MIT Industrial Performance Center
Innovation. Productivity. Competitiveness.

Innovation in Brazil: Advancing Development in the 21st Century

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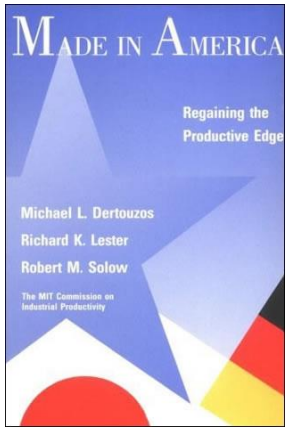
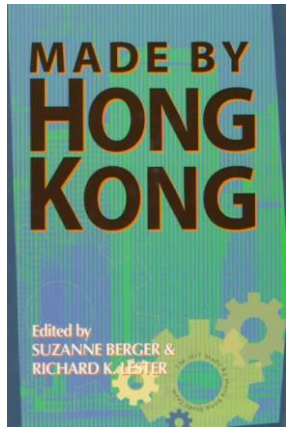
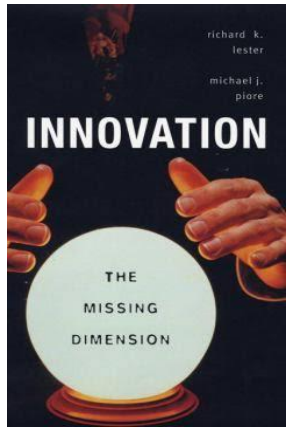
MIT Work of the Future

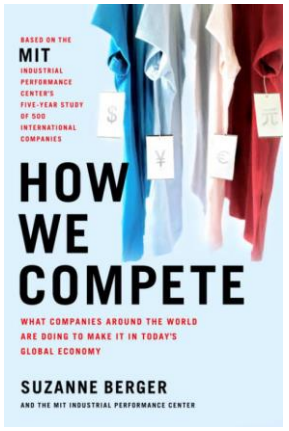
Brazilian Academy of Sciences
May 16th, 2019

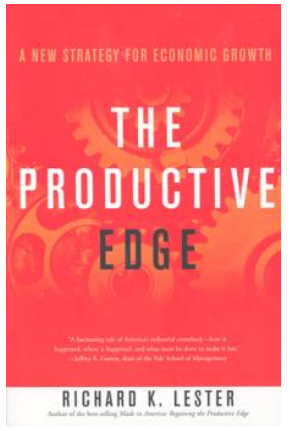
MIT's Industrial Performance Center is a multi-disciplinary research center concerned with industrial innovation, productivity and competitiveness in the global economy

