EVOLUTIONARY LOGISTIC SYSTEMS AND NATIONAL DEVELOPMENT: STRATEGY, STRUCTURES, POLICIES AND DECISION MAKING

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ABSTRACT
In the emerging global economy, private and public sectors have to move more quickly and flexibly than ever before. Concerted action is required in order to deal with evolving threats and opportunities. The present paper aims to address logistic systems' evolution and their interlacement with national development. Substantive attention will be attributed to macro-logistic scenario and evolving physical and institutional structures. Finally, an argumentative case will be built upon Brazilian logistic systems, tackling strategic issues and delineating evolutionary routes. To cope with and profit from current and forthcoming global business context, national logistic systems should be effectively supported and thus enhanced.

RESUMO
Na emergente economia global, os setores público e privado precisarão mover-se mais rapidamente e de forma mais flexível do que nunca. De forma a lidar com ameaças e oportunidades em constante evolução, ações intensivas são requeridas. O presente artigo objetiva abordar a evolução dos sistemas logísticos e seu entrelaçamento com o desevolvimento nacional. Atenção especial será atribuida ao cenário macro-logístico, bem como às estruturas físicas e institucionais. Por fim, um caso de estudo será construído com base nos sistemas logísticos brasileiros, abordando aspectos estratégicos e delineando caminhos evolutivos. De forma a adequar-se e aferir ganhos no cenário global de negócios, atual e futuro, os sistemas logísticos nacionais deveriam ser efetivamente apoiados e, dessa forma, aprimorados.

1. INTRODUCTION

The industry has undergone significant changes in recent decades: it is no longer home-based and operates in a global market. The global sourcing of raw materials, parts and products has widened the importance of logistic networks. Furthermore, trends towards internationalisation and innovation require organisations to be more agile and responsive to context changes. At the same time, these trends are pushing them toward closer collaboration with strategic partners.

This new scenario demands enhanced physical and institutional structures, and policies. Especially in the new emerging global economy, private and public sectors have to move more quickly and flexibly than ever before. It can be argued that in order to cope with evolving threats and opportunities concerted action is required. Cost and lead-time savings accrued with the introduction of better global sourcing strategies, new production technologies and processes might be seriously impaired by unbalanced logistics systems. Nevertheless strategy, structures, policies and decision making can exhibit relevant limitations, hence preventing or imposing difficulties for fundamental investments on production and logistics, and to such an extent impairing wealth creation and collective well being.

The present paper aims to address logistic systems' evolution and its interlacement with national development. Substantive attention will be attributed to macro-logistic scenario and evolving physical and institutional structures. In order to cope with and profit from current and forthcoming global business context, national logistic systems should be driven toward an

evolving enhancement. It is relevant to properly consider existing feedback loops (positive and negative) and leverage points in order to boost performance. Finally, an argumentative case will be built upon Brazilian logistic systems, tackling strategic issues and delineating evolutionary routes. On this argumentative path, questions like the following ones will be tackled: how do macro-logistics systems influence Brazilian strategic position in current global competition scenario? How could a strategic and long-term vision be translated into better structures and policies toward sustainable and effective logistic systems?

In this moment of substantive transformations it is mandatory to suitably approach the sight of opportunities embedded on the innovative and networked economy. Today and in the decades to come, the new economy will represent a huge challenge for logistic systems with direct and indirect impact on national development.

2. EVOLUTIONARY SCENARIO

Evolving business trends impose major challenges – threats and opportunities – to private and public sector throughout the world with reverberant impact on developing countries. Some well established trends like innovation, global integration, international investment and trade, strategic business networks, and new physical and social technologies will dynamically reshape the world economy in a way that future business scenarios are still not completely foreseeable.

This evolution has been mainly caused by internationalisation and deregulation of demand and supply as well as by business strategies questing effective and strategic competitive advantage. The analysis of two fronts can help elucidate explicit and implicit reasons for several economical-political decisions made in current global scenario: (i) the quest for new and attractive markets and (ii) the continuous search for high quality or/and low costs products, raw material and energy sources. Both trends have ceaselessly boosted the globalisation of commerce and production, making material and information flows more dynamic – due to vibrant demand and supply – and structurally complex. In fact, as a result of these initiatives today's economy is occurring in a connected, global and hypercompetitive context. Furthermore, the interconnection of these fronts under a holistic perspective – like the one assimilated in logistics – has contributed to the introduction and continuous adoption of the supply chain view. It can be argued that interwoven supply chains should not be managed in isolated steps, but in an integrated and articulated way, across agents/actors, networks and stakeholders, from suppliers until consumers. Hence logistic systems should evolve effective and sustainable structures and policies, fitted to a connected, dynamic, innovation-guided and, above all, competitive environment.

