

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

Wilhemina Quaye

Director of CSIR-Science and Technology Policy Research Institute

CT-519 Accra-Ghana

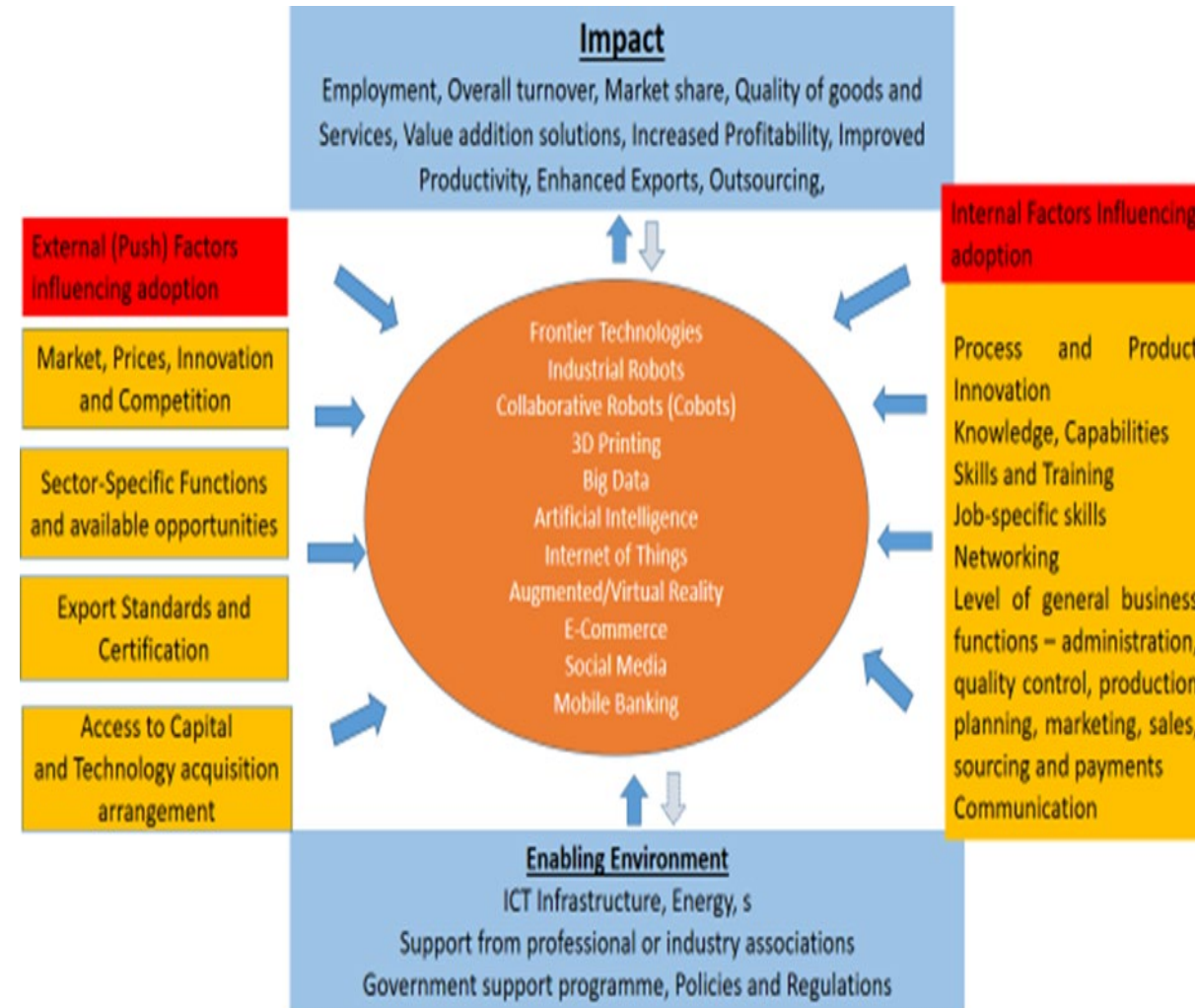
# Creating the Enabling Environment is Key

- 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 digitization 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 Digitilsation
- Ghana ready to take advantage of the fourth industrial revolution?



