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The Advantages of Integration for Social Systems – Evidence from the Automobile Industry

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***Abstract*—**The Japanese integrative approach to social systems can be observed in supply chain management as well as in the relationship between public and private sectors. Both the Lean Production System and the Developmental State Model are characterized by efforts towards the achievement of mutual goals, resulting in initiatives for capacity building which emphasize the system level. In Brazil, although organizations undertake efforts to build capabilities at the individual and organizational levels, the system level is being neglected. Fieldwork data confirmed the findings of other studies in terms of the lack of integration in supply chain management in the Brazilian automobile industry. Moreover, due to the absence of an active role of the Brazilian state in its relationship with the private sector, automakers are not fully exploiting the opportunities in the domestic and regional markets. For promoting a higher level of economic growth as well as to increase the degree of spill-over of technologies and techniques, a more integrative approach is needed.

***Keywords*—**Integration, Lean Production System, Developmental State Model, Brazilian automobile industry.

I. Introduction

THE purpose of this paper is to show that the integrative approach in supply chain management and in the relationship between private and public sectors is one of the reasons for the high level of economic growth observed in post-war Japan. Using the UNDP three-level framework for capacity building as the reference model for analysis, the present discussion contends that the main characteristics of the Developmental State Model and the Lean Production System favors the creation of integrated social systems that promote knowledge sharing, continuous improvements and capacity building at the system level.

Moreover, by means of a comparative study on organizational structure, inter-firm relations and state intervention in the automobile industry, this paper advocates for more integration in supply chain management to achieve a higher level of productivity and quality enhancement in the Brazilian automobile industry. Evidence collected during field survey also shows that, due to the lack of an integrative approach in the relationship between the Brazilian state and private firms, local companies are not fully exploiting the opportunities in the domestic and regional markets.

The automobile industry was chosen for study firstly because this sector provides a rich ground for the analysis of the relevance of inter-firm relations and capacity building at the individual, organizational and system levels. Additionally, the automobile industry plays an important role in the Brazilian economy. In 2004, Brazil was ninth in worldwide vehicle production, with 2,317,000 units and this industrial sector was responsible for 11.5% of the country's industrial GDP in 2005 [2]–[29].

This paper is divided into five sections. In the first section, the UNDP three-level framework for capacity building will be discussed. Section two will present the main features of the Lean Production System, which characterizes supply chain management in the Japanese automobile industry, and the pattern of relationship between public and private sectors under the Developmental State Model. Section three will be devoted to a brief discussion of the historical evolution of the Brazilian automobile industry and its new trends from the mid-1990s onwards. By means of a comparison between the patterns of supply chain management and state intervention in Brazil and Japan, the fourth section will advocate the necessity of more integration for faster and steadier growth in the Brazilian automobile industry. The main findings collected during a fieldwork will be showed in section five, followed by the conclusion.

II. The UNDP Three-Level-Framework for Capacity Building

Capacity is defined by the UNDP as "the ability of individuals and organizations or organizational units to perform functions effectively, efficiently and sustainably". This definition "implies that capacity is not a passive state", but rather "part of a continuing process" of creating and maturing abilities [32].

The UNDP framework for capacity building was developed as a guideline to help managers and officials in charge of public, private or civil society organizations that are in the process of developing capabilities for promoting sustainable change and the achievement of development objectives.

The UNDP asserts that a given policy or strategy will only be effective to promote capacity building at the individual or organizational level if it also considers the broader context. Such framework, therefore, was influenced by the Open System Theory.

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The Open System Theory was developed between 1940 and 1970 by Von Bertalanffy among other scholars, firstly in the field of Biology. Applied to the Organizational Theory, the Open System Approach showed the importance of observing the interaction of the several parts of a given entity and its relationship with the external environment [7].

The Open System Theory emphasizes two main aspects: (1) it is essential to analyze the interaction of the many components of a system, rather than each of them alone; and (2) the observation of the external environment is highly important and there should be an effort to get constant feedback from it [16]. Having those two aspects in mind, the UNDP emphasizes that individuals, as well as organizations, are members of a broader system. Therefore, in order to create successful strategies and policies to enhance the capabilities of individuals or organizations, it is necessary to take into account the situation at the macro level. In other words, the strategies developed by an organization must observe not only its own objectives, but also the policy framework of government and civil society.

Hence, applied to capacity building, the Open System Approach highlights the necessity to observe the interplay of all actors at the macro level. An effective strategy should encompass the interests of the firm, of its network of suppliers, consumers, the state, civil society and all relevant organizations at the system level. The UNDP proposal, therefore, adds the system level as a third element to the framework of capacity building, an element that has been somewhat neglected by managers.

To be effective, capacity building efforts should address the individual level (individual skills, attitudes, qualifications, etc.), the organizational level (mission, strategy, organizational culture, management values, human resources, information resources, financial resources, and infrastructure such as physical resources), and the system level (policy dimensions, legal/regulatory dimensions, process dimensions – i.e., inter-relations and interactions among entities, etc.).

As already mentioned, the Open System Theory highlights the importance of observing the interaction between the several parts of a system. The notion of synergy is connected to this interdependency. Synergetic outcomes can only be achieved if the relationship among the parts is considered. Strategies at the organizational level, for instance, should consider the organization in a broader context, i.e., as an element of a dynamic and interdependent system composed of several other firms, the government, and civil society.

