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The Diffusion of Innovation in Low Income Countries

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TECHNOLOGY and MANAGEMENT for DEVELOPMENT CENTRE

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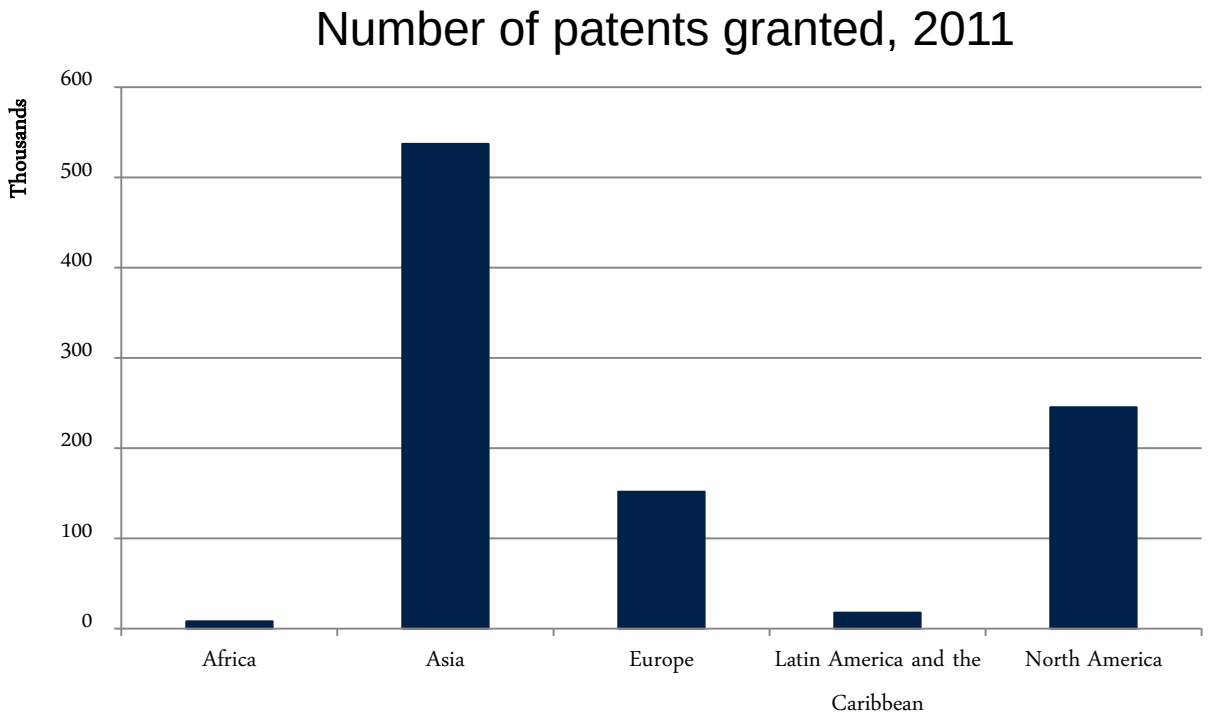
- Innovation as a major engine for long term growth
- Most of formal innovations are concentrated in a few countries
- Innovation diffusion and adoption is a key element of industrialisation and catch-up



The Diffusion of Innovation in Low Income Countries

(The DILIC Project)

Funded by DFID & ESRC

Objectives

- Understand the barriers to innovation creation and diffusion in LICs and redefine the space for innovation policy;
- Analyse the determinants of knowledge diffusion *in* LICs, especially the role of university-industry linkages and inter-firm networks;
- Examine the effect of external knowledge diffusion *to* LICs, in particular the role of South-South trade and FDI;
- Develop an SME open innovation network model to increase frugal innovation in LICs.

Definition of innovation

- Creation or adoption of new product or process, or new organisational and marketing practices (where "new" means new to the world or new to the country or the firm), but, also new business models and new sources of supply. (Oslo Manual, 2005)

- It includes the whole innovation chain which covers both the creation and adoption of new knowledge and the commercialisation process.