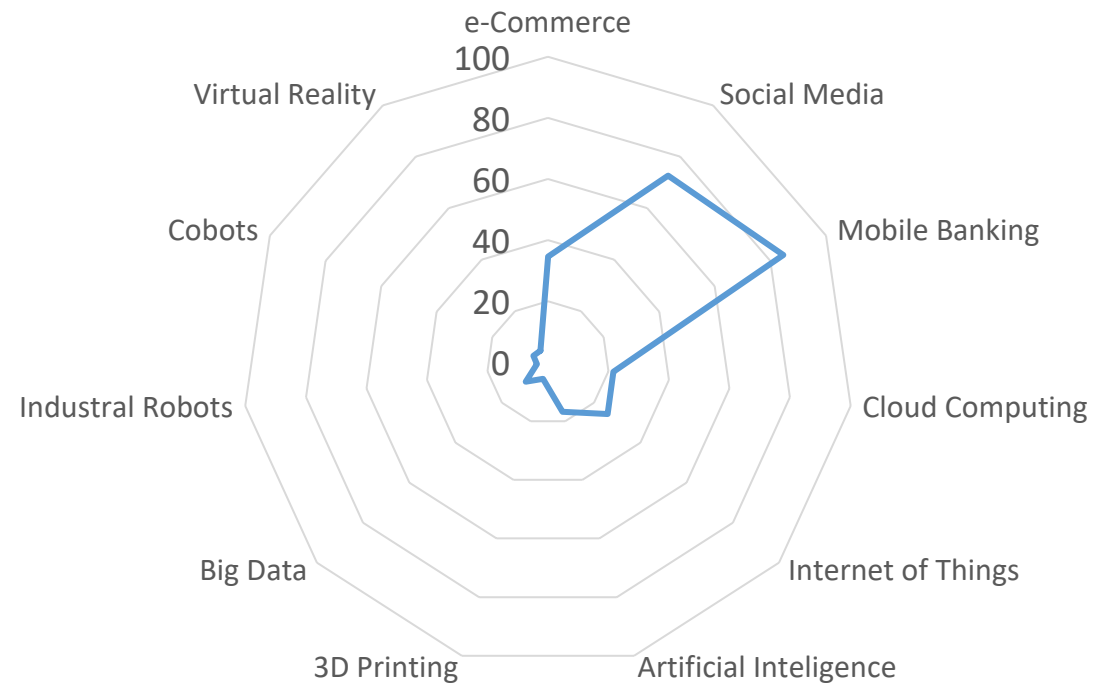
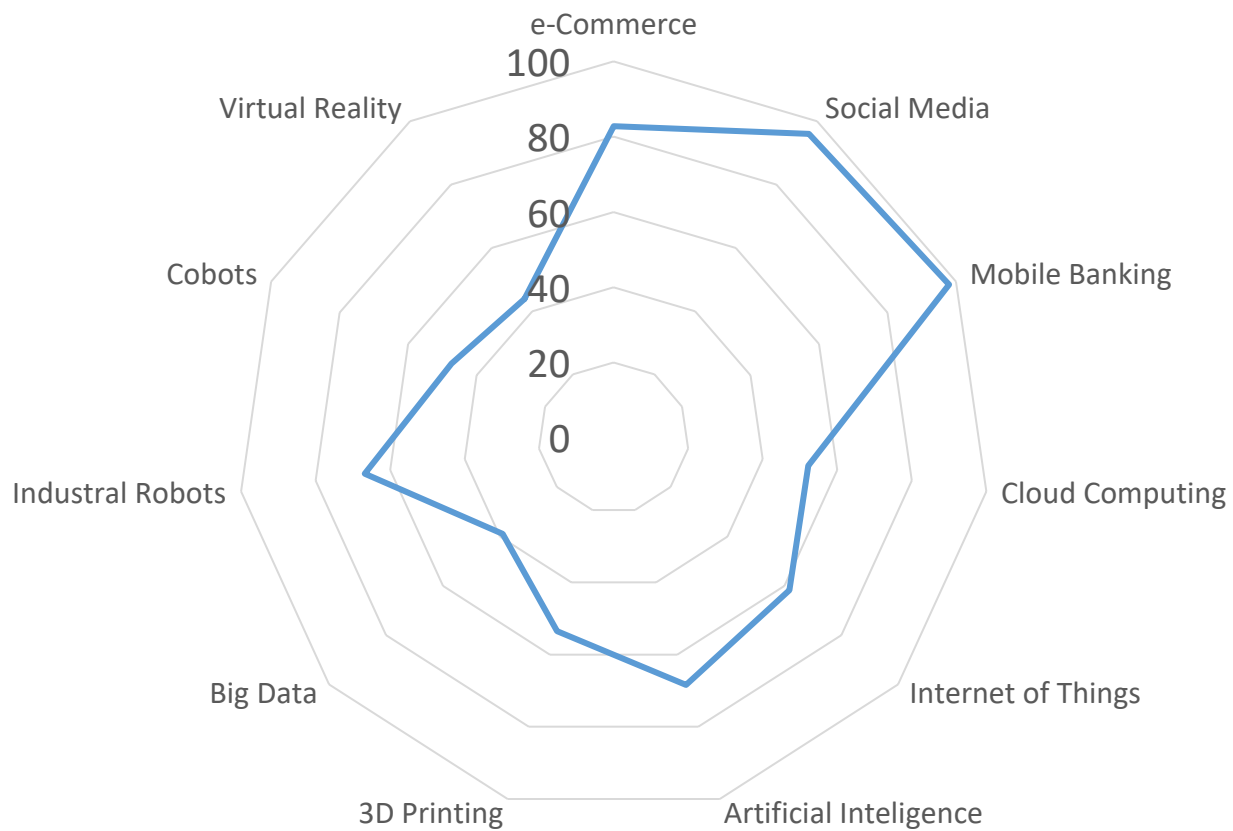
# UNCTAD's mandate to assist developing countries with technology and innovation policy formulation