The Lean Production System acknowledges the importance of the interaction among all firms involved in the production process. There are efforts of capacity building not only at the individual and organizational levels, but also at the inter-firm level. Fujimoto, analyzing the specific case of Toyota, affirms that, through long-term collaboration between this car assembler and its suppliers, Toyota's first-tier suppliers are able to accumulate the capability of component engineering. Through this relationship, the automaker and its suppliers, through various informal and formal linkages, can jointly deliver a product closer to the customer's expectations. It has also been emphasized that the subcontracting system in Japan is based on "problem-solving-oriented collaborative manufacturing" [10]. It is clear, therefore, that Lean Practitioners consider their suppliers as essential collaborators, and have an integrated approach to capacity building.

In sectors such as the automobile industry, in which several firms are intrinsically connected and the nature of inter-firm relations have a strong impact on the final outcome of the network, building capabilities at the system level is of a paramount importance. Knowledge and practices must be shared among firms in the same supply chain network and incentives for constant improvements should be given to continuously enhance productivity and quality. In this manner, the adoption of an integrative approach has clear advantages in the automobile industry, since a consistent and coherent institutional framework focused on building capabilities at the inter-firm level will result in better outcomes for the supply chain network as a whole, and consequently in higher level of growth in the industrial sector.

Hence, the Lean Production System successfully addresses the key factors highlighted in the UNDP guidelines, since it adopts an integrative approach to capacity building involving all firms in the supply network, and it also views capacity as a dynamic process that has to be constantly updated and improved.

III. The Japanese Integrative Approach to Social Systems

A. Lean Production System

The high level of economic development observed in post-war Japan gave birth to a vast literature that tried to point out the elements responsible for this successful growth. Much attention has been given to the practices adopted by Japanese automakers, since they were important to explain their high levels of productivity and efficiency. The main practices used by Japanese automakers as well as their way of managing the supply chain became known as the Lean Production System.

Womack et al highlighted the vast superiority of the Lean Production System in comparison to the Mass Production created by Ford, and contended that western firms had no option but to emulate this Japanese system in order to survive competition [37]. Fujimoto [10] declared that Toyota had created an evolutionary system that constantly updates itself through a process of trial and error, standardization of practices and revising of work processes for incremental improvements. According to Liker [18], the annual profit of Toyota by the end of the fiscal year of 2002 was higher than the combined earnings of General Motors, Chrysler and Ford. It has also been announced in the media that in the first quarter of 2007, Toyota has become the biggest seller of cars in the world [11], which can be considered evidence of the efficiency of the Lean Production System.

One of the main reasons for such positive outcomes is that the approach adopted by Japanese manufacturers is focused not only in enhancing the productivity and quality of the automaker, but of all firms involved in the production process. Therefore, their efforts go far beyond improving quality and lowering cost simultaneously at the organizational level. In fact, the Lean Production System tries to integrate automakers, suppliers and dealers in order to enhance the effectiveness of the whole supply chain network. For instance, due to the close

connections with dealers, the automaker can obtain reliable information about customers' demand and can produce a number of vehicles closer to the demand. Also, the information gathered by dealers about customers' preferences will be extremely relevant as inputs for product development [37].

Moreover, although some of the Lean Practices adopted by Japanese automakers, such as the *kanban* system – an inventory control system in which the downstream station obtains just enough components needed and the upstream station produces just enough to replenish what has been used [10] –, and *kaizen* – through which workers on the shop floor are motivated to constantly try to improve the manufacturing process and work conditions by implementing minor changes in their daily work [22] –, have a positive impact on productivity and quality when used only at the organizational level, they are optimized when diffused and jointly adopted by all firms in the supply chain network. Hence, the Lean Production system is concerned with all the stages of the production process, from product development to the delivery of the vehicle to the final consumer. It is interesting to add that such system even includes after-sales services and efforts to create a long-term relationship with customers [37].

In fact, Dore highlights that the pattern of supply chain management in Japan sacrifices short-term profits in order to maximize long-term benefits. He contends that such type of relationship tends to generate mutual obligations for buyers and suppliers. Hence, while in western countries it is reasonable for a firm to shift from one supplier to another if price and quality conditions are better, in the case of Japan, firms tend to create stronger and longer ties with suppliers. According to Dore [4]:

> "The Japanese (…) operate with a greater sense of the advantages, particularly in areas of rapid technical change, of the cooperativeness and willingness to oblige, to give and take in a loose exchange of favours, which a long-term relationship with a supplier can bring. Along with that goes a greater sense of obligation, greater recognition of how difficult you make life for your supplier if you suddenly refuse expected orders".

Sako [26] emphasizes the advantages of such type of cooperative relationship among firms in the supply chain network in her comparative study of Japanese and British firms in the Electronics industry. Although Williamson [35] argues that vertical integration has several advantages over market modes of contracting in reducing the possibility of one party behaving opportunistically, Sako states that supply networks based on Obligational Contractual Relations can contribute to achieve superior performance due to their high degree of mutual trust, which leads to a low level of transaction cost.

Sako distinguishes two types of contractual relations in supply chain management: Arm's length Contractual Relation (ACR) and Obligational Contractual Relation (OCR). In the Arm's Length Contractual Relation, independence is the guiding principle and there is no requirement to disclose much information to existing and potential buyers and suppliers. This type of contractual relation enables firms to "engage in a hand commercial bargain to obtain competitive prices". In the Obligational Contractual Relation, firms prefer "high trust cooperativeness with a commitment to trade over the long run. This commitment may come at the expense of taking on rather a lot of sometimes onerous obligations and requests (e.g. for just-in-time and ship-to-stock delivery). But the benefits of accepting mutual obligations lie in good quality and service, growing or stable orders, and other non-price aspects of trading born out of a tacit understanding over time".

