REGIONAL RESILIENCE AND ONTARIO’S AUTOMOTIVE CLUSTER: ITS FUTURE IN THE DIGITAL AGE

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Auto makers rev up Canadian R&D

1. **Self-driving accelerates**
   In this scenario, governments give autonomous vehicles the green light, accelerating uptake of this key new technology.

2. **Electric chauffeurs**
   In this scenario, strict fuel efficiency and emissions requirements and a consumer preference for shared mobility drive a shift towards ridesharing models using electric vehicles.

3. **Connectivity creates new champions**
   In this scenario, connectivity becomes a key factor in winning over a growing automotive market worldwide. New distribution strategies, new partnerships and potentially new entrants reshape the marketplace.

4. **Local business models prevail**
   In this scenario, the established automotive companies need to flex their business models to address very different regulatory requirements in local markets. Operating globally becomes significantly more challenging.


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Ford to invest $1.2-billion in Canada, create Ottawa R&D centre
Why the increase in multinational enterprise (MNE) automotive R&D outside of traditional locations?

Use EEG theory to identify factors behind why Ontario is chosen as a source of scientific/technical expertise. What is driving change in the Ontario automotive cluster?

Case studies

Data
I. MNE’S & REGIONAL DEVELOPMENT

- Relations between parent MNE’s & subsidiaries in host locations are changing

- MNE’s becoming mechanism for creating new technologies in discrete regional contexts

Cantwell and Mudambi (2011)
## Framework for linkages of MNE R&D units

<table>
<thead>
<tr>
<th>Degree of linkages</th>
<th>Type of linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>Wholly owned R&amp;D unit</td>
</tr>
<tr>
<td></td>
<td>Joint research</td>
</tr>
<tr>
<td></td>
<td>Human resource recruitment, education, training</td>
</tr>
<tr>
<td>low</td>
<td>Arm’s length</td>
</tr>
</tbody>
</table>

*Patra and Krishna (2015)*
Figure 1. Detroit automakers and geographical dispersion of patent connections

Harvard Patent Network Dataverse; Hannigan et al. 2015

Figure 2. Technological composition of Detroit patents connected to SW Ontario
II. PATH DEPENDENCY & REGIONAL RESILIENCE

“New paths do not emerge in a vacuum, but always in the contexts of existing structures and paths of technology, industry and institutional arrangements” (Martin & Simmie 2008, 186)

A. Path Dependence?

B. Ontario’s knowledge infrastructure/skilled labor

C. Supply chain strengths
Table 3. Plant Managers’ assessment of the degree to which selected public policies inhibit or contribute to plant success

<table>
<thead>
<tr>
<th>Public Policy Measure</th>
<th>Canadian-Owned Plants (n = 72)</th>
<th>Foreign-Owned Plants (n = 43)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average (Out of 5)</td>
<td>% Contributes (&gt;3)</td>
</tr>
<tr>
<td>Subsidies and/or tax credits for R&amp;D</td>
<td>3.8</td>
<td>72.2</td>
</tr>
<tr>
<td>Programs to retain or attract vehicle assembly capacity</td>
<td>9.1</td>
<td>63.9</td>
</tr>
</tbody>
</table>

Holmes et al. (2017)
C.  

<table>
<thead>
<tr>
<th>Category</th>
<th>2004</th>
<th>2009</th>
<th>% of 2004</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engines and engine parts</td>
<td>$1,902,600,000</td>
<td>$1,146,900,000</td>
<td>60%</td>
<td>$1,361,400,000</td>
</tr>
<tr>
<td>Electrical and Electronic</td>
<td>$299,200,000</td>
<td>$115,100,000</td>
<td>38%</td>
<td>$385,400,000</td>
</tr>
<tr>
<td>Steering and Suspension</td>
<td>$447,000,000</td>
<td>$264,200,000</td>
<td>59%</td>
<td>$432,700,000</td>
</tr>
<tr>
<td>Wheels and Brake Systems</td>
<td>$402,200,000</td>
<td>$185,700,000</td>
<td>46%</td>
<td>$131,300,000</td>
</tr>
<tr>
<td>Transmission and Powertrain</td>
<td>$1,135,900,000</td>
<td>$445,400,000</td>
<td>39%</td>
<td>$761,100,000</td>
</tr>
<tr>
<td>Seating and Interior</td>
<td>$1,384,100,000</td>
<td>$681,800,000</td>
<td>49%</td>
<td>$857,500,000</td>
</tr>
<tr>
<td>Metal Stamping</td>
<td>$1,557,500,000</td>
<td>$797,900,000</td>
<td>51%</td>
<td>$1,405,800,000</td>
</tr>
<tr>
<td>Other</td>
<td>$1,734,500,000</td>
<td>$896,500,000</td>
<td>52%</td>
<td>$1,651,100,000</td>
</tr>
</tbody>
</table>

Source: Statistics Canada, 2014; CANSIM Table 379-0030.
III. CASE STUDIES
GM

R&D

- Cold Weather Testing
- Canada Technical Centre
- GMC Center for Automotive Materials and Corrosion (McMaster)
- Research collaboration with Fraunhofer Project Center (Western U)
- New Engineering and Software Development Center (Markham)
- Communitech Innovation Research Zone
- Automative Center of Excellence (UOIT)
- Research Chair in Advanced Materials (Waterloo U)
- Attempts to establish Automotive Innovation Network

Supply chain

- GM Ventures
- GM-Sapa R&D collaboration
- Exco Technologies
- New mandate for the Canada Technical Centre
- Near IT cluster built around IBM

Project Beacon (2.5 billion, more than 400 million in gov. money)

Joins Automotive Partnership Industry Task Force/ PACE Partner

Partnersed with 9 research institutions in Ontario
IN CONCLUSION

Increased automotive R&D integration in the Great Lakes not only driven by the presence of technological expertise, but by historical relationships and activist policy.

Future research:

- Unpack the creation of R&D partnerships in more detail
- Quantify types of MNE R&D linkages in Canada
- Trace US patents back to innovators in Canada and their affiliations
- Introduce a comparator case