

# THE MACRO--MICRO- INSTITUTIONS OF PRODUCTION PRACTICES IN LATIN AMERICAN NATIONS

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## ABSTRACT

Although the conventional literature on industrial development has already indicated the connections between macro- institutions and industrial performance, there is still a significant research gap concerning how this process occurs at the micro- (firm) level. It is especially important to assess how macro- institutions - industrial relations, income distribution, industry policies and power groups – shape the way firms develop their production strategies, technologies and management practices. Simultaneously, how do – that is, under which processes and/or conditions – production strategies, technologies and management practices mould macro- institutions? Combining Whitley's 'business systems' concept with a production strategy framework, this paper constitutes a contribution to an examination of these issues in Latin America. It is important to stress that this is not a study of production engineering; rather, we would like to offer a fresh way of analyzing how Latin American economies have dealt with the micro-/macro- interface in developing appropriate production systems. Using empirical evidence from Brazil, Mexico and Argentina, this methodology is directly applied to their specific contexts.

## INTRODUCTION

In spite of an enormous proliferation of attempts to explain the industrial competitiveness path followed by developing nations, it is necessary to note that this literature has mainly focused on research questions from a macro-economic and institutional perspective<sup>1</sup> (c.f. Evans, 1979; Gereffly and Wyman, 1990). This approach is reasonable, since the influence of macro- institutional forces on micro- level developments is widely recognized. However, there seems to be a significant research gap concerning how this process impacts at the micro- (firm) level, that is, how macro-institutions - such as industrial relations, the income distribution path, industry policies and power groups – shape the way firms deploy production strategies, technologies and management practices. Similarly, relatively little is known about how – that is, under which processes and/or conditions – production strategies, technologies and management practices mould macro- institutions. Finally, under which environmental conditions do macro- forces overcome micro- level forces, and vice-versa?

The present study attempts to go beyond conventional macro- explanations by linking macro- and micro- level arguments in providing an improved understanding of the industrial competitiveness path followed by the largest economies in Latin America. Certainly, little agreement has been achieved to date in assessing the quality, significance and extent of the ways in which these systems have been linked (Boyer, 1993; Lutz, 1992). Moreover, conventional explanations of industrial competitiveness (Porter, 1980) fail to accommodate the nuanced balance between macro- and micro- influences, leading to a weakened understanding of firm-level practices. It is our

contention that this approach fails to accommodate business reality, in that complex political, social and engineering processes occur at the level of the firm in order to deliver 'competitiveness'. In particular, because strategies are a function of environments, and because different economies have different environments, which in turn are increasingly affected by 'global' forces, the understanding of the micro-macro linkage would help to understand which production practices/strategies and technologies must be adopted (Lindberg, Voss and Blackmon, 1998). It will also then be possible to design macro-institutional policies which are congruent with established production patterns. The article starts by assessing two complementary frameworks. On the one hand, Whitley's (2000) 'business systems' model is developed in order to systematize the key components of the macro- environment that affect micro-level deployments. At the same time, established production strategy theory (Hill, 1987; Swink and Way, 1995) will be applied in order to base micro-level explanations of how production strategies, technologies and operations management practices were deployed in order to cope with macro- level forces. The resulting framework (see Figure 1) is then applied to the late-twentieth century experiences in some of the leading Latin American economies, most notably Brazil, resulting in a much more balanced understanding of the dynamics linking micro-macro institutions. An ambitious research agenda is also proposed, as a means of extending the application of this model to the general experience in Latin America.

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<sup>1</sup> For a sophisticated overview of the role of the State, MNE, domestic politics, networks as well as industry finance and production relations in Latin American Nations, see Lierh and Lewis (2003, forthcoming).

## THE MACRO- MICRO- INTERFACE OF PRODUCTION PRACTICES

The key feature of what has come to be known as the 'institutional perspective' focuses on contextual factors that support or constrain human action at a given local reality in order to explain socio-economic developments. This implies that, for example, the same business 'recipe' might trigger different outcomes in different regions/economies, since the way of life, beliefs, values, and major institutions like the State, political, financial, industrial relations, and educational systems, are specific to each country or geographical area. Institutions, according to North (1990, 3-4), are "the rules of the game, or more formally, are the humanly devised constraints that shape human interaction ... That is, they consist of formal written rules as typically unwritten codes of conduct that underlay and supplement formal rules". Institutional analysis recognises the dynamic nature of socially-shaped events that usually change over time. Institutionalisation, therefore, can also be conceptualised as "the process by which actions became repeated over time and are assigned similar meanings by self and others" (Biggart, quoted by Scott, 1997).

Bringing this concept to the industrial arena, this means that the choice of a specific organisational solution is affected by institutional factors such as

"(1) business-elite mentalities, i.e. intellectual dispositions favouring particular solutions; (2) professional groups that elaborate organisational theories and offer employers and managers solutions to their organisational problems; (3) state actions supporting employers or particular solutions; and (4) workers' responses (collaboration, resistance, indifference) to the implementation of a particular organisational solution" (Guillén, 1994:21).

By conferring a significant explanative power to specific regional social arrangements, the institutional perspective is likely to explain how those factors influence (i) the interpretation of decision-makers; (ii) business choices, the implementation process, usage and its associated degree of

success or failure. Therefore, it seems to be that the failure of any business recipe may not be related to the recipe itself, but with the degree of alignment between the context in which the organisation is embedded and the technical, ideological and social 'demands' embedded in the specific organisational solution.<sup>2</sup> This means that any discussion about production practices needs to be approached through the consideration of the specific social, political and industrial arrangements in which they were developed (Perrow, 1992).

Whitley's (2000) framework is useful for tackling these research questions, because it approaches both macro- and micro- level actors and institutions in a coherent and balanced way. From the macro- perspective, the 'business system' is composed of economic actors whose governance relationships are organized under different logics in diverse national settings. Key economic players are providers and users of capital, customers and suppliers, competitors, firms in different sectors, and employers and different kinds of employees. According to Whitley (2000, 33), 'business systems' are "distinctive patterns of economic organization that vary in their degree and mode of authoritative coordination of economic activities, and in the organization of, and interconnections between, owners, managers, experts, and other employees".

When one comes to consider production strategies, the principal institutions influence and limit decisions performed at the level of the firm, specifically when addressing the kind of 'profit strategies' to be followed. In

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<sup>2</sup> In the manufacturing/supplier relationship, for example, a variety of rules exists: "taxation, employee insurance, health and safety inspection, employment protection, and a host of other regulations often differentiate between large and small firms. Large firms have more rules, costs, and restrictions; smaller firms are excused from rules or benefits from various subsidies. The effect is to make small firms more viable and to encourage large firms to cut costs by subcontracting to smaller ones." (Gourevith, 1996:247)

simple terms, depending on the degree and type of interdependency between the above mentioned macro- institutional factors and firm-level decisions, resources, people and technology are deployed differently in different firms (Pfeffer and Salancik, 1978). While 'strategic choice' still exists at the level of the firm (Child, 1972), those choices are severely limited by given environmental conditions (Lawrence and Lorch, 1967). Depending on both specific environmental conditions and firms' internal capacities, firms adopt differentiated corporate and production strategies (Miles and Snow, 1984). Production strategy, therefore, can be deployed accordingly (Hill, 1987) in terms of:

- the definition of corporate objectives,
- the determination of market strategies to achieve corporate strategy,
- the determination of performance objectives,
- the definition of production strategy

Performance objectives constitute the link between corporate/market strategy and how the factory should be organized in order to achieve those higher level goals. Depending on the specific performance target chosen, a particular form of organizing production operations emerges and a particular market feature is fulfilled.

In order to be coherent with the framework depicted in Figure 1, both process and infrastructural choices are translated as production strategy, production technology and manufacturing practices. In this context, the following concepts are used in the analysis of Latin American economies:

*Production strategy* refers to the decisions related to product volume and product scope, market target, performance objectives, and the definition of necessary process and infra-structure.