Moreover, the emphasis on long-term commitment on supply chain management in the Japanese automobile industry has several competitive advantages. Shimokawa [27], for instance, stresses that this industry in Japan is characterized by a high level of flexibility in responding to changes in consumer demand. According to him, the "demand for frequent design change, linked to the dynamics inherent in new technologies and innovation, as well as new demand, has been well handled by the assembler/supplier structure" in Japan.

Moreover, the commitment of all firms in the supply chain network with the adoption of practices such as the kanban system results in the reduction of the need for buffer inventories and consequent decrease of inventory costs. Lieberman & Demeester [17] present empirical evidence of an increase in productivity due to inventory reductions in a survey conducted in the Japanese automobile industry.

Also, Dyer and Nobeoka [6] emphasizes that the high level of integration in the Toyota supply chain network facilitates knowledge sharing and collaborative efforts towards constant improvements. In fact, the close contact and face-to-face interaction between automaker and supplier is said to enhance the transfer of tacit knowledge [6], reduce communication errors and make feedback more effective [5]. Since this type of integrative supply chain management favours the accumulation and sharing of knowledge within the network, the automaker will not lose the expertise of an activity outsourced to its suppliers.

The benefits of knowledge sharing obtained through this integrative approach to supply chain management are better explained by Takeishi [30]. He distinguishes "task partitioning" from "knowledge partitioning." While the former indicates which organization is responsible for the tasks of manufacturing a specific component, the latter designates "who has knowledge for the tasks among organizations." He advocates that an automaker should "keep the knowledge of the outsourced task within the firm, rather than outsourcing the knowledge together with the task." In an integrative approach, the automaker keeps the knowledge even when outsourcing the task. Integration, therefore, favours information sharing and creates conditions for enhancing productivity and the quality of the whole supply chain. This knowledge sharing and accumulation might become a competitive advantage for the supply chain network [5].

On top of that, one should note that, in highly integrated supply chain networks, such as the Toyota group, the exchange of technology and information does not take place only vertically, between the automaker and its suppliers, but also horizontally, among suppliers. Dyer & Nobeoka [6] surveyed Toyota's suppliers association and assert that such firms have a great motivation to share information at the horizontal level. In case of low quality or productivity problems, suppliers rely on technical assistance from both the automaker and other suppliers in the same network.

The key for the success of the Lean Production System is, therefore, its integrative approach to the production process. It is focused on improving the production process and work conditions in the automaker's shop floors and, at the same time, on enhancing productivity and quality throughout the supply chain and dealers.

Due to this integrative approach, there is a clear effort to develop the capabilities of workers from all firms in the supply chain. The Japanese Lean Production System, therefore, is based on a continuous effort to improve the capabilities of the automaker and to disseminate those improvements at the inter-firm level. As a result of this holistic view, which focus on the interrelationship and interdependence of all the firms involved in the production process, Japan could create conditions for capacity building at the system level.

As defined by the UNDP, capacity building is the process in which abilities are created and constantly updated. Initiatives for capacity building, as already stated, should be taken considering the three levels: the individual, organizational and system levels.

At the individual level, actions are taken to improve the capabilities of people. Formal and informal education, on-the-job and of-the-job training to develop specific skills could be pointed out as examples of efforts for capacity building at the individual level.

The actions related to capacity building at the organization level are focused on enhancing productivity, efficiency and the work environment of organizations. Strategic planning, management of physical and financial resources and efforts to improve the work conditions are some examples.

Companies often adopt several practices to enhance the capabilities at the two aforementioned levels, but sometimes neglect the necessity to consider actions to create conditions for capacity building at the system level. The UNDP highlights the importance of observing the system level because strategies adopted at the individual or organizational level that does not take into account the situation at the macro level might fail in the long-run for not being able to create synergetic outcomes. In other words, by neglecting the broader environment – inter-firm relations, public sector, civil society, etc. – to which it belongs, the organization loses latent opportunities for information and technology exchange and will not create conditions for sustainable growth on the long-term.

Capacity building at the system level, therefore, encompasses interactions between public and private sectors, associative organizations as well as inter-firm relations. This level is highly important for the improvement of the whole industrial sector due to the opportunities in terms of technology and information exchange across firms and even beyond industrial boundaries. Hence, this issue is highly relevant to achieve a higher level of economic growth in a country.

The Japanese integrative approach to social systems can also be observed at the macro level, in the relationship between the government and the private sector. The so-called Developmental State Model is characterized by the cooperation between public and private sectors towards the achievement of common goals.

B. The Developmental State Model

The Developmental State is said to be the key factor for the economic prosperity of East Asian countries, especially Japan, Taiwan and South Korea [1]–[33]. It is characterized by a strong intervention of the government in the economy and close links between private and public sectors. The State is able to dictate the allocation of capital in the economy by controlling the banking system and monitoring the inflow of foreign capital [36]. Although multinationals are welcomed into the country, the state imposes export requirements and restricts their access to the domestic market, to "insure that the companies adopt an internationally competitive technology, rather than one which is viable only on the protected domestic market" [33]. Also, the Developmental State has a close relationship with the private sector, inducing and fomenting entrepreneurs to start business in industrial sectors that are believed to be of national interest.

