Medical Devices Global Value Chain:

Opportunities and Challenges for Upgrading

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Agenda

1. **Medical Devices Global Value Chains**
   - **Key trends**
   - **GVC mapping**
2. **Costa Rica in the Medical Devices GVC**
3. **Comparative Perspectives**
4. **Opportunities & Challenges for Costa Rica**

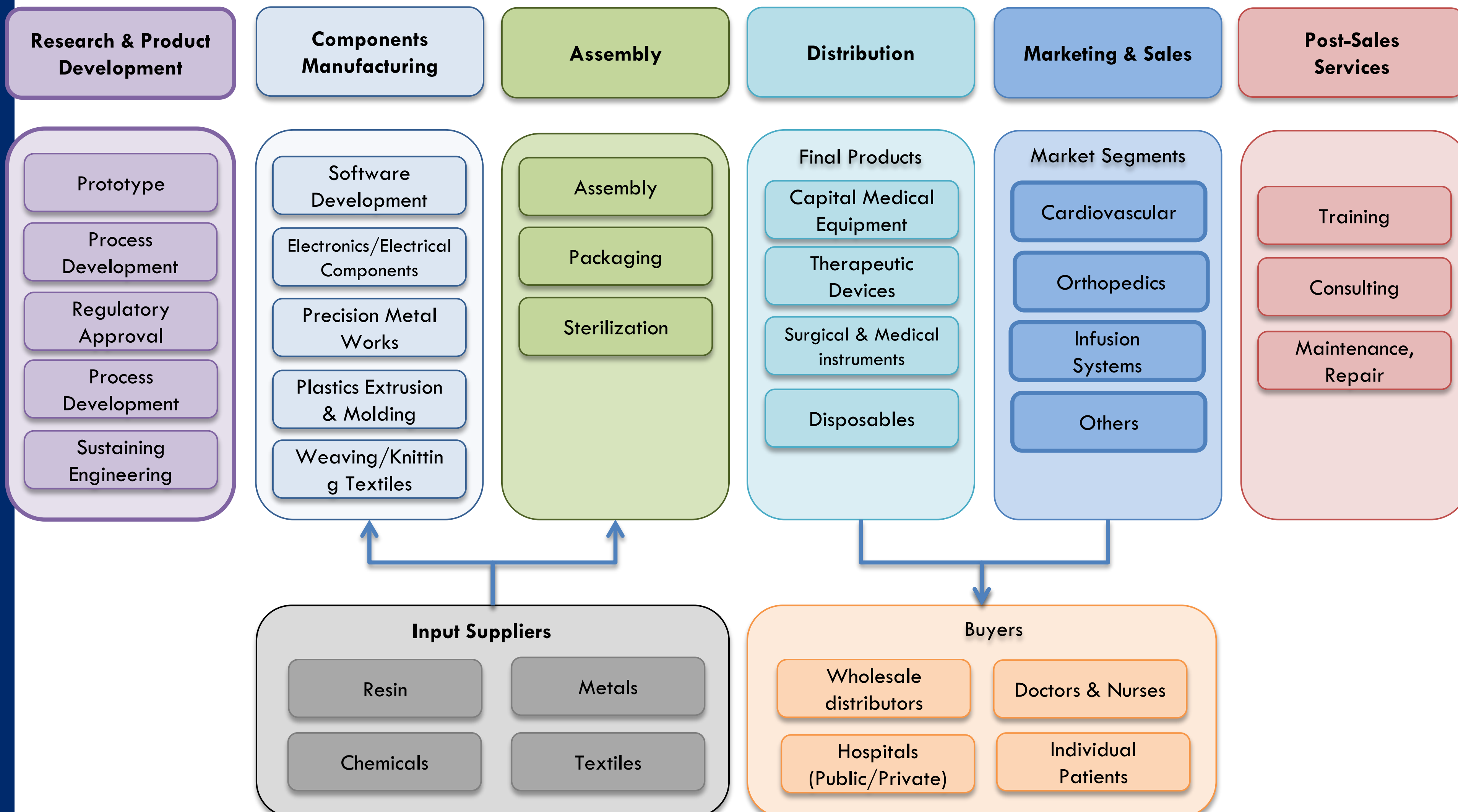
1. Medical Devices

Global Value Chain

Medical Devices Industry: Key Trends

- Mix of low- and high-value items (from disposable catheters to home test kits to MRIs)
- Growing global demand: developed countries still strongest, but emerging markets strengthening
- Production is highly concentrated geographically & among top firms in med devices GVC
- BUT increased offshoring creating opportunities for other countries → lower costs, leverage human capital & target new markets