*Production technology*, involves hardware machinery/artifacts and equipment used to transport components and parts and to transform materials, or to assembly parts/components in different configurations. It is included the accompanied software used to make hardware work. It can be from stand alone to highly integrated; or from low complexity to high complexity.

*Production Management Practices* involve production engineering and management knowledge, skill, techniques, concepts and organizational procedures used in order to achieve performance goals in a systematic, efficient and predictable way.

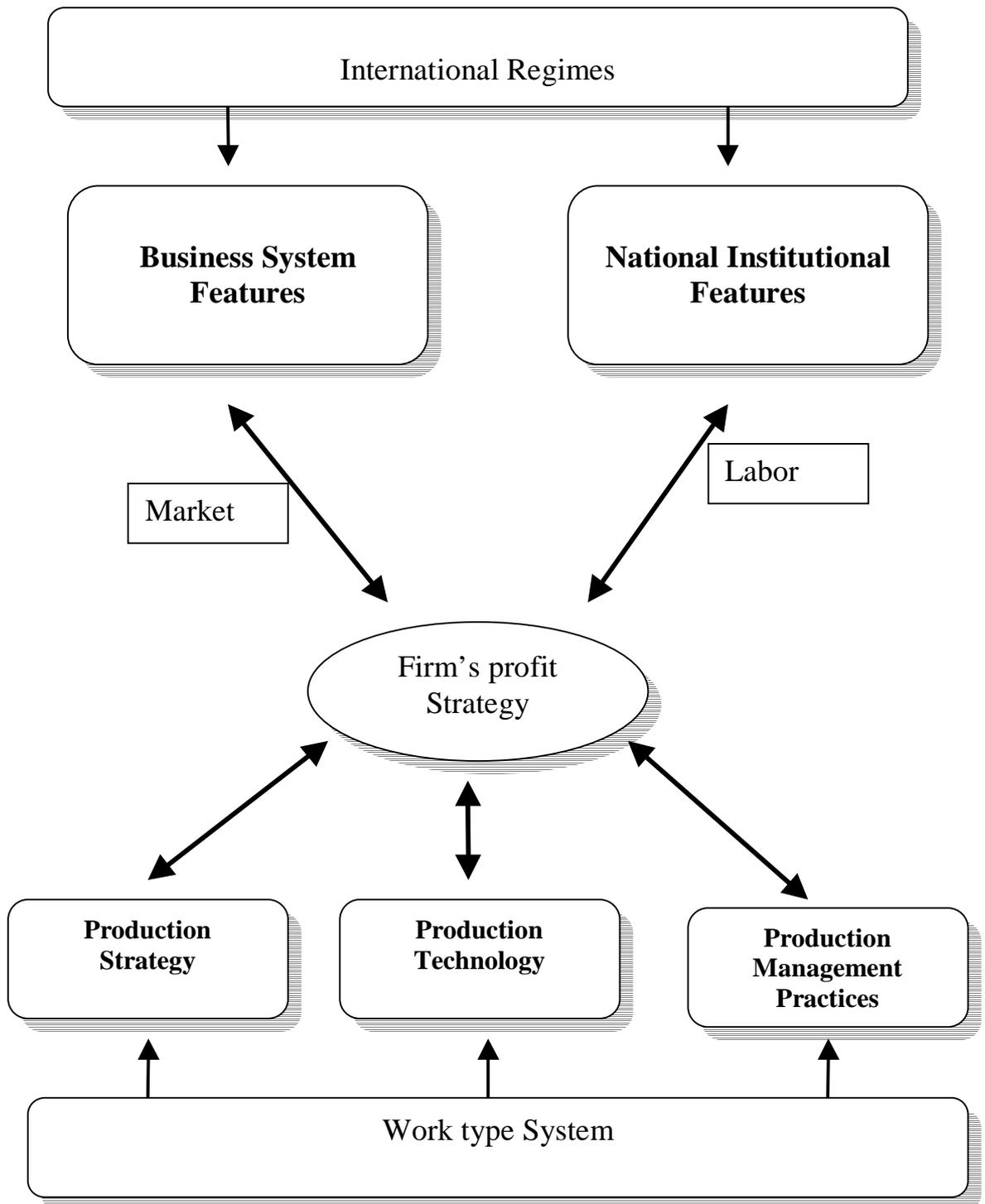
Depending on both the integration and the complexity level of technology, the efficiency degree achieved in the plant can be from 'technologically-determined' to socially-shaped. In other words, total plant efficiency can be more influenced by the degree technology is integrated and automated or by the role production management practices, which are social, have in the achievement of factory efficiency (Fleck and Howells, 2001).

These ideas are all brought together in Figure 1, which highlights the complex relationships between components of the production system and how the macro- and micro- institutions coincide. Figure 1 is especially useful in demonstrating how both business systems and national institutional factors influence production organization decisions, namely, the firm's production strategy, technology and management practices. This is because macro-

forces limit the number of economically feasible alternatives (in terms of products, markets and production 'inputs' available in the country), if a firm wants to be competitive. Therefore, exchange rates, trade agreements, the general level of economic development, availability of raw materials and skilled or unskilled manpower, manpower wage levels, existing infrastructure, as well as the degree of development of key national institutions (such as taxation, welfare systems and judicial processes) all influence two key micro-level decisions, the market and production strategies. That is, decisions regarding target markets are linked to the capacity to attend to a specific market; this, in turn, is a function of possible economies of scale and scope that can be obtained with existing technology and manpower inside the firm, as well as with the existing supplier network outside the firm. On the other hand, micro-level decisions on production organization might, in the long term, affect macro-institutions as particular firm/individual behavior is institutionalized over time. That is, micro-level decisions shape work systems features (and associated types) that influence the firm's performance, the market strategy, the sector performance and the skill development and control system, as well as the trust and authority relations. Thus, the micro-macro interface can be better explained in terms of both production volume (scale) and variety of production (scope) (Sorge and Streeck, 1988). Streeck (1992) argued that, in competitive nations, there seems to exist a fit between the macro-environment and production scale and scope<sup>3</sup>.

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<sup>3</sup> Scale can be from unitary production (for example, large airplane assembly) to high volume/mass production such as steel. Scope means, in production terms, the degree of customization of manufactured products. On the scope dimension, products can be either highly standardized or, at the other extreme, highly customized.



Roughly speaking, countries which manufacture highly standardized products in high volumes (that is, low scope and high scale) do so because they possess a 'congruent' macro- environment for producing competitively those products which have low cost as their key feature. This macro- environment is characterized by low wages, easy availability of raw materials, a large pool of unskilled manpower, low general educational levels, weak trade unions and the non-participation of labor in both production and distribution decisions. From this results what Whitley (2000) called 'fragmented' business systems.

At the other extreme, countries which successfully produce highly customized (or high variety) products in low volume are characterized by high performance/quality and high costs. The macro- environment that fits the competitive production of those products is associated with the availability of a pool of skilled manpower, high wages, very good educational and training institutions and strong trade unions that promote labor participation on both production and distribution decisions. This is what Whitley (2000) describes as an 'integrated' business system.

Thus, production strategy combined with macro- institutional forces shapes 'work systems' characteristics such as the degree of task fragmentation, worker discretion, type and degree of managerial control and degree of segmentation between employers and employees<sup>4</sup>.

While we have made very effort to describe the content of the proposed theoretical framework, it is necessary to qualify the 'processes' that drive the dynamics of micro-macro production practices, specifically by noting that:

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<sup>4</sup> Whitley (2000, 90) defines 'work systems' as "distinctive patterns of interconnected characteristics of (a) tasks organization and control, (b) workplace relations between social groups, and (c) employment practices and policies". Depending on the characteristics of work systems, different types of work system emerge, whether Taylorist, delegated responsibility or flexible specialization.

