Innovation in Chinese and Indian Auto Industries

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Strictly Private and Confidential

Agenda

Section 1
Where PwC’s viewpoint comes from

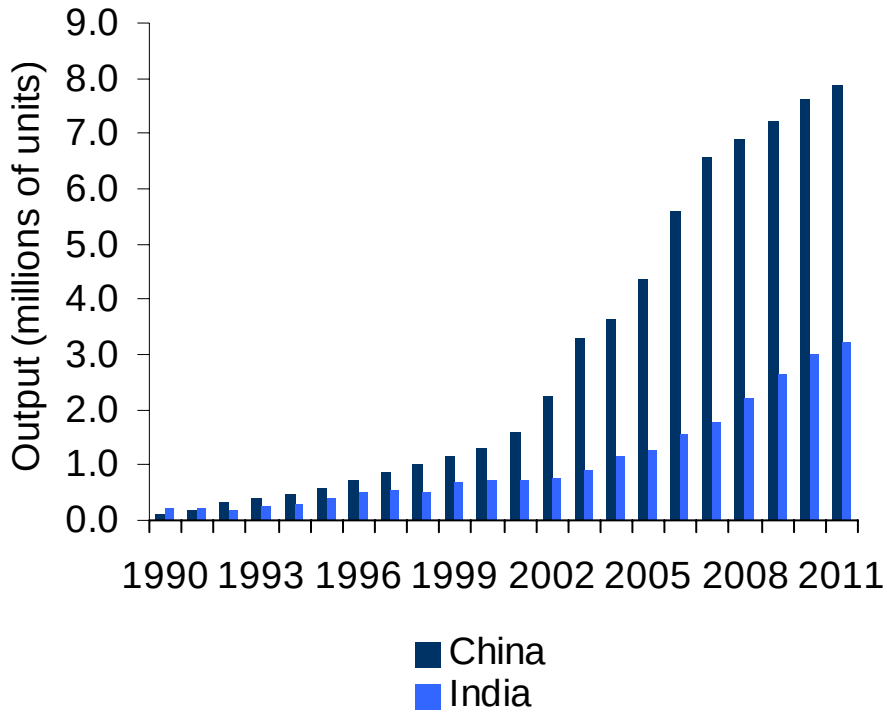
PwC's experience in Indian and Chinese automotive markets

- Leading professional services firm in China and India
- We have 9,000 employees in China; 3,500 in India
- 1,600 dedicated automotive consultants in Detroit, Canada, Brazil, Tokyo, Korea, Shanghai, India, Frankfurt
- Our Automotive Practice in India and China includes clients such as:

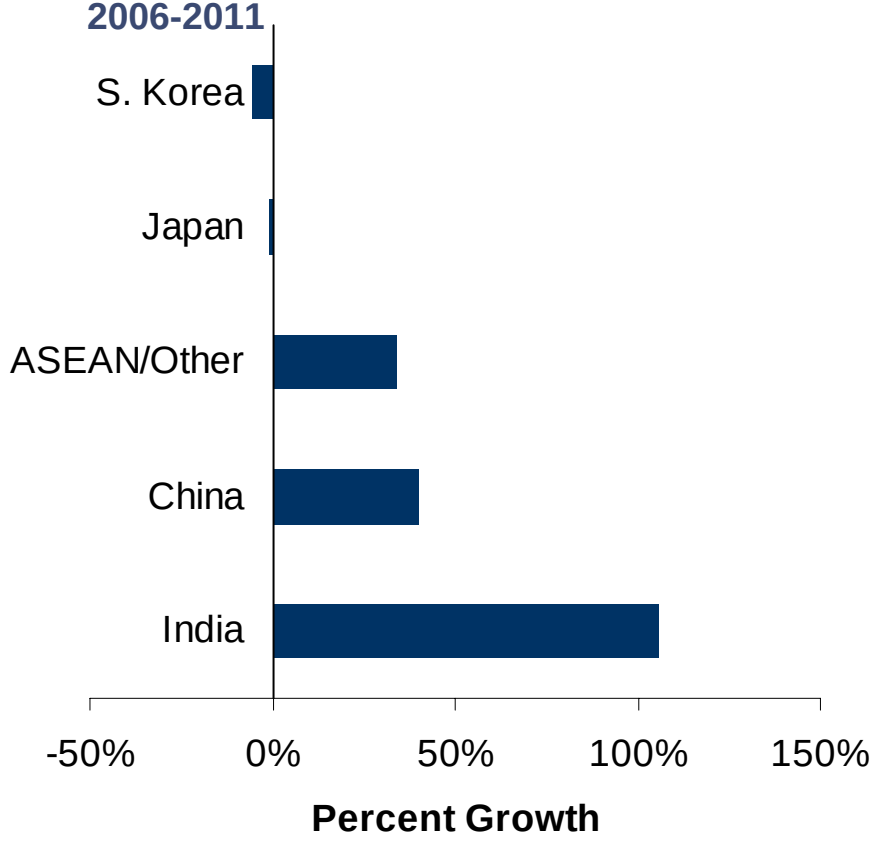
Section 2
Primer on Chinese and Indian auto markets