Medical Devices Global Value Chain

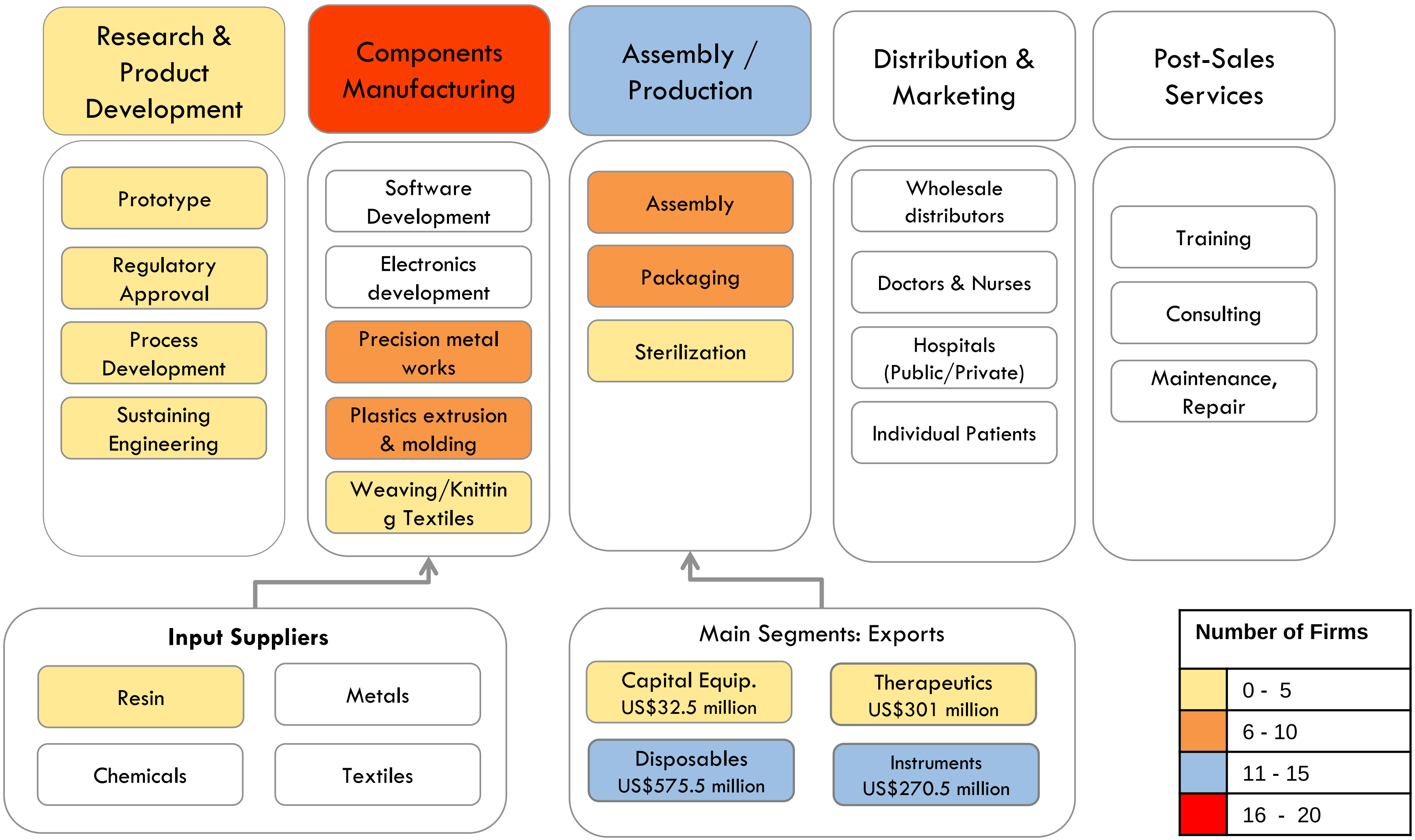


2. Costa Rica in the Medical Devices Global Value Chain

Key Trends in Costa Rica's Medical Devices GVC

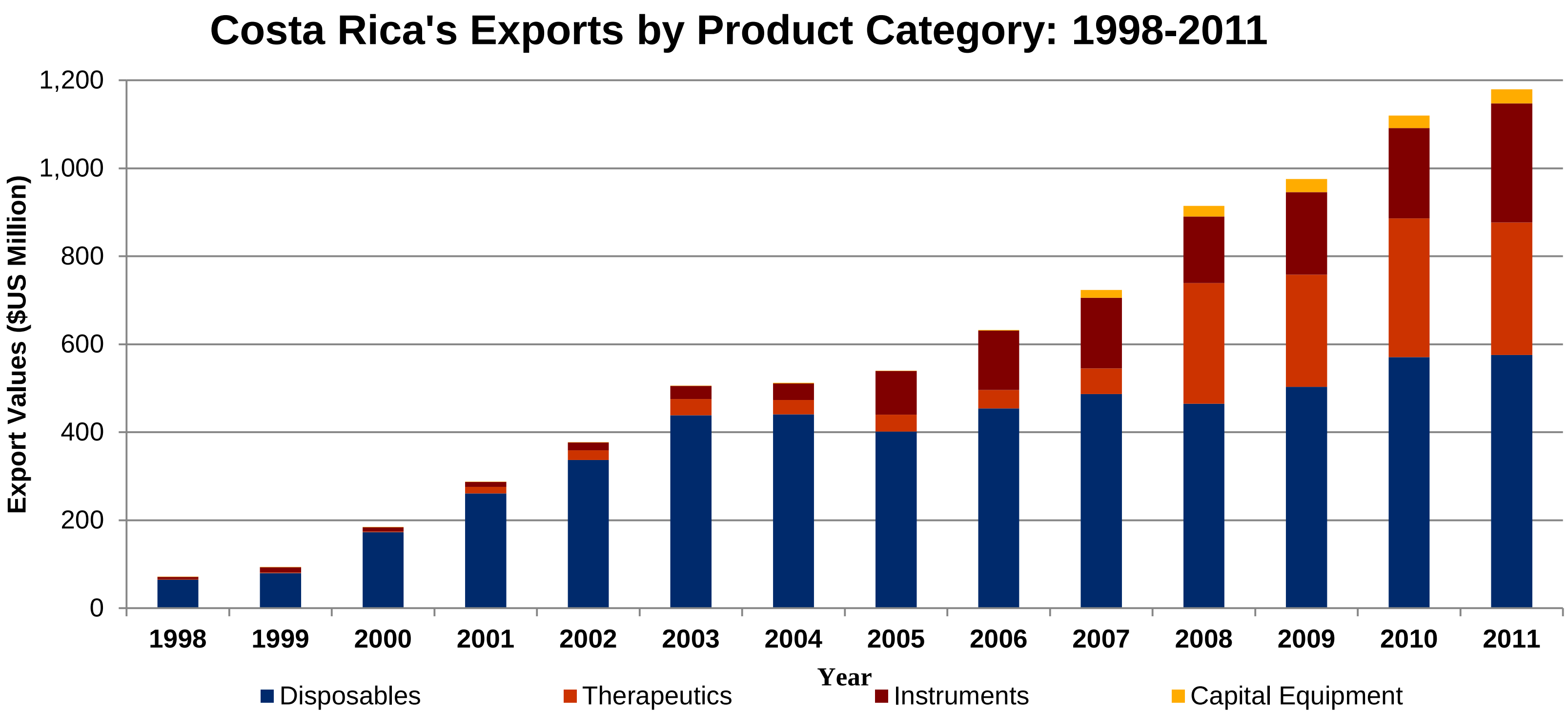
- **Product upgrading:** General increase in complexity of products → Growing confidence in ability to meet regulatory requirements.
- **Market segment diversification:** Disposables → Instruments → Therapeutics. (Shift toward higher-value products)
- **Forward and backward linkages**: In 2009-12, upstream (inputs) and downstream (sterilization) firms established in country; increase in country-capabilities & domestic value-added
- **Disposables, Instruments & Therapeutics categories are highly concentrated despite large number of entrants:**
    - Disposables: Baxter & Hospira
    - Instruments: Arthrocare & Boston Scientific
    - Therapeutics: Allergan & St. Jude Medical
- These six firms together exported 85% of the medical devices from Costa Rica.