There are, evidently, extrinsic factors which are relevant in explaining the economic success of the Developmental State Model. For instance, in the post-war period, the U.S. opened its market to East Asian countries and offered top-quality aid because it wanted to show the superiority of free economic institutions (free market and proprietary rights), by differentiating these three East Asian countries from the surrounding communist states [33]. The American assistance included financial aid; transfer of technical expertise and an unconditional welcoming market for the three countries' exports [33]–[21]. The intervention of external forces was also essential for undertaking land reforms in East Asian countries [21]. Such reforms are extremely difficult to be undertaken without external intervention, since it involves the removal of power from highly influential local elites. Despite the importance of these external factors, their analysis goes beyond the scope of this paper, whose main focus is to present the advantages of an integrative approach to social systems.

Wade [33] summarizes the mechanisms used by the government under the Developmental State Model to govern the market:

> "(…) the central economic mechanism of the capitalist developmental state is the use of state power to raise the economy's investible surplus; insure that a high portion is invested in productive capacity within the national territory; guide investment into industries that are important for the economy's ability to sustain higher wages in the future; and expose the investment projects to international competitive pressure whether directly or indirectly".

In this sense, the Developmental State can be considered more tolerable than communist regimes, and more goal-oriented than the market-rational systems [15]. At the same time that the public bureaucracy is insulated from the influence of private interests of the business sector as well as from pressure from civil society, it is able to create close connections with large firms in pivotal industrial sectors, to advance national interests through a process of collaboration towards the achievement of mutual goals.

Japan and South Korea highly relied on large-size private firms to promote sectoral policies (the *zaibatsu* in Japan and *chaebol* in Korea), while Taiwan relied more heavily on large

government enterprises and public research and service organizations during its early periods of growth [1]. Nonetheless, in all the three countries, the state bureaucracy played an important role in directing firms towards the industrial sectors considered indispensable for the economic growth. In Taiwan, in addition to a powerful and well-prepared bureaucracy, public research institutes were created to maintain the vigor of the government, preventing inertia by bringing up-to-date expertise into the public sector [33]. In the case of South Korea, the government is said to have played the main entrepreneurship function in the country, and in fact, "every major shift in industrial diversification in the decades of the 1960s and 1970s was instigated by the state" [1].

The public bureaucracy under the Development State Model is characterized by the ability to hire the most capable professionals. It is said that "once a competitively selected economic bureaucracy acquires a reputation for attracting the best and brightest (…) it continues to attract such people (even though at much lower salaries than the private sector) because selection is the stamp of outstanding talent" [33].

Such meritocratic state bureaucracy played an important role in directing the private sector into industrial sectors which were believed to be pivotal for the growth of the country. The Japanese public bureaucracy is well-known for playing a relational regulation role, thorough the widespread use of administrative guidance and statutory coercion [4].

In fact, from the early years of industrialization in Japan, government intervention was already essential for the growth of the private sector. Norman [19] highlights that, during the Meiji Period, state control of strategic industries and the prudence of statesmen to oversee the inflow of foreign capital were unique features of Japanese industrialization. According to him, during the early years of the Restoration, there was a huge gap between the Japanese techniques and the western methods of production. Moreover, the capitalist class in the period was too immature to undertake the entrepreneur role in the new industrial sectors necessary to develop the country and to catch up with the western economic and technologic growth. Therefore, Japanese government had to intervene and, as a result, "early Japanese capitalism has grown under the shelter of state protection and subsidy".

Nonetheless, the Developmental State Model is not only characterized by the existence of a 'hard state', capable of directing the market, but also by the close connections between private and public sectors, which are highly relevant for the creation of effective policies and to better address the needs of firms. The cooperation between state and research institutes, universities and managers from private firms is also important to avoid inertia in the public sector and to maintain governmental officials informed about which industrial sectors will be relevant for the growth of the country.

Hence, under the Developmental State Model, governmental intervention is based on constant negotiation and cooperation. There are joint efforts from public and private sectors to cooperate towards promoting economic growth in pivotal industries.

This pattern of constant negotiation between private and public sectors in Japan is better described through the concept of "embedded autonomy" defined by Evans. For an efficient state, autonomy is essential. Nonetheless, it cannot be the autonomy of corrupt or predatory states. In other words, this autonomy is not the one that results in maximization of personal interests in some developing countries. It is not a discretionary power given to the leaders to do whatever they want. The type of autonomy that Evans refers to has to be embedded in society. "Embedded (…) implies a concrete set of connections that link the state intimately and aggressively to particular social groups with whom the state shares a joint project of transformation" [8]. According to him, the key for the success of the Developmental State is the mixture of those two variables.

Through embeddedness, a higher level of synergy can be obtained. However, this synergy is only obtained when division of labor is "sustained by shared orientations and concrete integrations among the actors involved" [9]. True embeddedness requires not only that state and society shares the same goals and interests, but also that the state takes a constant and direct involvement to get private sector's efforts organized and to guarantee its involvement and commitment. Accordingly, successful industrial transformation requires both well-designed policies and a process of monitoring and negotiation, so that public and private sectors can implement the necessary changes to better achieve their shared goals.

In sum, the pattern of inter-firm relation and the interaction of public and private sectors show the integrative approach of the Japanese system. In both cases, the interests of the parties involved in the process play a greater role than the individual interests of each of them. Therefore, the relationship is prioritized, what makes easier to promote joint efforts towards a common goal. As a result, capacity building efforts tend to prioritize the system rather than the organizational level. Information exchange, technological transfer and diffusion of practices among firms are highly emphasized.