Chinese and Indian growth rates are projected to experience high levels of growth through 2011

Light Vehicle Assembly Actuals and Forecast 1990-2011



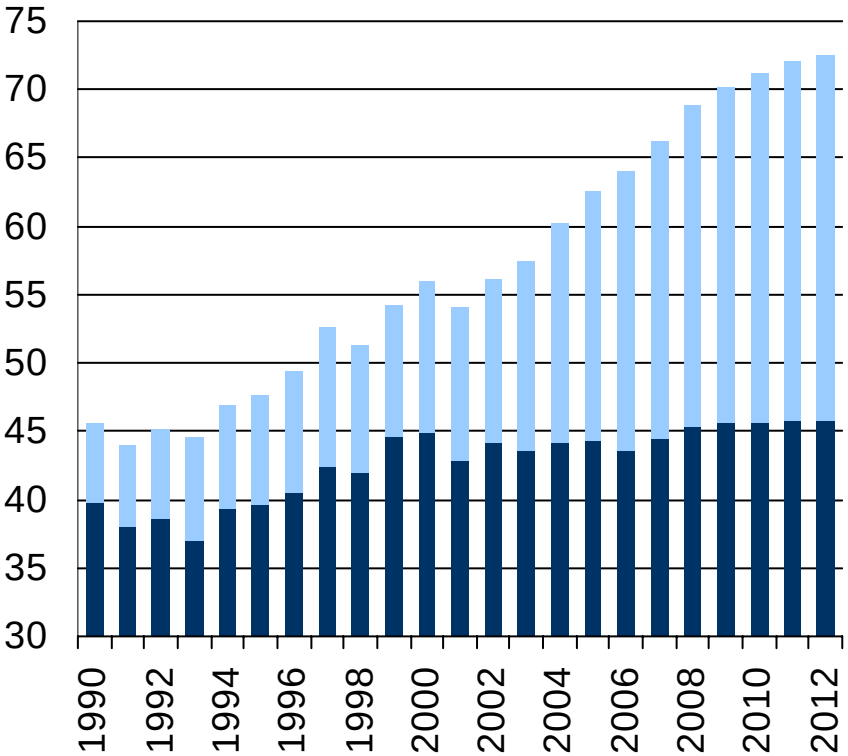
Light Vehicle Growth Percent Growth 2006-2011