Work Package 1: Constraints to innovation & diffusion in LICs & spaces for innovation policy

- **Objectives:**

  (1) understand the state, type and nature of innovation in LICs;

  (2) understand the constraints to innovation and diffusion in LICs at the firm level;

  (3) identify useful industrial and science and technology policies to overcome the barriers.

Work Package 2: Knowledge Diffusion in LICs

- **Objectives:**

(1) examine the role open innovation, in particular inter-firm networks and university-industry linkages, in knowledge diffusion and innovation in LICs;

(2) develop an SME open innovation and production network model for firms in LICs.

- **Res Ques.:**

(1) Will firms with low innovation capabilities benefit from open innovation?

(2) What is the nature of the linkage btw universities and industry?

(3) Will an SME open innovation network be an effective model to overcome the constraints in LICs?

(4) What is the role of policy in the formation of such networks?

Work Package 3: Knowledge diffusion to LICs: China-Africa trade, FDI and productivity growth

- **Objectives**:

(1) examining the impact of Chinese trade with Ghana on the productivity growth of local firms;

(2) analysing the transmission mechanisms through which Chinese FDI impacts on the diffusion of management and technological skills in LICs,

(3) comparing this form of FDI with traditional FDI from developed countries.

Research Methods

- Fieldwork and in-depth case studies
- Firm level survey of 500 firms (formal+informal)
- Firm level secondary data + trade data
- Statistical analysis

- Sectors: textile/apparel, food processing, mineral processing, wood/furniture, construction
- Both technology and managerial innovation
- Compare Chinese MNEs with OECD MNEs

People

- Principal Investigator: Xiaolan Fu (Oxford University)
- Co-Is: Pierre Mohnen, Luc Soete (UNU-MERIT)
- Local Collaborator: George Essegbey (STEPRI-CSID)
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TMD

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"The ability to create or adopt innovative ideas and deploy them upon technology and management"

The Technology & Management for Development Centre

Technology & Management for Development Centre

Technology & Industrialisation in Developing countries

- The diffusion of Innovation in low income countries
- Rural e-services in India
- Improving water governance through mobile financial innovation
- The Role of Management Practices in Closing the Productivity Gap

Innovation & Entrepreneurship in Emerging Economies

- International open innovation
- Collaborative innovation in China
- Outward direct investment from China
- The integration of the rising powers into the global innovation system
- China and the Evolution of Global Manufactured Prices

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Case study

- In-depth understanding, inform survey questionnaire design.
- 3 Industries: Textile, food sector, construction
- 2 sectors: Formal and informal
- 10 firms and a total of 32 in-depth interviews among managers from different divisions and workers
- Strategy: Within-case and cross-case comparisons

Image 1: Formal (left) and informal (right) establishments in the textile sector.

Image 2: Formal (left) and informal (right) establishments in the food processing sector.

Nature of Innovation

- Found innovation not only in production process and improved products, but also often seen in new or improved management and marketing practices
- Most of the innovations are incremental and not ground breaking.
- In informal sector, innovation is driven by people with characteristics that make them overcome the constraints
- Lack of incentives, esp. for employees
- Lack of knowledge transfer from outside Ghana

Nature of Innovation

- Learning and non-R&D based product and process innovation
  - Firms engaged in products innovation to increase market opportunities, to maximizing the profit, to optimize the production and reduce the waste, or to meet specific demand from suppliers
  - Most of the firms had introduced new machinery for production to increase efficiency and quality
- Non-technological innovation in marketing and management practices
  - Innovations in marketing range from the use of Internet and improving the packaging, to communication with costumers and adding services
  - Organizational innovations include cross-training, subletting, and outsourcing services

Innovation Diffusion from *within* and *outside* Ghana

- Innovation diffusion *within* Ghana
  - Training courses
  - Being members of clusters
  - Market
  - Collaborations with local Universities
- Innovation diffusion from *outside* Ghana
  - Internet
  - Social network
  - Collaboration with foreign institution