In fact, the on-going removal of trade barriers and technological progresses in transport as well as communication allowed many supply chains to expand out of their national borders, to exploit new markets and to locate business processes in different countries (Schary and Skjøtt-Larsen, 2001). Under such conditions, activities, processes and structures are interwoven worldwide, where they have to deal with multiple interrelations between actors situated in distinctive economic, political and social environments (Hülsmann *et al*., 2006). So, it can be argued that cultural, administrative (e.g. institutional and governance issues), economical and technological scenario is more relevant in nation's trade integration than simply geographic distance (Ghemawat, 2001).

Furthermore, economical scenario is becoming more complex in a world where purchasing power is increasing in the developing world. The relative importance of developing economies as engine of demand growth may shift more dramatically and quickly than expected (Goldman Sachs, 2003). Today's booming consumption seems irreversible and is dependent on formal and informal international cooperation, sovereign states, multiple non-state actors (Fukuyama, 2006) and political-economic liaisons that can be acknowledged in national cultures.

The global economy – in which to "invest, where you get maximum returns, source talent, raw materials, products and services from where it is best available, produce where it is most cost-effective, and sell where the markets are, without being constrained by national boundaries" (IHT, 2007) is essential – has imposed several economical and institutional challenges worldwide. So, the economy realm is the battleground and it can be argued that evolutionary logistic systems hold a major assignment.

To approach this challenging context it is of great worth to examine the work of Forrester, who back in the year of 1958, predicted that "there will come a general recognition of the advantage enjoyed by the pioneering management who have been the first to improve their understanding of the interrelationships between separate company functions and between the company and its markets, its industry and the national economy" (Forrester, 1958; Peck, 2006). Through the identification and obtainment of new and attractive markets as well as high quality/low cost sources, current evolutionary routes lead to the development and further improvement of processes and networks designated to fit and connect demand and supply fronts.

The connective function has intensified strategic relevance of logistics. In a working definition, logistics embraces the strategic design of structures and policies as well as the decision making concerning material and information flows, aiming to support and enhance competitive advantage. It can be further argued that a supply chain is a network of organisations that are involved, through upstream and downstream linkages, in the diversified processes and activities that produce value in the form of products and services to the ultimate customer (Christopher, 1998). Customer satisfaction occurs when business successfully fulfil their obligations on all components of the marketing mix: product, price, promotion and place (Lambert and Burduroglu, 2000). In fact, customer expectations, the pressure of competition on turbulent global markets and virtualisation of logistics companies result in complex and dynamic logistics systems, structures and networks (Scholz-Reiter *et al*., 2004).

Furthermore, increasing developments in information and communication technology is considered one of the main enablers of the quoted internationalisation and, at the same time is reinforced by it. Technology has to be aligned with industry best practises, fitted with the context and hence supporting present and potential business results. It has being extensively discussed the potential room for new (and innovative) approaches supporting the information and material flow management in global supply chains (Gunasekaran and Ngai, 2004).

Effective and sustainable processes connecting logistic partners within global supply chains should take into account aspects like: long-term and systemic view, customer's complex and bounded behaviour, growing demands for service level (and expanded products), development of a suitable organisational structure, dependence on trustful partnership,

suitable flow of information, and, finally, reliance on international cooperation and cross-cultural competences. Here, it will be argued that to achieve effectiveness is necessary to pursue efficacy – represented by a strategic approach, producing the right outputs in line with present and future market needs – and at the same time to quest efficiency – optimizing resources spent in achieving a desired effect. Furthermore sustainability concept embraces both: (i) keeping effectiveness along time and (ii) preserving (or even enhancing) economic, social and environmental resource base.

Evolving business scene increases the pressure on logistic systems. A descriptive model outlining these systems as well as related strategy, structures (e.g. institutions and infrastructures), policies and decision making would help prioritising actions that leverage and reinforce positive loops in the direction of enhanced performance.