Costa Rica's Position in the Medical Devices GVC



Local firms are mainly in packaging & support services (12 of 19) versus 4 in limited role in plastics molding & metal finishing and 1 OEM with exports under $2 million.

Evolution of Costa Rican Medical Device Exports



- **Disposables** still the largest product category exported, but no longer a strong growth area.
- Exports in **surgical instruments** have grown steadily since 2005.
- **Therapeutics** has become 2nd largest category since 2008; likely to increase as newly established firms complete transfer of new product lines.
- Limited export of highest value **capital equipment**

Firms in Costa Rica Medical Devices Sector

Entry Year	Firm Characteristics	Main Product Export Category	Core Market Segments	Product Examples	Select Firms
Up to 2000 24 firms: 8 US 15 CR 1 German	4 OEMs 8 Components 1 Input distributor 7 Packaging 1 Finishing 3 Support services	Disposables	Drug delivery; Women's health	Intravenous tubing (I) Mastectomy bra (I)	Hospira; Baxter; Amoena; Corbel
2001–2004 13 firms: 9 US 3 CR 1 Colombian	3 OEMS 6 Components 1 Finishing 1 Logistics provider 2 Support services	Instruments	Endoscopic surgery	Biopsy forceps (II)	Arthrocare; Boston Scientific; Oberg Industries
2005–2008 8 firms: 7 US 1 Puerto Rico	2 OEM 4 Components 1 Packaging 1 Finishing	Therapeutics	Cosmetic surgery; Women's health & urology	Breast implants (III) Minimally invasive devices for uterine surgery (II)	Allergan; Tegra Medical; Specialty Coating Systems
2009–2012 21 firms: 16 US 1 CR 1 Ireland 1 Japan 2 Joint ventures (US-CR)	5 OEMS 7 Components 2 Non-OEM assemblers 1 Input Distributor 2 Sterilization 2 Packaging	Therapeutics Disposables Instruments	Cardiovascular Drug delivery	Heart valves (III) Dialysis catheters (III) Guide wires (III) Compression socks (I)	Abbott Vascular St. Jude Medical Covidien Moog Synergy Health Volcano Corp.