Certainly, this integrative approach to capacity building can be pointed out as one of the main reasons for Japan's high level of economic growth. This holistic view could create a close relationship among firms in the same supply chain network and an environment of cooperation involving joint efforts to improve productivity and quality. It was clearly an important approach to facilitate the spill-over of technology and information across firms and industries.

IV. The Automobile Industry in Brazil: History and New Trends

The automobile industry in Brazil started in the 1950s and state intervention was essential to persuade translational companies to manufacture vehicles in the country [8]–[27].

In 1956, the Brazilian government prohibited car imports and established GEIA (Executive Group for the Automobile Industry), the governmental agency responsible for overseeing the automobile industry.

Brazilian government was particularly interested in promoting this sector because the automobile industry was expected to lead industrial transformation in the country. Hence, the main concern of GEIA was to attract as many transnational companies as possible. As a result, domestic firms were not protected and by 1968 the automobile industry was

completely dominated by transnational firms. There were no assistance from the government to increase quality and productivity of domestic auto parts firms and, therefore, foreign automakers opted to vertically integrate their factories until the mid-1970s [27].

Although Brazil was successful in introducing a top-to-bottom automobile production, the industry stagnated during the 1970s and 1980s. In fact, by the late 1980s, Brazilian's plants lagged "far behind the world pace in terms of productivity and product quality" [37].

In order to enhance productivity and quality up to global standards, in 1991 import tariffs on vehicles and components were reduced. Also, in the mid-1990s, incentives were given to stimulate the domestic production of automobiles, a new currency was adopted in Brazil, and the economy was stabilized. Those incentives attracted new automakers and suppliers to the country and competition increased. Ó hUallacháin & Wasserman [20] contend that the opening of the Brazilian market to imports, allied to the Mercosur free trade agreement and the reemergence of the global car strategies towards the Latin American market were key factors responsible for the revitalization of the automobile industry in the country.

From the mid-1990s, two major trends can be observed in the Brazilian automobile industry. The first is the increasingly adoption by transnational automakers of new organizational structures to enhance productivity and reduce costs [31], modularization in particular. The second major trend is related to the geographical relocation of automakers' and first-tier suppliers' facilities to regions out of the metropolitan region of São Paulo, due to fiscal incentives granted by local governments trying to promote regional development in their localities.

A. Current Situation and Prospects

Currently, most of the transnational automakers are operating in the country. According to data from Anfavea [2], the investment of automakers increased during the mid-1990s and peaked in 1998 at US$ 2,454 million. In 2005, there were 18 foreign automakers and 39 plants in Brazil.

Most of the vehicles produced in Brazil are absorbed by the domestic market. Although exports have increased in the country from the mid-1990s, the domestic market still is responsible for the greatest share of purchase of vehicles produced in Brazil.

In 2005, the estimated vehicle fleet in Brazil was 23,023 thousand units and the country was tenth in the worldwide operating vehicle fleet [2]–[29].

Despite its considerable vehicle fleet and the great increase in productivity showed from the mid-1990s, Brazil still has to address several problems to achieve a higher level of growth in this sector. An evaluation of the Brazilian automobile industry conducted by the PwC Automotive Institute, an arm of the PriceWaterhouseCoopers consulting firm, contends that the country is expanding its production in a lower pace than the other late industrializing countries. Brazil is also attracting less foreign investment to expand its production capacity than the other BRIC economies [14]. BRIC stands for the name of four countries, Brazil, Russia, India and China, which are expected to become a much larger force in the world economy until 2050. According to Wilson and Purushothaman [36], until 2035, Brazilian economy has the potential to become larger than the economies of countries such as Italy, France and Germany.

The PwC Automotive Institute report concludes that Brazil has to undertake three measures to improve its automobile industry. Firstly, the country has to attract more foreign investment into this sector, to acquire up-to-date technology and increase its productivity capacity. Secondly, Brazil has to adopt export oriented measures to achieve economies of scale and obtain the necessary technology to compete more aggressively in the international market. Finally, the study also highlights the necessity to expand the domestic demand, also as a way to reap the gains from economies of scale [23].

To address these problems, a more active role of the Brazilian government is necessary. A higher level of growth demands a closer relationship between public and private sectors in the automobile industry. It is true that Brazilian government has been successful in using fiscal incentives and protections to attract foreign investment. Nonetheless, the state's ability to adopt measures to nurture the development of such firms to promote high levels of growth in the automobile industry has not been equally efficient. More embeddedness from the Brazilian public sector is necessary to address the needs of the existing firms in the automobile industry and to create policies for faster and steadier growth.

V. The Need for Adoption of an Integrative Approach in Brazil

A. A Brief Comparison: Different Pattern of Supply Chain Management and State Intervention in Brazil and Japan

Similar to the Brazilian experience, state intervention in Japan was paramount for the development of the automobile industry in the country. As in the case of Brazil, Japanese government, under the influence of the military, created a law to protect the national industry, the "Automobile Manufacturing Law", in 1936. However, instead of focusing on bringing foreign companies into the country, the Japanese government wanted to create and nurture domestic firms. In fact, Ford already had a plant in Japan but the Japanese government shut down all the U.S. automobile assembly factories by the end of the 1930s. This law also subsidized three companies for the production of trucks: Toyota, Nissan and Isuzu [10].