Source: PwC Automotive Institute

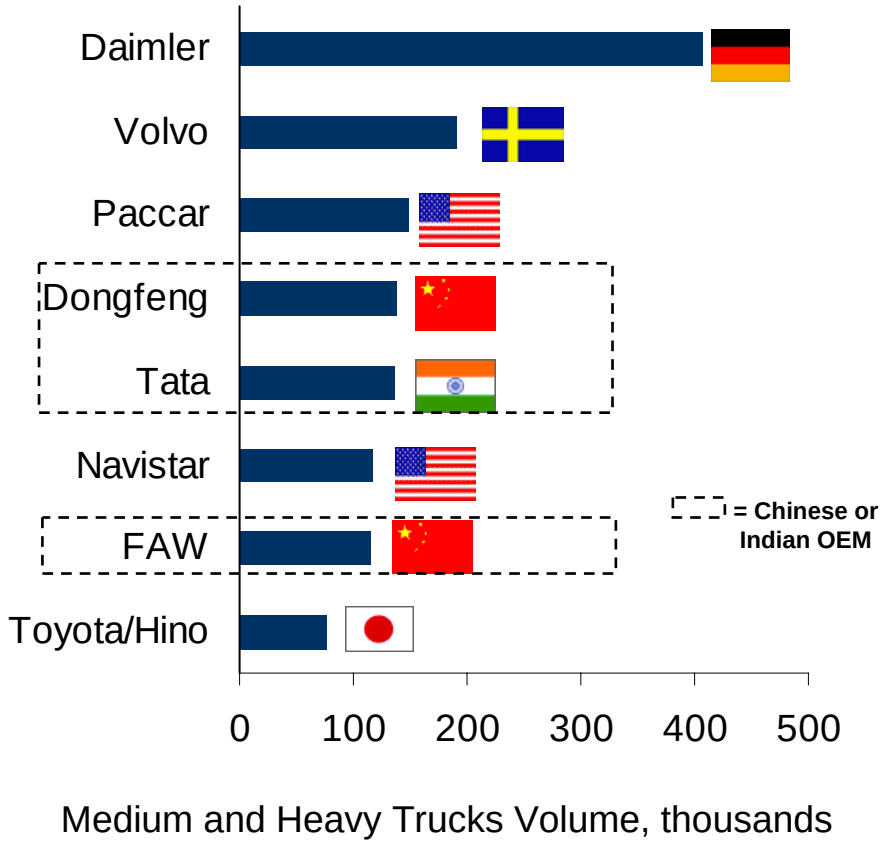
Significance of emerging market automakers to global industry

Global Light Vehicle Assembly Volume 1990-2012 (millions)



Source: PwC Automotive Institute

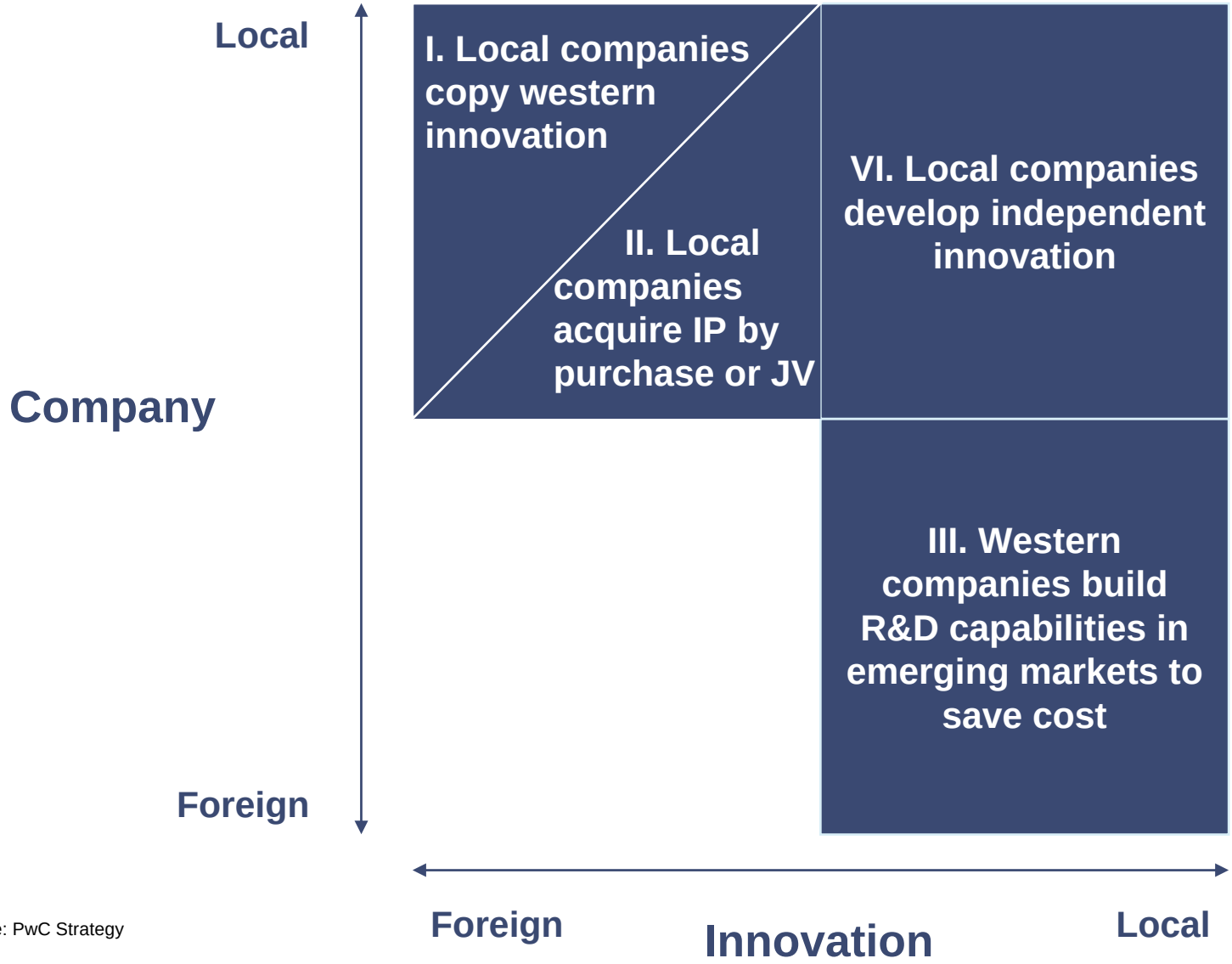
Largest Truck Manufacturers 2005, MDT/HDT