1. Macro- institutional forces and micro- level production strategies, practices and technologies are highly interdependent. The conventional literature, looking solely from either a macro- or a micro- perspective, has failed to establish the macro-micro connections explaining production practices. Despite important efforts to explain and empirically test this connection (c.f. Sorge, 1997; Maurice et.al., 1986), much work is still required to uncover how macro-micro congruence is developed. This is especially true when attempting to incorporate the analysis of crucial issues that are required to sustain industrial competitiveness, namely, production strategies, technologies and practices.<sup>2</sup> While the theoretical framework proposed in Figure 1 depicts key components of the business system, national institutions and production strategies, it is necessary to register that since different national economies have different micro-macro- institutions, both different business systems features and production strategies will emerge in different economies – even within firms producing the same products in the same sectors.<sup>5</sup>

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 3. Working conditions and living standards seem to be a function of the degree of worker's input in both production and distribution issues (Bowles and Gintis, 1995). And both production and distribution issues seem to be closely related to both the micro- dynamics of production strategies, technologies and practices and to the macro forces that shape firm level decisions.<sup>6</sup>

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<sup>5</sup> National specific 'soft factors', such as the available tacit knowledge, values, presumptions and ways of thinking, limit the cross-border standardization of production practices (c.f. Guzman, 2003).

<sup>6</sup> Crucial differences between German, Japanese and Swedish work systems for example, are related to the extent to which Labor can influence 'distribution' (i.e. matters related to rewards and

4. The dynamics of micro- and macro- components is also interdependent on the nature of interest groups and how they collaborate and compete with each other. Beside historical roots, the latter depend on a culturally-specific view of the world, including customs, values and presumptions of both national interest groups and (national) society as a whole.

### **INDUSTRIAL COMPETITIVENESS: Micro-macro Interfaces**

Latin American Nations (LAN) constitute an interesting case to examine the micro-macro linkages in developing industrial competitiveness. This not only contributes to a better understanding of the pace, path and relative successes and weaknesses of LAN, but also allows us to examine retrospectively processes and outcomes developed in the micro-macro interface in order to introduce a fresh approach to studies of industrial competitiveness. In order to facilitate the present analysis, both historical events and macro- institutional factors were divided into two periods. Phase I refers to the period before the opening of LAN's economies and Phase II involves events after the opening of the economy and application of more liberal policies. The line between phase I and phase II was different in different nations. Because of the NAFTA agreements, Mexico opened its economy first (in the mid-1980s), followed by Argentina, which in 1991 started to implement the 'convertibility' plan that in turn resulted in the achievement of macro-economic stability. Brazil, in the meantime, having slowly started to

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profit distribution) and 'production' (e.g. matters related to work organization and technology usage). In the Japanese case lower worker input in both production and distribution issues do exist (when compared to those of German and Swedish cases), and also lower living standards compared to the German and Swedish. The critical difference between those work systems, therefore, seems to lie between the degree of 'alignment' of micro- and macro- issues, achieved via unified ownership and

open its economy after the mid-1980s and exerting stronger control over its hyper-inflationary tendencies, was by 1994 introducing liberal economic policies. At the same time, one should stress that LAN are by no means homogeneous. Despite sharing historical events, religion, and conquerors, as well as possessing good natural resource endowments and being pressed by similar contemporary global economic forces, they have developed heterogeneous production strategies, technologies and have different socio-economic outcomes (Guzman, 1999).

**In phase I**, all countries experienced inward-looking industrialization process targeting domestic markets. Import-substitution policies were adopted because of the large domestic markets, abundant availability of natural resources and raw materials, wide supplies of agricultural and live stocks resources and relatively elastic supplies of unskilled and skilled personnel. Teitel and Thuomi (1986) have pointed out the main features of this phase. At the beginning, the main goal was to manufacture locally simple consumer and agricultural goods/tools and food. Demand comes mainly from the value created in the agricultural sector, such as beans and coffee in Brazil and beef and grains in Argentina. World trade restrictions that followed the Great Depression and World War II further indirectly benefited Argentina, Brazil and Mexico, all of which by then had developed a capacity to manufacture consumer durables, transport equipment, as well as technology-based industries such as chemicals and pulp.

Since the mid-1960s, the ISI strategy was deepening in metallurgical and chemical products, as well as in complex capital goods products. In this

stage, the role of national governments was crucial to support the emergence of large, capital-intensive industries such as petrochemicals (especially in Mexico), chemicals and metal works (Brazil). Strong government intervention occurred and markets were protected for local firms. This allowed the development of key strategic industries (such as oil, automobile and natural-resource based sectors), but a large proportion of local firms remained uncompetitive.

By the time programs to support manufacturing sectors had been initiated, they were also starting to export. While exports in the 1950s were mainly natural resource-based,<sup>7</sup> by the 1970s metallurgical, chemical, foodstuffs, consumer durables and metalworking products were the most important and natural resource exports decreased significantly in importance. This evolution, according to Teitel and Thuomi (op.,cit.), seems to be little associated with government subsidies and more related to income effects and international trade liberalization, as well as to the existence of a mature industry that was nurtured during the early ISI period. As a result, in 1975 for example, labour productivity rates in the above mentioned sectors in both Mexico and Brazil were comparable to international standards (Maddison and Ark, 1989). Nevertheless, as the most important factors in influencing productivity increases were management performance, worker skill, scale and learning-by-doing effects, the marginal attention paid in the 1980s to worker training and managerial performance started to undermine productivity levels and constituted a significant constraint to maintain productivity levels (Mefford, 1986).

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collaboration (Whitley, 2000).

The military governments that stepped up in LAN in the 1970s and 1980s (apart from Mexico) had an important role in Phase I, since their 'nationalist' policies echoed the ISI strategies. Military governments provided the legal institutional framework to exploit natural resources based on lower wages rates in order to fulfil domestic demand. The 'triple alliance' between State, local business and MNCs emerged in the 1970s (Cardoso and Faletto, 1979). In the automobile industry, for example, the State allowed the concentration of capital by restringing real wage increases through the biased intermediation of labour-capital relationships and the establishment of biased labour regulations (Arbache, 1999), accompanied by minimum expenditures in general education (Brown, 2002) in order to maintain the level of skills at a low level. As a result, there was a the 'structural' flexibility of labour markets in the 1970s and 1980s - for the low skilled - which resulted from the structurally poor working conditions, institutional low wages policies and the relatively easy legal ability to apply hire and fire policies in order to link labour forces to demand conditions.<sup>8</sup>

At the end of the Phase I, however, the structural contradictions of the ISI model were more widely used than the application of liberal-type policies that characterised Phase II (Moss and Mayer-Stamer, 1994). Firstly, the benefits of mass-production were not fully exploited because of high customs duties, local non-tariff barriers and over-valued currencies. Secondly, the low productivity level attained by domestic firms was a consequence of decades of subsidised prices accompanied by a business environment in which competition was relatively unknown. Thirdly, low productivity levels did not

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<sup>7</sup> While in Argentina natural resource based (NRB) exports accounted for 87 % of total exports, in Brazil NRB exports represented 96 % of total exports (Tietel and Thuomi, 1986).

support real wage increases and this constituted an important constraint on the development of a viable domestic economy. Fourthly, the model based on exports of raw materials and import of capital goods fuelled a balance of payments problem, which in turn contributed to high inflation levels and macro- economic destabilization. By the end of the 1980s (called the 'lost decade') two important learned lessons were learned: that the ISI strategy was obsolete, while structural adjustments were necessary.