In Brazil, the government was not concerned in creating a strong domestic firm, but rather to attract as many transnational automakers as possible. To some extent, the state was successful in performing such role, since it was capable of attracting foreign investment to start the automobile industry in the country. Even nowadays, the Brazilian government is able to direct investment of both foreign and domestic firms and entrepreneurs to particular regions by providing fiscal and financial incentives. The case study in section five presents an example of an automaker attracted to a municipality by local government incentives. Such plant would certainly not be constructed in that area without the fiscal incentives. Nonetheless, the Brazilian state lacks the capacity to further

nurture the growth of such enterprises and to direct their development according to the government's interests. The Brazilian state, therefore, can be considered as an example of a 'soft state', which has the capacity to "produce effects in the economy", but lacks the ability "to control the direction of those effects in line with intentions" [33].

Conversely, the pattern of relationship between private and public sector in Japan is one that emphasizes joint efforts to collaboratively promote industrial growth. From the very beginning of the automobile industry in the country, Japanese government actively intervened not only inducing domestic entrepreneurs to start business in this industrial sector, but also actively participating in the growth of domestic firms, collaborating with the private sector to decrease the gap in terms of quality and productivity between Japan and the west.

In fact, the quality of automobiles produced in Japan by Toyota and Nissan was not satisfactory at that time. The military constantly complained about their durability and reliability [10]. However, there was a clear incentive from the government to strengthen domestic firms rather than attracting transnationals.

Although state intervention in Brazil was equally important to induce firms to start manufacturing automobiles in the country, the same pattern of collaboration between public and private sectors cannot be observed. Brazilian government did not adopt any measure to protect the few domestic firms that tried to assemble automobiles in the country. As a result, they were soon absorbed by transnational firms. Moreover, although Brazilian state expected domestic firms on the auto parts sector to prosper supplying components to transnational automakers, initiatives were not taken to protect and nurture local parts manufacturers. Since the auto parts sector produces intermediate goods, it does not have enough bargain power to negotiate better prices with automakers. They are also in an advantageous position when buying raw materials, such as steel, due to the oligopoly of large firms in Brazil [25]. Therefore, without the aid of the government, such companies wouldn't be able to grow and to resist foreign domination. This situation illustrates the lack of embeddedness of Brazilian government, highlighted by Evans.

Here, it is important to highlight that historical factors are also relevant in explaining the different pattern of state intervention in Brazil and East Asia. For instance, due to the absence of external actors to undertake land reforms, the Brazilian government did not have as much power as East Asian states to implement its policies and was not as insulated from the demands of civil society and the private sector. In fact, during the colonization period, Portugal co-opted the local elite and maintained the population under a precarious social condition. This process strengthened agrarian elites, which made it difficult for the Brazilian state to undertake land reforms after independence. Such elite groups would not relinquish their privileges and their influence even intensified as they entered the local and central political arena. As a result, Brazilian government is forced to compromise with private interests to implement public policies. On top of that, since Brazil was not in a strategic position for the U.S. defense perimeter, the quality of aid provided to the country was much lower if compared to the technical and financial assistance granted to East Asian countries [21]–[33]. Although such external factors are important to explain the lack of autonomy of Brazilian state and the type of relationship between public and private sectors in the country, their analysis is beyond the scope of this paper.

Another evidence of the lack of joint efforts between Brazilian government and private firms to promote a sustainable growth in the automobile industry is the gap in terms of quality and productivity between Brazilian plants and those located in western countries during the 1980s. It is true that Brazilian government adopted some measures during the mid-1990s to improve quality, enhance productivity and create conditions for the automobile industry to compete at the international level. Nonetheless, it is important to keep in mind that those measures were reactive and the situation of the domestic automobile industry was already drastic when the government decided to change its policy towards this industrial sector in the early 1990s. Only a collaborative type of relationship observed in Japan would result in proactive measures and in a sustainable pattern of industrial growth.

One should also note that, similarly to Brazil, in the early stages of the automobile industry in Japan, the domestic auto parts sector did not have enough capacity to cope with the demand of automakers. Toyota actually had to develop the components by itself. Vertical integration, therefore, was necessary due to the primitive condition of the domestic auto parts sector. However, vertical integration at Toyota gave birth to Nippondenso, which, after being separated from Toyota in 1949, became an autonomous firm and grew to be one of the main suppliers in Japan.

In Brazil, automakers also had to rely on vertical integration due to the primitive conditions of domestic auto parts firms. However, vertical integration neither gave birth to new firms in the auto parts sector nor did it result in the creation of a collaborative pattern of relationship between automakers and suppliers. In fact, when the auto parts sector in Brazil became capable of supplying components in a satisfactory quantity and quality, automakers opted to outsource manufacturing related activities based on a cost-benefit analysis. Hence, the creation of a type of relationship based on collaboration between automakers and suppliers was not prioritized and, even nowadays, supply chain management in Brazil tends to emphasize short-term cost reduction rather than promoting integration in the supply chain [3]–[25].

In Japan, on the contrary, there is a clear cooperation between automakers and suppliers. Vertical integration at Toyota resulted in a type of collaborative and interdependent relation between the automaker and its suppliers. There is a clear focus on integration rather than on mere outsourcing of manufacturing activities under the Lean Production System. Task partitioning takes place but knowledge about the outsourced activities is still shared by all firms in the supply chain network.

The clear advantage of the Lean Production System and its emphasis on promoting integration between automaker, suppliers and dealers is the high level of information exchange and technologic transfer, resulting in joint-efforts for problem solving and continuous improvements throughout the supply chain. Skill development takes place not only at the individual

and organizational levels, but also at the system level, involving all firms in the supply chain. On top of that, the spill-over effect of technological improvements is more intense and can be observed in a shorter period of time, due to the close relationship and high level of information exchange between automaker and suppliers as well as horizontally among suppliers.

