Medical Devices Manufacturing Implications for the Coachella Valley

Avijit Sarkar
University of Redlands School of Business

Esri User Conference
San Diego CA
July 2015
Definition of Medical Device Mfg

• The US medical device manufacturing sector - highly diversified industry that produces a range of products designed to diagnose and treat patients in healthcare systems worldwide.

• Medical devices differ from drugs
  - They do not achieve their intended use through chemical reaction and are not metabolized in the body.

• Medical devices range in nature and complexity
  - from simple tongue depressors & bandages to complex programmable pacemakers & sophisticated imaging systems.

(Medical Market Fact book, 2008)
Key Products

• The key products that comprise the medical devices industry include:
  - surgical appliances and supplies,
  - surgical and medical instruments,
  - electro-medical equipment,
  - in-vitro diagnostic substances,
  - irradiation apparatus,
  - dental and ophthalmic goods.

(Medical Market Fact book, 2008)
### 2012 NAICS Codes

<table>
<thead>
<tr>
<th>NAICS CODE</th>
<th>MEDICAL DEVICE INDUSTRY SUB-SECTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>325412</td>
<td>Pharmaceutical preparation manufacturing</td>
</tr>
<tr>
<td>325413</td>
<td>In-Vitro Diagnostic Substance Manufacturing</td>
</tr>
<tr>
<td>327215</td>
<td>Glass product manufacturing</td>
</tr>
<tr>
<td>334510</td>
<td>Electromedical or electrotherapeutic Apparatus manufacturing</td>
</tr>
<tr>
<td>334516</td>
<td>Analytical laboratory instrument manufacturing</td>
</tr>
<tr>
<td>334517</td>
<td>Irradiation apparatus manufacturing</td>
</tr>
<tr>
<td>339112</td>
<td>Surgical and medical instrument manufacturing</td>
</tr>
<tr>
<td>339113</td>
<td>Surgical appliance and supplies manufacturing</td>
</tr>
<tr>
<td>339114</td>
<td>Dental Equipment and supplies manufacturing</td>
</tr>
<tr>
<td>339115</td>
<td>Ophthalmic Goods manufacturing</td>
</tr>
<tr>
<td>339116</td>
<td>Dental laboratories</td>
</tr>
<tr>
<td>541380</td>
<td>Testing Labs</td>
</tr>
<tr>
<td>541711</td>
<td>Research and development in biotechnology</td>
</tr>
<tr>
<td>621511</td>
<td>Medical laboratories</td>
</tr>
<tr>
<td>621512</td>
<td>Diagnostic Imaging centers</td>
</tr>
</tbody>
</table>
Global Landscape of MDM in 2008

• In 2008, the largest markets for medical devices were the U.S. (which constitutes about half the world market), EU, Japan, Canada, China, Brazil, Taiwan, Korea and Australia.

• U.S. medical device market valued at more than $100 billion (42% of the world’s total in 2008).

• Japan: second largest medical device market in the world & the second largest export market for U.S. medical devices.

• U.S. exports approx. $31.4 billion (in 2008).

• U.S. imports approx. $33.6 billion (in 2008).
US MDM Industry: in 2007

• **Establishments:** Approximately 5,300 medical device companies, mostly SMEs.

• **Employment:**
  - MDM industry employed more than 365,000 people in the U.S.
  - Approx. 73% of MDM companies had fewer than 20 employees, with 15% having as many as 100 employees.

• **Wages:** Average annual wage of approx. $60,000.
  - Median state medical technology jobs paid 15% more than the average U.S. manufacturing job.

• **Total Value of Shipments:** Valued at $98 billion.
  - In prior years had experienced approx. 6% annual growth.
US MDM Industry: in 2007

- **Locations**: States with highest number of MDM companies - CA, FL, NY, PA, MI, MA, IL, MN, and GA.
  - Located throughout US, mainly concentrated in specific regions known for other high-tech industries, such as *microelectronics* and *biotechnology*.

