The firm's side of the Brazilian Innovation System

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http://oic.nap.usp.br/

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Observatório da Inovação e Competitividade

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LGI Laboratório de Gestão da Inovação

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Notícias

Homenagem da ABDI ao coordenador do LGI

O LGI – Laboratório de Gestão da Inovação se propõe a avançar no conhecimento e na prática da organização e gestão da inovação nas empresas, bem como contribuir para o aperfeiçoamento e geração de políticas públicas.

Brazil and USA are countries of continental dimensions

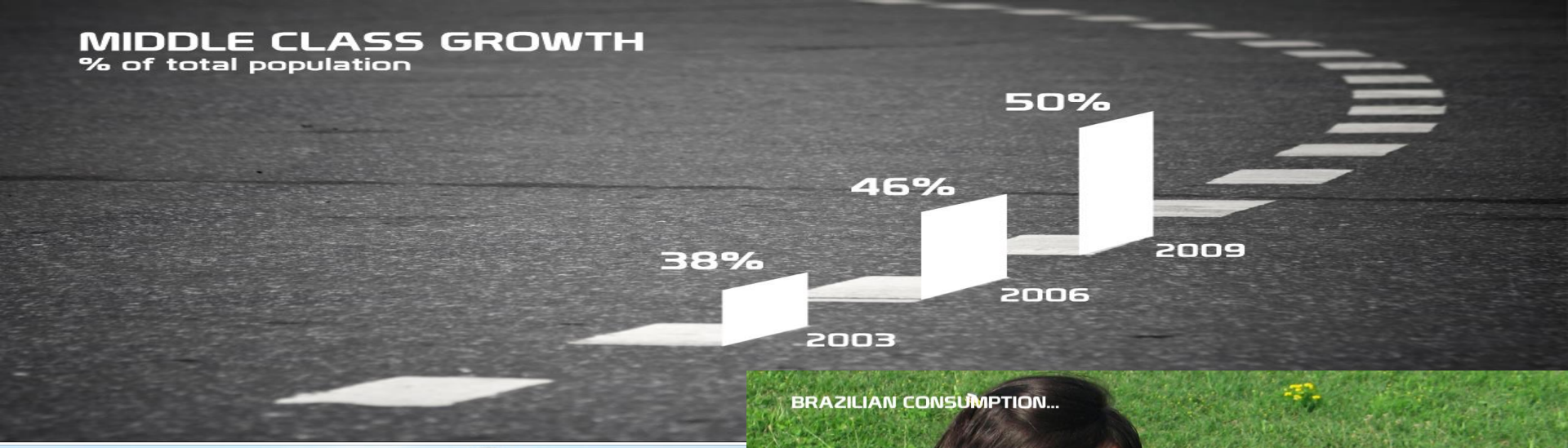
8,500,000 km²

9,800,000 km²

including Alaska and Puerto Rico

Facts and figures

- Borders with 10 countries
- 50% of South America's surface
  More than 8 million sq. km
- 50% of the South American Population
  ~ 200 million inhabitants
- 55% of South American GDP
  US$ 1.9 billion
  8th world's largest economy


MIDDLE CLASS GROWTH
% of total population
38%
2003
46%
2006
50%
2009


BRAZILIAN CONSUMPTION...
Computers:
5th
World Market

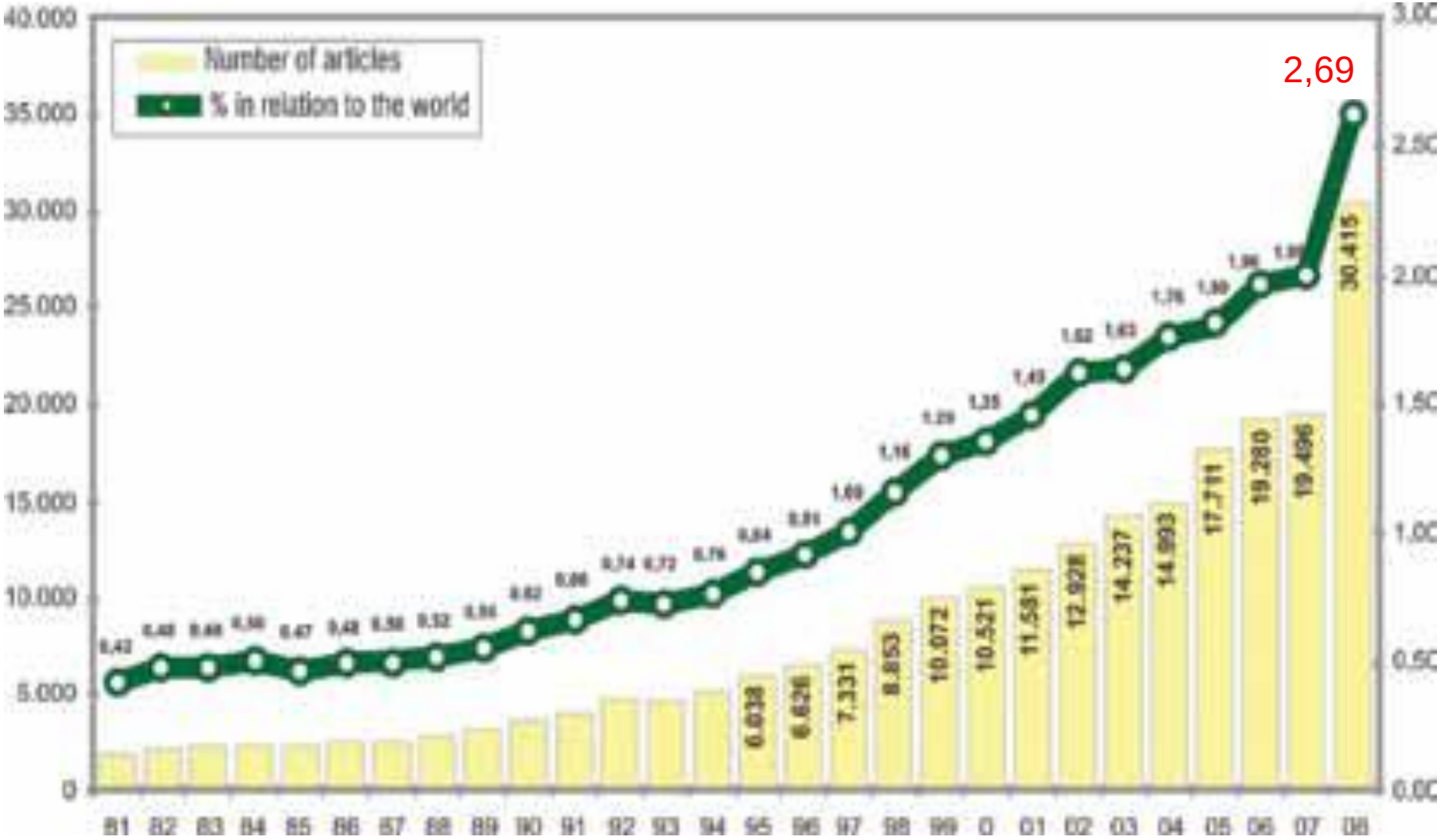

BRAZILIAN CONSUMPTION...
Mobile Phones:
5th
World Market
Source: RC CONSULTORES


BRAZILIAN CONSUMPTION...
Cars:
5th
World Market
Source: GUIDO VILDOSO

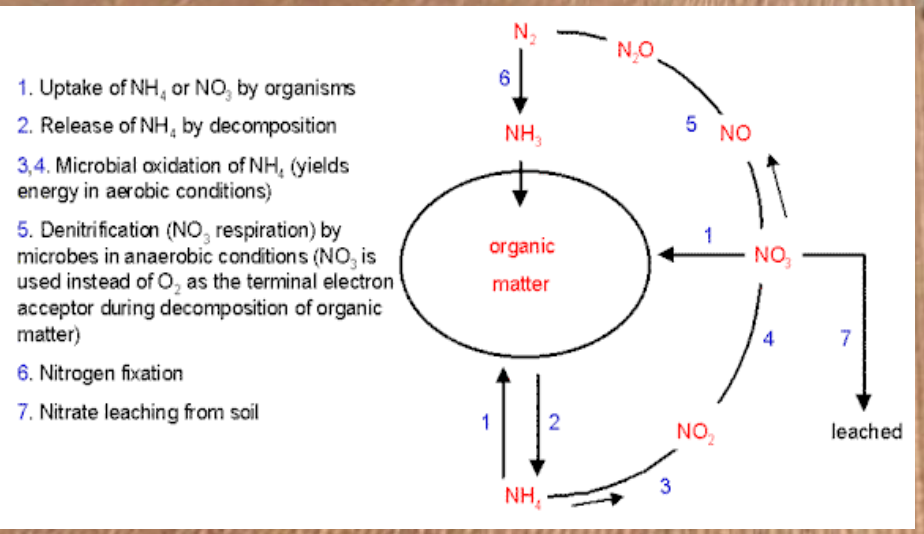

BRAZILIAN CONSUMPTION...
Cosmetics:
3rd
World Market
Source: INSTITUTO EUROMONITOR


Brazilian companies go global
AMBEV/INBEVI
THE WORLD'S
LARGEST BREWER
JBS-FRIBOI
1st
COMPANY IN ANIMAL PROTEIN PRODUCTION
VALE
2nd
COMPANY IN MINING PRODUCTION IN THE WORLD
EMBRAER
3rd
LARGEST AIRCRAFT COMPANY IN THE WORLD
MARCOPOLO
7%
GLOBAL PRODUCTION OF BUS BODIES AND PARTS
TOTVS
8th
WORLD BIGGEST BUSINESS SOFTWARE COMPANY
GERDAU
8th
COMPANY IN STEEL PRODUCTION IN THE WORLD
PETROBRAS
8th
LARGEST COMPANY IN IN THE WORLD

Brazilian scientific articles indexed in the Institute for Scientific Information (ISI)



Biological nitrogen fixation and the soybean industry



After early failures (since 1909), research (in biological nitrogen fixation, soil, ...) made soy one of the most important crops (planted area, production and exports) in Brazil.

