World Class Universities in India and Industry 4.0

Opportunities and Challenges

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The Impact of the Fourth Industrial Revolution on Higher Education in the Asia Pacific
Where am I from?

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Outline of the Presentation

• Set the context

• Propose a conceptual framework-WCUs of the future

• Take stock of where India stands
  • General economic, higher education and industrial profile
  • Digital Culture and Ecosystem

• Recent Government Initiatives

• Opportunities, Challenges and Possible Way Forward
Machine Learning: Replacement or Transformation of the Universities!

“Robots will replace teachers by 2027.”

—Vice Chancellor of University of Buckingham

• **Industry 4.0:** Transformation or Replacement?
  
  • In either case, in the next ten to fifteen years very rapid changes will happen and universities are expected to be up to the task.

  • Interestingly, this is the same time frame within which India aims to develop world class universities (WCUs).
# World Class Universities (WCUs) in India

<table>
<thead>
<tr>
<th>Country</th>
<th>QS World University Rankings</th>
<th>Times Higher Education World University Rankings</th>
<th>Shanghai Jiao Tong University’s The Academic Ranking of World Universities (ARWU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>China</td>
<td>7</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Japan</td>
<td>9</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Singapore</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>South Korea</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Taiwan</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: Websites of various ranking agencies
Elements of World Class Universities (Salmi, 2008)
Plan for developing WCUs in India

- Search for “Institutions of Eminence” (IoEs) - India’s version of WCUs - 10 public and 10 private institutions.

- **INPUT**: Public - 153.9 million dollar per institution in a span of 5 years & Autonomy*; Private - No Financial Allocation but Autonomy*.

- **PROCESS**: Research, Teaching, Internationalization, Academic Collaboration, Interdisciplinary, Science and technology

- **OUTCOME**: Feature in Top 500 of reputed global university rankings in 10 years and in top 100 eventually

Source: UGC, India Guidelines, 2017

* Institutions are free to chose their path to become institute of repute subject to the same being compliant to the rules and regulations of their professional regulatory councils.
Building Future Ready Education System-

World Class Universities

- Designing curricula and transforming research fit for/in Industry 4.0
- Inculcating critical thinking and collaborative aptitude
- Developing digital culture and ecosystem
- Transforming education delivery and management

“Systemic adaption perspective than just an organisation priority”

KPMG report on Industry 4.0

www.apaie2018.org
World Class Universities of the Future

• Transforming education delivery and management
  • Viable measures of comparative student learning outcomes: Ex: Tuning Academy’s Calohee project

• Designing curricula fit for Industry 4.0 and research that supports future growth:
  • Undertake research in AI, Robotics, cognitive abilities, socio-emotional skills

• Inculcating critical thinking and collaborative aptitude
  • Human intelligence to be put for higher order dynamic thinking

• Developing digital culture and eco-system:
  • Pre-requisite and supporting policy, physical and digital infrastructure
India: A General Profile* in the context of Industry 4.0

More than 800 universities and 40000 colleges

Per Capita Income:
- Singapore: 53000 US $
- Hong Kong: 44000 US $
- China: 8000 US $
- India: 1700 US $

Public Spending on Higher Education:
- Singapore: 172000 US $
- Japan spent 9000 US $
- India: 2400 US $

2016*
Annual Expenditure of Top Universities in Asia: India not spending enough?

Annual Expenditure of top* Universities in Asia and top universities in India in 2015-16
(in billion US dollar at PPP)

<table>
<thead>
<tr>
<th>University/Multiversity</th>
<th>Expenditure (billion USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>National University of Singapore and its subsidiaries</td>
<td>2.15</td>
</tr>
<tr>
<td>Peking University</td>
<td>2.45</td>
</tr>
<tr>
<td>Tsinghua University</td>
<td>3.57</td>
</tr>
<tr>
<td>Nanyang Technological University</td>
<td>1.37</td>
</tr>
<tr>
<td>University of Hong Kong</td>
<td>1.35</td>
</tr>
<tr>
<td>Indian Institute of Science</td>
<td>0.42</td>
</tr>
<tr>
<td>Indian Institute of Technology Bombay</td>
<td>0.35</td>
</tr>
</tbody>
</table>

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India ranked no. 13 in high quality research output in 2017 by Nature

The 2017 tables are based on Nature Index data from 1 January 2016 to 31 December 2016.