To sum up, in Phase I LANS did not pay much attention to production strategies because of a set of macro- institutional factors linked to the application of an ISI strategy. The ISI strategy was clearly directed to attend the (large) domestic markets by exploiting natural resources and developing basic industrial sectors to meet domestic demand. The ISI strategy applied during this phase, on the one hand, allowed the development of an industrial capacity – usually State owned – in selected sectors such as petrochemicals in Mexico and steel in Brazil. On the other hand, because of the lack of competition and structural difficulties associated with importing new technology, local firms and MNC branches had low productivity and offered outdated products. The low quality/productivity strategy that firms followed by default resulted in the creation of a low income social class that carried out this type of development, but that at the same time created structural obstacles for economic growth. Low incomes combined with the production of non-competitive products/services prevented domestic growth and paved the way for further economic problems such as inflation, high taxation rates and, balance of payments problems. The combination of industrial policies with

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<sup>8</sup> Camargo (1996) for example has pointed out that in terms of real wages and employment

non-distributive social policies was also reflected in the poor performance of social indicators.<sup>9</sup>

**In phase II**, an outward and liberal type of strategy was followed. All LANs changed their industrial policies and oriented their efforts to both improve domestic competitiveness to resist foreign competitors and to develop an export capacity. In this context, structural economic, political and administrative reforms were initiated. While macro-economic reforms were quickly implemented (in particular, opening of the economy), both administrative and political reforms were just starting. Therefore, significant problems and negative unexpected outcomes emerged, since the opening of the economy occurred without too much societal discussion or technical planning. Exports were used as a solution to obtain foreign currency to pay for both imports and the negative balance of payments, and inflation was controlled. All LANs were devising new alternatives to both cope with global economic forces and obtain economic growth with macro-economic stability, which in turn favored political stability.

Mercosur, the regional trading block, has affected Brazilian and Argentinean firms significantly. For example, due to the increased market size, sophisticated competitors are being attracted.<sup>10</sup> This, in turn, forces domestic firms to upgrade their manufacturing strategies. As a result, small domestic manufacturers, which traditionally focussed on low volume/high

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policies, Brazilian labor market are flexible. That is, turn over rates were high with unemployment rates that quickly are adjusted to changing demand conditions.

<sup>9</sup> Accordingly the Human Development Index (UNDP), Brazil for example, has a leading position in income inequality at world level. Illiteracy rates also fare high in absolute terms: Brazil's illiteracy rate (measured in percent of adult population) was 14.80 versus 8.6 in Mexico and 3.2 in Argentina (figures for the year 2000). Source: Oxford Latin American Economic History Database.

<sup>10</sup> The main advantages of Mercosur come from the potential for growth, economies of scale and scope, and specialization. Inter-Mercosur trade has soared from \$ 4 billion in 1990 to \$ 14 billion in 1995. Combined GDP have grown an average of 3,5% annually since 1990 (Lindberg et.al, op. cit., p. 303)

variety markets, are changing to high volume/low variety markets. Larger markets combined with economic stability also attracted more FDI. Between 1995 and 2000, for example, Mexico, Brazil and Argentina attracted \$US 262 billions in FDI<sup>11</sup> (Lindbeg et.al., op.cit.).

As a result, labour productivity<sup>12</sup> increased between 1970 and 1996 in both Argentina and Mexico, while in Brazil it improved significantly only after the early-1990s opening of the economy. It is important to note that all of the productivity achieved by Mexico and more than 50% of the increased productivity in Argentina occurred in the 1980s, that is, before the implementation of liberal-type policies of the 1990s. This means that the piece-meal process and product improvements developed in the 1970s and 1980s were important to explain performance in the 1990s (Katz, 2001). In social terms, economic reforms supported price stability and the acceleration of capital inflows, but 'little was achieved to reduce income inequality and poverty' (Amann and Baer, 2002).

While the commodity sector still prevails in LAN, the industrial sector manufacturing more complex and higher value-added products continues to evolve<sup>13</sup>. In some sectors, for example, productivity levels and quality standards in Brazil and Mexico were similar to US standards (Hay, 2001; Weiss, 1999; Solis et.al., 2000; Adam et.al., 2001). This process, however, is heterogeneous, with only a small proportion of firms acquiring capabilities to

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<sup>11</sup> Source: Oxford Latin American Economic History Database, OXLAD

<sup>12</sup> Refers to achieved labor productivity levels compared to United States levels (Maddison and Ark, 1989).

<sup>13</sup> The industries manufacturing/assembling computers, telecommunication equipment, industrial automation, machine tools and power related equipment are included in this group (Ferraz et.al., op.cit.)

compete and a large proportion of firms not yet ready to compete<sup>14</sup> (Covarrubias, 1992; Ferraz et.al., 1997). The key factor that allowed significant labour productivity increases since mid-1990s, however, seems to be more the result of the elimination of jobs in the industry than the product of output increases (Katz, op.cit.).

This means that increments in labour productivity were achieved at the cost of lower employment levels. This in turn resulted from the application of (1) production engineering techniques accompanied by the introduction of 'modern' management practices that eliminated 'non-value added activities' in the production processes, (2) outsourcing practices, in which part of the production process is transferred to a sub-contractor, in which both costs and working conditions are usually low, and, (3) downsizing. The absence of updated labour laws, together with the 'globalization' forces and 'modernisation' rhetoric, allied to the weakness of workers' associations, legitimated and enabled the rapid implementation of mass-dismissal policies. In other words, as industrial 'restructuring' was developed in a recessive economic environment, in which unemployment soared, the bargaining power of trade unions diminished to a significant extent. Additionally, the State was not prepared to properly regulate capital-labour relationships in the new environment. Under those conditions, trade unions had little power to bargain, leaving the option only to accept 'new' working and employment conditions dictated by firms.

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<sup>14</sup> A similar path occurred in Mexico. In one extreme, restructuring was greater in MNC branches, large SOE and leading Maquila industries. On the other extreme, many SME remained using conventional means, processes and products, widening the competitive gap between the first and the second group of firms (Covarrubias and Lara, 1995).

Thus, not only were rapid manufacturing improvements (that is, lower manufacturing costs) achieved, but also a new labour consent was simultaneously created, and this in turn seems to be the key to understanding the speedy implementation of 'modern' production engineering techniques such as JIT, TQM and SPC. The latter were also possible because of the implementation of a new legal framework to (de)regulate labour-capital relationships. In Brazil, for example, temporary contracts allowed firms to make easy dismissals, reduce overtime payments and permit 'decentralised' (that is, by enterprise) contract arrangements, contributing to minimizing the role of workers' associations in the negotiation process (Alves, 2001). This was truer in Brazil and Argentina (circa 1990s) than in Mexico (circa 1980s), in which existing labour laws prevented mass dismissals. From the micro-perspective, this means that industrial firms needed to obtain significant improvements in flexibility, quality, cost and responsiveness. This implied the introduction of significant changes in production strategies, technologies and management practices, themes that are developed in the next sections.

It is not difficult to draw from the above the significant challenges faced by those nations. After decades of being closed economies with minimum competition and captive markets, indigenous firms had to re-think their strategies, processes and practices in order to cope with the new environment. Products and services had to be competitive to simultaneously export and maintain (or gain) market share against either imports or new entrants (usually multinational companies). In order to support systemic competitiveness (Meyer-Stammer, 1997), key institutions also needed to modernize structures, goals, strategies and processes. In this context, the

degree of maturity of institutions regulating labor markets, trade union effectiveness, labor laws and training institutions, the effectiveness and equity of tax systems, the consolidation of an equitable welfare system, as well as the redefinition of the roles of key social actors in this process, seems to be crucial. This process is just starting in Brazil and Argentina, while in Mexico it began in the early 1990s. Reforms, nevertheless, do have limitations and costs. In Argentina and Brazil, for example, domestic politics either delayed/prevented reform or directly/indirectly increased costs (Sawers and Massacane, 2001; Panizza, 2000).

This analysis does not mean that all institutions need to change. Indeed, there are established institutions that help rather than constrain industrial competitiveness. In the case of Brazil, for example, besides restrictive macro contextual structural factors,<sup>15</sup> there are 'culturally-rooted' features that might support industrial restructuring, such as hierarchical and authoritarian relations; the ambiguous behaviour of individuals; a fascination with foreign artefacts, persons, cultures and concepts; and conservative management thinking (Barros and Prates, 1996; Wood and Caldas, 1998). The low level of business regulation favours minimal competition and combines with short-term logic and imperfect market communication. The institutionalisation of short-term visions and ambiguous behaviour makes easier the acceptance of foreign inter-firm arrangements. The fascination with the foreign favours the development of an alternative informal behaviour ('jeitinho') in order to minimise other uncertainties (Amado and Brasil, 1991).