- **Complementary industries**: In addition, the U.S. held competitive advantage in several complementary industries on which the medical device industry relies, namely *microelectronics*, *telecom*, *instrumentation*, *biotech*, and *software development*.
MDM companies in US

- Major U.S. MDM companies
  - Medtronic,
  - GE Healthcare Technologies,
  - Johnson & Johnson,
  - St. Jude,
  - Boston Scientific,
  - Baxter,
  - Becton Dickinson,
  - Beckman Coulter,
  - Abbott Labs,
  - Stryker Corporation.

- Trade associations:
  - Advanced Medical Technology Association
  - Medical Device Manufacturers Association
  - Medical Imaging Technology Association
  - Dental Trade Alliance
  - International Association of Medical Equipment Remarketers & Servicers

- Global Competition:
  - Germany (Siemens, Braun),
  - Japan (Hitachi, Toshiba),
  - Netherlands (Philips Electronics),
  - Bermuda (Covidien)
Our data

- MDM establishment level data extracted from Esri’s Business Analyst Desktop 10.2 (Dun & Bradstreet, 2013 business listing data).
- Location (street level address, NAICS, sales, employment).
- 85,499 MDM establishments across 15 sub-sectors (6-digit NAICS) in 2012.
Establishments vs. Sales Revenue in MDM sub-sectors in 2012

In 2012

- 85,499 MDM establishments across 15 sub-sectors (6-digit NAICS).
- $335 billion annual sales revenue.
Establishments vs. Employment in MDM sub-sectors in 2012

- 85,499 MDM establishments across 15 sub-sectors (6-digit NAICS).
- 1.93 million employees.
MDM Establishments, Employment, Sales in US States
MDM Landscape in Coachella Valley, CA
Location Quotient Analysis
(http://www.bls.gov/cew/cewlq.htm)

- Location quotients are ratios that compare the concentration of a resource or activity, such as employment, in a defined area to that of a larger area or base.
- For example, location quotients can be used to compare State employment by industry to that of the nation.

\[
LQ = \frac{\left( \frac{\text{Region’s Industry Employment}}{\text{Region’s Total Employment}} \right)}{\left( \frac{\text{U.S. Industry Employment}}{\text{U.S. Total Employment}} \right)}
\]
MDM Specialization in Coachella Valley
Cities that specialize in MDM