3. LOGISTIC SYSTEMS

Logistics in an interwoven world characterised by cyclical opportunities and threats is distinctly challenging. The survivors will be the most adaptable, i.e. capable of identifying and absorbing useful knowledge and turning it into competitive advantage. The approach of this evolutionary concept within logistic systems and its implications on national development will be circumscribed within the following argument.

Evolutionary economics (Nelson and Winter, 1982) conceptualises a piece of knowledge as a recipe in which a list of potential ingredients, encompassing both social and physical technologies as well as business processes are included (Sorenson *et al.,* 2005). The idealised recipe details how to combine ingredients – in which proportions, in what order, under what circumstances – to achieve a desired end (Sorenson *et al.,* 2005). Thus evolutionary logistic systems can be referred as the iterative process of search and discovery of new receipts (business plans) where evolving physical and social technologies (Beinhocker, 2006) are fittingly coordinated in order to connect market and sources fronts.

Also from a historical perspective the development of logistics systems might be viewed as an evolutionary process. Starting with a basic, low level system characterized by limited movement and storage facilities, the system gradually evolves over time to meet the changing logistic requirements of a given economy (Razzaque, 1997). The level of sophistication of the evolved system is largely a function of the national context in which it operates. If logistic system does not have suitable basis (i.e. social and physical technologies) for reliable material and information flows and nodes, or the institutional and regulatory environment is not ensured, evolution (e.g. new business plans and congruent investments) might be impaired. The network design and operation have both spatial and temporal aspects however, all these decisions are taken in a logistics environment consisting of "all factors, constraints, forces, conditions, circumstances, and relationships that surround and impinge on logistics decisions and over which the decision maker has little or no control" (Ballou, 1985). In a nutshell, a conductive logistic environment is a prerequisite for an efficient (Razzaque, 1997) and hence profitable logistic system.

On this scene, systems thinking can help understand systems complexity by revealing which underlying structures exist, how complex problems are generated and which/how factors influence them over time (Senge, 1990). Forrester (1998) vigorously argued that more attention must be placed on processes, systems, structures and policies design, instead of

purely on contingencial day-to-day decision making. On the same way, systems approach tries to overcome the existent role of uncertainty and cognitive limits regarding to firms' or individuals' ability to gather and process information, its bounded rationality (Simon, 1955). The systems perspective is oriented toward a long-term view and that is why inter-relations (e.g. delays and feedbacks loops) are important (Senge 1990). On this background, systems thinking are iterative learning processes in which a reductionist, narrow, short-run, static view of the world is replaced with a holistic, broad, long-term, dynamic view, reinventing our structures and policies accordingly. In fact, as argued by Sterman (2006):

> What prevents us from overcoming policy resistance is not a lack of resources, technical knowledge, or a genuine commitment to change. What thwarts us is our lack of a meaningful systems thinking capability. That capability requires tools to understand complexity, stocks and flows, feedback, and time delays. It requires the use of virtual worlds and simulations to augment the evidence generated by experiments in the real world. It requires an unswerving commitment to the rigorous application of scientific method, and the inquiry skills we need to expose our hidden assumptions and biases. It requires crossing boundaries between departments and functions in an organisation, between disciplines in the academy, between the private and public sector. It requires breaching barriers of culture and class, race and religion. It requires listening with respect and empathy to others—then using these systems thinking capabilities to act in consonance with our long-term goals and deepest aspirations.

Forrester (1998) also argued that current understanding of physical systems is far more advanced than the understanding of social (e.g. corporate, governmental and economic) systems. Although the later systems are far more complex, they belong to the same class of high-order, complex, nonlinear and feedback systems as do the former (Forrester, 1998). Systems thinking require us to examine issues from multiple perspectives, to expand the boundaries of our mental models, to consider the long-term consequences of our actions, including their environmental, cultural, and moral implications (Sterman, 2002). Structures and policies designing in social systems has employed methods much weaker than the ones used for technical systems (Forrester, 1998), it can be said that managers and politicians have limited themselves to intuition and debate in designing corporations and countries.