Soy contributes around 6 % of the Brazilian gross national product (GNP)

Around 1 million people are employed in the soy sector in Brazil.

Renewable Energy: Bio-fuels

Brazil is the world leader in developing bio-fuels and their use in automobiles

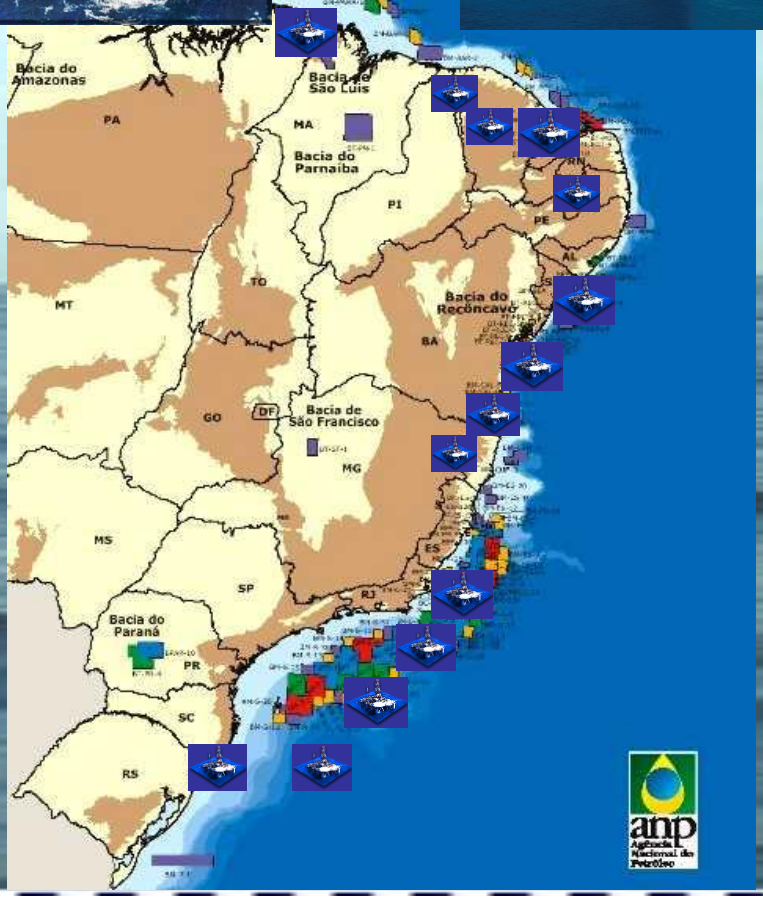
"Brazil represents a great success story, as the country's National Alcohol Program dates back to 1975, when the Brazilian government first introduced the policy as a measure to reduce its dependence on petrol imports and enable the country to produce renewable and environmentally friendly energy.

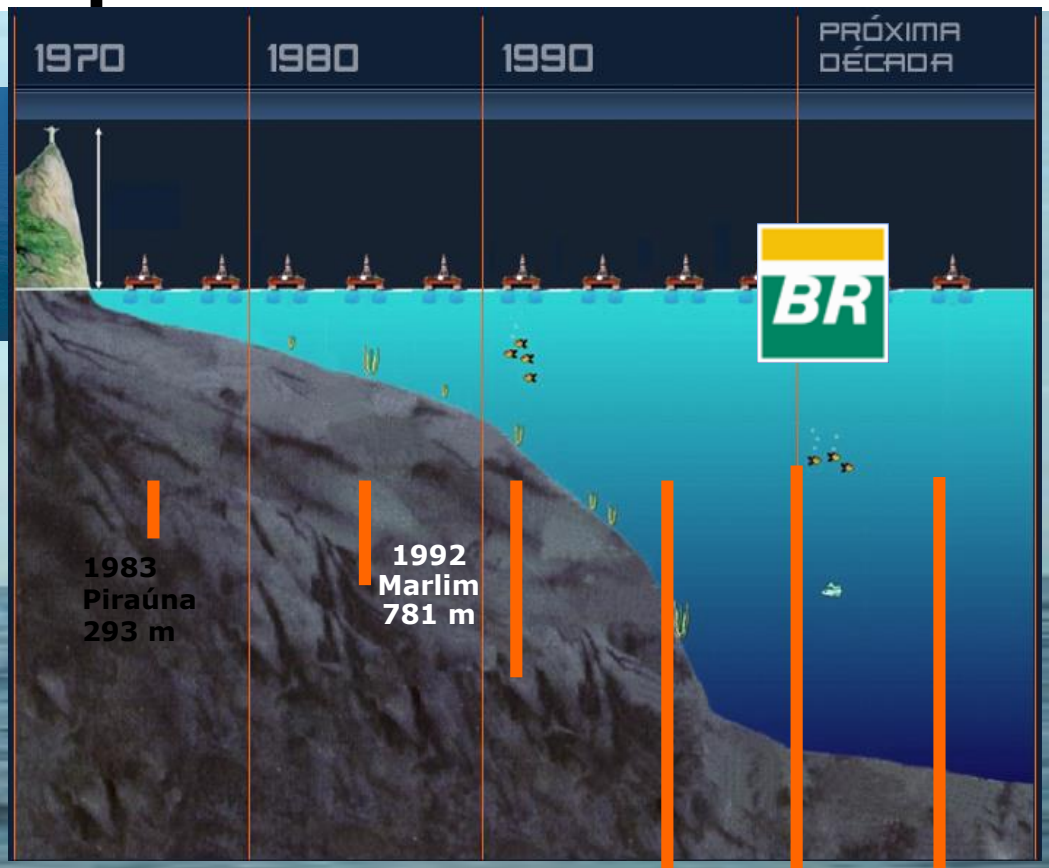
From 1985 to 1990, around 90% of all automobiles manufactured in Brazil were powered by ethanol.

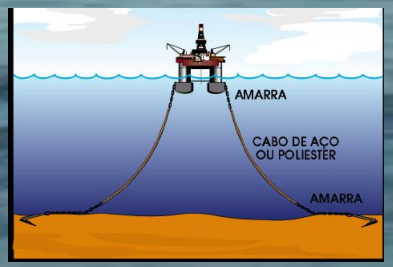
To date, more than 6 million ethanol and flexible fuel vehicles have been manufactured in Brazil"

Ford Motor Company, USA, May 10, 2005
(http://media.ford.com/print_doc.cfm?article_id=20825)