Upgrading Success: A Leading Medical Devices MNC in Costa Rica

2004 – First production plant opens in Costa Rica

2005 – **Exports: <US$20 million**

2008 – Second plant opens. First plant begins restructuring

2010 – Initial plant reopens after restructuring

2011 – **Exports: >US$100 million**

Functional Upgrading	• 2004: Manufacturing functions • 2012: Engineering for process improvements ➔Focused on cardiology segment; strategy – to alleviate R&D costs in the US.
Product & Process Upgrading	• Biopsy forceps➔ Labor intensive, basic metal works & extrusion. • Urethral stent➔ Thermoforming, laser marking, coating capabilities. • Guide Wires ➔ Sophisticated Laser cutting & welding. • Today – CR facilities cover 42 manufacturing processes.
Market Diversification	• Gastroenterology segment ➔ Urology ➔ Cardiovascular
Forward Linkages	• Recent co-location of sterilization vendors will allow the firm to export directly to global distribution centers

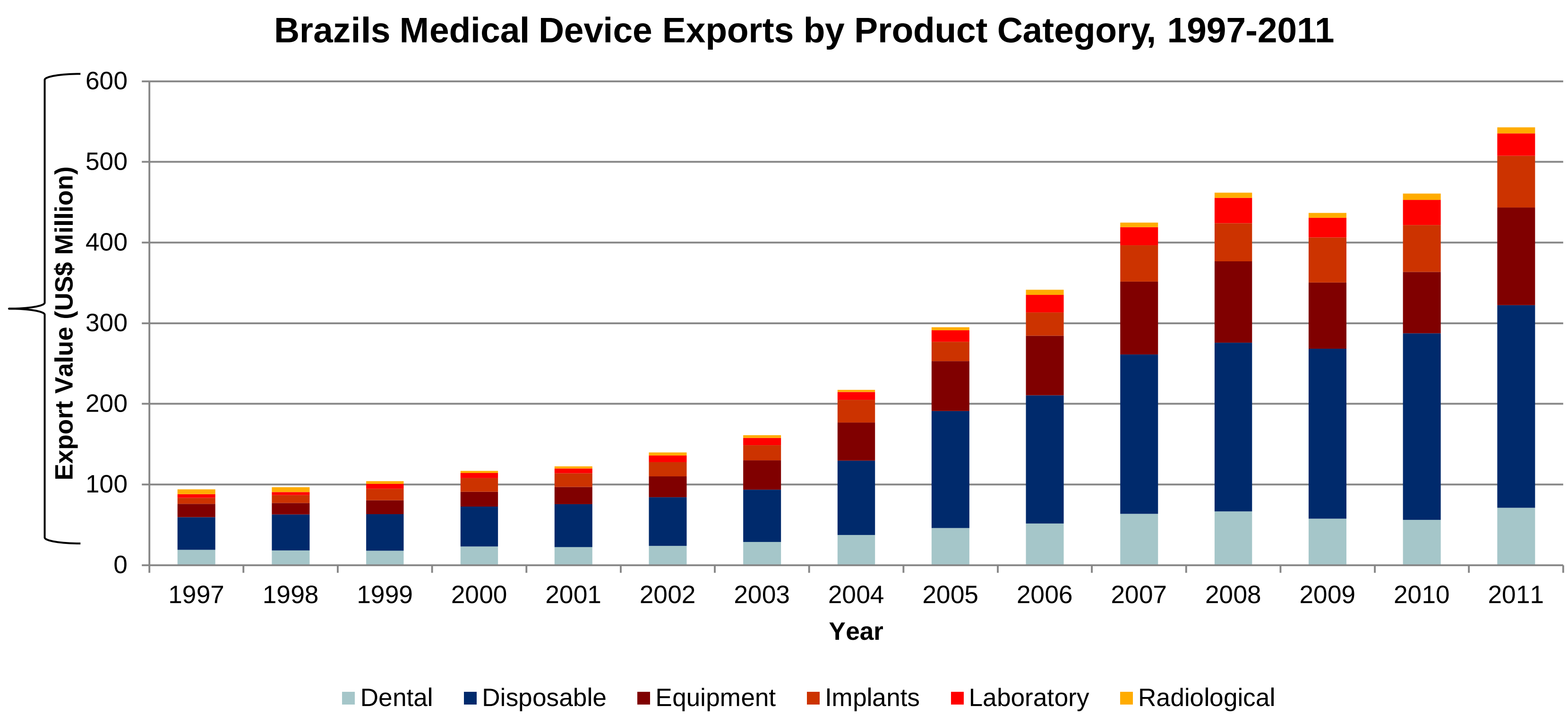
3. Upgrading in the Medical Devices GVC: A Comparative Perspective