Therefore, comprehensive understanding of structures and policies is essential to sense, learn and lead strategic evolutionary routes. To ease the following analysis, a logistic system and its distinctive yet interlaced levels will be illustrated as an interactive system that, in the spirit of Forrester (Forrester, 1958; Peck, 2006) extend themselves to the contextual level of a national economy and even beyond. Furthermore, logistic systems can be viewed as linked levels and co-related interdependent universe of actions, i.e. decision making, structures and policies design as well as strategy. The descriptive model (Figure 1) aspires to connect, in a suitable fashion, the constructive elements, enhancing the understanding of this socio-technical system.

In fact, the discrete levels of analysis are inextricably attached elements of the logistic system (Peck 2005) as follows: (1) value stream, material and information flows; (2) assets and infra-structure dependencies; (3) organisations and inter-organisational networks and power dependencies; and (4) context – cultural, administrative, economic and geographic dimensions (Ghemawat, 2001). Together they cover elements of a logistic system and the context within they are embedded, though each level reflects quite different perspectives (Peck 2005). For example, inter-organisational network distinguishes the system where nodes represent organisations – private and public sector – that interact with, own or manage assets and infrastructure, and through which the physical goods and information flow. Here, the links represent power dependencies between organisations (e.g. trading relationships). The

wider context embody the environment where organisations do business, assets and infrastructure are positioned and value streams flow (Peck 2005).

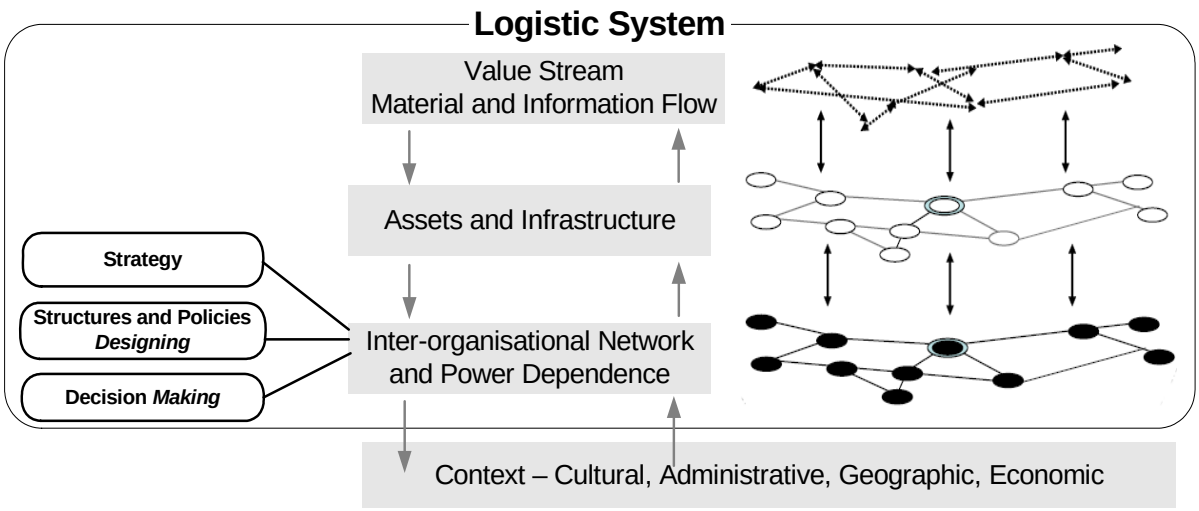

Figure 1: Logistic system – descriptive model (adapted from Peck, 2005)

Furthermore, logistic systems' strategy should envision and support (private and/or public) implementation of suitable structures, policies and decision making processes. In fact, shared infrastructure and services, the conjoint impacts of material and information flows as well as inter-organisational networks and power dependencies justify the demand for a macro-logistic view, which can contemplate such effects in an integrated and systemic manner (Novaes and Frazzon, 2005).

In a congruent fashion, macro-logistics transcend pure organisational focus (micro-economical) and integrates simultaneously economical, operational, environmental, social and sustainability aspects (Novaes and Frazzon 2005). It involves activities and business processes of organisations through logistic systems which act both in temporal and spatial dimensions. As consequence of expanded geography associated to globalisation and the search for new markets and suppliers, as well as the growing concern of society with environmental conditions and security, it becomes necessary to focus these problems from a wider macro point of view (Sjőstedt, 1997; Novaes and Frazzon, 2005). On a regional or even national level, the performance of interwoven supply chains can be improved through cooperation and communication between actors. Hence it will be argued that macro-logistics initiatives should comprise coordinated and networked collaboration between private and public actors and stakeholders, with diverse and thus complementary knowledge and interests.