Petrobras: world's top producer of oil in deep waters



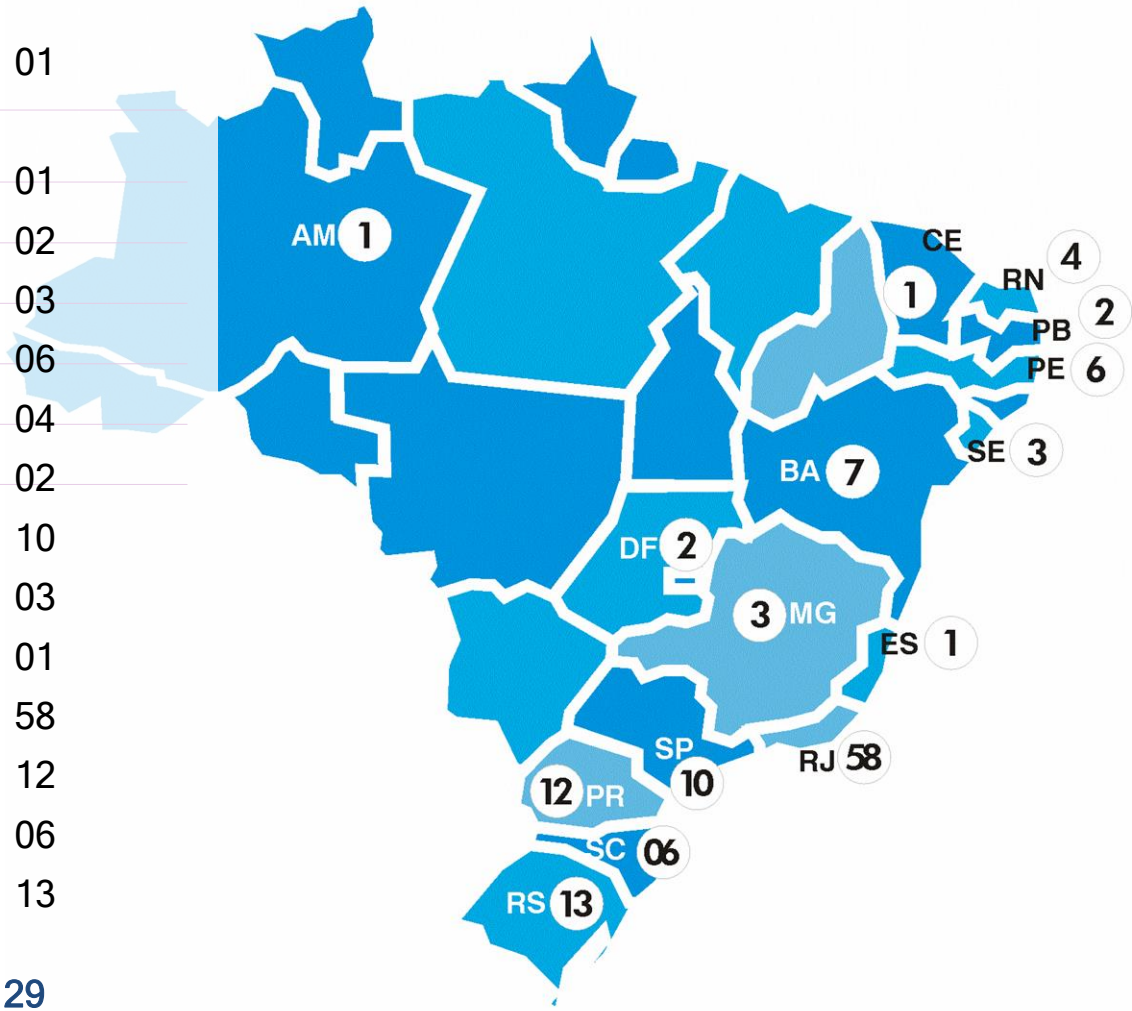




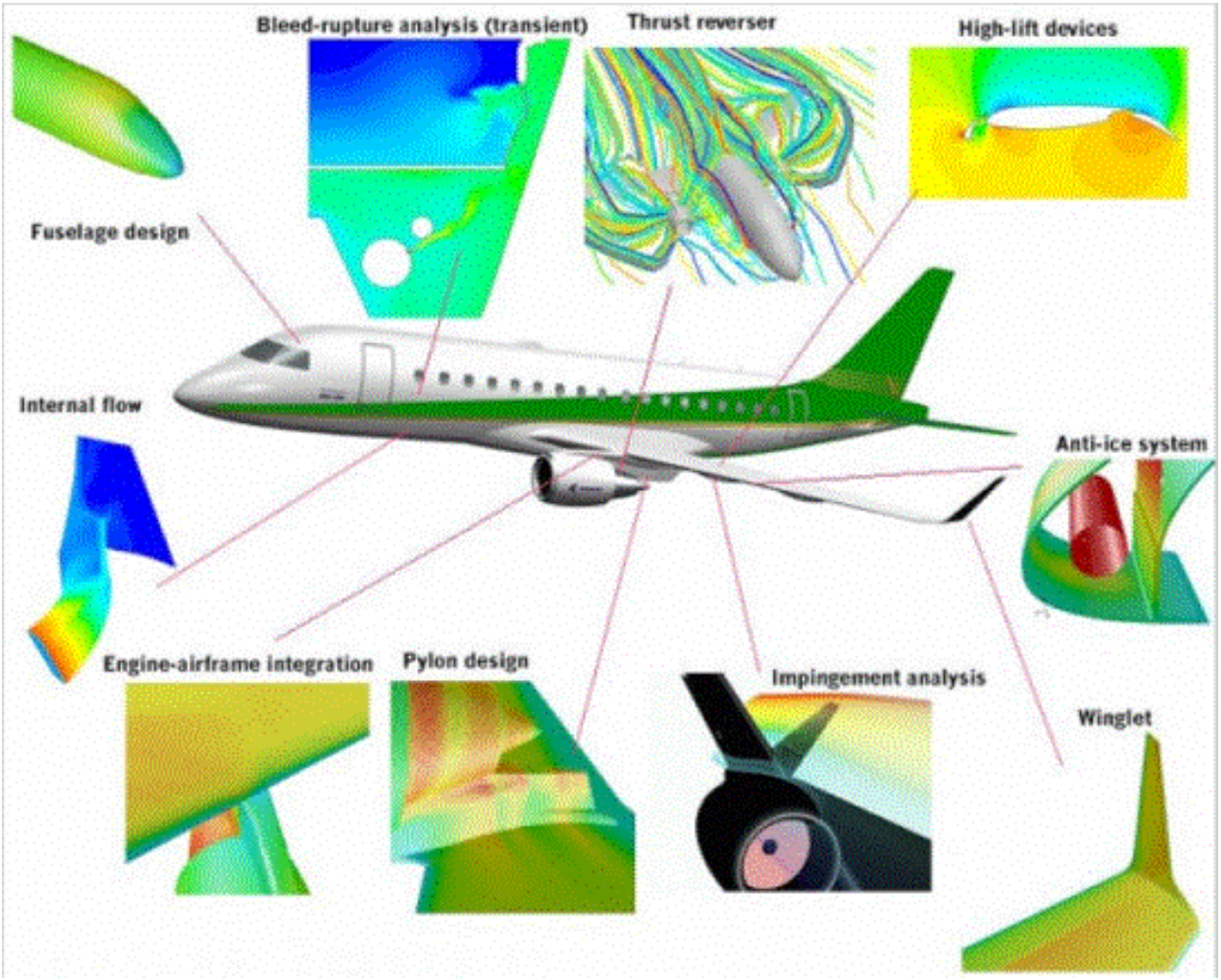
Tupi – up to 7.000m

Cooperation Petrobras / Universities in Brazil

Region	*State*	*Research Groups*
North	Amazonas	01
Northeast	Bahia	07
	Ceará	01
	Paraíba	02
	Sergipe	03
	Pernambuco	06
	Rio Grande do Norte	04
Centre West	Distrito Federal	02
Southeast	São Paulo	10
	Minas Gerais	03
	Espírito Santo	01
	Rio de Janeiro	58
South	Paraná	12
	Santa Catarina	06
	Rio Grande do Sul	13
Total Research Groups		129

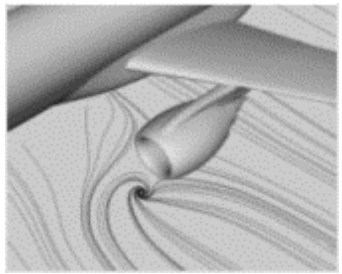


Computational Fluid Dynamics (CFD)

