his workplace. Potentially, gains are obtained when all the parts of this puzzle are put together and superfluous pieces eliminated.
10. Instructions writing is essential for five reasons:
    - It preserves the know how and the how-to-do, many times kept only and almost secretly in the memory of a few old timers
    - It is an invaluable tool for new employees training
    - It is the guardian of rules. One can only exact compliance to a rule if this is written
    - It constitutes the starting tracks for future improvement
    - It is required by organisms of certification like ISO – International Organization for Standardization whose motto is: "do what you write, write what you do".
11. Automation, substitution of human workers by machinery, is a natural solution to reduce costs in places where machines are cheap and manpower expensive, and to improve quality; the label "robot-made" might be a relevant sales promoter. Some works, like painting and welding, should not be done by humans, for health maintenance reasons. Although more discretely than Japan, Brazil has acquired many robots, numerical control equipment, and CAD-CAM systems.
12. The use of statistical methods - such as DOX – Design of Experiments, multivariate analysis, analysis of variance, is fundamental in production and operation and should be encouraged. The correct way to find the root causes of a difficult production problem is to take notes of all data and analyze them carefully, with statistical tools.
13. Much in vogue has been outsourcing. It is above all a manner to transfer a problem to another party, or to reduce costs, paying lower salaries of wages to outsourced employees. Even the main principle of the area, namely: "do not outsource core functions" has been frequently overruled, without taking in consideration the many strategic, ethic, legal, technical, economical and financial implications of the outsourcing decision. One has to do some homework before deciding to export the work.
14. As a source of potential gains, through better negotiation, purchasing was discovered in the seventies by large manufacturers, hospitals, retailer chains, banks, government offices. To gain bargaining power, purchases centralization and joint purchasing have been extensively used (Fernie, Sparks – 2009). Technical purchasing, which can be

defined as knowing all about the purchased item, has also been used by large companies.

In the nineties, an effort was made in Brazil to implement the ECR – Efficient Consumer Response concepts. The main idea, here, is to operate a better management of the whole supply chain through friendly cooperation of its members instead of the usual distrust and antagonism between supplier and purchaser (Chopra, Meindl – 2003). Huge improvements could be reached if barriers between departments and companies were removed.

15. A technique, simple in principle, but technically complex, called Quality Function Deployment – QFD, attracted the attention of a few hundred Brazilian companies in the eighties. It consists in listening to the clients expectations and translate then in engineering specifications of the product or service. For instance, if clients want that their car be completely silent, absolutely reliable and totally perfect visually, create the electric car. More use should be done by manufacture of the basic concept of listening to the customer.
16. Since the eighties there has been a rush for accreditation or certification on part of the Brazilian company. It was necessary to be certified by ISO 9000, ISO 14000 and ISO 18000 in order to export to Europe. It is probable, though difficult to prove, that such certifications improve quality and increase sales, as they require the adoptions of many suggestions here made, like writing everything and training everybody.
17. The standardization of components or parts of projects should be constantly activated in all factories. It consists in using the same components and parts in diverse final products. For instance, with two or three engines, a car manufacturer cans assembly thirty different models. The design of the product is different but many of the 5,000 parts which form the car can be the same. Such reduction decreases the cost of maintaining inventories and simplifies many activities.
18. In the understandable intention to attract the largest possible range of customers, many manufacturers produce a large variety of items, differing between them by only a few features. Too much variety can let the client confused. History has shown that a menu of 30 products can sell more than a competitor offering 200 products. The simplification of the line is an important possibility which should be continually monitored, on a systemic viewpoint.
19. Postponement is a technique consisting in letting the product semi-finished - for instance, complete but without paint -. The final product is completed only after ordered by the client. This quite obvious solution reduces inventories of end products, but requires agility in delivery.
20. Of all the proposals suggested by the Japanese School of Management, the Just-in-Time principle, as applied to material management, has attracted the interest of practically all manufacturers in Brazil. There is possibly more savings attached to this dogma than to any other. It consists in imposing that all raw materials, parts, components, in process items and final products arrive precisely on time where they are needed. It eliminates totally inventories, from the user viewpoint. On the factory floor, this objective is obtained with the implantation of the kanban system, a method for signaling the need for some batch and the delivery of the batch needed. Much room is saved by cutting inventories, an important feature of the JIT-Kanban system. In Brazil, many hospitals have adopted the JIT philosophy, in pharmacy and laundry

operations and inventory management (Barbieri, Machline – 2009). A consequence of JIT is the pull idea, in contrast to the push concept. It means to produce only when there is a confirmed demand. This idea has not been accepted in Brazil.