Evolution of Brazilian Medical Device Exports

Costa Rica 2x

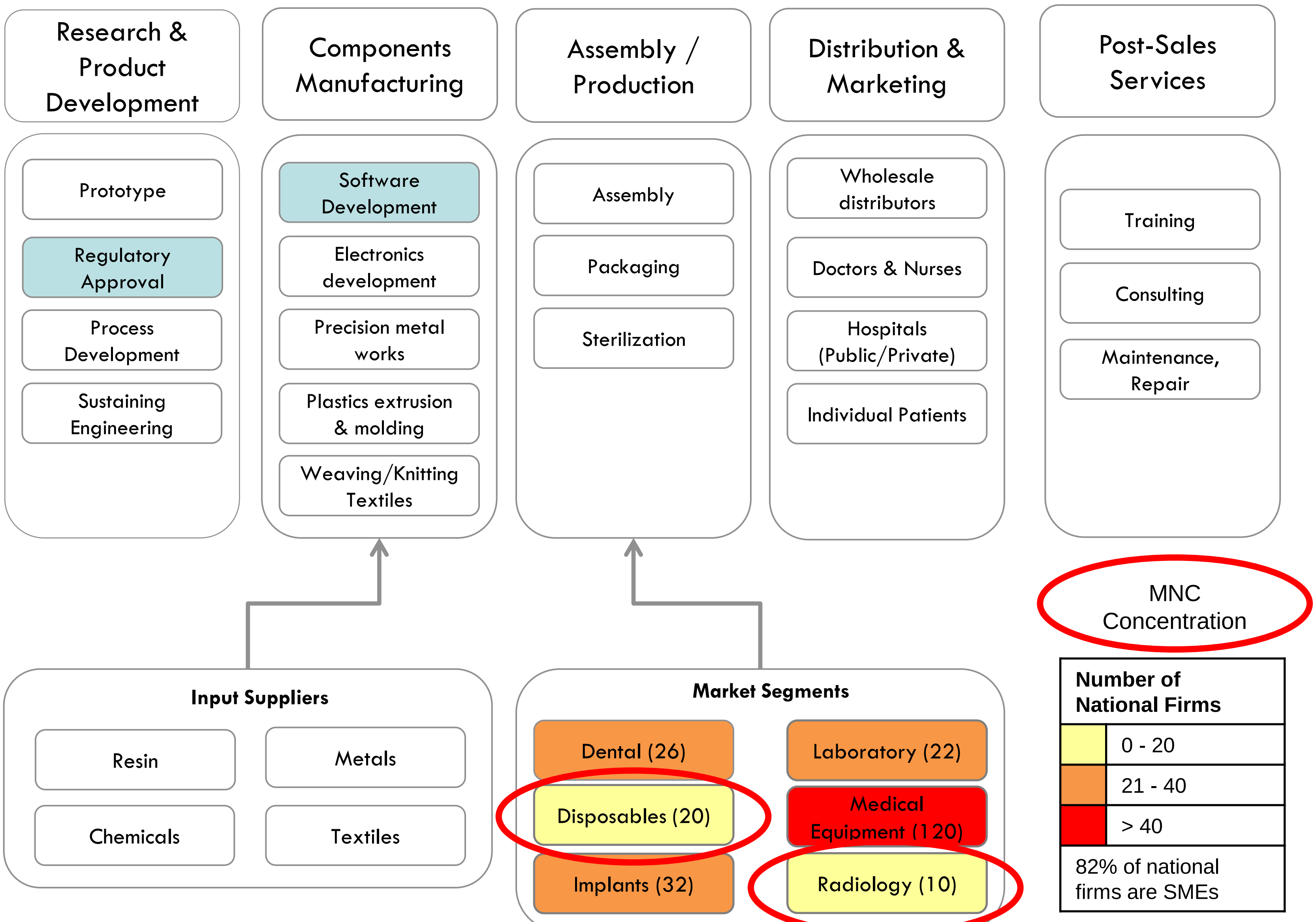
Mexico 10x

Ireland 18x



- **Disposables** are both the largest product category exported and an area of growing exports.
- **Medical equipment** surpassed **dental products** as the second largest export category in 2002.
- Export statistics hide the sectors of greatest importance, since the main export items tend to be low-tech. Brazilian government and private sector actors are working to promote price-competitive, mid-tech exports.

Brazil’s Position in the Medical Devices GVC



GE Healthcare in Brazil: Market-Seeking Offshoring

2010	2012 April	2012 June	2012 June	2013
GE Healthcare opens first plant in Brazil, manufacturing 3 products	GE fails to receive approval to produce 14 new products in Brazil	GE aquires XPRO, a local x-ray device manufacturer	Brazil approves a 25% preference for locally produced goods for public hospitals	GE plans to open a multi-disciplinary research center in Rio de Janeiro

- GE seeks to gain access to Brazil's rapidly growing healthcare market. Industrial policy tools create further incentives for local production.
  - The Brazilian informatics law: tax incentives for local production and R&D
  - The Dilma administration approved a 25% preference for the national healthcare system to purchase locally manufactured medical devices.
  - Certification by ANVISA, the regulatory arm of the Ministry of Health, is required to distribute medical devices in Brazil. ANVISA certification is very difficult and time-consuming (1 year on average), so MNCs frequently find it easiest to acquire local companies.

- GE is pushing for relaxed ANVISA requirements, but through its control of the largest public healthcare system in the world, the Brazilian government is in a strong bargaining position.

4. Opportunities and Challenges for Upgrading in Costa Rica’s Medical Devices GVC

Opportunities for Costa Rica

- Product upgrading → Therapeutics & capital equipment
  - Increasing value of products produced in country