Source: DaimlerChrysler website

Section 3
Innovation in Chinese and Indian auto sectors

Different levels of innovation and IP in the Chinese and Indian automotive industries



Source: PwC Strategy

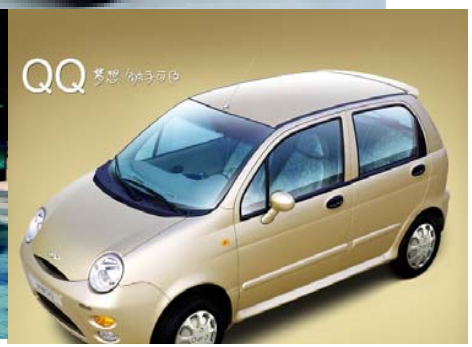
I. Local companies copy Western IP

Chinese and Indian innovation, in its primitive form, has often been direct imitation of existing vehicles

2004 Toyota Tundra vs. 2007 Chamco Pickup

2007 Smart ForTwo vs. Shuanghuan Noble

Geely Merrie 300 vs. Mercedes C-Class



Daewoo Matiz vs. Chery QQ

Source: gemssty.com, Chery, GM Daewoo

II. Local companies purchase Western IP

The growth of Chinese and Indian auto manufacturers has been and will continue to be an opportunity for Western IP holders

Examples of Design Outsourcing:

Tata Indica designed by **IDEA**

AVL Austria-designed **Chery** ACTECO engine

China Brilliance Zhonghua Junjie designed by **Pininfarina**

Examples of IP Licensing:

Cummins – Licensed diesel engine technology to Dongfeng (China) and Tata (India) which now account for $1.8B of $11B revenue

ArvinMeritor – In July 2007, formed a joint venture with Chery to build chassis systems in what will grow to be a $150 million business by 2010

III. Western companies build R&D in emerging markets

Western companies are leveraging Chinese and Indian human resources for both cheaper R&D and new innovations

Every major multinational automaker has at least one research facility in either India or China. Examples include:

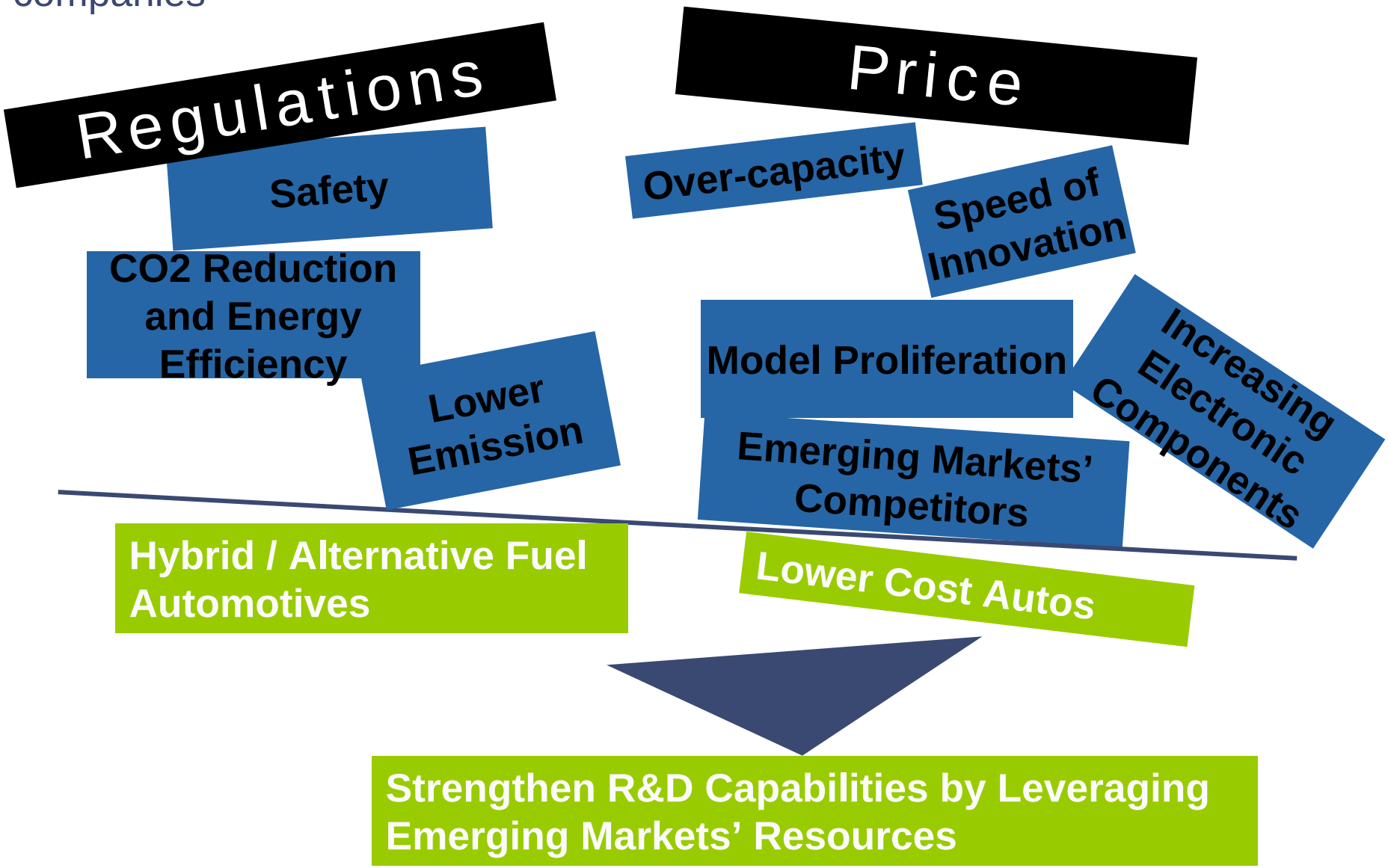
- Ford Motor Research & Engineering (Nanjing) Co. established 2006
- Daimler and Chrysler significantly increased the amount of R&D outsourced to their Bangalore Research Center in 2006
- R&D revenues in India expected to cross $1-billion by 2010

Multinational Automaker Research Centers In China

Source: Company reports, valuenotes.biz

III. Western companies build R&D in emerging markets

Demand for automotive innovation is increasing, putting strains on western companies



IV. Local companies develop independent innovation

Example: Tata driving low-cost auto revolution, influencing strategy of MNCs

The Renault Logan pioneered the low-cost car model, priced from $6000-8000

Tata introduced it's plans to produce a Rupees 1-Lakh car (US $2500)

Multi-national automakers intend to enter low-cost segment, with plans being influenced by the 1-Lakh car

