Why Smart Manufacturing Matters to U.S. Industrial Competitiveness

Stephen Ezell
VP, Global Innovation Policy
ITIF

November 30, 2016
Today’s Presentation

1. Smart Manufacturing and Why It Matters

2. Global Competition for SM Leadership

3. Policy Recommendations
What is Smart Manufacturing?

- The application of IT to every facet of manufacturing
- A strategic, game-changing set of technologies holding the potential to alter the global manufacturing landscape
“Smart” at Each Step of Modern Manufacturing

1. Digitally Enabled Product Design
2. Additive Manufacturing (3D Printing)
3. Digitally Empowered Factory Operations
4. Digitally Linked Supply Chains
5. Smart Products Beyond the Factory Floor
Digitally Enabled Product Design

- Generative design techniques and modern CAD software herald a new era for how products get designed.
3D Printing (Additive Manufacturing)

- Particularly suited to producing complex, high-value, low-volume, highly customizable products.
Digitally Empowered Factory Operations

- Gives manufacturers a comprehensive, real-time view of status of production equipment, work cells, and systems.
Predictive/Preventive Manufacturing and Maintenance

- Identifying failure modes in advance in both fabrication processes and deployed products.
Digitally Linked Supply Chain Management

- Real-time visibility into every component in mfg. supply chains.
Smart Products Beyond the Factory Floor

- Enabling mass customization, low-cost variability, evergreen design, and product servification.
Benefits of Smart Manufacturing

Economic

- Increase global manufacturing productivity by 10 to 25%.
- Produce $1.8 trillion in value by 2025.
- Anticipated 25% increase in revenues from new products and services at firms using smart manufacturing techniques.
The Benefits of Smart Manufacturing

**Strategic**

- Increasingly enables competitive manufacturing in higher-cost economies.
- Enables more localized manufacturing, in part by reducing efficient production lot sizes.
- Boosts justification for co-location of idea generation, design, systems development, production, and supply chain management.
Today’s Presentation

1. Smart Manufacturing and Why It Matters
2. Global Competition for SM Leadership
3. Policy Recommendations
Countries Are Aggressively Implementing Policies to Achieve Smart Manufacturing Leadership

<table>
<thead>
<tr>
<th>Country</th>
<th>Smart Manufacturing Policy/Program</th>
<th>Investment Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>R&amp;D projects associated with Industry 4.0</td>
<td>€250 million (approximately $280 million)</td>
</tr>
<tr>
<td>China</td>
<td>Made in China 2025 Program; Implementation Plan for the 2016 Intelligent Manufacturing Pilots Special Project</td>
<td>Specific funding line for this pilot unavailable, but China is investing more than $3 billion in “advanced manufacturing”</td>
</tr>
<tr>
<td>European Union</td>
<td>“Factories of the Future” program calls for “leadership in deploying key enabling and industrial technologies”</td>
<td>€7 billion ($7.8 billion) (total over seven years to 2020)</td>
</tr>
<tr>
<td>Germany</td>
<td>Efforts to help industry associations, research institutes, and companies create Industry 4.0 implementation strategies</td>
<td>€500 million (approximately $550 million)</td>
</tr>
<tr>
<td>Sweden</td>
<td>The “Smart Industries” Strategy</td>
<td>163 million SEK (approximately $18 million) for various smart manufacturing support programs</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>High-Value Manufacturing Catapult, a network of seven advanced-manufacturing technology institutes, includes a Manufacturing Technology Centre (MTC)</td>
<td>£140/$220 million (over the next five years)</td>
</tr>
<tr>
<td>United States</td>
<td>At least four related IMls Digital Manufacturing and Design Innovation Institute (DMDII); America Makes (additive manufacturing); Clean Energy Smart Manufacturing Institute; Institute for Advanced Composites Manufacturing Innovation</td>
<td>Across those four institutes: public investment of $240 million; matched by $460 million from nonfederal sources, including private-sector consortium partners</td>
</tr>
</tbody>
</table>
Today’s Presentation

1. Smart Manufacturing and Why It Matters

2. Global Competition for SM Leadership

3. Policy Recommendations
Recommendations

1. Build out Manufacturing USA network
Policy Recommendations

1. Build out Manufacturing USA network
2. Expand funding for adoption of smart manufacturing by SMEs
Policy Recommendations

1. Build out Manufacturing USA network
2. Expand funding for adoption of smart manufacturing by SMEs
3. Expand portable manufacturing skills credentialing
Policy Recommendations

1. Build out Manufacturing USA network
2. Expand funding for adoption of smart manufacturing by SMEs
3. Expand portable manufacturing skills credentialing
4. Pass and fund Manufacturing Universities Act
Policy Recommendations

1. Build out Manufacturing USA network
2. Expand funding for adoption of smart manufacturing by SMEs
3. Expand portable manufacturing skills credentialing
4. Pass and fund Manufacturing Universities Act
5. NIST should collaborate with industry to develop voluntary smart mfg. standards around interoperability, privacy, and security
Thank You!

Stephen Ezell  |  sezell@itif.org  |  202.465.2984