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>United States of America (USA)</td>
<td>17232.78</td>
<td>16222.9</td>
<td>25935</td>
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<tr>
<td>2</td>
<td>China</td>
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<td>6537.28</td>
<td>9772</td>
<td>0.6% ↑</td>
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<tr>
<td>3</td>
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<td>3844.75</td>
<td>9066</td>
<td>-6.1% ↓</td>
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<td>4</td>
<td>United Kingdom (UK)</td>
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<td>3294.83</td>
<td>8486</td>
<td>-2.4% ↓</td>
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<tr>
<td>5</td>
<td>Japan</td>
<td>3083.71</td>
<td>2773.57</td>
<td>4791</td>
<td>-9.6% ↓</td>
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<tr>
<td>6</td>
<td>France</td>
<td>2133.28</td>
<td>1979.33</td>
<td>5499</td>
<td>-7.2% ↓</td>
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<tr>
<td>7</td>
<td>Canada</td>
<td>1477.92</td>
<td>1296.27</td>
<td>3173</td>
<td>-12.3% ↓</td>
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<tr>
<td>8</td>
<td>Switzerland</td>
<td>1137.15</td>
<td>1110.06</td>
<td>3028</td>
<td>-2.4% ↓</td>
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<tr>
<td>9</td>
<td>Spain</td>
<td>1059.37</td>
<td>1074.07</td>
<td>3324</td>
<td>1.4% ↑</td>
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<tr>
<td>10</td>
<td>South Korea</td>
<td>1116.4</td>
<td>1036.56</td>
<td>1964</td>
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<tr>
<td>11</td>
<td>Italy</td>
<td>1068.52</td>
<td>948.78</td>
<td>3373</td>
<td>-11.2% ↓</td>
</tr>
<tr>
<td>12</td>
<td>Australia</td>
<td>942.75</td>
<td>915.25</td>
<td>2833</td>
<td>-2.9% ↓</td>
</tr>
<tr>
<td>13</td>
<td>India</td>
<td>903.43</td>
<td>884.35</td>
<td>1612</td>
<td>-2.1% ↓</td>
</tr>
<tr>
<td>14</td>
<td>Netherlands</td>
<td>718.71</td>
<td>779</td>
<td>2720</td>
<td>8.4% ↑</td>
</tr>
<tr>
<td>15</td>
<td>Israel</td>
<td>533.65</td>
<td>490.58</td>
<td>1127</td>
<td>-8.1% ↓</td>
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<tr>
<td>16</td>
<td>Sweden</td>
<td>526.12</td>
<td>489.81</td>
<td>1708</td>
<td>-7.3% ↓</td>
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<tr>
<td>17</td>
<td>Singapore</td>
<td>487.14</td>
<td>427.29</td>
<td>833</td>
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<tr>
<td>18</td>
<td>Russia</td>
<td>371.26</td>
<td>385.9</td>
<td>1503</td>
<td>3.9% ↑</td>
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<tr>
<td>19</td>
<td>Belgium</td>
<td>336.63</td>
<td>365.93</td>
<td>1175</td>
<td>8.7% ↑</td>
</tr>
<tr>
<td>20</td>
<td>Taiwan</td>
<td>415.9</td>
<td>363.82</td>
<td>977</td>
<td>-12.5% ↓</td>
</tr>
<tr>
<td>21</td>
<td>Denmark</td>
<td>309.28</td>
<td>322.67</td>
<td>1191</td>
<td>4.3% ↑</td>
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<tr>
<td>22</td>
<td>Austria</td>
<td>278.29</td>
<td>279.05</td>
<td>1037</td>
<td>0.3% ↑</td>
</tr>
<tr>
<td>23</td>
<td>Brazil</td>
<td>236.2</td>
<td>255.72</td>
<td>1078</td>
<td>8.3% ↑</td>
</tr>
<tr>
<td>24</td>
<td>Poland</td>
<td>237.37</td>
<td>207.7</td>
<td>1059</td>
<td>-12.5% ↓</td>
</tr>
<tr>
<td>25</td>
<td>Finland</td>
<td>182.69</td>
<td>173.1</td>
<td>753</td>
<td>-5.2% ↓</td>
</tr>
</tbody>
</table>
By 2025 the Indian workforce will be larger than its Chinese counterparts.

**Gross enrollment ratio in higher education:**
- China: 43.39
- Hong Kong: 68.48
- Turkey: 94.73
- India: 27

**Nurturing India’s demographic dividend?**
Make in India ?: Missing Industry

Source: The World Bank 2016
Industry and Services sector not absorbing enough workforce!

Source: The World Bank 2016
Estimated share of employment that is susceptible to automation


Note: For more details see figure 2.24 in the full Report. OECD = Organisation for Economic Co-operation and Development.
Developing digital culture and eco-system

• “Analogue complements of digital revolution”
• Regulations: economics of IoT, favoring incumbent firms
  • Skilled workers and talent
  • Accountability of the Institutions, data security concerns
  • High amount of resources
• “Digital complements of industry 4.0 revolution”
  • Number of people offline
  • Familiarity with common digital and financial instruments and processes
  • Exposure to media


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Offline Population in India: A Comparative Look

Digital Awareness and Access among 14-18 years old in 2017

**Digital Awareness**
- 73% have used a mobile phone in the last week.
- 30% have used the internet in the last week.
- 61% have never used the internet.
- 28% have used a computer in the last week.
- 56% have never used a computer.

**Access to Financial Instruments**
- 78% have own bank account
- A slightly higher percentage of females have bank accounts than males in this age group.
- 51% have deposited or withdrawn money from the bank
- 16% have used ATM
- Only 5% have done any internet banking

Girls and young women have far lower access to computer and internet as compared to boys. While 49% of males have never used the internet, close to 76% of females have never done so.

With respect to internet & computers, being enrolled in formal education raises the likelihood of access.
Recent Indian Government Initiatives

✓ Make in India Initiatives: 2014
✓ Institutions of high level committee headed by NITI Ayog
✓ Atal Innovation Mission
✓ Digital India Programme
✓ Green Corridors
✓ Task Force on AI for India’s Economic Transformation
✓ Andhra Pradesh Government has adopted an IoT policy
✓ India’s ‘smart factory’ to be set up in Bengaluru.
Challenges

• No ready blue print or policy recipe
• Shortage of financial resources
• Weak digital culture and eco-system
• Looking forward to a supporting policy framework and infrastructure
Opportunities

- Clean slate
- Talented human resource
- Government consciousness
- Willing to collaborate and learn
Thank you!

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