One function of aforementioned public-private networks would be acting to enhance supportive function executed and/or influenced by public sector. Nevertheless, the risk of unsynchronised, inexistent or even antagonist actions as well as time-delayed causal effects might impair performance. This ineffective situation could occur due to intrinsically dissonant objectives, culture and dysfunctional relations. In order to avoid this kind of misacting, macro-logistics system involving public and private actors and stakeholders as well as structures and policies should be properly design and implemented.

Nevertheless academy has its share on this evolution. The design and implementation of fitted structures and policies should embrace collaborations between academy, private and public sectors in applied-research projects. This approach would enhance the comprehension of logistic systems and could help prioritising supporting actions. Furthermore, research focusing on national and international success cases, gearing innovation through absorption, integration and creation of knowledge would represent one of the main challenges. In fact, academy should act as innovation catalysers. In a congruent manner, macro-logistics (Novaes and Frazzon, 2005) claim that research in the transport and logistic sector, being currently carried out in specific areas, on an independent basis, should integrate academy and actors/stakeholders across private and public sector.

The following section will tackle an argument focused on a long-term vision within current complex and challenging scenario. Effective system thinking reinforced with practical reasoning and evidence obtained form primary or secondary sources will support a case embracing Brazilian logistic systems and national development.

4. ARGUMENTATIVE CASE

The argumentative case will circumscribe some logistic systems' levels and elements mentioned in the proposed descriptive model. Then considering a holistic view, a brief analysis of current situation and a long-term vision will be outlined. It is particularly relevant to properly consider, in this kind of complex adaptive system, leveraging actions and feedback loops fitted to boost effective and sustainable performance.

Brazilian macro-logistics has changed in the last decades. Even though several initiatives have taken place within different frameworks involving private-public actors and stakeholders, they have produced ambiguous support to wealth creation and national development. Nevertheless it is becoming transparent that private sector mind-set has evolved, mainly due to Brazilian increasing market openness. Multinational firms "made in Brazil", as well as several interwoven relations of trade and investment are here to stay and will consolidate a new business culture in the decades to come. It will be here argued that public sector should follow the same path, i.e. improve pragmatic focus on effective and sustainable performance. This urgent action would overcome existing dichotomy.

Logistic shortages reduce the flexibility to develop networks fitted to organisational demands. Logistic system' problems and connected development barriers are unique to each country, derived mainly from (Razzaque, 1997): geographical features, socio-economic and institutional systems, cultural dimensions, industrial development and resources. In the same way, factors that contribute to competitive success include differences in national economic structures, institutions, values and cultures. In fact, the role of a nation in developing its own competitive advantages seems to be stronger than ever (Porter, 1990).

As already quoted the discrete levels of analysis are inextricably linked as elements of a logistic system. Therefore, Level 1 – Value Stream, Material and Information Flows – suffers (and also profits) directly from weakness (and strengths) originated in the other levels, generating impacts across business networks and reaching, directly or indirectly, the final customer. Here further leveraging actions should embrace: (i) effectiveness of material and information flows; as well as (ii) improved and unblocked nodes and interfaces, mainly the ones involving private-public interaction and bureaucratic procedures.

The domain where private and public sectors face mutual dependency in an inherent intense form is the Level 2 – Assets and Infrastructure – as well as the closely interlaced Level 3 – Inter-organisational Networks and Power Dependencies. This battleground is one of the frontiers from where barriers to development arise. Leveraging actions should embrace: (i) commitment to a shared vision, (ii) funding possibilities (public and private investments) and (iii) regulatory and institutional stability.

There is no denying that availability of adequate logistics facilities is a vital requirement for drawing investments (national and international). It has been suggested that global manufacturing strategies provide the greatest competitive advantage when they are appropriately supported through key value-added logistics activities (Fawcett *et al.*, 1993). With the quoted ever increasing globalisation of business, better logistics facilities and their management are bound to assume important roles in international business (Razzaque, 1997).