Low-cost car segment (<$10,000) is the fastest growing in the world

Example: Tata 1-Lakh Car

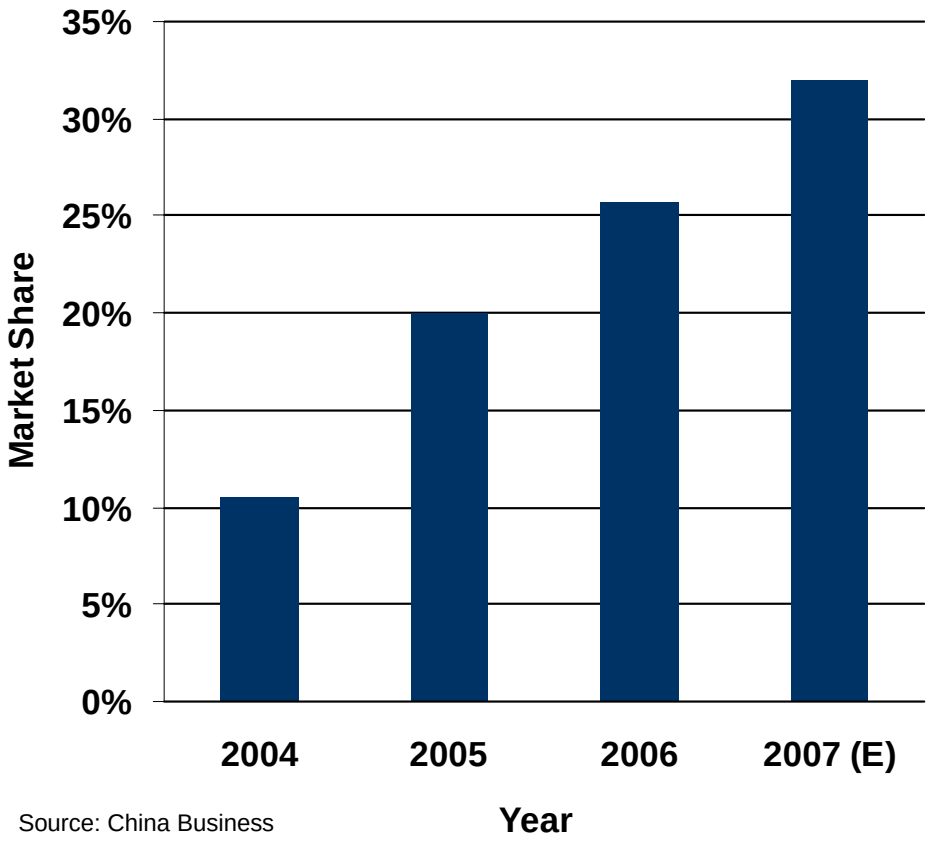
- To be sold for approx. Rs 1-Lakh (100,000 Rupees or US $2500)
- 4-door, 4-5 seater
- Rear-engine configuration
- 30 horsepower, 600cc engine
- Achieve approx. 25 kmpl (59 mpg)
- To be launched in 2008

Though Tata did not initiate the low-cost revolution, its innovation has driven established players to target cars below the Logan

Source: BusinessWeek, April 23, 2007

Chinese indigenous brand cars have witnessed an increasing market share

Chinese Indigenous Brand Passenger Car Share in Domestic Market



Source: China Business

- **Chinese automotive innovations have achieved positive results**
  - Most brands are sold less than RMB 100K and target low-end market segment
  - Chinese exports vehicles at a CAGR of 99.7% from 2003 to 2006 and the trend is expected to continue
- **China's R&D investment is still low relative to other countries**
  - R&D only take 0.63% of sales in Chinese companies, compared with 3-5% in western companies;
- **Even though we are seeing more and more market and design innovation, technical innovation still remains weak**
  - Chinese companies need to develop their R&D capability in core technologies such as engine, transmission and chassis

China's 11th Five-Year Plan encourages auto industry innovation and development

Government Objectives	Actions
Upgrade local R&D capabilities and build indigenous brands	• Government support in the areas of capital, technology, tax policy, purchasing and IP protection • Preferential treatment to key companies • Example: Chery has received RMB 1700 million from government to support innovation
More environmentally friendly and energy efficient vehicles	• Policy support and government funding for electric, hybrid and fuel cell cars • Stricter fuel economy standards
Speed up Industry Consolidation	• Fragmented industry with over 500 automakers; Government struggling to execute this objective • Higher entry barriers for license

Source: China Auto News

IV. Local companies develop independent IP

Example: Chery Case Study

I. Reverse Engineering/ Modification

- Locally modifying a design to call it their own; sometimes this is merely reverse engineering

II. Joint Design and R&D

- Foreign designers lead development of vehicle/platform/engine; local engineers responsible for certain portions (local capabilities)

III. Trial Independent Design and R&D

- Local development of certain systems and/or local development of vehicles off existing platforms

IV. Independent Design and R&D

- Full local design and development capabilities

Chery QQ

Chery Crossover

Dodge Hornet

Analysis

- Chery is currently between phase II and III
- But, ambition is clearly independent innovation capability
- Will Chery become the Chinese Toyota?