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<sup>15</sup> General macro- institutional conditions that support and/or constrain industrial competitiveness in Brazil have already been pointed out by the literature. See Chudnosky, 1986; Erber, 1986; Evans and Tigre, 1989; Hobday, 1990; Katz, 1987; Dalhman and Frishtak, 1993; Sobrinho, 1985; Castro and Andrade, 1990; Coutinho and Ferraz, 1994 .

The lack of, or minimal, legal regulation of business may also attract foreign firms and their capital, as they can set up and close down facilities easily.

### **Production Strategies**

**Phase I.** Before opening their economies, LANS followed a Tayloristic orientation in managing industrial operations. In other words, there was a high fragmentation of tasks, centralisation of management and hierarchical labour management strategies. Management was paternalistic and used disciplinary supervisory controls. This production management strategy was consistent with both the type of product manufactured (standardized products in high volume) and the prevalent institutions associated with cheap, non-unionised labour, with strong central control and relatively low living standards.<sup>16</sup>

In the case of Argentina, up to the 1970s there was a lack of competition and a concentration of production in few large industries supplying to the domestic market. Companies were highly integrated, because of both a lack of trust with suppliers and demand stability. Because of the lack of a competitive structure, firms did not have a clear production focus (or strategy), supplying a high variety of product to a wide range of customers. Therefore, typical Argentinean firms had a centralized mass-production organizational configuration (Paladino et.al., 1998). This productive configuration – caused by macro factors - constituted an important ‘structural’ constraint on manufacturing performance. General-purpose equipment was used to manufacture a wide variety of products in order to maximise

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<sup>16</sup> In the case of Brazil (circa 1970s and 1980s) for example, because of the highly protected and regulated economy, local firms focused on the mass production of simple products, using simple technologies. Labour organisation was deployed around highly fragmented tasks and production organisation used conventional functional layouts. Low skilled and low waged manpower was the base of this strategy (Fleury 1995).

equipment utilization. In the 1985-91 period, high inflation rates introduced higher demand uncertainty, making forecasting techniques useless. In order to cope with this, high capacity and high inventory levels were the norm, a policy consistent with the strategy of competing on cost and quality, rather than on flexibility or service (Paladini et.al., op.cit.).

In the Mexican case up to 1981, the main competitive priority was installed capacity, since market share depended on capacity (Miller et.al., 1992). Due to the high demand instability, sales were made to order, but this also brought many changes in production plans and negatively affected productivity levels. Forecasts were directed towards the short and medium term, and subjective factors played an important role in the forecasting of demand, stocks and production volume (Flores et.al., 1993).

**In phase II**, manufacturing strategies evolved simultaneously within the macro-economic context. After the opening of the economy and implementation of economic stabilisation programs, LANs started to introduce industrial modernization programs, following either a 'hard' path (that is, via flexible automation) or a 'soft' path (that is, through the implementation of organizational concepts). Therefore, it was common to observe efforts to diffuse quality-related programs and new management and human resources (HR) practices in order to stabilise manpower, accompanied or not by the use of flexible automation. This process, however, was not universally adopted. With some variations, manufacturing strategies in most LANs evolved in such a way as to achieve lower manufacturing costs and higher quality of low/medium value-added products. Domestic companies tried strategic alliances to access world markets (for example, in the steel, petroleum and

chemical industries), or attempted to link into a global productive supply chain, such as in the case of component manufacturing and light equipment engineering (Fleury, 1995, 1999). Subsidiaries of MNC were reintegrated into the global strategies of their parent firms and became responsible for optimising the production mix, achieving economies of scale and the management of the supply chain at local and regional levels. In the automobile sector, for example, large scale production was concentrated in Brazil, while production of low scale, diversified models was relocated to Argentina. Simultaneously, both global sourcing and follow-sourcing became predominant, even though this implied the modification of commercial and social relations with suppliers and partners (Fleury, 1999).

In order to acquire low-waged and low-skilled manpower, hire and fire policies were applied. This, combined with labour laws, weak trade unions and the existence of inexpensive raw materials, made it possible to follow the strategy of increasing the quality of products while maintaining wages at low levels.<sup>17</sup> (Guzman, 2000) The level of manpower skills, however, would appear to have been an obstacle to manufacturing improvement (Fleury et.al., 1998).

In order to address quality and cost demands, Argentinean supply chains were restructured and a trend to de-verticalisation started. Simultaneously, programs aimed at further enhancing skilled manpower were introduced and investments occurred in manufacturing machinery and equipment. However, investment in the acquisition of new manufacturing

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<sup>17</sup> The introduction of the 'Modular' production concept in the new GM factory in Sao Jose dos Pinhais (RS) or the 'Modular Consortium' in DaimlerChrysler's Juiz de Fora factory, (MG), had little Trade Union resistance. This contrast with the ban imposed to those concepts by the UAW in the USA. (McClellan, (2000).

machinery and equipment was the main focus in the Argentinean industry to the detriment of investments in organizational techniques. In other words, Argentinean firms opted for a 'hard' trajectory of modernisation. That was consistent with the low level of investment that occurred in HR practices such as incentives, pay-per-skill, low worker participation and training (Paladini et.al., op.cit.).

Brazilian firms opted for the adoption of a 'soft' approach, because in the early 1990s the economic context was still not conducive to investment in plant and equipment.<sup>18</sup> Within the 'soft' path, nevertheless, the implementation of organisational issues prevailed over social issues. That is, firms made significant efforts to introduce cellular manufacturing layouts, statistical process control, pull scheduling and simultaneous engineering, while little effort was made to simultaneously introduce worker participation, multiskilling, flexible scheduling and productivity incentive payments. They were adopted as the means to improve layouts, optimise stocks and reduce lead-times. The application of quality related techniques, however, occurred in differing levels of intensity and obtained varying results. In the automobile sector, for example, new manufacturing, management and HR practices were extended to the supplier chain. On the other hand, non-exporting firms had few reasons to improve their manufacturing competitiveness, since in specific sectors they still had a large domestic market with little competition. The main barrier identified was the lack of a well-trained and educated workforce (Lindberg, 1998, Fleury, 1995, Fleury and Arkader, 1998).

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<sup>18</sup> By the early 1990's, still under high inflation rates and demand instability, the relaxation of imports restriction continued. Because of high interest rates and high demand instability, industrialists avoid large investments to improve competitiveness. Therefore, the general strategy adopted was to follow a 'soft' trajectory for competitiveness improvement. (Lindberg, 1998).

The differentiated technological path ('hard' in Argentina versus 'soft' in Brazil) followed by Argentina and Brazil is explained by two events.<sup>19</sup> In the first place, by that time the Argentinean stabilisation/convertibility plan was already implemented. Secondly, key national institutional features were more favourable to investments in both infrastructure and capital cost than in Brazil. Issues related to price control, the state control of enterprises, anti-trust laws and intellectual property protection were better than in Brazil. In consequence, FDI in Argentina was \$4.18 billion, as opposed to \$1.45 billion in Brazil. Furthermore, because less domestic and external funds (FDI) were available in Brazil, industrialists opted for the 'soft' road of modernisation which required lower investment and did not involve long term financial commitments in foreign currency (Fleury et.al., 1998).

In the Mexican case, after the implementation of the NAFTA agreement indigenous firms had to focus their product range and develop capabilities to improve delivery times. The main strategies were related to closing and re-allocating plants, followed by the redefinition of production strategies: from low volume and wide scope (high variety), industrial firms started to focus their manufacturing activities on low variety and high volume production (Miller et.al., 1992). Nevertheless, because of demand instability, the emphasis was placed on short-term management, so there was little long-term and inventory planning. Changes in forecasting and in production plans were the norm in small and medium firms, triggering inefficient practices such as late delivery

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<sup>19</sup> A comparison of the number of machines per thousand employees in total sample companies in Argentinean and Brazilian companies sustain this argument: 130 vs. 107 for conventional machines; 17.6 vs. 12.9 for NC machines; 5.0 vs. 0.8 for machining centers; and 4.4 vs. 0.3 for robots (Fleury and Arkader, op.cit.)

caused by either a lack of raw materials or machine and operator capacity (Flores et.al. 1993).