Creation of wealth and development can be impaired due to the lack of efficient logistic networks. For instance, trans-European transport network is argued to be a key element in the relaunched strategy for competitiveness and employment in Europe (EU, 2005). In fact, empirical analysis finds a positive and significant contribution of infrastructure to output levels and growth in Latin America (Calderón and Servén, 2003). Nevertheless, in Brazil public infrastructure expenditure has borne the brunt of fiscal adjustment, and private investment has failed to take up the slack (World Bank, 2005). Focus should be attributed for upgrading infrastructure, as this can yield great dividends in terms of growth, competitiveness and poverty reduction, as well as improving citizens' well being (World Bank, 2005).

Public sector emphasis should be put on horizontal policies, in order to yield bigger gains in terms of productivity and growth. On this way, horizontal policies that have proven to contribute towards development, apart from orthodox fiscal policy, inflation control as well as incentives to savings, are investment in human capital and infrastructure.

In developing and developed countries as well, governmental initiatives or resources alone are not adequate to meet nation's growing requirements, and private sector participation is necessary (Razzaque, 1997). Infrastructure investment demands a regulatory framework that supports efficiency through tariff policies that take properly into account finance-economic balance as well as service level. Brazilian privatisation and regulation process started in the 90's had clear commitment to support growing investment and dynamism in monopolised sectors, including several logistic-related services (IPEA, 2006).

Nevertheless, private participation does not reduce the need for public involvement. Governments still need to regulate infrastructure provision and to pay for a share of investments. In fact, public sector must leverage their resources to attract as much complementary financing as possible (World Bank, 2005). Although much has been accomplished in reforming Brazilian infrastructure sectors, at least as much remains to be done. The challenges ahead are significant, politically sensitive and complex, but this should not stop Brazil from facing them (Pinheiro, 2003).

In the highly competitive world of international infrastructure investments, Brazil's success in attracting funds will ultimately depend on aforementioned perceived risk of regulation, the

judicial system, and macroeconomic and institutional stability (Mckinsey, 2007). There are further issues in infrastructure sector that should be tackled, for instance, to foster government commitment to a framework where the separation of policy, regulation and business activities is clear and steadfast. Also, as part of this process, it is necessary to consolidate current regulatory culture, strengthening the mandate to the regulatory agencies (Pinheiro, 2003). To ensure decision-making autonomy from operators, consumer groups and the government, regulatory agencies should have formal detachment from the corresponding ministry, as well as sufficient financial capacity and autonomy (Guasch, 2004). Finally, it is important to emphasise that the demand for stronger public institutions has increased with the potential growth of concessions and public-private partnerships. This is due to the more extensive conditions and obligations involved, which makes the presence of an adequate institutional framework more important (Guasch, 2004). In sum, to reinvigorate private sector investment, governments need to find ways to make the risk-return ratio of projects more attractive.

Furthermore, decentralization and participatory planning can make infrastructure spending more responsive to local needs, but only if carefully and institutionally implemented. Involving stakeholders and final users in the prioritization of infrastructure investments should have the advantage both of tailoring provision to the needs and priorities of particular communities and of encouraging greater "ownership" of the projects (World Bank, 2005). In fact, according to Lambert and Stock (1993), "few areas of study have as significant an impact on a society's standard of living as logistics. Almost every sphere of human activity is affected, directly or indirectly, by the logistic process".

Level 4 – Context – impacts in most of the aforementioned features. It can be translated in the following dimensions: cultural, administrative, geographic, and economic. Each of these dimensions encompasses many different factors, some of which are readily apparent; others are quite subtle. For instance, cultural social norms, the deeply rooted system of unspoken principles that guide individuals in their everyday choices and interactions, are often nearly invisible, even to the people who abide by them (Ghemawat 2001).

The quoted dimensions seem to be connected in a complex and evolving manner to present and historical factors. On level 4 – Context – leveraging actions should embrace: (i) trust building, (ii) focus on effectiveness of interfaces, (iii) enhanced institutionalisation, and (iv) design and implementation of stable, clear and fair rules and taxes.

An evaluation of global production paradigm, scenarios and relevant patterns could substantiate the perception that Brazil is lagging behind investments if compared with other developing countries due to structural (e.g. institutional) weakness and other derived constraints. This is specially truth in economic fields where Brazilian natural competitive advantage is not overpowering. Taking into account current practices and perspectives, further improvements and contingencial growing acceleration programs could be endangered due to multi-fold shortages. Although seeming unsolvable and externally generated, this kind of complex situations have normally internally generated causes (Sterman, 2002). Therefore it would be essential to tackle properly institutional and economic aspects within aforementioned macro-logistic system.

