

Talent in tooling: a supply chain and strategic perspective

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Background

- Recent study of apprenticeship, with US Department of Commerce
- Long study of auto supply chain

The Benefits and Costs of Apprenticeship: A Business Perspective

November 2016

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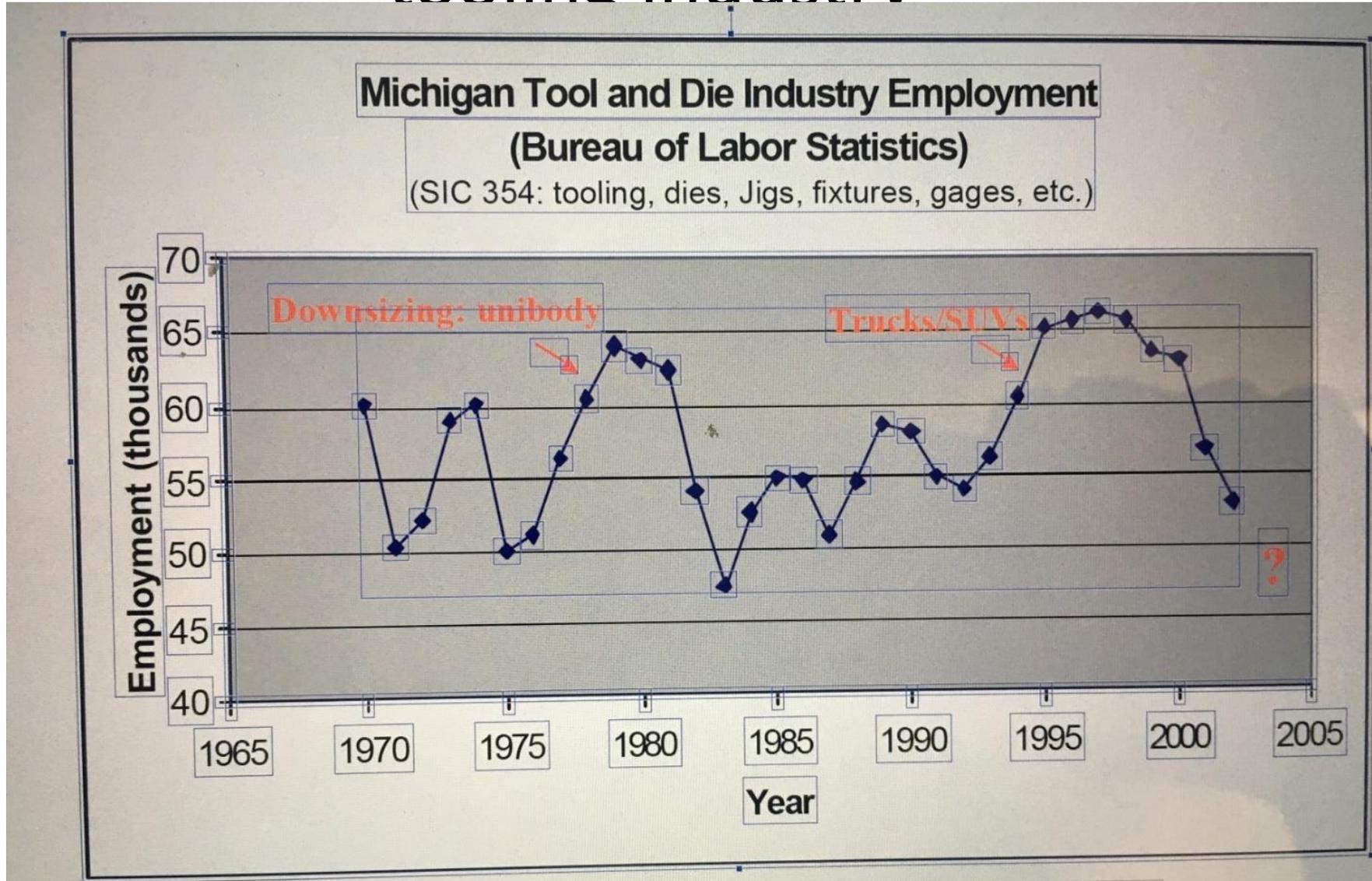
SUPPLY CHAIN INNOVATION:
STRENGTHENING AMERICA'S
SMALL MANUFACTURERS

The Executive Office of the President and the
U.S. Department of Commerce

March 2015



Supply-Demand mismatch not a new problem in US tooling industry



Increased demand for toolmakers

- Increase in Detroit 3 demand for tooling for launch from 3 M hours in 2017 → 5.5 M hours in 2019
- 43% of toolmakers are over 55 years old

