A transition towards electric mobility: Exploring the need for business model innovation in the car industry

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Societal challenges

PART OF THE SOLUTION: LOW-EMISSION VEHICLES
1899 - France
Jamais contente
EV - Zero emissions
First vehicle to go over 100 km/h
Car firms searching for a suitable solution
What are the problems of LEVs?

**Features of a car**

- **Utility**
  - Roadster
  - Multi-Purpose
  - City

- **Comfort**
  - Air-con
  - Navigation
  - Leather

- **Performance**
  - Acceleration
  - Fuel efficiency
  - Costs

**LEV$s$: Compromise on all three dimensions**
How can firms make a potentially disruptive technology such as low-emission vehicles attractive to mainstream customers?

How does a new industry for low-emission vehicles emerge?
Two mechanisms

- Use protection levers (public and private)
- Employ new business models
Mechanism 1

Use protection levers (public and private)
The need for protection at different stages of the innovation process

<table>
<thead>
<tr>
<th>Development phase</th>
<th>Commercialization phase</th>
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<tbody>
<tr>
<td>Autonomous innovation</td>
<td>'Separate entities'</td>
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<td>'Market leadership'</td>
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<td>Systemic innovation</td>
<td>'Dynamic boundaries'</td>
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<td>'Modularity'</td>
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<td>Socially embedded innovation</td>
<td>'Incubation'</td>
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<td>'Empowerment'</td>
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Example: protection of hybrid cars

Private Protection
  e.g. resource allocation

Public Protection
  e.g. subsidies
Findings

Main public protection levers:
► Regulation, tax incentives, and public-private partnerships
► Impose or stimulate ‘new’ performance metrics (e.g. fuel economy and vehicle emissions)

Main private protection levers:
► Resource allocation, niche occupation and collaboration-integration

Two most prominent levers:
► Regulation imposing large-scale commercialization of low-emission vehicles
► Dumping of products in the market below cost price
Public and private protection levers stimulated the LEV development

- International government policies stimulated engagement
- Competition and uncertainty led to diffusion
Employ new business models
- Business models in new industries evolve (Morris et al., 2005)
- Business model innovation is influenced by the history of a firm and can be a challenge, e.g. because of past decisions or existing resources
- How does individual firms’ business model innovation influence the evolution of the business model at an industry level?
### Impact of history on business models: incumbents vs. entrepreneurs

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<tr>
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<th>Incumbents</th>
<th>Entrepreneurs</th>
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<tr>
<td>Dominant business model logic</td>
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<tr>
<td>• Cognitively constrained</td>
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<td>• Fit into existing business models</td>
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<td>• Focus on efficiency</td>
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<tr>
<td>• Not cognitively constrained</td>
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<tr>
<td>• Design novel business models</td>
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<td>• Focus on novelty</td>
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<td>Complementary assets</td>
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<tr>
<td>• Bundle old and new products</td>
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<tr>
<td>• Different business models simultaneously</td>
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<td>• Cross-subsidize with revenues from existing business models</td>
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<tr>
<td>• Bundling new products and services in unique ways</td>
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<td>• Focus on a single business model</td>
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<td>• Leverage pre-entry knowledge</td>
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<td>Contingent events</td>
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<tr>
<td>• Stick to a business model</td>
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<td>• Not vulnerable to disruptive contingent events</td>
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<tr>
<td>• Continuous changes to business model</td>
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<td>• Vulnerable to disruptive contingent events</td>
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Analytical framework

**Value proposition**
- **Product content**
  - Full EV vs. range extended
  - Conventional vs. futuristic design
- **Service content**
  - Fast-Charging
  - Battery swapping
  - At home charging
  - Ownership vs. car sharing

**Value network**
- **Development & production**
  - In-house vs. outsourced
  - Purpose-built vs. refitted
- **Sales process & After-sales service**
  - Dealer vs. Flagship store vs. internet
  - After-sales service on site, at the customer vs. not required

**Target segment**
- Luxury vs. economic
- Single-purpose (e.g. urban use) vs. multi-purpose

**Revenue & cost model**
- Pricing: leasing vs. selling vs. per km charging
- Government support: integrating monetary and non-monetary government incentives
- Additional income: e.g. credits, technology licensing
Four value proposition archetypes

**Target customer**

**Luxury**
- High performance two–seater
- Refitted conventional car
- Production outsourced
- Sales in flagship stores

**Economic**
- Urban commuter two seater
- Service component: car sharing, rent battery
- Refitted / purpose-built

**Main purpose of the car**

**Specific-purpose**
- High performance two–seater
- Refitted conventional car
- Production outsourced
- Sales in flagship stores

**Multi-purpose**
- High performance multi-purpose
- Production outsourced
- Sales and leasing

- All round sedan
- Incrementally more service components
- Mainly purpose-built, in-house
LEV business model evolution

Low emission vehicle path
Re-emergence of EV business models
Generic EV business models
Industry internal and external events and general contingencies that filter path
Selected paths (bandwagon effect)

Low emission vehicle trajectory

Contingent events:
- ZEV program CARB (Credits)
- Structural industry crisis in the US
- Improved battery technology
- Increased environmental awareness
- Rising oil prices
- Climate Change

Target customer
- Luxury
  - Specific-purpose
    - High performance
    - High performance multi-purpose
  - Multi-purpose
    - All round sedan
    - Browned out of service
    - Mainly purpose-built, in house
- Economic
  - Specific-purpose
    - Urban commuter
    - Service component: car sharing, rental battery
    - Rent to own/purpose-built
  - Multi-purpose
    - Incrementally more service components
    - Mainly purpose-built, in house
Conclusion

Mechanism 1: Protection

- Systemic technologies need protection
- Need to combine public and private protection levers

Mechanism 2: Business model innovation

- Because of technological shortcomings: need for new business model
- Evolution is shaped by dominant business logic, complementary assets and contingent events
Outlook
Future: Project V2X in Amsterdam

Use electric cars as power plants in the grid to regulate peak demands
THANK YOU FOR YOUR ATTENTION!

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