Smarter, cleaner, fewer? Demand shifts and technological innovation from the carmakers‘ perspective
Our three presentations focus on different facets of the Peak Car discussion.

Focus now

Suppliers
Carmakers
Customers
Peak car (Japan)?
Different interpretations

INDUSTRY
– ...peak of car assembly in Japan?
– ...decline of Japanese car makes?

TECHNOLOGY
– ...decline of the internal combustion engine car?
– ...the end of carmaker dominance of value chains?

BUSINESS MODEL
– ...disruptive innovation of the automotive industry business model towards service?
Key questions

What are sources of (in)stability in the automotive industry?

Who will collect the spoils of upcoming innovations in the industry?
Central concerns: Disruptive innovation and hollowing out

Current industry dynamics in Japan

Technological substitutes

Disruptive innovation?

“Peak Car??“

Carmakers lose power in value chain

Hollowing out?
JAPANESE AUTOMOTIVE INDUSTRY DYNAMICS
Industry view: Peak car (Japan)?

• Declining revenue & profit (after record fiscal year 2016)
  – Yen appreciation
  – Shrinking domestic market...

• Peak for Japanese carmakers?
  – Unlikely for large firms such as Toyota, Nissan who benefit from incumbent advantages and international value chains
  – Likely for small players such as Mazda, Suzuki, Subaru who might lack scale to sustain necessary R&D investments (emission/drive-train diversity, safety/automation)

• Peak for domestic production?
  – Further decline very likely, increased focus on emerging markets
  – Counter-pressures:
    • Political commitments to keep production in Japan (Toyota: 3 Mio., Nissan: 1 Mio.)
    • Mother-plant model, dependence on stable local supply base
Two distinctions are central to the discussion

• Integral / Modular product architectures

• Disruptive / Sustainable innovation
Emission and safety/automation requirements increase the competition by functionality.
DISRUPTIVE INNOVATION AHEAD?
Definition

Disruptive innovations originate in low-end or new-market footholds
Disruptive innovation #1: “Low-end footholds“

- “Low-end footholds exist because incumbents ... pay less attention to less-demanding customers. In fact, incumbents’ offerings often overshoot the performance requirements of the latter. This opens the door to a disrupter focused (at first) on providing those low-end customers with a “good enough” product.”

Disruptive innovation #2: “New market footholds“

• “In the case of new-market footholds, disrupters create a market where none existed. Put simply, they find a way to turn nonconsumers into consumers.”

What innovation is “disruptive“?

Successful, but not a “disruptive innovation“ #1

- Neither low-end nor new-market foothold
- Success more related to high taxi market regulation
- New competition, not ‘disruption’
Successful, but not a “disruptive innovation“ #2

- Neither new consumers nor low-end entry
- Entry into contested high-end niche market
- New competition, not ‘‘disruption’’
PEAK CAR(MAKER)?
From WINTEL to ´Google Inside´?

Modularity in the Computer Industry
- Close mapping of part to function
- Open, standard interfaces
Modularization in the automotive industry – substantial need for systems integration remains

- Modules as used in the Automotive industry are not really ‘modular’, the Computer industry metaphor does not hold
  - No direct mapping of part to function
  - Substantial inter-component interdependencies
  - Often proprietary designs belonging to or customized for carmakers
  - Substantial systems integration required
Realizing the risk: The automotive industry has shifted from the liberal outsourcing of key sub-assemblies towards a more careful approach and knowledge duplication.