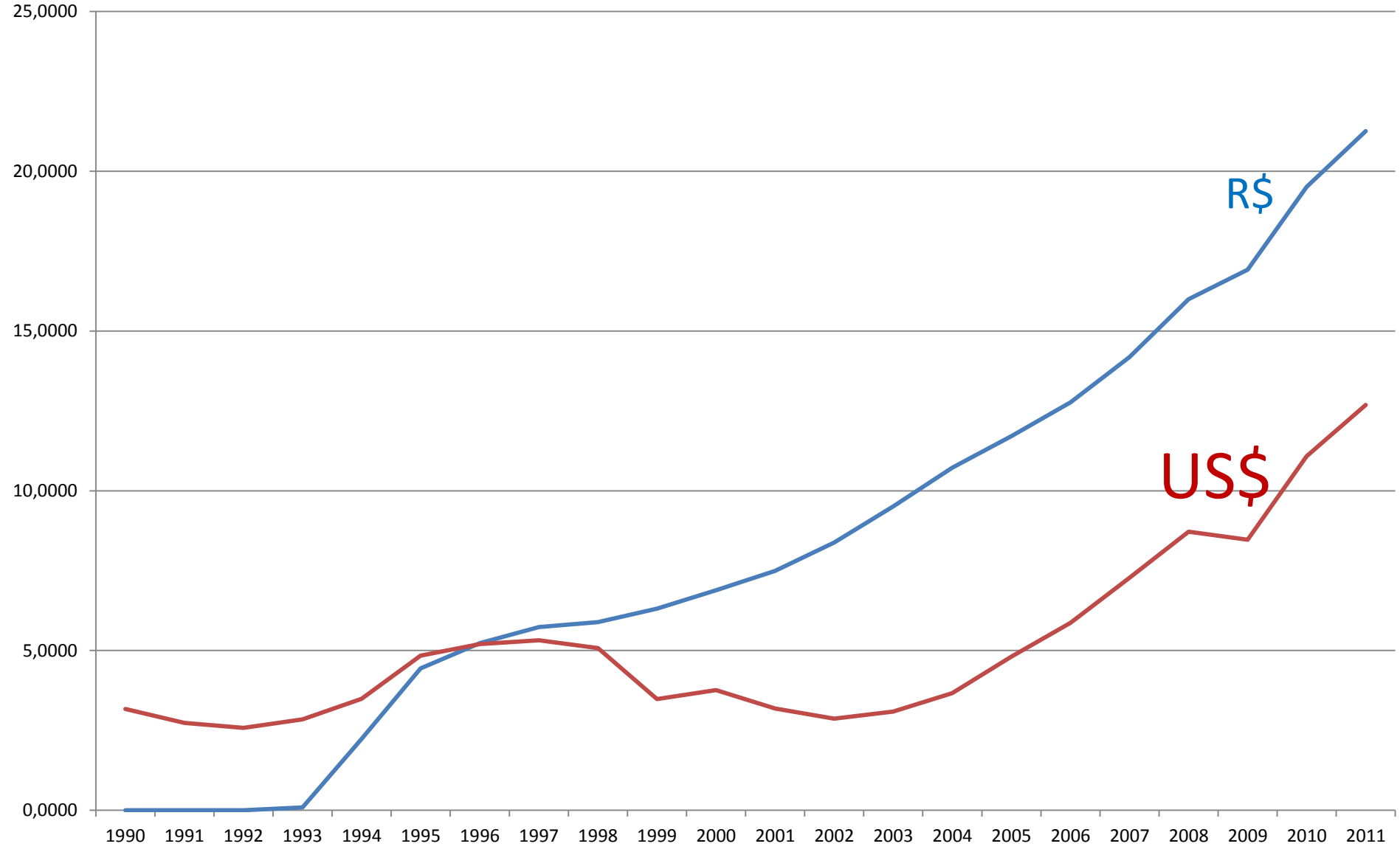


Prize CNI 2005

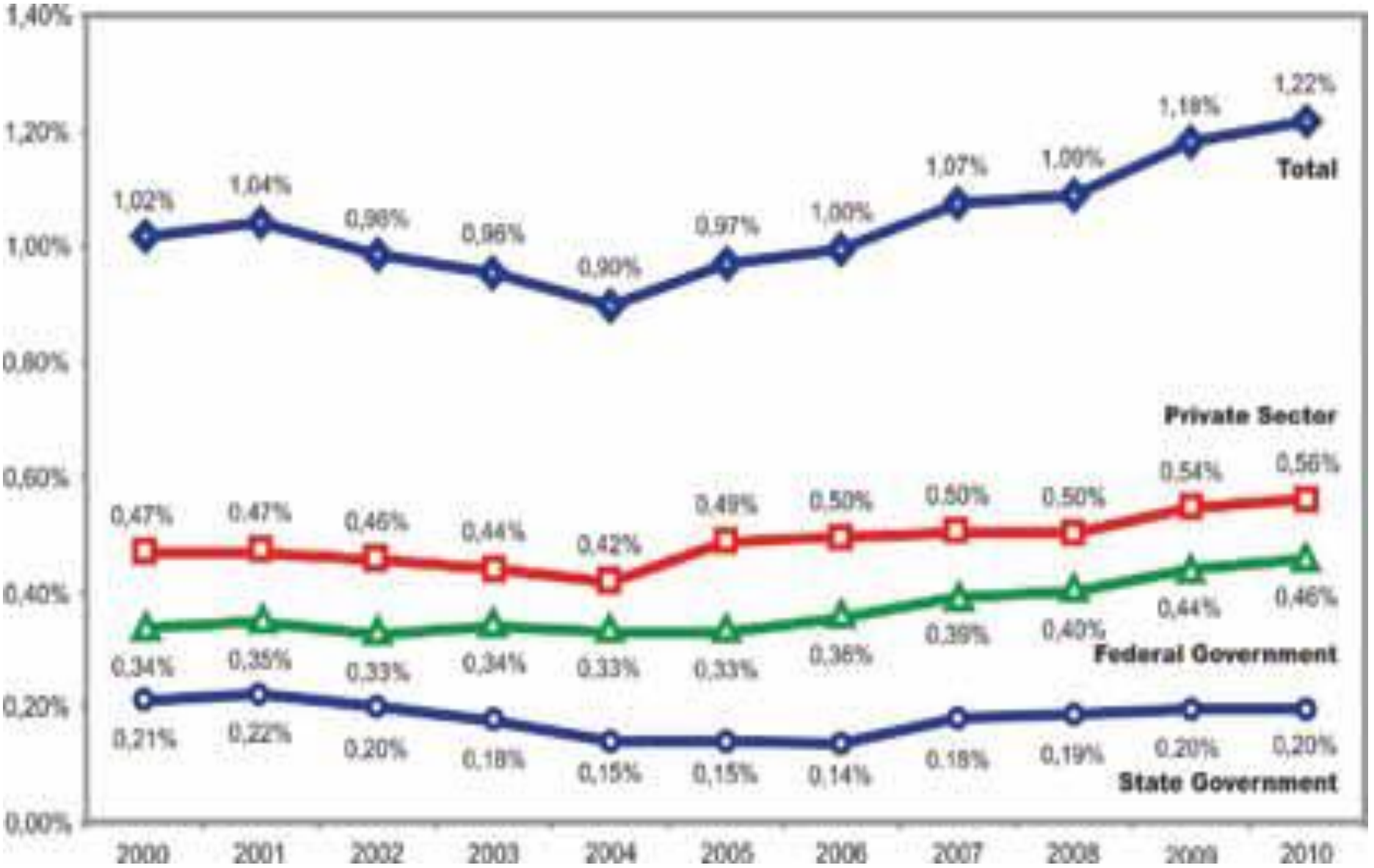
- 8 Institutions: Embraer, CTA, USP – Poli & São Carlos, UNICAMP, UFSC, UFU, PUC-Rio
- 3 enterprises: ESSS, CITS & DELTACORE.
- 100 specialists.



GDP per capita



R&D/GDP

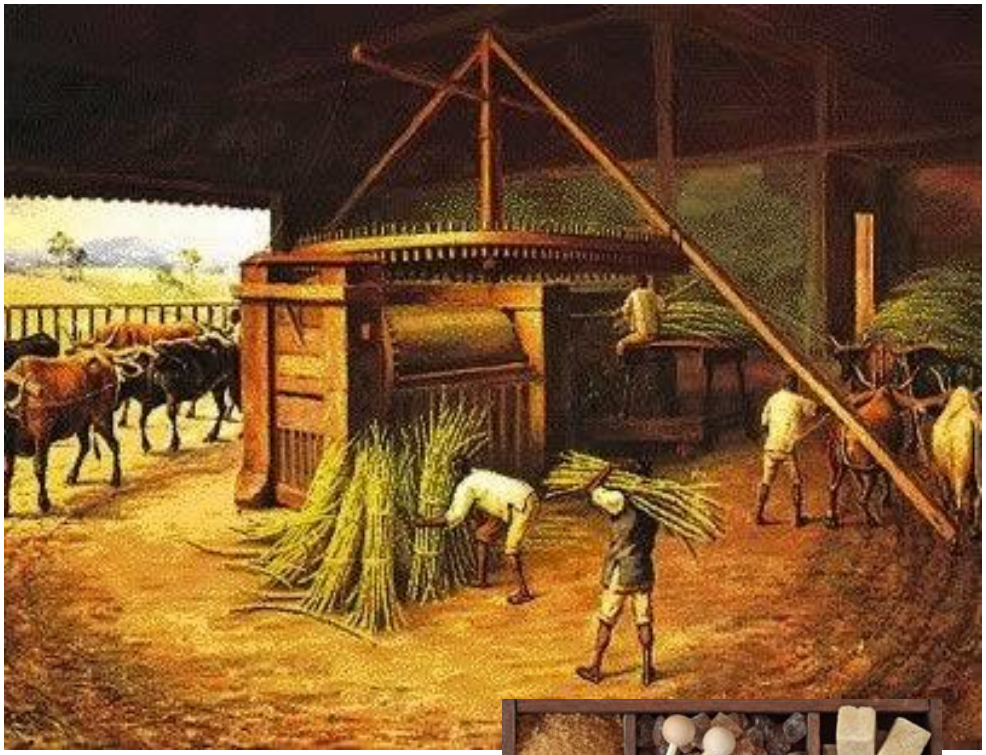

1,40%
1,20%
1,00%
0,80%
0,60%
0,40%
0,20%
0,00%
1,02%
1,04%
0,98%
0,96%
0,90%
0,97%
1,00%
1,07%
1,09%
1,18%
1,22%
Total
Private Sector
0,47%
0,47%
0,46%
0,44%
0,42%
0,49%
0,50%
0,50%
0,50%
0,54%
0,56%
Federal Government
0,34%
0,35%
0,33%
0,34%
0,33%
0,33%
0,36%
0,39%
0,40%
0,44%
0,46%
State Government
0,21%
0,22%
0,20%
0,18%
0,15%
0,15%
0,14%
0,18%
0,19%
0,20%
0,20%
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

A bit of history

The building of Brazilian industry

Late industrialization

- Industries were forbidden until April 1st, 1808
  - Only sugar mills, for export
  - Internationalization
    - Dutch capital, portuguese / dutch logistics, European consumption
    - MMC: Cia das Indias Ocidentais



Slavery until 1888

- Last slavery country in the world

A bit of history

The building of the Brazilian industry

At the moment....