It is true that much progress has been made in capacity building at the individual and organizational levels in the Brazilian automobile industry. Through the restructuring process that started in the mid-1990s, productivity and quality were enhanced. Automakers' facilities in the country became more efficient and, through mergers, acquisitions and joint-ventures with foreign capital, the auto-parts sector was strengthened and first-tier suppliers became capable of producing and delivering subsystems [20]. At the organizational level, therefore, both automakers and suppliers could successfully improve their capabilities. Nonetheless, the Brazilian automobile industry still needs a higher level of integration to create conditions for a sustainable growth.

In fact, the adoption of Lean Practices only at the organizational level in Brazil shows that automakers are overlooking initiatives for capacity building at the system level. This lack of integration hinders knowledge sharing and accumulation among firms in the same supply chain network as well as joint-efforts for problem solving and continuous improvements.

This lack of efforts in terms of capacity building at the system level can also be observed in the relationship between public and private sectors. The case study presents an example of the partial ability of the Brazilian government to promote industrial transformation. By providing fiscal and financial incentives, both local and central governments are capable of persuading firms to build facilities in certain municipalities, inducing industrial transformation. However, due to the low level of communication with the private sector, the Brazilian state cannot nurture the development of such firms, which hinders the achievement of high levels of economic growth.

B. Integration for Faster and Steadier Growth

The analysis of the Brazilian domestic market shows a low percentage of inhabitants per vehicles, which represents a latent opportunity for expansion. In 2004, according to Sindipeças' database, there were 8.1 inhabitants per vehicle in Brazil. The rate is also low in other countries of South America (16.8 inhabitants per vehicle in Colombia, 10.3 in Venezuela, 7 in Chile and 6 in Argentina) [29]. Therefore, there is also a great chance for Brazil to consolidate its leading position in the automobile industry in the regional market.

Although the automobile industry in Brazil has improved since the mid-1990s, it is still far behind the world leading countries in terms of production of vehicles [29]. To improve this condition it is necessary to create a more integrative supply chain in order to facilitate knowledge and technology exchange across firms. Capacity building at the systems level, therefore, is a relevant issue in the Brazilian automobile industry at the present stage.

Fieldwork data, as well as studies conducted by Arkader [3] and Salerno et al [21], show that Lean Practices are being implemented at the organizational level in Brazil. Nonetheless, a lack of an integrative approach can be observed in the inter-firm relations. As already mentioned, the Lean Production System is characterized by a high degree of interaction among all firms involved in the process. Under the Japanese system, there is an effort to maximize the efficiency of the whole system, including automakers, suppliers and dealers. In Brazil, however, efforts for capacity building at the system level are being overlooked and Lean Practices such as the kanban system are not achieving the same level of development observed in Japan.

Therefore, although many Lean Practices have been adopted in Brazil at the organizational level, there is a lack of effort to diffuse those practices throughout the supply chain. The relationship and negotiations between automakers and suppliers are still characterized by a win-lose perspective [3] and as a result, capacity building at the system level has not been emphasized.

Efforts for building capabilities at the system level are also intrinsically related to the type of relationship between private and public sectors and to the governmental policy framework. Although governmental intervention has been important during the history of Brazilian automobile industry for attracting foreign investment, a more active role would be necessary to promote a higher level of knowledge and technology transfer across firms and industries. As Weiss [34] points out, policies for high level of industrial growth demand "regular and extensive consultation, negotiation and coordination with the private sector".

In sum, the lack of an integrative approach in the relationship between private and public sectors as well as among the several interdependent firms in the same industrial sector can be point out as one of the reasons for the slow pace of economic growth of Brazil if compared to Japan.

Both at the macro and micro levels, therefore, the promotion of integration is paramount for a higher level of growth. An integrative approach is necessary for facilitating the communication between public and private sectors, resulting in policies that can better nurture private firms and achieve national interests, and for the creation of a more effective supply chain network.

VI. Case Study

A. Methodology

The case study was conducted in a domestic company which assembles Mitsubishi automobiles called MMC automotores do Brasil ltd. This company was chosen for the case study firstly because it illustrates one of the aforementioned trends in the Brazilian automobile industry: it is a factory located far from the metropolitan region of São Paulo. Therefore, the role of the local government in attracting this new automaker in order to promote industrialization in the municipality could be observed. On top of that, MMC assembles Japanese vehicles and therefore the researcher expected to find a high level of diffusion of Lean Practices in the factory.

For the case study, on November, 17th, 2006 a visit was made to the MMC factory, located in the municipality of Catalão (Goiás), to observe the facilities and assembly process.

Also, during the visit an in-depth interview was conducted with the logistics manager. Additional information was collected through informal communication by e-mail with MMC personnel. Information about the profile of blue-collar workers at the factory, MMC's satellite firms in the same municipality, and legislation on programs created by the local government to promote the industrialization of the region were gathered through secondary sources.

The questions during the interview tried to collect information about MMC's initiatives concerning capacity building at all three levels, but a greater emphasis was given on the analysis of the situation at the system level. For this purpose, the logistics manager was asked about logistical problems faced by the company due to its geographic position and whether there were joint efforts to adopt Lean Practices such as the kanban system with its suppliers. The answers as well as the observations made during the visit showed a low level of integration with first-tier suppliers. Also regarding capacity building at the system level, the manager was questioned about the reasons that led MMC to build a factory in that region, the relationship between the company and the local government and the role of the factory in the regional growth of Catalão (number of jobs generated, tax payment, small and medium size companies attracted to the region, etc.).