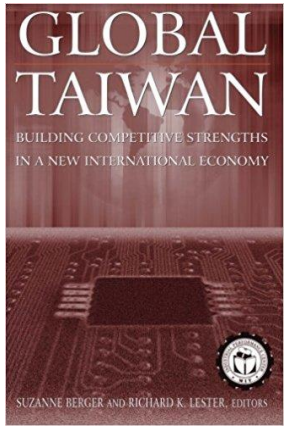


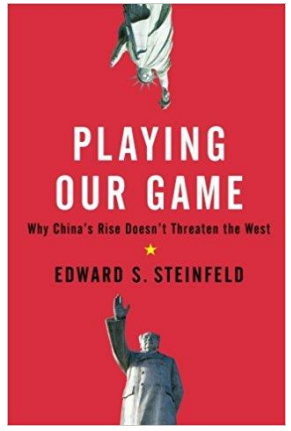


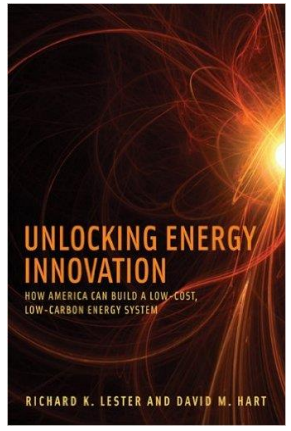


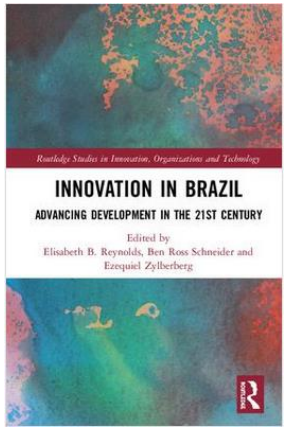


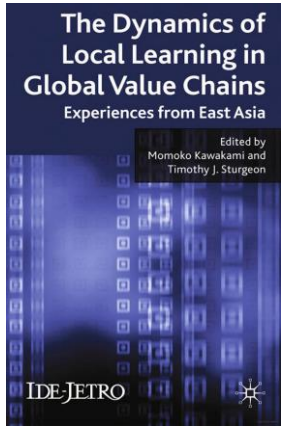


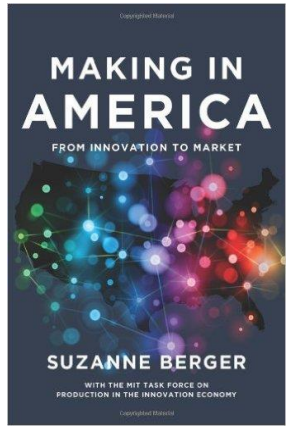












MIT IPC – SENAI Project Objectives

ACCELERATING INNOVATION in BRAZIL

- Launched in June, 2014 as a five-year research project sponsored by SENAI with the following objectives:
  - Examine SENAI's Innovation Institutes, how they fit within the larger ecosystem in Brazil, and how they can foster greater innovation at the regional and national level
  - Examine the Brazilian innovation ecosystem more broadly and make recommendations for increasing innovation capacity
  - Foster greater links with Brazil, through education, research and development, business and other points of connection

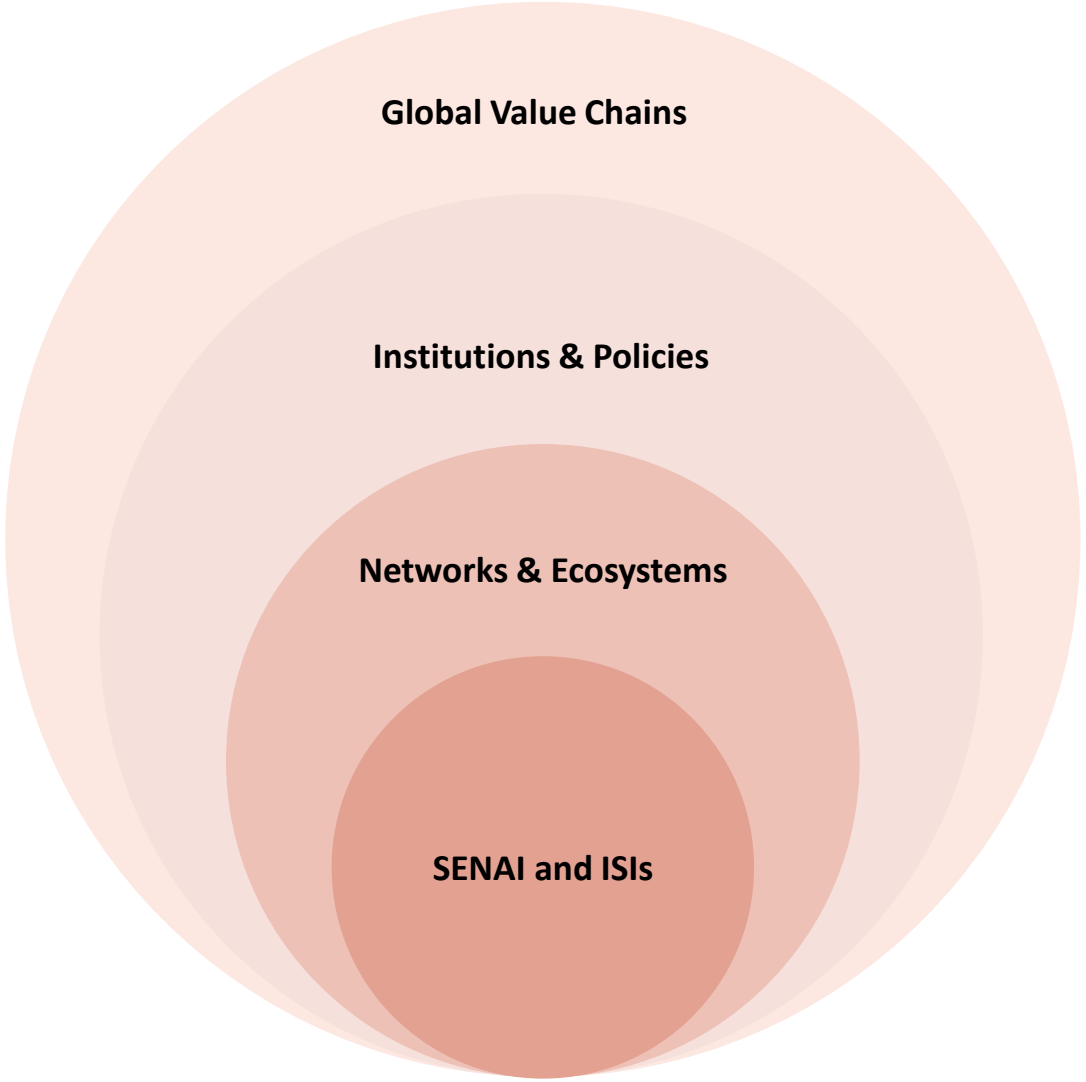
Accelerating Innovation in Brazil:
MIT IPC-SENAI Project Research Pillars