- Most of the main value chains / value networks governed by MNCs/TNCs
  - 5 out of 10 / 8 out of 20 largest companies are TNCs, the others were created by the State
    - Exceptions: Braskem, Ipiranga
- Productive chains / networks based on eletromechanicals
  - Gaps in (micro)electronics, fine chemicals

A bit of history

The building of the Brazilian Production System

Origin of Capital – 10 largest companies by sector (2010)

SECTOR	FOREIGNER	BRAZILIAN	OBS
Automotive	10	0	
Capital goods	4	6	No Brazilian integrators
Consumer goods	6	4	
Electro-electronics	9	1	Brazilian Co is an assembler in Manaus Free Zone - Japanese technology and product)
Pharma	7	3	Only 1 Braz Co with a MeToo* molecule. Panorama is likely to change.
IT	9	1	Braz Co is State-owned, providing services to Federal Government
Cellulose / Paper	5	5	Sector based on natural resources
Chemical - /Petrochemical	7	3	Braz Cos in petrochemical and fertilizers (*commodities*)
Telecommunication	7	3	
Textile	10	0	
Commerce (not gross)	5	5	

Source: Revista Exame - Melhores e Maiores Capture at http://exame.abril.com.br/negocios/melhores-e-maiores/, Feb 10, 2012.

Industrial polices since 1950s (1)

- Getúlio Vargas (1940s)
  - State-owned heavy industries (steel, basic chemicals, oil)
- Juscelino (JK) government – "Plano de Metas" 1950s
  - "50 years in 5", but no exigency of design activities
  - Attraction of foreign industries to produce for the internal market
    - Ex.: Auto assemblers for foreigners; the policy "killed" the Brazilian industry at the time (less taxes for foreigners)
  - Import substitution: closed market (for TNCs...)
- The hegemony of foreign capital in industry may explains the differences of the Brazilian import substitution policy from those of Japan and Korea

Industrial polices since 1950s (2)

- Military dictatorship (1960s -70s)
  - Nationalistic view of production, not of engineering and product design
  - Heavy investments to fulfil gaps in industrial chains (petrochemicals, machinery etc.), external debt
  - Mid70s
    - Brazil as the fast growing economy of 20th century
    - Imports accounted for only 6% of its GDP
- Oil crisis / debt crisis and political fights against dictatorship have dismantled the model
  - Crisis - the “lost decade” (80s) with high inflation, high external debt and low growth

FHC: 1995 – 2002

- FHC: “The best industrial policy is not to have one”, by Pedro Malan, Ministry of Economy
  - Focus on stabilizing the economy (Plano Real)
  - Fixed parity real – US$ dollar, industrial regression
  - Privatizations, financed by BNDS
  - Some programs based on “total quality”
  - Automotive regime to cope with investments being deviated to Argentina
  - New funds aiming at regaining historical levels of public investments in scientific research

Lula's Government: PITCE 2003

First explicit industrial policy in many decades

- Focus 1: technology and innovation
  - Innovation law
  - Tax incentive law, inducing R&D expenditures and employment ("lei do bem")
- Focus 2: exports
  - Credit, Apex, procedures simplification, monitoring
- Focus 3: institutional
  - ABDI – Brazilian Agency for Industrial Development
  - CNDI – The National Council of Industrial Development
  - Finep: new programs to finance firms' innova-tion projects

Researches on innovation

1. Design headquarters increases local production
2. Impacts of innovation and product differentiation
3. Innovation processes: which one for which process?
4. Entrepreneurial action & uncertainty management in the ecosystem

I. R&D, engineering design & manufacturing

- The crucial role of location
  - Research in the automotive chain in Brazil and in VW and Renault's headquarters (supported by BNDES)
  - Location of R&D and product engineering activities have a close link with location of physical production
    - The concept of **design headquarters** (Salerno et al, 2009)
  - The design headquarter has power to define and to change parts specification
  - Some key suppliers participate from the very beginning of the design – they must be located nearby

The importance of locally commanded design for the consolidation of local supply chain: the concept of design headquarters

Mario Sergio Salerno*, Roberto Marx and Mauro Zilbovicius

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Abstract: This
best practices in
studies were co
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a strong relatio
local autoparts
value, most of
activities and its
chain is discusse

Keywords: auto
Brazil.

Reference to
Marx, R., Zilbo
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of design headq
Vol. 16, No. 4, p

Biographical n
Production Engi
São Paulo, resea
policy

The characteristics and the role of modularity in the automotive business

Mario Sergio Salerno

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Abstract: Modularity is discussed in a broad sense, beyond proximity and physical production. The paper proposes a strategic view of the process, by considering modularity as an attempt to reduce the capital employed by assemblers to set up a plant, to share the risk of the business with first tier suppliers, and to reshape the boundaries of the companies by a type of relationship assembler – suppliers characterized by a special service relation in order to cope with the productive vulnerability inherent in a low inventory system. The evolution of modular plants in Brazil – a key country in the matter – is discussed from the modular consortium of the VW Resende plant to the newest passenger car plants set in the industrial condominiums system, particularly the GM Gravataí. The last section focuses on modularity and design activities and location, discussing the possibilities for decentralized design activities. Finally, some research questions are proposed.

Keywords: Modularity; industrial condominiums; assembler–supplier relationship.

Reference to this paper should be made as follows: Salerno, M.S. (2001) 'The characteristics and the role of modularity in the automotive business', *Int. J. Automotive Technology and Management*, Vol. 1, No. 1, pp.92–107.

Biographical notes: Dr. Mario Sergio Salerno is Associate Professor in the Production Engineering Department at the Polytechnic School, University of São Paulo, researching on work and production organization in a broad sense. He is also a member of GERPISA (Groupe d'Études et de Recherches Permanent sur l'Industrie et les Salariés de l'Automobile/Permanent Group for the Study of the Automobile Industry and its Employees) International Network scientific board.

1 Introduction

Modularity is currently a key issue in how to run an industrial business, in how to

International division of labour in product development activities: towards a selective decentralisation?

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Abstract: This paper aims to contr
division of labour among headquarte
markets, concerning product develop
proximity and technological sourcing,
PD activities, are not sufficient to
subsidiaries located in emerging mar
We then propose that this integration
time and costs; also, the integration of
with headquarters and on the role
Finally, we present some proposals
concerning the development of platfo
PD process. These propositions are
major car assemblers in the last four y
as their Brazilian subsidiaries.

Keywords: emerging countries; glo
international division of labour; profit

Reference to this paper should be m
Salerno, M.S. (2004) 'International d
activities: towards a selective decentr
and Management, Vol. 4, Nos. 2/3, pp

Biographical notes: Ana Valéria Car
Administration Department, Centro
researching on the integration of Brazi
in product development activities and
main areas of research are work and p

Mario Sergio Salerno is Associate P
Department, Polytechnic School, Univ
and production organisation in a broad

The modular consortium in a new VW truck plant in Brazil: new forms of assembler and supplier relationship

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Since November 1995, VW has been running an experimental plant to produce trucks and buses in Brazil. The manufacturing strategy is quite different from the current strategies one can see in the automotive industry worldwide. VW has defined its concept as "modular consortium". Describes the plant's main characteristics, and discusses the risks and the opportunities for VW and its partners to obtain sustainable competitiveness based on a radical new production concept.

Introduction

Two of the major areas of change in the world auto industry are the patterns of production organization and to the relationships between assemblers and suppliers.

An innovative experiment is being conducted in a new Volkswagen truck and bus plant in Resende, Brazil. All the operations are being carried out by suppliers *inside* the site. This organization concept has been called a "modular consortium".

This paper discusses a set of results from a larger research that is being developed by the authors and some other colleagues. The aim of the research is to monitor and evaluate the development of this new concept of organizing production, establish its relationship with other changes that are occurring in the global automobile industry and especially in Brazil, where huge investments are being made and planned by transnational companies. The development of this concept is a unique opportunity for researchers to follow and analyse from its very beginning a concrete experiment that is being conducted by a major assembling company outside US, Japan or Europe.

