Where are the Jobs?
Estimating Skill-Based Employment Linkages across Sectors for the Indian Economy: An Input-Output Analysis

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11 September 2019
OUTLINE

• Motivation
• Objective
• Contribution to Literature
• Methodology
  • Defining skill: A two step process
  • Clubbing Sectors
• Data Description: Direct Skilled Employment
• Direct plus Indirect Employment
  • Methodology
  • Results
• Conclusions and Policy Implications
• Way Forward
MOTIVATION

• Skilling India initiative

• Supply side approach: skill training – skill mismatch

• Demand side approach: sectors that demand different types of skilled employment

• 24 priority sectors identified by NSDC in its National Policy for Skill Development and Entrepreneurship (2015)

• Direct and indirect employment creation

• Traditionally skills has been measured by general education
  – Data Gaps
Contribution to Literature and Policy

- Integrating different strands of policy recommendations
- Defining Skills
  - Previous Literature: General Education
  - Contribution: General, formal vocational and technical
- Usually, links to within-sector employment
  - Contribution – within and outside sectors
- No acknowledgement of higher skilled workers
Objective

• Which sector is creating the most jobs?

• What type of employment are being created in each sector? Which skill level?

• Identification of sectors: potential to generate different types of employment directly and indirectly
METHODOLOGY
## SKILLS ILLUSTRATION

### CONSTRUCTION SECTOR SKILL COUNCIL

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Mason Tilling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>4.0</td>
</tr>
<tr>
<td>Qualification Pack Name and Reference Id.</td>
<td>CON/No103</td>
</tr>
<tr>
<td>Version No.</td>
<td>1.0</td>
</tr>
<tr>
<td>Version Update</td>
<td>30-12-2015</td>
</tr>
<tr>
<td>Pre-requisites to Training</td>
<td>Preferably 5th Standard</td>
</tr>
<tr>
<td>Experience (Assumed, though not mentioned)</td>
<td>Minimum experience of 1 year of Level 3</td>
</tr>
</tbody>
</table>

### IT SECTOR SKILL COUNCIL

<table>
<thead>
<tr>
<th>Job Role</th>
<th>Domestic IT Helpdesk Attendant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>4.0</td>
</tr>
<tr>
<td>Code</td>
<td>SSC/Q110</td>
</tr>
<tr>
<td>Minimum Education Qualification</td>
<td>12</td>
</tr>
<tr>
<td>Maximum Education Qualification</td>
<td>Masters Degree in any Discipline</td>
</tr>
<tr>
<td>Experience</td>
<td>0-1 year of work experience/intern ship in a related area</td>
</tr>
</tbody>
</table>

Source: Partial Adaptations from Construction Skill Council and IT Sector Skill Councils
Defining Skills

General education (not literate to below primary) and/or No Technical education and/or Did not receive any Vocational training → Low skilled

General education (primary to secondary) and/or No Technical education and/or Received Vocational training → Low-medium skilled
Defining Skills

General education (higher secondary, diploma/certificate courses) and/or Technical education (diploma/certificate course below graduate level) and/or Received Vocational training Medium-high skilled

General education (graduate, post-graduate & above) and/or Technical education (diploma/certificate course above graduate level) and/or Received Vocational training High skilled
### 1st Step: Combining General and Technical Education

<table>
<thead>
<tr>
<th>General Education</th>
<th>Technical Education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No technical</td>
</tr>
<tr>
<td>Not literate</td>
<td>Low skill</td>
</tr>
<tr>
<td>Literate without formal schooling</td>
<td>Low-medium skill</td>
</tr>
<tr>
<td>TLC</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
</tr>
<tr>
<td>Literate: below primary</td>
<td>Low-medium skill</td>
</tr>
<tr>
<td>Primary</td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td></td>
</tr>
<tr>
<td>Higher secondary</td>
<td></td>
</tr>
<tr>
<td>Diploma/certificate course</td>
<td>Medium-high skill</td>
</tr>
<tr>
<td>Graduate</td>
<td></td>
</tr>
<tr>
<td>Post-graduate &amp; above</td>
<td>High skill</td>
</tr>
<tr>
<td>Missing Cases</td>
<td>Low skill</td>
</tr>
</tbody>
</table>

Source: Conceptualised by Authors
### 2nd Step: General and Technical Education and Vocational Education

<table>
<thead>
<tr>
<th>Combination of General and Technical education</th>
<th>Vocational education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Formal vocational training</td>
<td>Non-formal vocational training</td>
</tr>
<tr>
<td>Low skilled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-medium skilled</td>
<td>Low-medium skill</td>
<td></td>
</tr>
<tr>
<td>Medium-high skilled</td>
<td></td>
<td>Medium-high skill</td>
</tr>
<tr>
<td>High skilled</td>
<td></td>
<td>High skill</td>
</tr>
<tr>
<td>Missing cases</td>
<td>Medium-high skill</td>
<td>Low-medium skill</td>
</tr>
</tbody>
</table>
Only 16.8% of the workforce are either Medium-High or High-Skilled i.e. 70 million employed

Percentage Share of Skilled Workforce (% of Workforce, 2011-12)

- Low Skilled, 37.1%
- Low - Medium Skilled
- Medium - High Skilled, 8%
- High Skilled, 8.8%

Low - Medium Skilled, 46.1%

Source: Author’s computation using 68th (2011-12) employment-unemployment survey by the National Sample Survey Office (NSSO, 2013)
DIRECT SKILLED EMPLOYMENT
Share of medium-high and high employment across sector is low..