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
<th># of MDM Establishments</th>
<th># of MDM Employees</th>
<th>Employment LQ</th>
<th>Establishment LQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Triangle Park</td>
<td>North Carolina</td>
<td>27709</td>
<td>33</td>
<td>11,346</td>
<td>27.15</td>
<td>18.98</td>
</tr>
<tr>
<td>Cambridge</td>
<td>Massachusetts</td>
<td>2142</td>
<td>53</td>
<td>3,312</td>
<td>13.70</td>
<td>11.95</td>
</tr>
<tr>
<td>San Diego</td>
<td>California</td>
<td>92121</td>
<td>266</td>
<td>10,968</td>
<td>9.90</td>
<td>10.41</td>
</tr>
<tr>
<td>Sunnyvale</td>
<td>California</td>
<td>94089</td>
<td>44</td>
<td>1,495</td>
<td>4.45</td>
<td>7.50</td>
</tr>
<tr>
<td>Oklahoma City</td>
<td>Oklahoma</td>
<td>73104</td>
<td>25</td>
<td>1,486</td>
<td>5.30</td>
<td>7.36</td>
</tr>
<tr>
<td>Palo Alto</td>
<td>California</td>
<td>94304</td>
<td>23</td>
<td>2,732</td>
<td>8.44</td>
<td>6.94</td>
</tr>
<tr>
<td>Richland</td>
<td>Washington</td>
<td>99354</td>
<td>30</td>
<td>9,954</td>
<td>35.96</td>
<td>6.85</td>
</tr>
<tr>
<td>Cambridge</td>
<td>Massachusetts</td>
<td>02139</td>
<td>78</td>
<td>20,262</td>
<td>30.00</td>
<td>6.77</td>
</tr>
<tr>
<td>Lexington</td>
<td>Massachusetts</td>
<td>02421</td>
<td>30</td>
<td>4,310</td>
<td>23.26</td>
<td>6.57</td>
</tr>
<tr>
<td>Carlsbad</td>
<td>California</td>
<td>92010</td>
<td>23</td>
<td>893</td>
<td>9.17</td>
<td>6.44</td>
</tr>
<tr>
<td>Monmouth Junction</td>
<td>New Jersey</td>
<td>08852</td>
<td>24</td>
<td>368</td>
<td>2.40</td>
<td>6.09</td>
</tr>
<tr>
<td>Mountain View</td>
<td>California</td>
<td>94043</td>
<td>75</td>
<td>1,407</td>
<td>3.82</td>
<td>6.07</td>
</tr>
<tr>
<td>Davis</td>
<td>California</td>
<td>95618</td>
<td>22</td>
<td>350</td>
<td>4.67</td>
<td>6.05</td>
</tr>
<tr>
<td>Sunnyvale</td>
<td>California</td>
<td>94085</td>
<td>47</td>
<td>1,254</td>
<td>3.95</td>
<td>5.75</td>
</tr>
<tr>
<td>Houston</td>
<td>Texas</td>
<td>77054</td>
<td>55</td>
<td>733</td>
<td>1.74</td>
<td>5.72</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>Utah</td>
<td>84108</td>
<td>22</td>
<td>4,577</td>
<td>30.94</td>
<td>5.68</td>
</tr>
<tr>
<td>Bedford</td>
<td>Massachusetts</td>
<td>01730</td>
<td>29</td>
<td>2,008</td>
<td>8.75</td>
<td>5.63</td>
</tr>
<tr>
<td>Houston</td>
<td>Texas</td>
<td>77030</td>
<td>33</td>
<td>1,079</td>
<td>1.07</td>
<td>5.36</td>
</tr>
<tr>
<td>San Antonio</td>
<td>Texas</td>
<td>78229</td>
<td>69</td>
<td>1,003</td>
<td>1.62</td>
<td>5.33</td>
</tr>
<tr>
<td>Los Gatos</td>
<td>California</td>
<td>95032</td>
<td>41</td>
<td>439</td>
<td>2.50</td>
<td>5.06</td>
</tr>
</tbody>
</table>
Warsaw IN: Orthopedics Capital of the World

- OrthoWorx, a community based initiative was founded in 2009.
  - Primary objective: help Warsaw remain as the Orthopedics capital of the world.
  - Work strategically and collaboratively with the orthopedic industry, other life sciences partners and regional stakeholders.
  - Strategic Advisory Board: Mayor of City of Warsaw, VPs/Senior Execs from Biomet, Zimmer, DePuy, Medtronic, regional banks, financial advisory groups, etc.
  - Universities committed to join University-Industry Advisory Board: Indiana Univ; Univ of Notre Dame; Ivy Tech Community College; Ball State Univ; Purdue Univ.

- MDM companies foster an influx of individuals & families to Warsaw from larger communities, some of whom face challenges to adjust to slower paced small-town environment.

---

Quality of place & life

<table>
<thead>
<tr>
<th>Quality K-20 education</th>
<th>Healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult &amp; childcare services</td>
<td>Arts &amp; culture</td>
</tr>
<tr>
<td>Entertainment &amp; recreation</td>
<td>Transportation</td>
</tr>
<tr>
<td>Inclusiveness &amp; Diversity</td>
<td></td>
</tr>
</tbody>
</table>