These modernising efforts, however, seemed to be insufficient compared with the efforts of other nations. As a consequence, up to 1993 the general performance of Brazilian firms was far behind the average standard for companies of sample IMSS firms.<sup>20</sup>

### **Production Technology Strategy**

**In phase I**, as a consequence of the ISI strategy technological capacity was low. Firms relied mainly on conventional machinery in order to manufacture licensed products which were designed overseas (Fransman, 1986). Stand-alone and conventional machinery arranged in conventional line and functional layouts to produce high volumes of a narrow range of standardised products in batches were the typical processes in both Mexico and Brazil. In smaller economies like Argentina, the same layouts were used to produce a high variety of standardised products in batches.

The common goal was to acquire capacity that would adapt new manufacturing processes and equipment to local conditions. However, this was not an easy task since new equipment demanded not only new technical knowledge but also new organizational skills. This learning process was

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<sup>20</sup> A sample of 28 companies were surveyed in Brazil as part of the International Manufacturing project. According Fleury and Arkader (op.cit.), 'Brazilian firms spent an average of 60 hours on training their new production workers compared with 113 hours in sample IMSS firms, even though they stood somewhat above the average for the latter relative to training given to the regular workforce – 43 hours compared with 35 hours. In terms of incentive payments of all kinds, Brazilian firms were quite behind, with very few companies (some 10%) adopting such a practice. This contrast with total sample averages, in which 24% of the companies paid based on individual incentives and 22% practiced group incentives. In addition, Brazilian firms scored poorly in terms of job classifications in manufacturing: they had 49 job classifications, compared with only 10.2 for the whole sample. All this must have negatively influenced the performance of Brazilian companies in terms of the number of suggestions per employee- only 1.6 per year, compared with 7.4 for the sample as a whole' (p. 68).

constrained by the fact that new equipment was designed to operate in overseas environments, that is, manufacturing a large variety of models in small batches. This type of demand was fundamentally different to that of the LANs, as we shall see below. This pattern of technology strategy was common for the large majority of small and medium sized firms.

In the case of large state-owned enterprises (SOE), MNC and large private national firms, the strategy was different. They invested in technology development and technology acquisition, even if this occurred in only a few industrial sectors in which they performed. State-owned enterprises (in natural resource based industries) multinationals (in the automobile industry) and large private firms (in both capital goods and natural resource based industries) were the principal investors in the acquisition and development of both product and process manufacturing technologies. Therefore, products manufactured by those firms had a much higher technological content and hence higher value added. This technological behavior seems to be consistent with the production strategy of producing in high volumes a low variety (or standardized) of low cost-low quality products. Institutions seemed also to be congruent with this type of technological behavior. For example, training institutions existed, but were limited to support SOE which mainly produced commodities. Labor laws and regulation was therefore more suited to arbitrate conflict in large firms (both MNC and state-owned) than to the large majority of small and medium firms.

**In phase II** investment levels with new technologies were higher than at any time before. On the other hand, as capital is less expensive overseas than locally, foreign firms were in a better position to quickly obtain the benefits of Factory Automation (FA) in both Mexico and Brazil. FA was used

as a means to increase productive efficiency, since accuracy, homogeneity and speed of machining is high, while set-up times are shorter. In the case of Argentina, not only had the level of use of FA remained low, but also the level of computer integration had been low. Conventional machinery was common in production and the use of NCMT, robots and FMS was low (Paladini et.al. 1998). The adoption of FA<sup>21</sup> in these nations enabled improvements in operational efficiency<sup>22</sup> and resulted in increased economies of scale at plant level and increased economies of scope and scale at product level. In order to realize the full benefits of FA, techniques like JIT, TQM and Quality Control were implemented. This combination of FA and organizational techniques also had a major impact on plant efficiency.<sup>23</sup> Furthermore, FA facilitated the increase in product variety (economies of scope) as shorter life cycles demanded higher product differentiation. Economies of scope, however, implied an increase in organizational complexity and vertical integration. Organizational complexity was the result of higher numbers of models (with different specifications, machining processes, material flow, and set-up specifications) which in turn pushed forward the development of engineering capacities and further training around both the operation of new equipment and plant organization. Vertical integration also occurred because new machinery demanded more accurate parts and raw materials. Because of the

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<sup>21</sup> Factory automations refers to the replacement of conventional machine tools and transfer lines by new computer-numerically-controlled machine tools, CAD/CAM, electronic testing equipment and computerized production control (Alcorta, (op.cit.).

<sup>22</sup> Sample firms declared improvements in processing (machining operations, inspection and testing and in overall process control). Machining speed increased from 15 % to nine times; metal off-cuts waste were reduced by 40 % (Alcorta, 1988).

<sup>23</sup> Labor productivity increased between 16 and 137 % in Brazil and between 16 and 650 % in Mexico. FA enabled a significant raise in output (or capacity) occurred in surveyed firms (around 50 % increase) and unit cost –as expected – lowered despite increasing training and quality measurement costs (alcorta, op.cit.).

scarcity of skilled suppliers, the alternative for FA-adopting firms was to produce their own parts and components (Alcorta, 1988).

As FA continues to diffuse and production processes become more homogeneous across firms, it is possible to suggest that institutional factors are starting to play a key role in raising competitiveness. Simultaneously, the embedded labor-saving feature of FA does not help to reduce the higher unemployment rates that exist in Brazil and Mexico (early phase II) and in Argentina throughout Phase II.

### **Production Management Practices**

In spite of the heterogeneous production resources, infrastructures and technology strategy applied in different LANs, a certain convergence regarding manufacturing practices occurred in the majority of LANs in Phase II, though at different times. An explanation for this is the combination of homogeneous external pressures for products with better quality and lower costs and heterogeneous internal forces such as high inflation levels (at the beginning of phase II), lack of skilled technicians, lack of management experience and appropriate institutional systems. These shortcomings were the result of the 'financial' culture introduced during long periods of high inflation, a fact that pressed enterprises to focus their efforts on financial issues since a significant proportion of the firm's results were more a result of financial management than operational results. Therefore, during long periods both management and production engineering techniques were simply absent from factories. As a result, in the early stages of phase II a 'production' culture failed to develop. There was a generalised lack of experience, as well as

formal and informal knowledge, to apply management and production techniques. Thus, common production practices during the early stages of Phase II were (Miller et.al., 1992; Whybark and Rho, 1993; Voss, 1998 ; Lawrence and Lewis, 1996):

- An emphasis on short-term production planning;
- Little use of formal techniques to forecast sales (e.g. use of statistical techniques). Subjective factors play an important role as they involve the state of the economy, domestic political events and industrial trends. This practice is congruent with the uncertain environmental conditions in which Latin American economies operate.
- Make-to-order and make-to-stock are the usual forms of ordering techniques. This is due to the high demand instability and lack of flexibility to change products and volumes according to the customers need. Lack of flexibility to change products/models is the reason for the few engineering changes that are accepted after the production order reach the shop floor.
- Production planning, control and scheduling are highly centralised. Nevertheless the use of the planning is different depending on the sector involved. In Mexico for example, while textile firms use production plans mostly for material and inventory planning, in the machine tool industry, production plans are used to detail the operations scheduling.
- Because of instability demand, low reliability of suppliers and lack of production flexibility, delivery dates are unstable and can be negotiated. This for example, occurs frequently in the machine tool industry in Mexico and Chile.