- 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

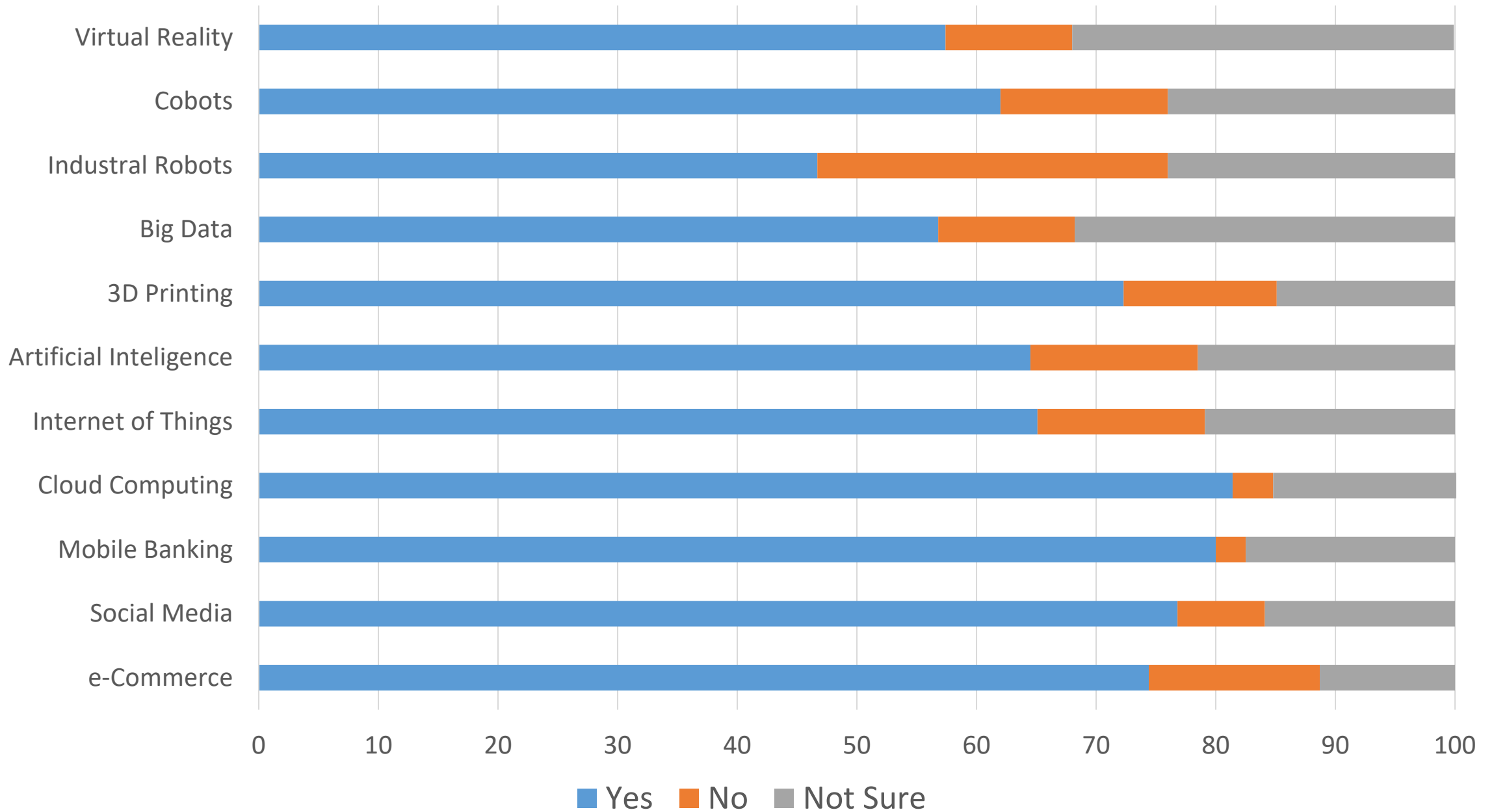
- Survey results show high level of awareness of frontier technologies among the firms except for Big Data, Cobots, and Virtual Reality and to a lesser extent Cloud Computing.
- The level of adoption of Industrial Robots, Cobots, 3D Printing, Big Data and Virtual Reality was very low.
- Only 4.1% of 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.