Furthermore, considering that private sector is the domain of innovation in an open society, where wealth is effectively created and from where national development emerges, it can be

argued that the focus for public sector action should be targeted on active support of private competitiveness. On the long-term an effective and sustainable wealth creation is a basic requirement to accomplish national development and thus collective/societal well being.

Brazilian vibrant private sector is in some sense a case study, dealing constantly with several difficulties (e.g. lack of infrastructure, institutional complexity) and even though succeeding on business battlefield. In fact, Brazil has evolved in recent years, but on its own, stabilization will be insufficient to sustain growth rate, therefore substantial structural reforms are needed (Goldman Sachs, 2003) and the following main obstacles should be handled: lack of openness to international trade, lower savings and investments, weak fiscal adjustment in public and foreign debt. Furthermore, McKinsey (2007) study proposes five groups of priority measures aimed at removing barriers in Brazil: (i) tackle its huge informal economy, which distorts competition; (ii) reduce high levels of government consumption, which keep the cost of capital high; (iii) improve the inefficient judicial system and other public services; and (iv) develop an adequate infrastructure. The fifth priority is to create a nationwide commitment to a long-term economic vision and also the framework for implementing these measures (Mckinsey, 2007).

The ideal approach should bring logistic systems' actors and stakeholders together within a shared and integrated perspective involving: supply and demand evolving patterns and their influences on material and information flows; assets and infrastructure; macro-logistics; inter-organisational networks; and holistic understanding of context. Logistic failure in sustaining evolving business scenario would manifest itself first in the form of logistic costs inflation and, later, as typical boom-and-bust cycles. When will the next arrive?

4. CONCLUSIONS

There is neither *silver bullet* nor *free lunch*, much work have to be done before the argued leverage points and following positive feedback loops start to invigorate Brazilian logistic systems evolution. Challenges discussed above require a holistic approach encompassing a long-term vision as well as a strategic road map with clear short-term objectives. It is important to realize that public initiatives or resources alone are not sufficient to meet nation's growing requirements (Razzaque, 1997), and hence public sector support for growing private participation under a clear and trustful institutional structure is essential.

Government must set policies that promote and facilitate private investment in infrastructure and make sure the process becomes an ongoing one (Porter, 1990). Furthermore, as stated in the European Union White Paper (EU, 2001): "we will not be able to adapt transport policy to the requirements of sustainable development unless a way is found to finance infrastructure to eliminate bottlenecks and transportation policy is backed up by economic policy, land-use policy, budgetary policy, fiscal policy and social policy."

Top-down actions resulting in effective institutional and regulatory context, fair taxation and fees as well as balance between centralisation and decentralisation should be embraced in order to set in motion the evolution of Brazilian logistic systems. Concomitantly, attention and support should be devoted to bottom-up initiatives in which actors and stakeholders, from private and public sectors, interact aiming to enhance interwoven logistic systems. Thus structures and policies guided by joint-strategies could underpin the necessary national development.

Private sector and wealth creation are directly affected (positive and negative feedbacks) by national macro-logistics system. The speed at which the argued evolution needs to be implemented has grown, generating increasing pressure in all actors, both of the private and public sectors (Novaes and Frazzon, 2005). In fact, these impacts transcend the limits of economics, influencing directly in the social, political and cultural evolution of a country (Novaes and Frazzon, 2005).

Present paper's main limitation is regarded to chosen theoretical – argumentative approach. Nevertheless, these characteristics were necessary to accomplish the strategic perspective carried out here. In fact, further deepening (e.g. empirical studies, applied research) should be underpinned on the foundation here argued. It would be illuminating to conduct comparative studies involving two or more countries rather than undertaking country-specific cases. Nevertheless, there are further promising research potentials on both domains.

It is suggested that these approaches should follow a 4-phase structure: (i) identification of potential partners from public and private sectors and collaboration frameworks; (ii) identification of main focus considering specific interests; (iii) development of customised descriptive model (including detailed description and evaluation of each level) and, (iv) strategic implementation map proposition, including suitable long-term objectives and feasible short-term actions toward increasing competitive advantage.

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