21. Factory resettling is being adopted by most manufacturers. All the units located in urban centers have moved to the outskirts or to small towns where cost of living is smaller, wages are lower and taxes reduced. The profit making by the sale of the former building more than compensates the considerable cost of moving the employees to the new place or of dispensing them.
22. A cluster is an agglomeration of similar factories concentrated in the same city, district or street. It offers definite advantages in specialized employees hiring, as well as in selling, purchasing and logistics. Brazil has had, for decades, important clusters, mostly in textiles, shoes, furniture industries. Many have been severely affected by the present crisis, some have restructured and are reviving.
23. The JIT idea, described in 3.20, is on its turn a part of the fundamental concept of waste elimination, the old tenet presented in 3.1, but now waged as an implacable war against any kind of waste. The lean doctrine (Womack, Jones – 2003) is the background for a series of improvements, which have been actively used in many Brazilian factories, since the eighties. One of them is the andon. It consists in three lamps – at the top of each piece of equipment. Whenever a red light shines, it means there is some trouble. Immediate attention is thus given to that machine, avoiding costly interruptions.
24. The setup is the preparation of the equipment for the work on a new production order. It requires equipment cleaning, changing dies, adjusting the machinery, as well as paper work. If not well managed, it can take hours. The Just-on-Time proposal consists in not spending more than a few minutes to perform the setup, so as to not let the machine a long time idle.
25. Instead of the traditional forms of layout, either grouping similar machines in the same place or mounting an assembly line, many Brazilian manufactures have favored a cell layout. A cell is an assembly of equipments – for instance some numerical controlled machine tools – capable to produce a whole family of similar products, like, for instance, bearings. The machines are usually arranged in a U-shaped layout. The cell is autonomous. The workers self manage themselves. They are polyvalent (multifunctional) which mean they can operate several different machines. They do not need supervisors nor quality inspectors. They are able to perform some maintenance, a feature called Total Productive Maintenance – TPM. Self management is a must. Almost all Brazilian manufactures have installed at least a cell. It is a question of honor, to show the factory is up to date.
26. Downsizing is the reduction of hierarchical levels in order to easy and speed the transmission of information along the line. It has come to mean workforce reduction, eliminating any real or imaginary excess of workers, aiming basically at cost cutting. A host of Brazilian companies have done and are doing it. One can consider three kinds of downsizing.

- The vertical downsizing, by elimination of intermediary hierarchical positions: vice- presidents, general managers, supervisors. One keeps a minimum, say four, number of levels.
- The lateral downsizing, by the elimination of staff. Planning, Programming,

Controlling are done by the line.

- The overall downsizing. One cuts blindly 20% of the employees in each section.

27. Total Quality Management – TQM is an extremely wide program, which embraces many projects. Many industrial and service companies have adopted this line of action. It stresses the quality of management and of its strategic planning. The quality of products and services will be a consequence. The quality leaders have created a Quality Control Award, similar to the well known Deming Award in Japan and Malcolm Baldrige Award in U.S.

    The Kaizen concept is a relevant aspect of TQM. It means continuous progress and continuous strive of human beings toward perfection. The goal of business should be to maintain the Kaizen spirit alive.

    Other features associated with TQM are among others, the 5S, which means five techniques adopted years ago by many Brazilian manufactures and since forgotten; plan, maintain order, maintain workplace clean, keep clean, be disciplined; autonomation, which means authorization given to worker to stop the production line whenever he sees a defect; and Bakayokê, simple and clever devices to help worker to avoid making errors and to discover defects. There could be a much broader use of these instruments in Brazilian plants.

28. Another favorite tool in quality management, much praised in Brazilian companies, is the Ishikawa fishbone, a clever way to find the root causes of a production recurrent problem.

29. While the lean doctrine is extremely popular among Brazilian manufacturers, the Six Sigma movement, often associated to it, has not yet made many inroads in them. Probably its most significant feature is the adoption of ppm – part per million defective, as the normal yardstick to assess a batch quality. In a few years, for many products, the quality level, which was measured by defect percentage, is now appraised in ppm. A previous program, the Zero Defect System, had identical goals.

30. Another device, called the Deming Cycle or Shewhart Cycle, has reached a high degree of popularity in Brazilian factories. This cycle indicates the sequence of procedures one has to follow in any problem solving situation. Plan-Do-Control-Act – PDCA. The PDCA cycle has been hailed as a major contribution to rational thinking. Indeed, if it had been always cultivated many errors would have been avoided.

Final Considerations

Good management requires hierarchy in decision making. All the suggestions here presented shall be submitted to a high level decision making jury before they are implemented in the factory. It is necessary to analyze carefully the ethic, legal, technical, - economical and financial feasibilities of each proposal. Which are the cost, the return, the appropriate timing, the other alternatives?

The primary suggestion, therefore, is to apply the 30th technique, the PDCA cycle, to each suggestion, or, still better, to apply a more complete cycle, an APDCA cycle, in which the first A stands for Analyze. Companies should analyze continually their problems and opportunities, and then Plan, Do, Control and Act on their improvements possibilities.

Conclusion

There is no conclusive evidence that a deadly crisis is hurting the Brazilian manufacture. The paper debates some indicators used to prove the crisis existence. Some industrial sectors are growing, other have been hurt but are recovering, a few, indeed, are fatally wounded. Identical conclusion could be reached for many other countries' manufactures.

Thirty suggestions were listed, which had been used in past crises by Brazilian industries in order to improve results and cut costs. They should be implemented again, more vigorously than ever.

No mention was made here to some costs inherent to the Brazilian economy as a whole: the high interest rate, the high taxation level (36% of the GNP), the weak transportation infrastructure, which causes high logistic costs, the excessive red tape, also very expensive. Industry efforts should be matched by government actions to reduce all these costs.

Brazilian manufacture has survived to many crises, here mentioned. The creativity and resourcefulness of Brazilian businessmen are strong indicators it will match its competitors and survive.

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