Economic Development Plan that integrates business with community

---

City of Warsaw IN

<table>
<thead>
<tr>
<th>Zip Code</th>
<th>MDM Establishments</th>
<th>MDM Employees</th>
<th>Employment LQ</th>
<th>Establishment LQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>46580</td>
<td>10</td>
<td>2,649</td>
<td>9.91</td>
<td>1.15</td>
</tr>
<tr>
<td>46582</td>
<td>12</td>
<td>1,923</td>
<td>18.65</td>
<td>4.51</td>
</tr>
</tbody>
</table>
Key Demographic & Socio-Economic Indicators

**2013 Total Population (Esri)**

- Irvine, CA: 222,697
- Warsaw, IN: 78,798
- Indio, CA: 52,216
- Cathedral City, CA: 49,737
- Palm Desert, CA: 35,046
- La Quinta, CA: 38,019
- Desert Hot Springs, CA: 26,619
- Palm Springs, CA: 45,503
- Coachella, CA: 41,645
- Indian Wells, CA: 50,310
- Rancho Mirage, CA: 17,557

**2013 Median Age (Esri)**

- Irvine, CA: 28.3
- Warsaw, IN: 41.5
- Indio, CA: 37.0
- Cathedral City, CA: 38.2
- Palm Desert, CA: 35.5
- La Quinta, CA: 39.5
- Desert Hot Springs, CA: 30.0
- Palm Springs, CA: 33.0
- Coachella, CA: 31.0
- Indian Wells, CA: 34.0
- Rancho Mirage, CA: 35.0

**Ethnicity**

- **2013 White Population (Esri) [%]**
- **2013 Black/African American Population (Esri) [%]**
- **2013 Asian Population (Esri) [%]**
- **2013 Hispanic Population (Esri) [%]**
Industry & Occupation Indicators

- 2013 Manufacturing (NAICS31-33) Businesses (%)
- 2013 Health Care & Social Assistance (NAICS62) Businesses (%)
- 2013 Professional/Scientific/Technical Services (NAICS54) Businesses (%)

Cities: Irvine, CA, Warsaw, IN, Indio, CA, Cathedral City, CA, Palm Desert, CA, San Juan Capistrano, CA, La Quinta, CA, Desert Hot Springs, CA, Palm Springs, CA, Coachella, CA, Indian Wells, CA, Rancho Mirage, CA
Summary of findings

- Coachella Valley zip codes with at least 10 MDM establishments that are specialized in MDM are 92262 (Palm Springs) & 92270 (Rancho Mirage).
- Mecca (92254) also “specialized” but only 2 MDM establishments.
- Apart from Indio & Cathedral City, other CV cities are older than MDM benchmarks (Warsaw IN & Irvine CA).
- Apart from Rancho Mirage & Indian Wells, educational attainment (Bachelors or higher) in other CV cities lags MDM benchmarks (Warsaw IN & Irvine CA).
- Other demographic & socio-economic attributes seem to be mostly comparable with Warsaw IN & Irvine CA.
Recommendations for Coachella Valley

1. Focus on manufacturing,
2. Focus on workforce education and training,
3. Focus on cities of Rancho Mirage and Palm Springs,
4. Explore regional cooperation with Orange County CA,
5. Expand CVEP’s role to foster regional collaboration:
   1. Identifying opportunities and issues for development of medical devices specialization in the region;
   2. Mobilizing resources in partnership with cities, Riverside County, educational institutions, policy-making bodies,
   3. Developing strategies to attract more R&D companies in biomedical, biosciences, and health and life sciences,
   4. Offering coaching, mentoring, and support to incubate new, innovative start-ups possibly through the CViHub program,
   5. Fostering conversations and collaborations between all stakeholders within and outside the region.
Acknowledgements

• Mr. Shakhyar Neog, University of Redlands, MBA, 2014.
• Mr. David Robinson, Geographic Information System coordinator, CVEP.
• Mr. Joe Wallace, Chief Innovation Officer and Managing Director, CViHub
• This work was funded by a grant awarded to CVEP & University of Redlands by the US Department of Commerce.