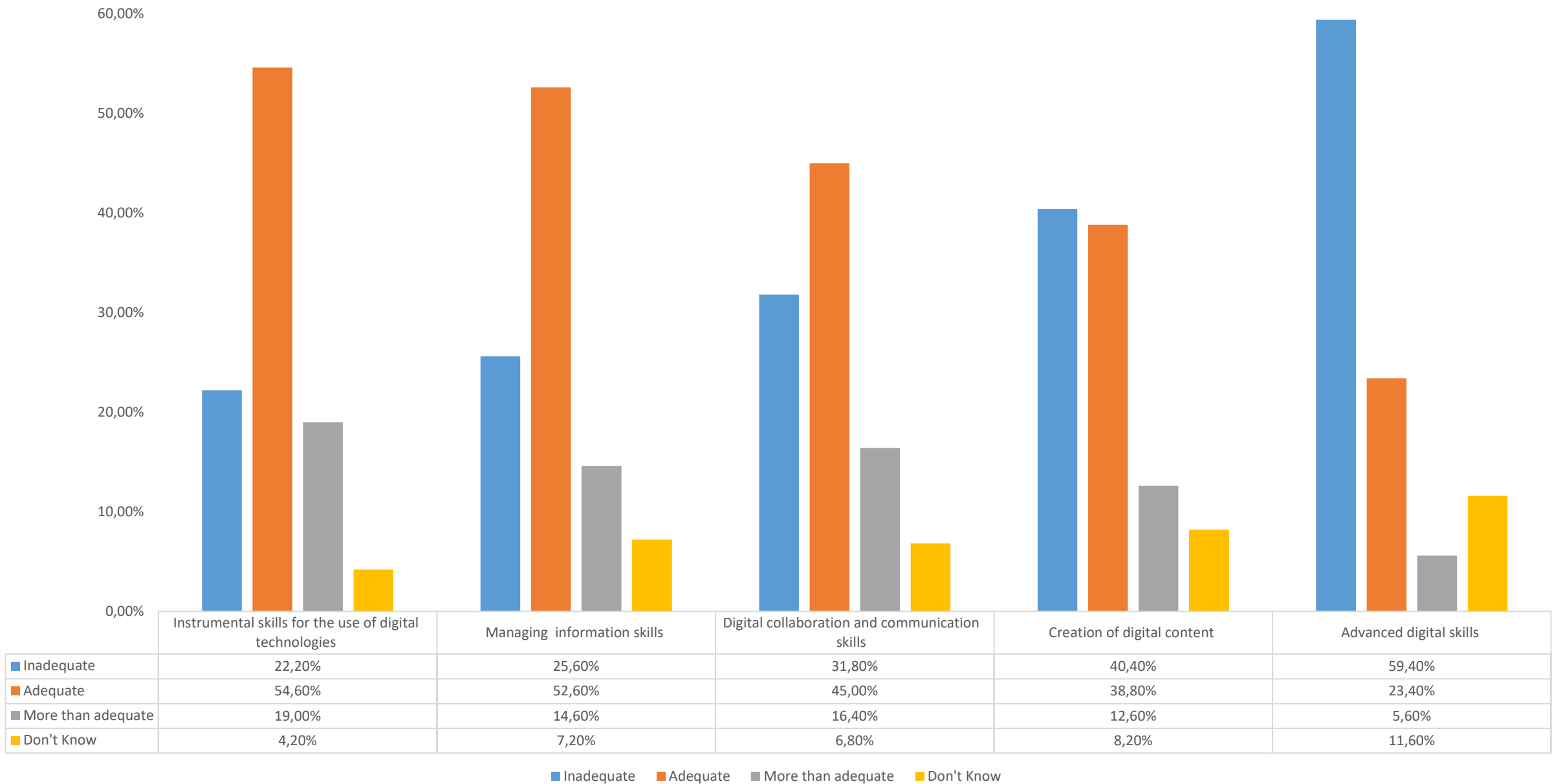
Awareness Vs Adoption of Frontier Technologies in Ghana

# Level of Adoption of Frontier Technologies by Sector

Frontier Technologies	Sectors				
	ICT	Tourism	Agro-processing	Pharmaceuticals	Textiles
E-Commerce	48.5%	54.1%	38.1%	28.6%	14.7%
Social Media	90.9%	79.7%	64.9%	66.7%	72.1%
Mobile Banking	78.8%	81.1%	85.7%	79.4%	90.7%
Cloud Computing	37.9%	27.0%	22.6%	14.3%	12.4%
Big Data	28.8%	10.8%	7.1%	3.2%	5.4%
Artificial Intelligence	36.4%	24.3%	15.5%	6.3%	9.3%
3D Printing	10.6%	6.8%	1.8%	7.9%	6.2%
Internet of Things	54.5%	43.2%	22.6%	23.8%	6.2%
Industrial Robots	4.5%	0.0%	7.7%	3.2%	0.0%
Cobots	6.1%	2.7%	8.3%	3.2%	3.1%
Virtual Reality	18.2%	6.8%	3.0%	1.6%	0.0%



## Possibilities of Using Frontier Technologies among non-Adopting Firms



## 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!!