Technology-Intensive Manufacturing in Virginia

Findings and Recommendations from the 2001 Study for Virginia's Center for Innovative Technology

August 2004

Purpose of CIT Study

Global economic shifts are creating more complex, more fast-paced, more technologically demanding markets for manufacturers.

How have these changes affected Virginia's technology-intensive manufacturers - particularly their R&D functions?

Focus on Virginia's Technology-Intensive Manufacturers

- How have they performed in output and employment over the past decade?
- Have they expanded or contracted their R&D functions - and why?
- What public policy directions will best support and promote these R&D functions?

Manufacturing and the Economy

- Manufacturing conducts nearly two-thirds of all U.S. industrial R&D
- Productivity gains drive smaller employment and GDP shares
- Manufacturing R&D drives productivity growth for the service sector and the entire economy
- R&D creates knowledge spillovers that accumulate locally

The Role of Technology

- Companies that compete only on cost are an endangered species
- There are no low-tech industries - only low-tech operations
- **Technology governs value-added.**
  - **Higher profits**
  - **Better job opportunities**
  - **Higher wages**
  - **More wealth for our communities.**

Performance:
Virginia's Tech-Intensive Manufacturers, 1989 - 1998

- Employment decline: 2.7%
  - Smaller than national decline (5%)
  - Due to productivity gain
  - 1998 employment: 107,975
- Output increase: 15%
  - Greater than national increase (12.7%)
  - Due to productivity gain
  - 1998 output: $34.4 billion
- Wage Index: 137%

Performance: Regional Advantage?

- Technology-intensive manufacturing is relatively non-concentrated in Virginia
- Only six industries above average in employment concentration
- Concentration has not increased

Survey Findings: Firm Characteristics

- **Sales:** About half of respondents had annual sales over $50 million; about one-third had sales over $100 million
- **Scale:** Firms employ 43,000 in Virginia; 7% work in R&D and 63% in production
- **Locations:** 75% have facilities outside VA; about two-thirds are branch plants

Survey Findings: R&D Characteristics

- **R&D Changes:** Just over half the firms saw no change in R&D employment or effort; about one-third saw significant increases
- **Type of R&D:** Over 85% of firms perform development activities and applied research; 40% also perform some basic research
- **R&D Collaboration:** 60% of firms collaborate on R&D projects with universities, labs, or other companies

Survey Findings: R&D Performance

- **Expansion factors:** Industry growth, competitive pressures to innovate, and availability of skilled workers
- **Decrease factors:** Firm's financial condition, industry slowdown
- **Public sector role:** 80% cite importance of public support for industrial R&D: R&D tax credits, access to public grants, assistance from CIT

Survey Findings: Location Factors

- Tech-intensive manufacturers serve two masters; these firms emphasize production
- Also cite education systems; availability of scientists, engineers, managers
- 3 of top 4 factors are workforce-related:
  - Labor productivity
  - Positive business environment
  - Availability of skilled workforce
  - Labor costs

Survey Findings: Areas of Need

- **Technology transfer:** Access to laboratories and new technologies; incentives for universities to collaborate with industry
- **Funding:** R&D tax credits, access to public grants, R&D-targeted loan programs
- **Statewide research capacity:** Support for medical and biotech research centers
- **Workforce training:** Expanded education and training for technology-skilled workers

Policy Recommendation #1: **Separate Statewide Strategy**

Craft and implement a separate and distinctive statewide strategy to promote the competitiveness of Virginia's technology-intensive manufacturing community.

- Foster public awareness of this community's critical role in Virginia's economy
- Develop and implement a focused workforce development strategy for the R&D needs of Virginia's tech-intensive manufacturers

Policy Recommendation #2: **R&D Funding Opportunities**

- State R&D tax credits
  - Cited as the single most important public sector policy for future R&D investments
  - More aggressive R&D tax credits can motivate manufacturers to expand R&D activity
- Single gateway for information about and access to public sector R&D funding
  - Government programs cited as major factor in expanding R&D activities
  - Facilitated access would enable Virginia to claim a greater share of federal support

Policy Recommendation #3: **Recruitment and Retention**

- Focus on retaining and recruiting tech-intensive manufacturers as a strategy to promote R&D investment.
  - Addressing firms' production needs will help support their R&D employment and investment
- Establish ongoing support efforts for Virginia sites' R&D and technology bids
  - Economic development agencies can help branch plants bid to HQ for new technologies, production lines, or R&D programs

Policy Recommendation #4: **Strategic R&D Partnerships**

- Analyze and study manufacturers' basic research plans and needs
  - Stronger partnerships with universities can support manufacturers' basic research
- Explore efficacy of promoting R&D alliances among manufacturers
  - Alliances can expand and leverage small R&D operations

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