Source: Author’s computation using 68th (2011-12) employment-unemployment survey by the National Sample Survey Office (NSSO 2013).
Within and Outside Sector Skilled Employment though Employment Linkage Effects
Employment Linkage Effects

Employment linkage effects: forward and backward (Bulmer-Thomas, 1982)

**Backward employment linkage:** how much employment in one sector can create jobs in other sectors, when final demand within that sector increases by unity.

**Forward employment linkage:** how much employment in one sector can create jobs within itself, when final demand from rest of the economy increases by unity.
METHODOLOGY

Incorporating different types of employment into an I-O model (Bulmer-Thomas, 1982)

**Assumption:** constant returns to scale

**fixed employment coefficient:** \( E_i = \frac{L_i}{X_i} \)------- (1), \((i = 1, 2, ..., n)\) homogeneous labour

**heterogeneity in labour force:** different types of employment, \( L_i = LS_i + LMS_i + MHS_i + HS_i \) ------- (2)

**Fixed employment coefficient with respect to each type of employment:**

**Following the conventional I-O model:** \( X = (I - A)^{-1} F \) and juxtaposing that in those above labour equations with respect to different skill level,

Calculate Employment Forward as well as Backward linkages with respect to all four types of skill level
Data Sources


National Sample Survey Office (NSSO) 66th (2009-10) and 68th (2011-12) round of employment-unemployment survey

NIC 2008, 2004

Price and Quantum indices published by the National Accounts Statistics 2011 and 2014
Clubbing Sectors

- I-O table of India for 2009–10 (CSO) – 130 sectors

Aggregated to 23 sectors – provides macro picture of the Indian economy consisting of the primary, manufacturing, non-manufacturing and services sector

Choosing sectors:

Map with - 24 priority sectors mentioned by National Policy for Skill Development & Entrepreneurship (2015)
- NIC (2008)

BACKWARD LINKAGE: OUTWARD SECTOR EMPLOYMENT (FOR 2009-10 & 2011-12)

Low skill
- Agriculture
- Wood & wood products
- Food, beverages & tobacco
- Hotels & restaurants
- Leather products
- Textiles
- Construction

Low-med skill
- Agriculture
- Wood & wood products
- Textiles
- Food, beverages & tobacco
- Hotels & restaurants
- Leather products
- Construction

Med-high skill
- Wood & wood products
- Paper products
- Textiles
- Other services
- Food, beverages & tobacco
- Hotels & restaurants
- Trade

High skill
- Other services
- Paper products
- Communication
- Financing, real estate & business activities
- Trade
- Leather products
- Wood & wood products

Note: ranking of the sectors in descending order
Source: Author’s estimation using I-O table for India for 2011 using WIOD (Timmer, 2012)
SUMMARY OF RESULTS FROM EMPLOYMENT BACKWARD LINKAGE

- Agriculture (as a whole except forestry & fishing) is creating all four types of employment in other sectors.
- Among manufacturing, ‘textiles’ is creating above unitary employment at all types of skill level, however, ‘food, beverages & tobacco’ creates mostly low and low-medium skilled employment for both the years. And within ‘textiles’, especially ‘cotton & jute textiles’ are creating more employment in other sectors.
- Services sector is mostly engaged in creating medium-high and high skilled jobs, especially ‘other services’, ‘trade’, ‘financing’ etc.
- However, some manufacturing sectors like ‘paper products’ mostly publishing activities create lot of medium-high and high skilled jobs outside the sectors.
WITHIN SECTOR EMPLOYMENT: FORWARD LINKAGE (FOR 2009-10 & 2011-12)

Low skill

- Agriculture
- Mining & Quarrying
- Non-metallic mineral products
- Construction
- Leather products
- Trade

Low-med skill

- Mining & Quarrying
- Agriculture
- Textiles
- Non-metallic mineral products
- Leather products
- Hotels & restaurants

Med-high skill

- Mining & Quarrying
- Agriculture
- Trade
- Communication
- Other services
- Paper products
- Textiles

High skill

- Communication
- Other services
- Paper products
- Trade
- Financing, real estate & business activities
- Mining & Quarrying

Note: ranking of the sectors in descending order
Source: Author’s estimation using I-O table for India for 2011 using WIOD (Timmer, 2012)
SUMMARY OF RESULTS FROM EMPLOYMENT FORWARD LINKAGE

• A new sector within non-manufacturing (‘mining & quarrying’) has come up to create within sector employment

• Other sectors like ‘paper products’ continue to create within sector medium-high and high skilled employment as well.

• Similar result is for the sectors like ‘other services’, ‘textiles’, ‘financing’, etc.
Some sectors are creating more indirect jobs than direct ones.

Source: Author’s estimation using I-O table for India for 2011 using WIOD (Timmer, 2012)
Conclusions and Policy Implications

• Agriculture (as a whole except forestry & fishing) is creating all four types of employment in other sectors both inside and outside that sector
• Among manufacturing, ‘textiles’ is creating above unitary employment at all types of skill level indirectly, however, ‘food, beverages & tobacco’ creates mostly low and low-medium skilled employment for both the years. And within ‘textiles’, especially ‘cotton & jute textiles’ are creating more employment in other sectors
• Services sector is mostly engaged in creating medium-high and high skilled jobs, especially ‘other services’, ‘trade’, ‘financing’ etc. both directly and indirectly
• However, some manufacturing sectors like ‘paper products’ mostly publishing activities create lot of medium-high and high skilled jobs outside the sectors.
• Creates a basis for manufacturing vs services in terms of their employment creation in terms of different levels of skill

• Demand side approach to capture the direct as well as indirect employment creation by the sectors
Thank You