- Key firms and industries
- GVC insertion and upgrading
- Carving out role in R&D networks

- Institutional fragmentation
- Industrial and innovation policies
- Emerging innovation agenda

- Institutional innovation
- Universities as engines of innovation
- RTOs and innovation intermediaries

- Organizational transformation
- Organizational dynamics
- SENAI/SESI call for projects



Brazil's Innovation Agenda:
Progress, challenges and diagnoses

- The **gains associated with Brazil's innovation policies and programs have been limited**. Many factors contribute to this, but three primary reasons are:

  - **Global integration:** Brazil needs to be better integrated in the global economy to benefit from the global flow of goods, services, and ideas

  - **Costs and risk:** the cost of knowledge-intensive inputs and the risks associated with investing in innovation are too high

  - **Specialization:** programs and incentives are spread too broadly, and should be more focused on Brazil's areas of comparative advantage to support specialization

Priorities for Brazil's Innovation Agenda in 2019 and Beyond

1. Align Industrial and Innovation Policies

PPB: Selected Local Content Requirements for Tablets

Component	Local Content (%)			
	2011	2012	2013	2014
PCBs (processing)	50%	80%	95%	95%
PCBs (communications)	0%	0%	50%	80%
Mobile Chipsets	0%	0%	20%	30%
Chargers	0%	50%	80%	80%

Informatics Law R&D Spending and Outsourcing Requirements

Internal Expenditures (Can also be spent via third parties)			2.16%	4.00%
External Expenditures	Certified institutes anywhere in Brazil		0.80%	
	Certified institutes in North, Northeast and Center West	Public or private entities	0.45%	
		Public entities only	0.19%	
	Science and Technology Fund (FNDCT)		0.40%	

These industrial and innovation policies should not be eliminated, but should be made more flexible and brought into greater alignment

2. Support Institutional Innovations

- Innovation intermediaries play critical roles in innovation systems, including: technology development and diffusion, stakeholder convening, and the provision of public goods and services
- Brazil counts on a number of novel, innovative models such as SENAI's network of Innovation Institutes, EMBRAPII, and FAPESP's Engineering Research Centers, and MEI (Business Movement for Innovation)
- There should be continued experimentation with different models; however, if a model proves ineffective over time, it should be sunseted to ensure that resources are not unnecessarily fragmented