Source: PwC Analysis, MIT International Motor Vehicle Program

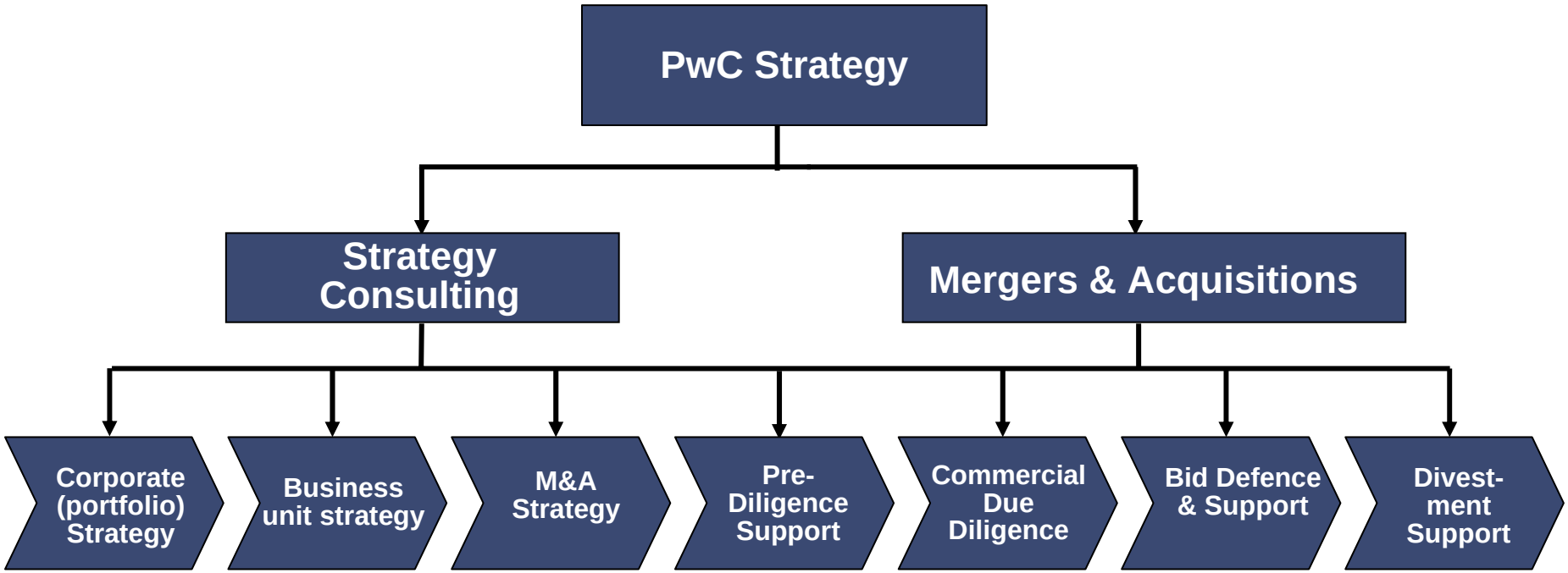
Section 4
Implications

Innovation and R&D outsourcing are key to future success

Levels of Innovation	Implications
I. Copy Western Innovations	• A problem, but increasingly marginal and a declining pattern • Therefore, not a significant threat to Western companies
II. Acquire Western IP	• Significant financial opportunity for Western IP holders and suppliers • But IP must be protected and differentiated between what is sold and what remains proprietary
III. Leverage R&D in emerging markets	• Western companies must take advantage of low-cost R&D opportunities in India and China to remain cost competitive and meet innovation demands
IV. Emerging markets' independent innovation	• If a Chinese or Indian company becomes the next Toyota, established Western companies will face a real threat • Reinforces the importance of investing in innovation to maintain a competitive gap for American and other Western automotive companies

PwC TS Strategy provides a range of services from strategy development to deal appraisal.

Our clients include Western companies entering or operating in India and China as well as Chinese and Indian companies looking to invest outwards.



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