Ways to meet this demand

- Increase efficiency (technology, lean, focus on assembly)
- Offshore
 - Reduced ability to coordinate
- Delay launch
 - Potential loss of sales
- Raise wages
 - Increase supply by recruiting young people; people from other industries
 - We expect to pay the market price for other products
- Reduce cyclicalities
 - Parents are not crazy to worry about these jobs (instability, falling wages)
- Training, especially apprenticeship

Training

- Training is easier to justify if we take:
 - Supply chain approach between companies
 - Choices made affect whole industry
 - Failure to train/ pay holds whole industry back
 - Strategic approach within companies
 - Hidden benefits of broad-based training (eg, registered apprenticeship)

From supply chain perspective, training is cheap!

- To replace the 43% of 16,000 toolmakers > 55 years old:
 - => 6800 people over 10 years; @ \$100,000 per apprentice, total training cost = \$68M
 - Spread over 10 years, @ 12.2M vehicles assembled/year in the US
 - **< 60 cents/ car to train replacements for retiring toolmakers**
- Advertising costs /car: \$250-\$1200/car

(sources: see last slide)

Within firm strategic perspective

- But training is expensive!!

Study approach

- Grant-supported collaboration between Case Western Reserve University and U.S. Department of Commerce
- Four parts:
 1. Overview and definition of apprenticeship in the United States
 2. Major decision points for companies to consider
 3. Roadmap for measuring benefits and costs
 4. Case studies of 13 firms and intermediaries

Findings: Quantitative studies

- **Combined HR and production data**
to calculate internal rate of return of
apprenticeships relative to best alternative
- Dartmouth-Hitchcock: 40% rate of return
- Siemens: 50% rate of return

Measurement: Costs

- Fairly straightforward to understand
- Measurement of some costs was limited.

Table 1. Costs of Apprenticeships

Fixed Costs	Variable Costs
<ul style="list-style-type: none">• Curriculum development• Equipment purchases• Staff time spent on setup• Overhead and management• Classroom space• Recruitment	<ul style="list-style-type: none">• Wages and benefits of apprentices• Mentor time• Supplies and uniforms• Tuition, books, and classroom materials

Measurement: Benefits

- Much harder to measure than costs:
 1. Some benefits are inherently difficult to measure and monetize, including soft skills and long-term benefits.
 2. Companies often do not collect detailed production data by worker over time.
 3. Company data is often siloed:
 - Personnel and training data in HR
 - Production data in operations
 - Program costs in finance
 - Benefits metrics potentially scattered across all three
 - Staff may not know each other; barriers to sharing data.

Measurement: Counterfactual

- We calculate the internal rate of return of the *difference in the discounted net benefit* between:
 - Hiring apprentices and
 - The counterfactual (hiring off-the-street workers, paying overtime, leaving positions vacant, etc.)
- This takes into account differences in costs and benefits for alternative approaches to building talent.
- Results are very sensitive to the parameters.

Lessons from Siemens

- Benefits of general training are enormous
 - Dramatic increase in capacity utilization
 - Development of management
- Achieving these benefits requires strategic thinking re: HR
 - Free up time for mentors, instructors
 - Keep some easy work inhouse for training purposes
- Have lost no one to poaching, because pay market wage
 - Tooling: if raise wages to OEM levels (20%) → 7% total cost increase
 - Is this worse than paying overtime/leaving position unfilled?

Future Research and Activities

- Additional case studies
- Work directly with firms to develop an occupation-specific cost-benefit calculator
- Good evidence that apprenticeships work – but *how*?
 - Mentors a particular mystery but also management, unions, etc.

Conclusion

- Solving apparent lack of toolmakers is easier with different perspectives:
- Supply chain:
 - Training and increasing wages of toolmakers is cheap compared to potential delayed launch, loss of competitiveness
- Strategic:
 - Broad training, retaining skills opens new options
 - Keep existing business, diversify, promote into mgt.

sources

- Employment numbers: <http://www.cargroup.org/wp-content/uploads/2017/02/The-World-Class-Tool-Shop-Prospects-in-Michigan.pdf>
- auto production: <http://www.cargroup.org/wp-content/uploads/2017/02/Accelerating-the-Growth-of-the-U.S.-Automotive-Manufacturing-Industry-at-Home-Rather-than-Abroad.pdf> and
- Advertising: <https://chargedevs.com/newswire/auto-industry-except-tesla-spends-an-average-1000-per-vehicle-in-advertising/>
- Apprenticeship study: <https://www.commerce.gov/news/blog/2016/11/how-us-companies-use-and-adapt-apprenticeship-model-create-innovative-workforce>