B. The Lack of Integration at the System Level

MMC automotores do Brasil ltd is a limited liability private company funded with Brazilian capital. MMC was founded in 1996 and is located in the municipality of Catalão, in the state of Goiás. The company has 1,135 employees and, in 2005, it assembled 20,153 vehicles [2].

The estimated population of Catalão in 2006 was 71,680 inhabitants [12]. In 2004, the municipality was responsible for 4.60% of the total GDP of the state of Goiás [13]. The industrial sector has a great presence in the municipal GDP: 68% in 1998 [24].

The visit showed that MMC had, to some extent, successfully adopted some Lean Practices at the organizational level. The kanban system, for instance, was implemented in MMC for synchronizing workstations. The researcher observed that in one of MMC's warehouses, small components were organized in various aisles. Such parts were loaded onto different carts and sent to the assembly line in the correct synchronization to the models being assembled.

Nonetheless, this system is not being jointly adopted with suppliers and thereby is not optimized. According to the logistics manager, MMC is currently investing in the automation of this process, to facilitate information exchange with suppliers. At the present stage, however, the level of integration between MMC and its first-tier suppliers is very low.

On top of that, due to the distance between MMC and its first-tier suppliers' facilities, the company incurs in high inventory costs and faces several logistics problems. The company imports around 50% of its components and its main first-tier suppliers are located outside Brazil. Moreover, Catalão is about 750 kilometers from São Paulo, where most of the domestic suppliers are located, and 830 kilometers from the port of Santos, where the imported components are discharged. Such distance hinders efforts for promoting a higher level of integration in the supply chain network and for faster enhancements in terms of productivity and efficiency.

It is true that the decision of MMC to build a plant in the municipality of Catalão had several financial advantages, since the company was benefited by the reduction of both the import tax and a value-added tax on the circulation of goods called ICMS (Imposto sobre Operações Relativas à Circulação de Mercadorias e sobre Serviços de Transporte Interestadual e Intermunicipal e de Comunicação, ainda que as Operações se Iniciem no Exterior - Tax on the Circulation of Goods, Interstate and Intercity Transportation and Communication Services, even when the Operation is Initiated Abroad). Such fiscal incentives were part of a broader policy of the local government to promote the industrialization of the region.

The case study also shows that these initiatives of the state of Goiás to promote industrialization were, to some extent, successful. The participation of the industrial sector in the state's GDP has increased, and, in the case of MMC, several satellite firms were attracted to the municipality after the automaker decided to settle in the region.

It is important to observe, however, that none of the first-tier suppliers of MMC were brought to Catalão. The company imports around 50% of its components and its main first-tier suppliers are located outside Brazil. Therefore, for faster and steadier growth, a higher degree of cooperation between public and private sectors is essential in order to attract MMC's key suppliers to the region and to enhance its productivity level by promoting more integration in the supply chain network. Hence, although the fiscal incentives were important to attract investment to the region, they are insufficient mechanisms to nurture the sustainable growth of this automaker in the municipality.

VII. Conclusion

The UNDP three-level framework for capacity building highlights the necessity of considering the system level in efforts for building capabilities and emphasizes the need for firms to consider the situation at the broader level, including governmental policies, demands of civil society and inter-firm relations in their strategic planning. Therefore, initiatives for capacity building should include not only the individual and organizational levels, but also the system level.

In this context, the Japanese approach to supply chain management deserves special attention due to its integrative character. Under the Lean Production System, the automaker makes efforts to enhance productivity at the organizational level, but also tries to improve the outcomes of the whole production process, including suppliers and dealers. Moreover, Lean Practitioners promotes horizontal relation among suppliers as a way to diffuse technology and information throughout the supply chain network.

Such integrative approach, which characterizes supply chain management in Japan, can also be observed at the macro level. The so-called Developmental State Model is based on constant interactions between public and private sectors and on an attempt to build capabilities at the system level. Therefore, under the Developmental State Model, information sharing

occurs not only within the government, but also at the system level, since there is a continuous process of negotiation and information exchange between public and private sector. The state keeps formal and informal channels of communication with the private sector and research institutes. This information exchange avoids inertia in the government and favors a more successful strategic planning process and proactive initiatives. On top of that, through this information sharing process, the state can better address the needs of the private sector, nurturing the growth of enterprises and achieving high levels of growth.

Conversely, the analysis of the situation in the Brazilian automobile industry tends to indicate a lack of integration. Fieldwork data shows that the automaker has been successful, to some extent, in implementing Lean Practices at the organizational level. Nonetheless, the huge inventory costs, the lack of joint efforts in problem-solving and quality enhancement and the unexplored opportunities in the domestic and regional markets show that a more integrative approach to supply chain management is necessary.

Brazilian state also lacks an integrative approach in its relationship with the private sector. As a result, it cannot be considered as successful in directing the market as East Asian countries. The analysis of the automobile industry shows that Brazilian government has been capable of attracting foreign investments and persuading domestic entrepreneurs to start business in certain regions. Nonetheless, it lacks the capacity to further nurture the growth of such firms and to orient their development according to the government's interests.

The case study illustrates this partial ability of the Brazilian government in promoting industrial transformation. By providing financial incentives, both local and central governments are capable of persuading firms to build facilities in certain municipalities, inducing industrial transformation in some localities. However, due to the lack of communication with the private sector, the Brazilian state cannot nurture the development of such firms, which hinders the achievement of high levels of economic growth.

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