Increase in outsourcing and modularization

Coalition supporting M+O develops at OEMs and suppliers

Up to mid 1990s

Enthusiasm build for M/O

Mid- 1990s onwards

Framing rethought as carmakers realize the risks

Mid 1990s onwards

Pursuit with M+O activities. Difficulties with M encountered

Early 2000s onwards

Carmakers regaining control, keeping value-add

Mid 2000s to present

Modification or abandonment of M; persistence of O

Note: M+O = Modularization and Outsourcing

Some examples of alternative approaches to the original modularization idea

• Example Toyota:
  – Achieve access to supplier specialization advantages by close collaborative design
  – Retain close quasi-hierarchical control
  – Retain **closed, proprietary standards**

• Example Hyundai:
  – Some, but limited modularization
  – **Quasi-hierarchical control** over key supplier Mobis

• Example VW:
  – MQB platform approach, sharing core assemblies across multiple carlines
  – Main gain from economies of scale, restricting design engineer parameters
  – **Proprietary (closed) design**
Incumbent carmakers react to increasing risks of modularization and new technologies. They have substantial advantages in this struggle:

- Proprietary designs and IPR
- Certification and legal accountability
- Link with final customers
- Access to distribution
- Substantial funds
- Strong knowledge of integral manufacturing

´Modularity´ in the automotive industry

- Started with sub-assemblies (soon termed ´modules´) in manufacturing
- Outsourcing of sub-assemblies started in the 1990s, including quality testing
- Bolstered by the popularity of the ´core competence´ model (Prahalad & Hamel 1990)
- Scope increased to sub-assembly design in the mid-1990s
- Carmakers pushed for creation of mega-suppliers that could act as full-service suppliers to take over purchasing, design, production of sub-assemblies
- In early 2000s: problems with quality and supplier coordination emerged, led carmakers to re-establish control over designs and reversed the hope for a hands-off delegation of tasks
- Modularity now largely interpreted as outsourcing of sub-assembly with substantial systems integration by the carmaker
– ‘Real’ modularization with open standard interfaces tried out in the 1990s, now largely abandoned
– Carmakers retain substantial quasi-hierarchical control despite (?) outsourcing
– Japanese carmakers have reaped some of the expected benefits of modularization without it in their close relational supplier collaboration in R&D and part design
What drives carmakers’ structural dominance?

ZOOMING OUT:
SOURCES OF STABILITY IN THE AUTOMOTIVE INDUSTRY
What makes cars a special product? **Safety** and **high expectations** result in **extreme complexity**.

Cars are **heavy, fast-moving objects operated by individuals in the public space**. High consumer expectations for styling, power, handling, reliability, and amenities. 2,000 components, 30,000 parts, and 10 million lines of software code.
1880s to 2010s: What explains the recent surprising stability of the automotive industry?

The automotive industry moved towards highly integrated architecture – quite unlike the Computer Industry.

Integral and modular architectures follow different approaches to achieve competitive advantage

Functionality-driven competition reigns in the current (and likely: future) automotive industry.

In sum: Confusion of terms increase the sense of automotive peak/crisis, substantial barriers of entry remain

- Disruptive innovation not really ´disruptive´
- So called modularity not really modular
- Systems integration remains the key competitive advantage of carmakers
- Given the industry environment, this is a very strong barrier of entry and remains a substantial advantage for incumbents
Outlook:
‘Reign of the dinosaurs‘ continues

=Continuity of substantial incumbent advantage in the automotive industry

Peak car? Some tentative conclusions

– ...peak of car assembly in Japan? Very likely, already passed

– ...decline of Japanese carmakers? Unlikely for large incumbents, given substantial incumbent advantages. Consolidation likely due to increased R&D requirements (emissions, safety/automation...)

– ...decline of the internal combustion engine? Certainly, though hybrids will likely dominate for the next decades

– ...the end of carmaker dominance of value chain? Unlikely in the near future given sustained integral architecture and strong carmaker advantages (proprietary designs etc.).

– ...disruptive innovation of the automotive industry business model towards service? No disruptive innovation, instead increasing hybridization between production & service niches. Incumbents strongly invested in capturing emerging business models
Thank you for your attention.

Do not hesitate to contact me for any questions.

Dr. Roman Bartnik
IN-EAST School of Advanced Studies
University of Duisburg-Essen
roman.bartnik@uni-due.de
Mobil: +49-1575-474-2789