- Very little use of computer-based communication. In Mexican machine tool industry, for example, purchasing orders were developed using conventional means (i.e. forms and telephone and fax).
- Supply chains are underdeveloped and not very efficient (except Chile). The high propensity to vertically integrate operations and the inefficiency of small and medium firms, the poor transport structure and the high instability of economic conditions (up to the early 1990s) are some factors that help to explain this outcome.
- The adaptation of external JIT was limited due to poor transportation infrastructure, economic instability and in Brazil, large distances together with peculiarities of inter-State tax laws that induce firms to look for price differentials rather than for delivery times (JIT purchases).
- The introduction of quality related programs was very heterogeneous, since small and medium firms have lesser knowledge and material resources to implement those practices.
- While attempting to introduce preventive maintenance programs, the usual practice is corrective rather than preventive
- Co-ordination between design and manufacturing practices is through conventional rules and standards.
- Late orders are in small proportion (around 10- 20 %) and causes are similar in all LANS: production bottlenecks, limited machinery capacity and shortages of materials. This pinpoints the lack of organisational and managerial capacities.
- Up to the early 1990s, the conventional patterns of work organisation were functional. This is compatible with batch manufacturing and line layouts.

Worker performance systems were mainly individual and little investment in training, participation and education occurred. Besides, little use of incentive payments schemes and too many job classifications exist. As a result, participating programs did not yield expected results. After the opening of the economy, there was a substantial change in organisational terms. Higher investment in training, use of incentive payment methods and application of participating practices are common targeted in large firms that have both domestic and foreign competitors. This however, is not the case of small and medium firms.

- Because small LANS have small domestic markets (i.e. low production scale), their markets are fragmented and industry needs to manufacture a wide range of product in small batches. To minimise costs, Chilean and Argentinean firms for example adopted a policy to maximise machinery utilisation what in turn de-emphasised the achievement of production flexibility.

At the same time, while these production practices were common trends in Brazil, Mexico and Argentina, different macro- environments stimulated the development of differentiated practices.

In the case of Argentina, contrary to the world trend of minimizing the number of suppliers, firms have a high and increasing number of suppliers. Because of historically high levels of vertical integration, Argentinean firms did not have available a network of suppliers, as low trust relations between firms and suppliers constrained partnership development. However, another key reason restricted the development of the supplier network. Argentinean labour

laws designed to preserve labour stability pressed firms to maintain high vertical integration. In the case of production control and planning (PCP), systems were highly centralised and Taylorist, reflecting the low level of empowerment of HR. Accordingly, maintenance policies were predominantly corrective and not preventive. These particularities of production practices in Argentinean firms, according to Paladino et.al. (op.cit.), are consistent with low levels of training, incentives and trust.

In spite of these liabilities, Brazilian firms have been able to implement new production and management techniques that were above the average firm in the total sample of the IMSS survey. This was evident in pull scheduling, value analysis, quality function deployment, ISO9000 and statistical process control (Fleury and Arkader, op.cit.). Nevertheless, this was possible only because of the existence of a wave of mass-dismissals (including not only the low skilled but also the highly skilled management cadres), weakened workers' associations and new labour laws that legitimised low waged and temporary jobs. Therefore, consent was facilitated by the above mentioned macro-institutional conditions. Employees had no other choice but to 'collaborate'.

In the case of Mexican Maquilladoras,<sup>24</sup> highly heterogeneous production practices were applied since this type of firm includes a wide range of products and process technologies, including different manufacturing roles

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<sup>24</sup> Close proximity with the large US consumer market; the existence of low labour costs, and – from the Mexican perspective – a source of foreign exchange, a mechanism for technology transfer and a source of employment, are the main reasons that supported the development of Maquilladoras. In Phase I the conventional view of Maquilladora was the direct exploration of low waged/low skilled manpower to assembly simple products under poor working conditions.

from fabrication and sub assembly to final assembly.<sup>25</sup> This means that not only labour intensive simple products were manufactured but also more complex ones using new technology. New production concepts such as JIT, TQM and SPC were introduced in firms producing more complex products. Added to low labour costs, quality has become an important performance goal. While new manufacturing performance targets are being demanded from the workforce, 'structural' low wage rates (\$2.85 per hour average) with a significant proportion (60%) of female workers features prominently. As a result, worker turnover continues to be high (from 10 to 15 % monthly) and operational performance has improved, with productivity ranging from 85 to 110% of US levels (Fawcett, Taylor and Smith, 1995). It is necessary to note, however, that the way productive practices evolved and the level of production performance achieved seems to be closely linked with the degree of labor flexibility achieved,<sup>26</sup> which in turn is a function of labour regulations.

Nevertheless, there are different types of Maquilladora industries. On the one hand, because of existing conflictual relations with local trade unions, labor flexibility was from low to medium in some firms. In other cases, labor flexibility was low in firms using 'traditional' (Taylorist) productive processes. On the other hand, firms that for the first time signed collective labor

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<sup>25</sup> 'Traditional' firms seems to be the ones in which 'traditional' production practices and outdated technologies – fabrication of simple products at low cost using functional layout and low skilled workers – still are predominant. But the rise of a second generation of more technologically complex, capital-intensive industrial facilities, specially in the Electronics and Automobile sectors, demanded the implementation of modern production and management techniques (Covarrubias, op.cit.).

<sup>26</sup> Labor flexibility was oriented towards obtaining flexibility on the labor process (in terms of internal allocation of workers, elastic working hours, and significant freedom to perform technical and organizational changes), on the employment relationship (freedom to subcontract, hire or fire and adjust the size of manpower when needed) and, on wage rates (i.e. changing payment system from fortnight/monthly payments to hourly payments and introducing individual productivity components) (Covarrubias, 1992).

agreements, or export-oriented firms (such as in electronics and automobiles) labor flexibility was high. Higher flexibility, however, was achieved in many cases because of either the non-existence of worker associations or labor contracts were designed without the participation of employees. Yet in other cases high labor flexibility was a designed feature, as 'sociotechnical' types of work processes existed in order to operate either high technology manufacturing processes (such as in the continuous production industries) or more complex production processes (such as in the export-led batch production industries) (Covarrubias, 1992). Labor flexibility, nevertheless, was in all these cases vertically imposed by the firm without considering labor input or views. This was congruent with the State's self-proclaimed role in regulating industrial relations. Labor flexibility in Mexico's Phase II was characterized by: the State assuming a tutelary role, controlling both conflict and negotiation; limited protection of wages (the trend to cover costs of labor reproduction only); limited protection of employment; and limited labor input in production issues (de la Garza, 1989). As a result, both explicit and latent capital-labor conflict are common (reflected in high turnover rates) not only at the Maquilla but also in large domestic firms and in MNC branches.

As a result of the combination of firm-level production strategies deployed, production technologies used, management practices at the micro-level, and somewhat conflicting/weak institutional forces at the macro-level, the average performance of LANs firms was poor compared with world standards. Severe deficiencies were found in the supplier chain and in product development aspects. In particular, the low level of investment in process technologies has hindered the upgrading of LAN manufacturers.

With the exception of key strategic sectors developed by state-owned enterprises, firms in LANs had up to the 1980s low technological capacity. Because the acquisition of technological capability was approached as a necessary precondition to boost industrial competitiveness, LAN's industry was categorised as structurally fragile (Fransman, 1986, Coutinho and Ferraz, 1995; Katz, 2001). It was limited to assimilation of conventional production practices, learning of some process engineering and adaptation of existing products to the local conditions of machinery, know-how and personnel. Furthermore, installed manufacturing capacity seems to be competitive in commodity related industries (which have instable prices).

## CONCLUSIONS

This study has attempted to shed additional light on the understanding of the dynamics of industrial performance by integrating 'Business Systems' and 'Production Strategy' theories in order to develop a new integrated macro – micro research approach<sup>27</sup>.