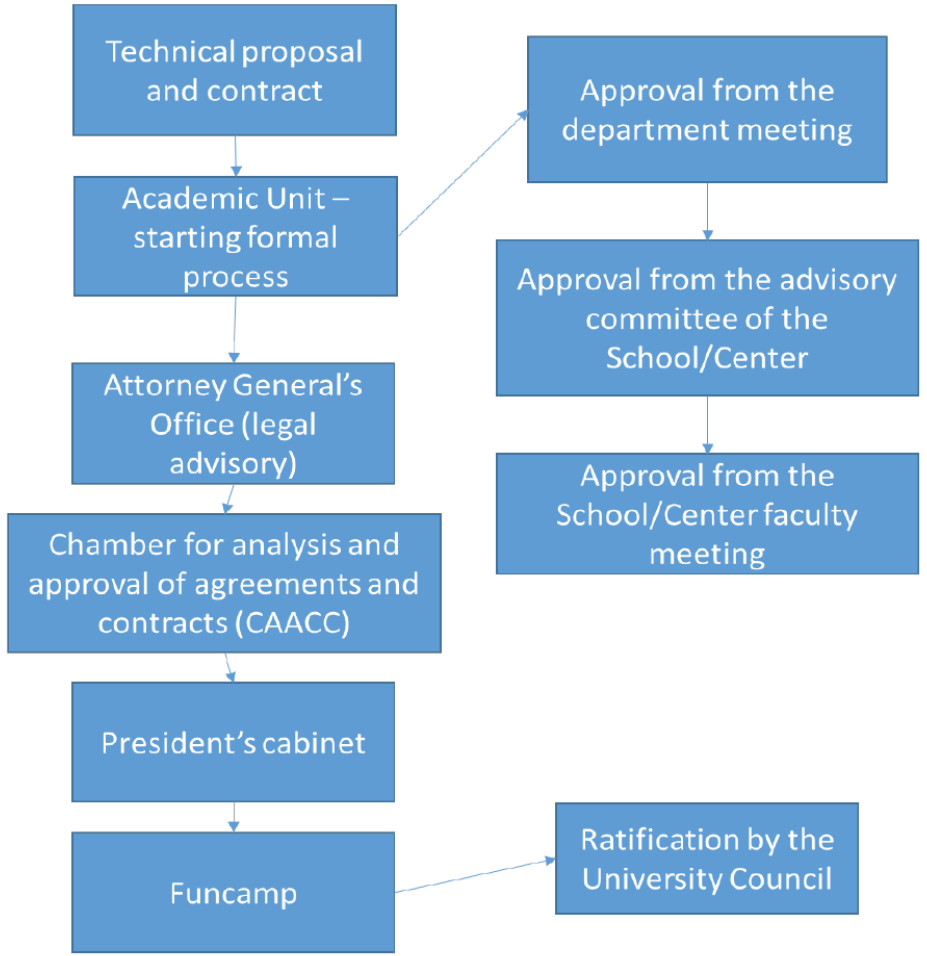
EMBRAPII has expanded significantly since its inception drawing significant private R&D funding

	YEARS				*TOTAL*
	2014	*2015*	*2016*	*2017*	
Number of Signed Research Contracts	9	70	99	208	386
Total Value of Contracted Projects (R$ Million)	10.3	116	155	331	612.3
EMBRAPII's Funding of Contracted Projects (R$ Million)	3.4	38.7	51.7	110.3	201.1
Concluded Projects	–	1	39	69	109
EMBRAPII's Projects	3	13	28	42	42
Industrial Companies	9	51	62	144	266

3. Strengthen Translational Capacity at Universities

- Minimize bureaucracy, create incentives, and foster the right environment to support risk-taking and streamline interactions with industry partners
- Support and reward specialization in universities that can show national and global excellence in particular disciplines or fields
- Focus technology transfer offices on translation and impact more so than revenue
  - Patenting bottleneck in Brazil is inhibiting translational impact
  - ***"A patent without a license is the worst of all worlds. You spend money and tie up technology"***