A series of interviews were conducted with VW directors, managers, and engineers; some of the suppliers involved in the project; managers of companies that participated in the process of negotiation with VW but eventually did not take part in the project; engineers from a company that was subcontracted to design the facility; trade unionists. Plant visits were also held.

Integrated Manufacturing Systems
8/5 [1997] 292–298
© MCB University Press
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Conceptual framework

Very little can be found in the literature that can be used as a theoretical framework for this case. Some references discuss the benefits and the risks associated with initiatives like vertical integration, joint ventures and virtual factories which are relevant but do not deal exactly with the new aspects introduced by VW Resende plant. Nevertheless, Williamson's (1994) approach to "transactions economics", Hill's (1993) approach to focusing and the benefits and risks associated with vertical integration and the Chesbrough and Teece (1996) critique on the virtual factory concept will be briefly presented in order to build a useful conceptual framework.

Williamson (1994) argues that the degree of vertical (dis)integration must be considered in the light of the costs of transaction between organizations. This author has opened a wide range of new and important research questions by stressing the need of considering the various types of transactions and forms of contracts intra and inter firms to better understand their behaviour. One of his main conclusions is that the best management structure for a firm is one that allows stronger adaptability to uncertainties. Based on this assumption he stated that vertical integration could be a good choice when this adaptability can be obtained without the need for renegotiating contracts between parts.

According to Hill (1993), focusing strategies must be seen in the context of a reorientation in the business strategy as a mean to reduce complexity and to concentrate efforts in less products/markets/processes.

When analysing what he calls the post-industrial company, Hill (1993) assumes that it would do little manufacturing and will rely on others for many important and essential business functions. The risk associated with this strategy is the possibility of losing the company ability to compete, since it will weaken its capacity of innovation and productivity

II. Innovation and product differentiation – Ipea Research

- Large data set on Brazilian industry (1992-2002)
  - PINTEC/IBGE; PIA/IBGE; RAIS/MTE; SECEX/MDIC; BACEN; MPOG
  - 95% of industrial value added; 72.000 industrial firms, 5.6 million workers
- Firms categorized according to real measured strategy

A) *Firms that innovate and differentiate products*
  - New product t the market
  - 30% premium price in exports (same category of product comparing to other exporters)

B) *Firms specialized in standard products, high productivity*
  - Exporters without premium price
  - Non exporters, productivity equal or greater than exporters

C) *Firms without product differentiation, lower productivity*
  - Non classified in A or B

General Overview

Category	N	Number of Workers	% Em ployment	% Income
A) Innovate and differentiate product	1.199 (1.7%)	545,9	13,2%	25,9%
B) Specialised in commodities	15.311 (21,3%)	158,1	48,7%	62,6%
C) No differentiation / lower productivity	55.486 (77,1%)	34,2	38,2%	11,5%
Total	71.996			

General Overview

Category	Productivity (R$1.000/worker)	Value added R$ 1.000,00	Market leadership	P&D expend. (% income)
A) Innovate and differentiate product	74,1	51,1	0,02	3,06
B) Specialised in commodities	44,3	10,6	0,004	0,99
C) No differentiation / lower productivity	10,0	0,45	0,00028	0,39
	Value added by worker		(Firm income) / (CNAE sector income)	P&D expenditures / income

Germany=2,7
France = 2,5

Wages

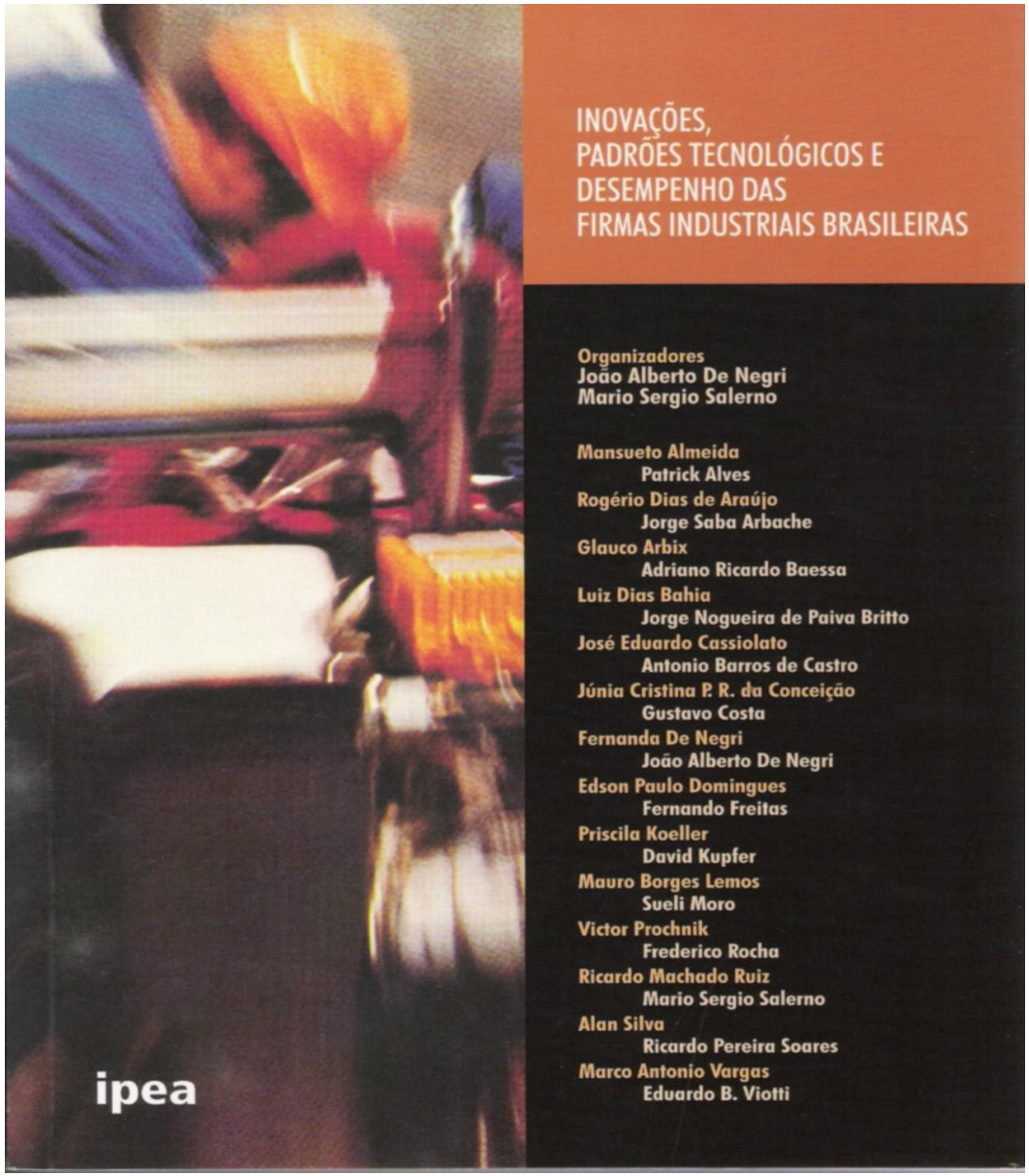
- Average A= R$1.255,00 / B=R$749,00 / C= R$431,00
  - Average compares different conditions (income, sector, external trade etc)

- Probabilistic model controlling 200 variables (income, sector, exports, qualification, schooling, employment time, turn over, capital origin, etc.)
  - *A* firms pay wages 23% higher than *C* and 11% higher than *B*
  - So, an increase in the number of *A* firms tends to have positive effects on general wages

Innovative effort

Innovative effort is greater in Brazilian-owned firms

- R&D expenditures / income
  - A = 3.06; B=0.99; C=0,39 Total = 0,7 (Germany =2,7%)
  - Braz Co = 0,75% ; MNCs = 0,62%
  - 79% of MMCs are B or C
  - MNCs: less internal expenditures, more external acquisitions
- 39% of A are MNCs or mixed
- Probabilistic model controlling variables such as income, # of personnel, sector, external trade, etc.
  - Innovative effort of Brazilian Cos is 80,8% greater than the MNCs ones