Above all, it is clear from the micro-macro examination of Mexican, Brazilian and Argentinean industry that production strategies, production

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<sup>27</sup> It should be noted that the present study was not about describing outcomes of the industrialisation process in LAN since the literature has already done this. LAN structural weaknesses reside in producing and exporting non-traditional exports (manufactured goods) out of the natural resource based products. The 1990s pattern of productive specialization (in natural resource based commodities) which represents a structural weaknesses in relation to the creation of jobs. This is the case with Argentina and Brazil, in which the main industrial sectors are concentrated in natural resources processing sectors which have both capital and labor-saving intensity. In contrast, Mexico's Maquilladora industries are job creating industries. Despite non-traditional exports have increased (e.g. 9,8 % of increase in late 1990), exports of commodities have had a slow growth demand at world level. And uncertain commodity prices worldwide further undermines any long term industrial policy strategy (Katz, 2001; Coutinho and Ferraz, op.cit).

technologies and manufacturing practices need to be incorporated into the wider institutional framework as its components do not seem to follow – in unproblematic ways – macro-institutional rules, norms and events. And this may contribute to providing a better understanding of industrial competitiveness, not just of the LANs, but also across the industrialised world. As such the proposed research strategy opens new opportunities for developing comparative international studies considering the micro – macro dimension.

The above description of industrial performance and behaviour in the three largest Latin American economies shows that micro- (firm level) events are linked to macro- factors, but this relationship does seem to be neither direct nor clear. Conversely, macro- factors seem to affect in a very wide range of forms and degrees micro- level decisions. Simultaneously, micro-level decisions/actions seem to be more subtle and evolutionary than macro-level issues. Furthermore, what seems to be clear is that industrial competitiveness performance is related not only to the existence of strong institutions, but also to the congruence between macro institutional factors, (micro level) production strategies and, predominant type of ‘business system’. Those findings are illustrated in the next five points.

Firstly, the common ISI macro strategy followed during Phase I in the three countries, yielded similar macro economic outcomes because there seemed to exist micro-macro congruence between the ISI macro strategy applied, and production strategies, practices and technologies at each LAN. That is, the macro industrialisation strategy to produce simple products to satisfy the large domestic markets, was – in general terms, congruent with the

use of simple production technologies, equipment and layouts accompanied by manufacturing practices that required simple tasks performed by low skilled and low waged workforce. Firm level Taylorist-like strategies make sense to produce (simple) standardised products in large volumes (though volumes were lower in Argentina than in Mexico and Brazil). Simultaneously, macro institutions seemed to be compatible with the above mentioned firm level practices. Military governments in Argentina and Brazil and long term Mexican PRI party in government favoured the building of the socio-institutional bases for enabling the development of firm level taylorist strategies. This meant, labour laws and regulations as well as low investment in education and professional training favoured the emergence of production systems in which labour had little voice regarding production organisation issues (e.g. layout, organizational techniques, work organisation and type of technology used), at the factory level. At the macro level, centralised and State-mediated industrial conflict resolution accompanied by low educated workforce allowed the uneven distribution of resources that enabled, on the one side capitalise firms in order to realise productive investments and, on the other side the creation of a low-income social class. In the end of Phase I, this social class constituted an important barrier for further economic development as production output was mainly directed to the domestic markets which had low purchasing power.

Secondly, the above developments in Phase I were possible also because macro institutions and production strategies were congruent with prevailing country 'business system'. LAN's business systems seem to be far from 'integrated' (using Whitley's definitions). The competitive performance of

LAN seems to be connected to structural factors, which in turn, are more related to domestic decisions rather than to international (global) influences. Fragmented business systems seem to have evolved in LANs as a consequence of the existence of powerful horizontal interest groups (such as the rural supporters in the Brazilian Congress or the PRI members in key State institutions in Mexico), direct ownership coordination is the norm in private firms, while market coordination is common in SOE's. Additionally, in all three countries the State seems to be weak in terms of lack of capability (and/or political will) to address key institutional issues (such as performing tax or judicial system reform, setting up regulatory bodies for supervising relations among key social actors, and neglecting its role in developing training and education for the general population). The Argentinean difficulty with performing structural reforms programs in the 1990s showed this. The outcome is either a fragmented or a compartmentalised business system. In fragmented systems in which individual firms do not cooperate with one another, a state is approached where workers are suspicious of firms, since labour laws are either inefficient or inexistent and, mainly, were set up to boost productivity, ignoring social issues such as unemployment and the availability of welfare and health systems. The case of Mexican Maquilladoras illustrates this type of business system. Compartmentalised business systems are more frequently found in SOE (such as petrochemicals in Mexico and Brazil) or large domestic private firms, such as in the case of Argentina's agro-industries.

Third, micro- level forces also seem to have a role in explaining the emergence of both fragmented and compartmentalised business systems in

LANs. On the one hand, the application of the conventional Taylorist production and management practices in Phase I at all three LANs reinforced the State policy to neglect education and vocational training institutions, as they were perceived as 'unnecessary' and helped to perpetuate this situation. On the other hand, the firm level choice to introduce new production and management concepts in either a 'mechanical' (or spurious) way or in an 'integrated' (i.e. socio-technical) way,<sup>28</sup> influenced the way labour flexibility was obtained. In some cases (for example, Brazilian 'brownfield' auto parts firms in the late 1990s), it was negotiated with workers' representatives. In other cases, such as in some Maquila industries in Mexico, it was individually imposed by the firms with the implicit support of the State. When this practice occurred at the level of SOE, large private firms or MNC branches, it was perceived as the 'model' role, generating a 'wave' of restructuring. As a result, labour flexibility in Maquila industries were, in the majority of cases, vertically imposed.

Fourth, in Phase II, industrial strategies were characterised by targeting external markets. Therefore, firm level strategies changed in order to meet new competition caused by an open and deregulated economy. Therefore, firms adopted new strategies, resulting in a significant heterogeneity of production practices, strategies and technologies, both among and within nations. Amidst this heterogeneity of firm level strategies, two approaches were differentiated. On the one hand, the 'soft' approach followed clearly by Brazil in the beginning of the 1990s showed how macro institutional factors (such as high inflation rates, high interest rates, over-valuated currency and

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<sup>28</sup> It is necessary to recognize that macro- economic forces together with type of technology (integrated new technology) influence, but do not determine, firm level choice.

low availability of skilled cadres) influenced industrialist to apply 'soft' methods such as organizational techniques (JIT, TQM, cellular manufacturing and work group) in order to improve competitiveness at factory level with minimum equipment and machinery investment. On the other hand, the 'hard' approach (i.e., investment in manufacturing technology and equipment) developed in Argentina resulted from the availability of skilled manpower and capital with low rates as well as the prevailing economic stability of the early 1990s.

Fifth, slow socio-industrial development experienced in LAN in Phase II, seems to be linked not only with 'external' financial events (such as the 1995's Asian crisis), and domestic political (in)capacity, but also with the mismatch between prevailing country macro institutions and micro level strategic responses. That is, the structural weaknesses of LANs industry does not seem to be connected only to the development of fragmented and compartmentalised business systems. Rather, there seems to be a major incongruence between product scale, scope, supporting macro- institutions (such as labour laws) and production practices and production technologies. In Phase I of their industrialisation, this incongruence was minimal as firms produced standardised products in low or high volume using Taylorist-type production practices and conventional technology. In Phase II, with the need to introduce new production and management practices, a contradiction emerged. That is, firms 'focused' their efforts to improve performance, volume (scale) was increased (especially in Brazil) and variety (scope) was decreased (in Argentina and Mexico). On the other hand, excluding the 'spurious' labour flexibility approach introduced in the majority of LANs, the other macro- institutional factors remained the same. That is, they continued

to support Taylorist-type work systems, while new production and management concepts were introduced alongside new technologies that were called socio-technical type work systems. This combination of events and factors not only helps to explain the degree of competitiveness achieved by LANs, but also indicates the limits of applying 'correct' production strategies in non compatible macro- environments. Therefore, the understanding of the micro –macro relationships in different national contexts seems to be crucial. As such the proposed framework (see Figure 1) might contribute to guide further studies within this focus.

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