Flowchart for the Unicamp contracts and agreements approval process

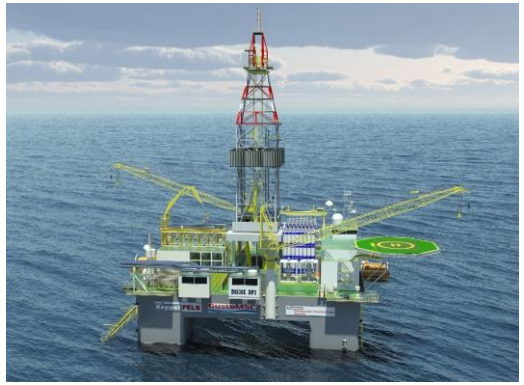


Source: Flowchart sent by Inova/Unicamp

4. Promote Strategic Sectors

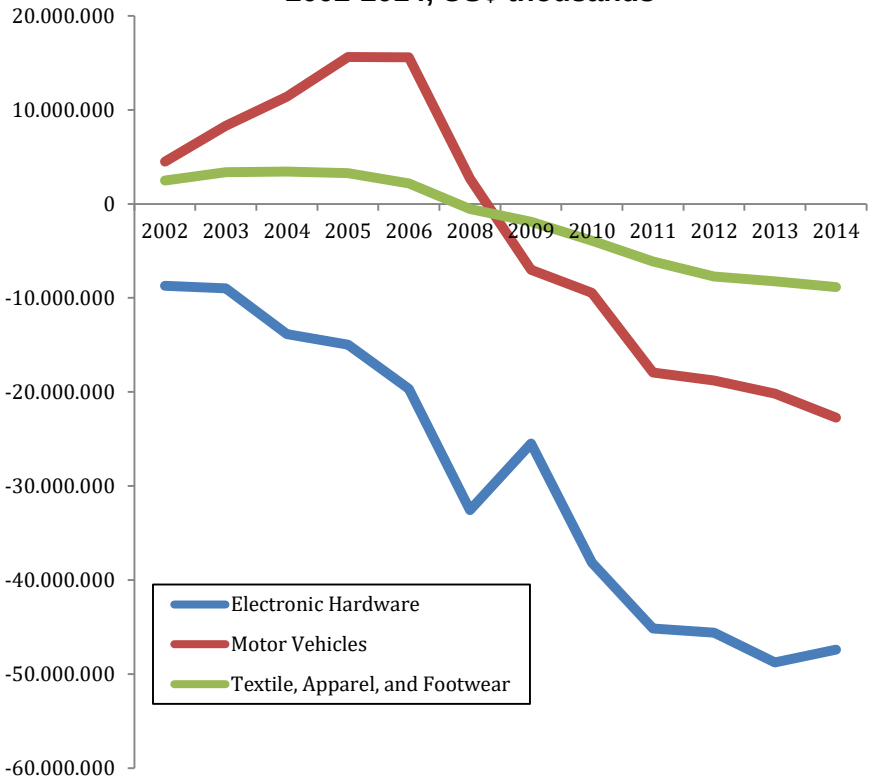
- National strategies should be focused and limited to **areas in which Brazil has an established or emergent comparative advantage**

- Priorities should be pursued through **mission-driven, long-range programs** that are stable and involve collaborative partnerships across industry, government, and academia



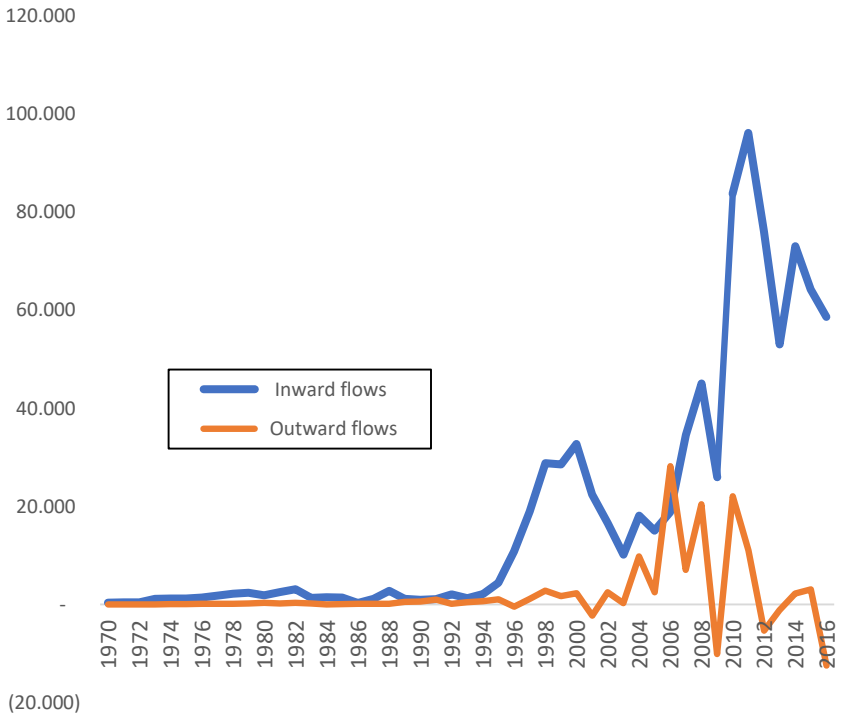
5. Engage the Global Economy

Brazil's Trade Balance in Three "GVC" Industries, 2002-2014, US$ thousands



Source: World Bank MC-GVC Database and calculations by Lara Loewenstein.