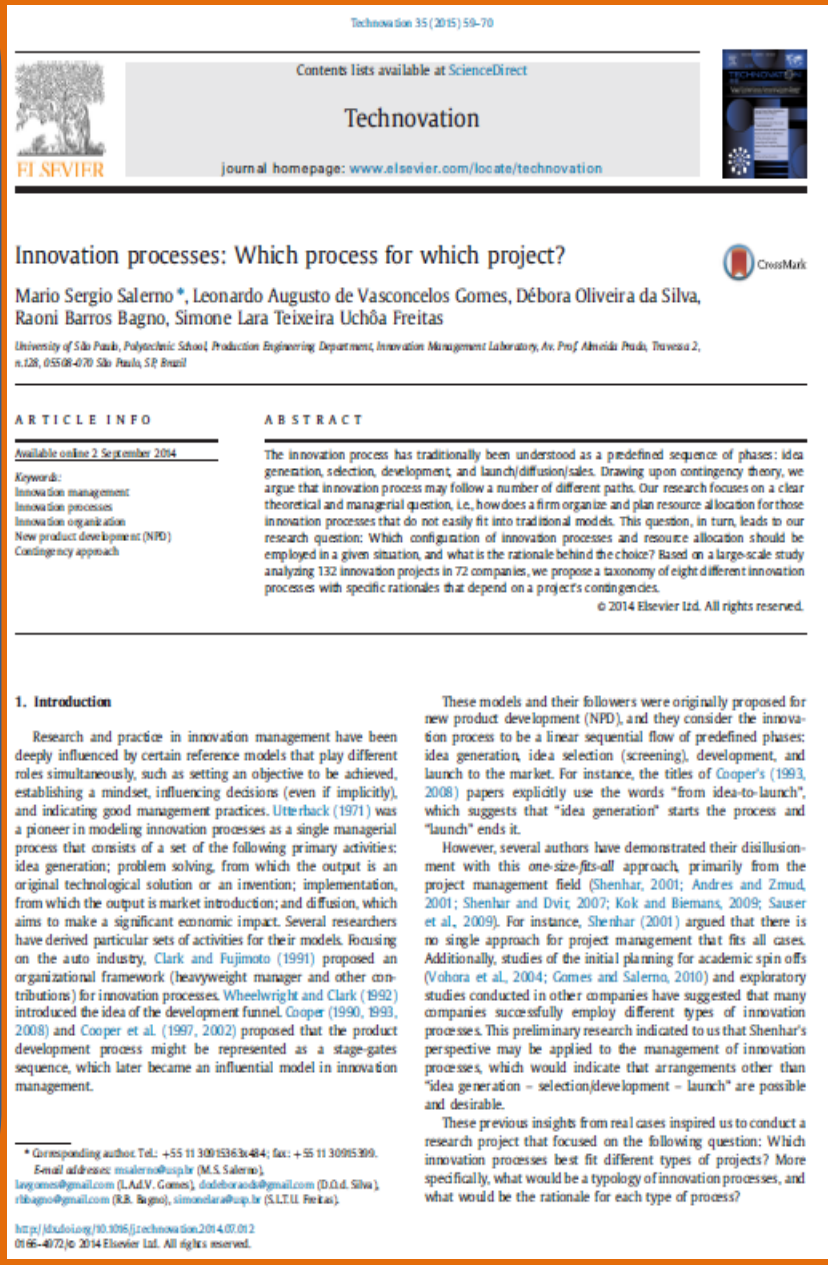


- Ipea's research was developed to support the building of PITCE (2003 onwards)
- The book has inaugurated a series of studies based on Brazilian national databases
  - External trade, productivity etc

Download at
http://www.ipea.gov.br/portal/images/stories/PDFs/livros/Inovacao_Padroes_tecnologicos_e_desempenho.pdf

III. Innovation processes: which one for which project?

- ✓ 132 innovation projects researched in 72 Cos
- ✓ Contingency approach: which factors influence innovation process?
- ✓ Large field work, many possibilities of analysis



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Innovation processes: Which process for which project?

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New product development (NPD)
Contingency approach

ABSTRACT

The innovation process has traditionally been understood as a predefined sequence of phases: idea generation, selection, development, and launch/diffusion/sales. Drawing upon contingency theory, we argue that innovation process may follow a number of different paths. Our research focuses on a clear theoretical and managerial question, i.e., how does a firm organize and plan resource allocation for those innovation processes that do not easily fit into traditional models. This question, in turn, leads to our research question: Which configuration of innovation processes and resource allocation should be employed in a given situation, and what is the rationale behind the choice? Based on a large-scale study analyzing 132 innovation projects in 72 companies, we propose a taxonomy of eight different innovation processes with specific rationales that depend on a project's contingencies.

1. Introduction

Research and practice in innovation management have been deeply influenced by certain reference models that play different roles simultaneously, such as setting an objective to be achieved, establishing a mindset, influencing decisions (even if implicitly), and indicating good management practices. Utterback (1971) was a pioneer in modeling innovation processes as a single managerial process that consists of a set of the following primary activities: idea generation; problem solving, from which the output is an original technological solution or an invention; implementation, from which the output is market introduction; and diffusion, which aims to make a significant economic impact. Several researchers have derived particular sets of activities for their models. Focusing on the auto industry, Clark and Fujimoto (1991) proposed an organizational framework (heavyweight manager and other contributions) for innovation processes. Wheelwright and Clark (1992) introduced the idea of the development funnel. Cooper (1990, 1993, 2008) and Cooper et al. (1997, 2002) proposed that the product development process might be represented as a stage-gates sequence, which later became an influential model in innovation management.

These models and their followers were originally proposed for new product development (NPD), and they consider the innovation process to be a linear sequential flow of predefined phases: idea generation, idea selection (screening), development, and launch to the market. For instance, the titles of Cooper's (1993, 2008) papers explicitly use the words "from idea-to-launch", which suggests that "idea generation" starts the process and "launch" ends it.

However, several authors have demonstrated their disillusionment with this *one-size-fits-all* approach, primarily from the project management field (Shenhar, 2001; Andres and Zmud, 2001; Shenhar and Dvir, 2007; Kok and Biemans, 2009; Sauser et al., 2009). For instance, Shenhar (2001) argued that there is no single approach for project management that fits all cases. Additionally, studies of the initial planning for academic spin offs (Vohora et al., 2004; Gomes and Salerno, 2010) and exploratory studies conducted in other companies have suggested that many companies successfully employ different types of innovation processes. This preliminary research indicated to us that Shenhar's perspective may be applied to the management of innovation processes, which would indicate that arrangements other than "idea generation – selection/development – launch" are possible and desirable.

These previous insights from real cases inspired us to conduct a research project that focused on the following question: Which innovation processes best fit different types of projects? More specifically, what would be a typology of innovation processes, and what would be the rationale for each type of process?

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0166-4972/

Contingencies

1. Product cycle time and product development time
2. Design based on technological principles and scientific discoveries or on tacit knowledge and experience
3. Market: mature; in expansion; being shaped; not existent (projects that opens up a new market, such as Walkman or Post It)
4. Technological trajectory: mature techs; adaptation of familiar techs; integration of existent techs; not existent in the beginning of the project
5. Total expenditures
6. Product: improvements; new family; new platform
7. Relation with clients: shelf x order (tailor made product)
8. Product concept: concept improvement, new concept for a known product, new concept with a new product

Innovation Processes - Taxonomy

Type of innovation processes	Cases		Number of companies presenting the process (*)
	#	%	
1. Traditional process: from idea to launch	70	53,0%	46
2. Anticipating sales: the tailor-made approach (open order)	8	6,1%	6
3. Anticipating sales from a given client specification (closed order)	7	5,3%	7
4. Process started by a call	17	12,9%	12
5. Process with a stoppage: waiting for the market	9	6,8%	8
6. Process with a stoppage: waiting for the advance of technology	4	3,0%	4
7. Process with a stoppage: waiting for the market and for the advance of technology	2	1,5%	2
8. Process with parallel activities	15	11,4%	14
Total	132	100,0%	

8 Innovation Processes

Figure 1. Traditional linear process from idea to launch.

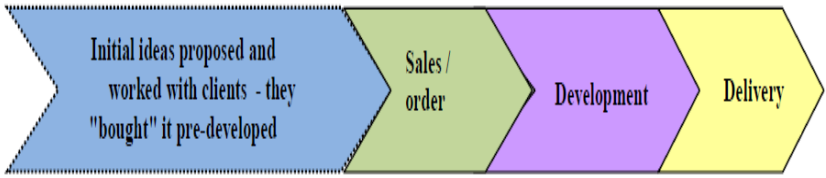

Figure 2. Anticipating sales: development to order (open).

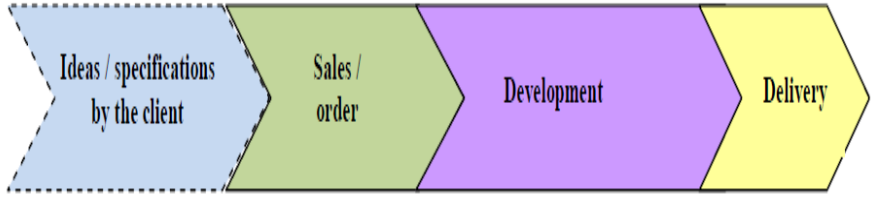

Figure 3. Anticipating sales: development to order (closed).

