Level of preparedness of developing countries in Africa for adopting Frontier technologies and the potential use for cleaner production: Experience with firm-level survey in Ghana and the STI for SDGs roadmap

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Creating the Enabling Environment is Key

• Creating the enabling environment in terms of policies and regulatory frameworks in place to facilitate technology transfer and adoption in developing countries is critical

• Ghana has a digitilization agenda aligned to the AU’s Digital Transformation Strategy for Africa (2020-2030)

• ICT4D Policy (2003) has a vision of transforming the country into an information-rich and knowledge-based society and economy through the development, deployment and exploitation of ICTs

• Ghana’s STI4SDGs Roadmap (2021) has measures to promote adoption of emerging technologies

• Institutional Arrangements – Ministries of Environment, Science and Technology, Trade and Industry, Communication and Digitalisation

• Ghana ready to take advantage of the fourth industrial revolution?
UNCTAD’s mandate to assist developing countries with technology and innovation policy formulation

- In line with UNCTAD’s mandate a pilot study was conceptualized to provide data on the firm-level adoption of frontier technologies

- Frontier technologies considered include IoTs, big data, AI, Virtual Reality, e-Commerce, Cloud Computing, Industrial Robot, Cobot and 3D Printing

- The economic sectors for the survey in Ghana were agro-processing, ICT, tourism, pharmaceuticals and textiles
Key Highlights of the Survey results

• Survey results show high level of awareness of frontier technologies among the firms except for Big Data, Cobots, and Virtual Reality and to a lesser extent Cloud Computing.

• The level of adoption of Industrial Robots, Cobots, 3D Printing, Big Data and Virtual Reality was very low.

• Only 4.1% of the firms surveyed had adopted Industrial Robots and Virtual Reality. Firms adopting Cobots and 3D Printing constituted 5.2%, and 5.6% respectively.

• Firms adopting Internet of Things (IoTs) formed 25.8%.

• This suggests that more firms adopt less sophisticated frontier technologies compared to more sophisticated ones.
Awareness Vs Adoption of Frontier Technologies in Ghana
# Level of Adoption of Frontier Technologies by Sector

<table>
<thead>
<tr>
<th>Frontier Technologies</th>
<th>Sectors</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>ICT</td>
</tr>
<tr>
<td>E-Commerce</td>
<td>48.5%</td>
</tr>
<tr>
<td>Social Media</td>
<td>90.9%</td>
</tr>
<tr>
<td>Mobile Banking</td>
<td>78.8%</td>
</tr>
<tr>
<td>Cloud Computing</td>
<td>37.9%</td>
</tr>
<tr>
<td>Big Data</td>
<td>28.8%</td>
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<tr>
<td>Artificial Intelligence</td>
<td>36.4%</td>
</tr>
<tr>
<td>3D Printing</td>
<td>10.6%</td>
</tr>
<tr>
<td>Internet of Things</td>
<td>54.5%</td>
</tr>
<tr>
<td>Industrial Robots</td>
<td>4.5%</td>
</tr>
<tr>
<td>Cobots</td>
<td>6.1%</td>
</tr>
<tr>
<td>Virtual Reality</td>
<td>18.2%</td>
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</tbody>
</table>
Possibilities of Using Frontier Technologies among non-Adopting Firms
Inadequate 22.20% 25.60% 31.80% 40.40% 59.40%
Adequate 54.60% 52.60% 45.00% 38.80% 23.40%
More than adequate 19.00% 14.60% 16.40% 12.60% 5.60%
Don't Know 4.20% 7.20% 6.80% 8.20% 11.60%

Inadequate | Adequate | More than adequate | Don't Know
--- | --- | --- | ---
Instrumental skills for the use of digital technologies | Managing information skills | Digital collaboration and communication skills | Creation of digital content | Advanced digital skills

Level of Adequacy of Digital Skills
Emerging Issues

• The level of skills and capabilities of the workforce of a firm is a critical driver of adoption of the frontier technologies.

• This survey provides a basis for the formulation of new strategies and programmes on firm-level adoption of frontier technologies.

• The productive sectors of the economy and their economic actors including micro, small, medium and large firms cannot remain competitive unless there is intensive adoption of frontier technologies.

• A national policy must be formulated to accelerate the adoption of frontier technologies.

• Some of these considerations are captured in the STI4SDGs Roadmap
Ghana’s STI4SDGs Roadmap

• Developing new business and delivery models to increase access to STI education.
• Improve or establish Innovation systems, increasing the opportunity for knowledge transfer between multiple actors.
• Foster collaboration between private sector, universities and other research institutions.
• Policy reform/incentives for businesses that wish to adopt technologies that promote sustainability.
• Policy reform that encourages the adoption of technology within industry.
• Lowering the cost of the acquisition of technologies.
Thank You!!