Brazil's Foreign Direct Investment Inflows and Outflows, 1970-2016 US$ million



Note: figures are in constant dollars.
Source: UNCTAD, http://unctad.org/en/Pages/DIAE/FDI%20Statistics/FDI-Statistics.aspx
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Encourage entrepreneurial pathways

Successful startups in Brazil:

- Leverage Brazil's **innovation ecosystem** for technology, funding, and mentorship
- Seek **foreign partners** to raise capital, acquire technology, and/or develop markets overseas
- Address problems in Brazil **and** in other countries, rather than focusing on the domestic market alone

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The Innovation Narrative

Building a Forward-Looking Innovation Agenda

- *There has been **significant progress** in the last 20 years on Brazil's innovation agenda.*
- *However, **ongoing political and economic crises** have threatened to derail the country's innovation agenda*
- *As **the pace of technological change quickens and the globalization of production & innovation grows** in scale and scope, Brazil needs to actively engage with new technology and global markets*
- *Brazil's **social policy agenda is tightly linked to its innovation and growth agenda**. Without the latter, there is limited ability to support the former in the long run*

Thank you!

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Appendix

Align Industrial and Innovation Policies

- Brazil has sought to 'trade markets for technology,' granting preferential market access in exchange for technology-intensive investments (i.e. R&D)
- These policies have been layered on top of long-standing local-content, import substitution policies in the auto, electronics, and oil & gas industries
- These policies are limited by the global nature of manufacturing, by characteristics of the R&D function itself, and by the government's limited ability to shape MNCs' R&D strategies
- ***These industrial and innovation policies should not be removed, but should be made more flexible and brought into greater alignment with one another***

ANP: Local Content Requirements for Modules with First Oil Through 2021

Subsystem	Item		Minimum Local Content (MLC) Requirement (%)	MLC Development Phase Modules (%)
Drilling, Assessment and Completion	Drilling Rig		50	55
	Logistics Support (Maritime/Air/Base) (obs 1)		50	
	Christmas Tree		70	
	Drilling and Completion (obs 2)		37	
	Auxillary Systems (obs 3)		58	
Production Collection System	Flowlines	Flexibles	40	
		Rigids	80	
	Basic Engineering		90	
	Detailed Engineering		90	
	Management, Construction, and Assembly		34	
	Flexible Production/Injection Lines (Flowlines, Risers)		56	
	Rigid Production/Injection Lines		50	
	Manifolds		70	
	Underwater Control System		20	
	Umbilicals		55	
Stationary Production Unit (SPU)	Hull	Basic Engineering	90	
		Detailed Engineering	90	
		Management	90	
		Construction and Assembly	75	
		Comissioning	90	
		Equipment and Materials	40	
		Naval Systems	50	
		Materials	80	
	Plantas (obs 5)	Basic Engineering	90	
		Detailed Engineering	90	
		Management	90	
		Construction and Assembly	75	
		Comissioning	90	
		Equipment and Materials	57	
		Materials	80	
	Installation and Integration of Modules	Basic Engineering	90	
		Detailed Engineering	90	
		Management	80	
		Construction and Assembly	75	
		Naval Systems	10	
		Comissioning	75	
		Materials	75	
	Anchoring	Preinstallation and Hook up of Anchoring Lines	40	
		Multiple Anchoring Systems	85	

Informatics Law: Local Content for Tablet Computers (%)

Component	2011	2012	2013	2014 –
PCBs (processing)	50	80	95	95
PCBs (communications)	0	0	50	80
Mobile Chipsets	0	0	20	30
Chargers	0	50	80	80
eMMC (Multi Media Card)	0	20	30	50
MCP (Multi Chip Package)	0	20	30	50
Nand Flash Memory	0	20	30	50
DRAM	0	20	30	50
SSD Module	0	20	30	50
Plastic Injection Molded Parts	0	15	22	40

Inovar Auto: Manufacturing Activities to be Conducted Locally (Number of Activities)

Manufacturing Activities	2013	2014	2015	2016	2017
Stamping	8	9	9	10	10
Welding					
Anti-Corrosive Treatment and Painting					
Plastic Injection					
Motor Manufacturing					
Gearbox and Suspension Systems Assembly					
Steering and Suspension Systems Assembly					
Electrical Systems Assembly					
Axle and Brake Systems Assembly					
Monoblock Manufacturing or Chassis Assembly					
Final Assembly					
Review and Testing					
Product Development and Testing					