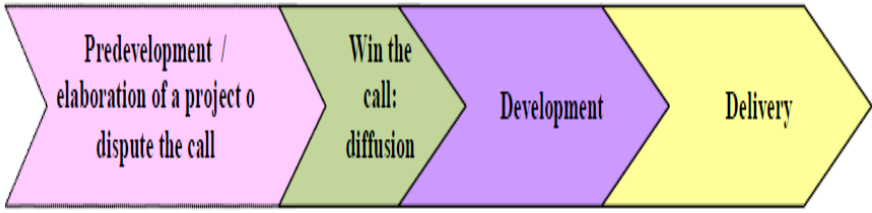

Figure 4. Process started by a call

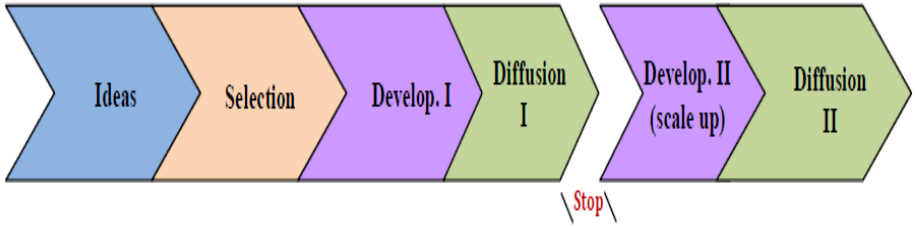

Figure 5. Process with a stop - waiting for the market

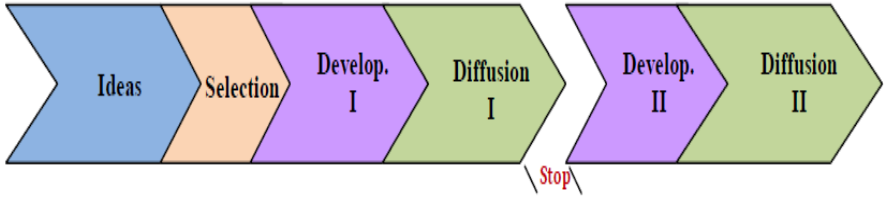

Figure 6. Process with a stop - waiting for technology improvement

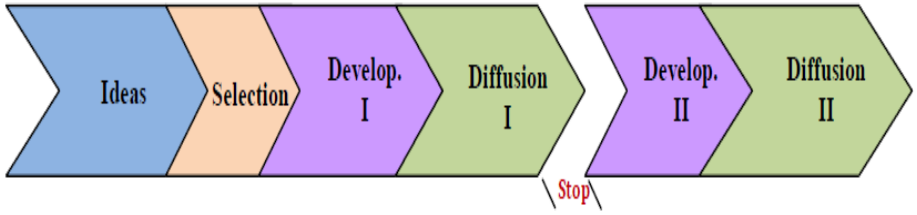

Figure 7. Process with a stop - waiting for market & technology

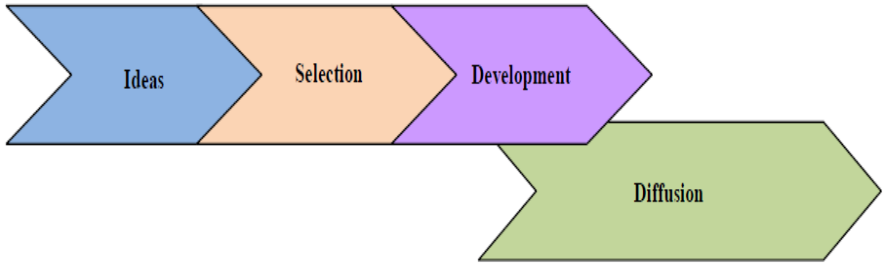

Figure 8 Process with parallel activities

Conclusions

- The research aimed to categorize innovation processes
  - One size does not fit all
- We identify 8 innovation processes
- The main contingencies are
  - The position of the clients (shelf x order)
  - Cycle time (e.g., fashion)
  - The building of conditions to make the project attractive, viable
    - Market and/or technology
- It highlighted the issue of uncertainty management
  - A concept / category not present in the beginning of the research

IV. Entrepreneurial action and uncertainty management

How do entrepreneurs manage uncertainties at the ecosystem level?

Current approaches to entrepreneurial action focus on the firm level

As entrepreneurs are not able to deliver all the innovations required to set a new business, they face the challenge of creating and coordinating **a complex ecosystem**

Unpacking uncertainty

Dimensions of the uncertainty construct

Degrees

Strong uncertainty
Weak uncertainty

Types

State uncertainty
Response uncertainty
Effect uncertainty

Managerial approach

Learning trial-and-error
Selectionism

Source/Extension

Endogenous
Exogenous

Unpacking uncertainty

Dimensions of the uncertainty co

Difficulty to predict environment evolution

Difficulty to perceive the options to respond to a change

Types
State uncertainty
Response uncertainty
Effect uncertainty

Difficulty to predict the effects of a given change or a given action

Managerial approach
Learning trial-and-error
Selectionism

Source/Exte
Endogenou
Exogenous

How do entrepreneurs manage uncertainties at the ecosystem level?

Bridging uncertainty

Idea
An ecosystem could be described as a network of uncertainties affecting individuals and groups.

Concept
Bridging uncertainties process occurs when entrepreneurs connect individual and collective uncertainties that affect different actors in the ecosystem, in order to mitigate these uncertainties or/and create and capture value from solving them.

Uncertainty propagation

Idea
An ecosystem could also be described as network of assumptions. Both networks may co-evolve.

Concept
Uncertainty propagation phenomenon occurs when an uncertainty propagates throughout an ecosystem.

How do entrepreneurs manage uncertainties at the ecosystem level?

1. Making sense of uncertainties
2. Perceiving collective uncertainties
3. Bridging uncertainties
4. Conducting collective learning experiments
5. Building a common template

More s er!

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DOSSIÊ DESENVOLVIMENTO E INOVAÇÃO

ESCASSEZ DE ENGENHEIROS NO BRASIL?

Uma proposta de sistematização do debate

Leonardo Melo Lins
Mario Sergio Salerno
Bruno César Araújo
Leonardo Augusto Vasconcelos Gomes
Paulo A. Meyer M. Nascimento
Demétrio Toledo

RESUMO

Buscamos ordenar e qualificar uma discussão contemporânea, relativa a uma possível escassez de engenheiros na sociedade brasileira. Com base na literatura, elencamos as hipóteses que levariam à caracterização de escassez e procuramos argumentos baseados em dados para discutir tais hipóteses. Os dados não corroboram a tese de escassez generalizada.

PALAVRAS-CHAVE: *escassez de engenheiros; engenharia; mercado de trabalho.*

ABSTRACT

In this article, we systematize a contemporary discussion concerning a possible shortage of engineers in Brazilian society. Based on the literature, we list the assumptions that could characterize scarcity and we have looked for data that allow us to test these hypotheses. The data do not support the idea of a general shortage of engineers.

KEYWORDS: *Shortage of engineers; Engineering; Brazilian labor market.*

II – INOVAÇÃO E COM

Gest. Prod., São Carlos, v. 18, n. 2, p. 221-236, 2011

As estratégias na relação com fornecedores: o caso Embraer

The strategic relationship with suppliers: Embraer case study

Vanessa de Lima Ferreira[1]
Mario Sergio Salerno[2]
Paulo Tadeu de Mello Lourenção[3]

Resumo: A Embraer se notabilizou, na relação com fornecedores, por estratégia de parceria, a qual se tornou referência em vários segmentos industriais. O tema deste artigo é justamente a estratégia na relação com os fornecedores, sendo a Embraer o caso utilizado para a investigação. Com base na literatura de relações de fornecimento e de fornecimento modular, a pesquisa recupera o enfoque da Embraer em suas diferentes linhas de produtos. Se nas famílias ERJ145 e E-Jets – EMB170/190, foram identificadas as parcerias de risco, nas quais fornecedores investem diretamente no desenvolvimento do produto e na capitalização do negócio específico, nas famílias mais recentes, de jatos executivos, a estratégia é outra. Isso levou à questão de pesquisa do presente texto: quais contingências estão relacionadas às diferentes abordagens na relação com fornecedores. Nesses termos, discute-se do fornecimento tradicional ao compartilhamento de investimentos e riscos, e as racionalidades subjacentes. As técnicas utilizadas para elaborar o trabalho foram observação direta, pesquisa em documentos da empresa, revistas especializadas, *web sites* vinculados à indústria aeronáutica e associações, e artigos acadêmicos. Além disso, foram conduzidas entrevistas semiestruturadas, com empregados e ex-empregados da empresa, inclusive diretores. Os resultados mostram que apesar de as grandes empresas – como Boeing e Airbus, inspiradas pelo caso da Embraer – terem passado a adotar parcerias de risco, a Embraer mostra que a forma de relação segue modelo de contingência – o melhor depende de características da situação do momento e de suas perspectivas.

Palavras-chave: Relações de fornecimento. Parcerias de risco. Desenvolvimento de produto. Enfoque contingencial. Indústria aeronáutica. Embraer.

The firm's side of the Brazilian Innovation System

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THANK YOU!

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