  - Synergies with IT sector
- Improve capability of local & foreign suppliers
  - Automation to increase overall supply w/o increasing labor costs
  - Capture more value from participation in technology- and capital-intensive production processes
- Strengthen backward & forward linkages in chain
  - Locally available inputs → lower inventory needs and costs
  - Sterilization → opens up possibility for direct distribution

Opportunities for Costa Rica (cont'd)

- Diversification across geographic end-markets for functional upgrading in marketing, distribution & incremental R&D
  - e.g., Mexico
    - Growing supply (exports) and demand (domestic)
    - Cultural & language bridge
    - Close to the US
    - Mature industry with training opportunities
    - Leverage offshore services experience

Challenges for Costa Rica’s Med Devices Sector: Expansion & Upgrading

- **Expansion of manufacturing segments -- constrained**
  - Shortage of human capital, increased attrition & wage inflation.
    - All levels: Direct labor, technicians and esp. engineering staff
    - Sector competes with other priority sectors such as offshore services firms for engineering talent.
  - Transportation infrastructure limits continued growth, particularly in the Central Valley

- **Functional upgrading into R&D**
  - Cost and skills driven due to limited CR domestic market & EPZ incentives → Need to explore potential regional market
  - Limited R&D – need to build academic strengths in cutting edge technology

Challenges for Costa Rica (cont'd)
Building local linkages

- **Expand opportunities for local firms**
  - Local firms have limited presence in EPZs due to follow sourcing by MNC partners → enhance supplier development programs
  - Sourcing decisions made globally → look for regional expansion opportunities.
  - Limited scale, access to finance & technological expertise inhibit local firms from becoming reliable suppliers of critical inputs & services → look for upstream and downstream GVC opportunities.

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THANK YOU!

Questions?