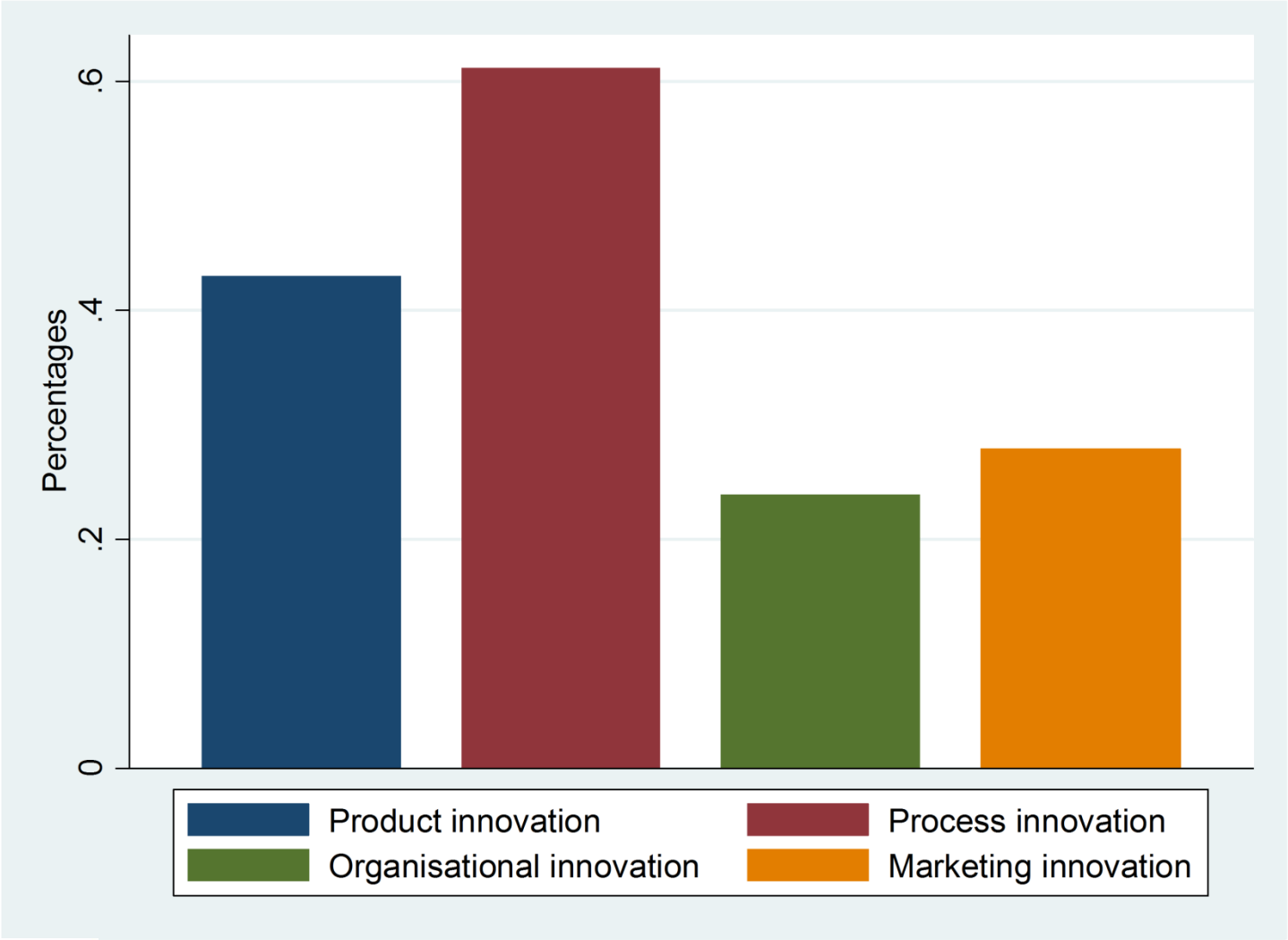
Policy implications from case study

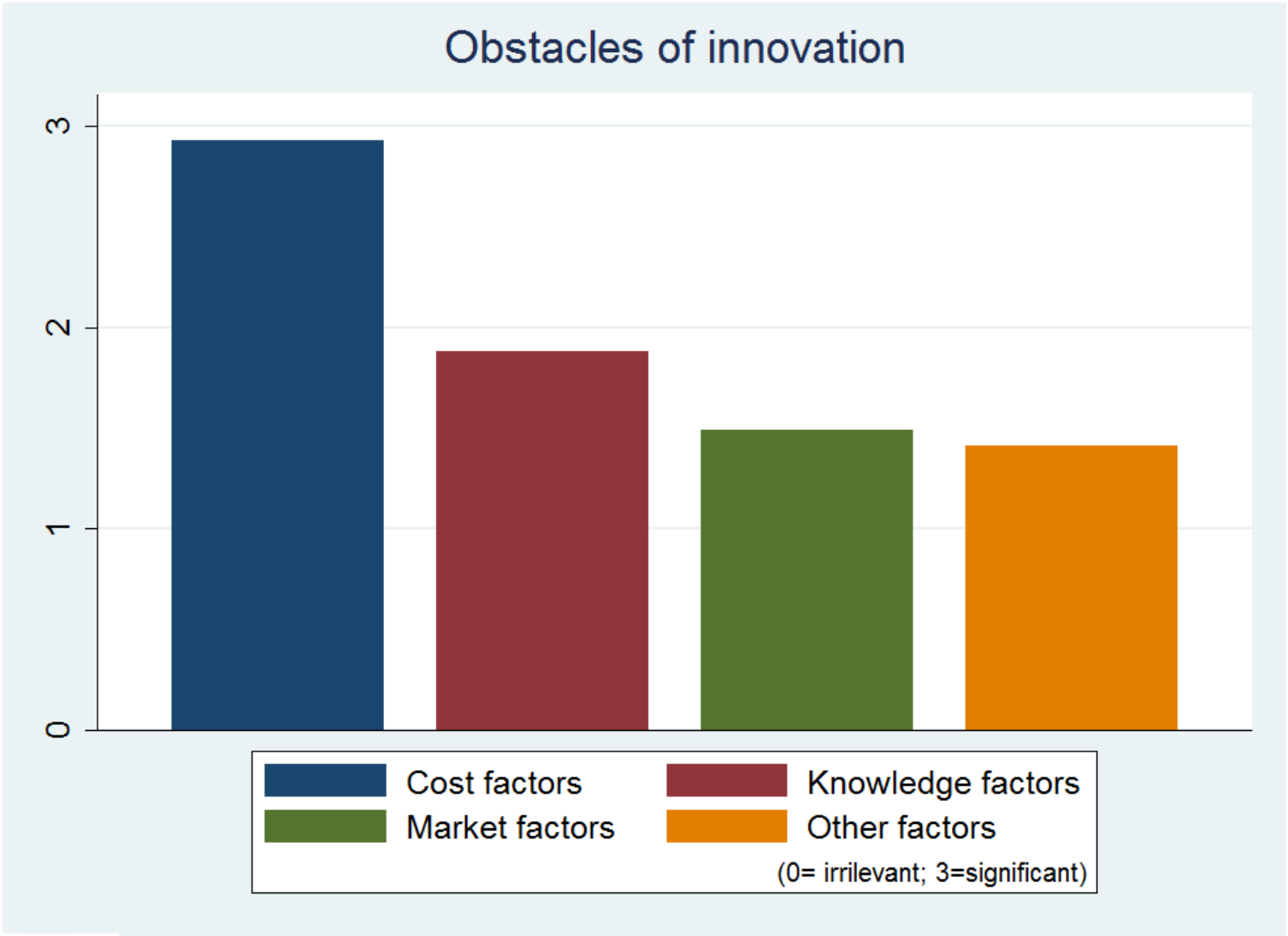
- General consensus on the validity of the industrial and innovation policies in Ghana but pessimism on their implementation.

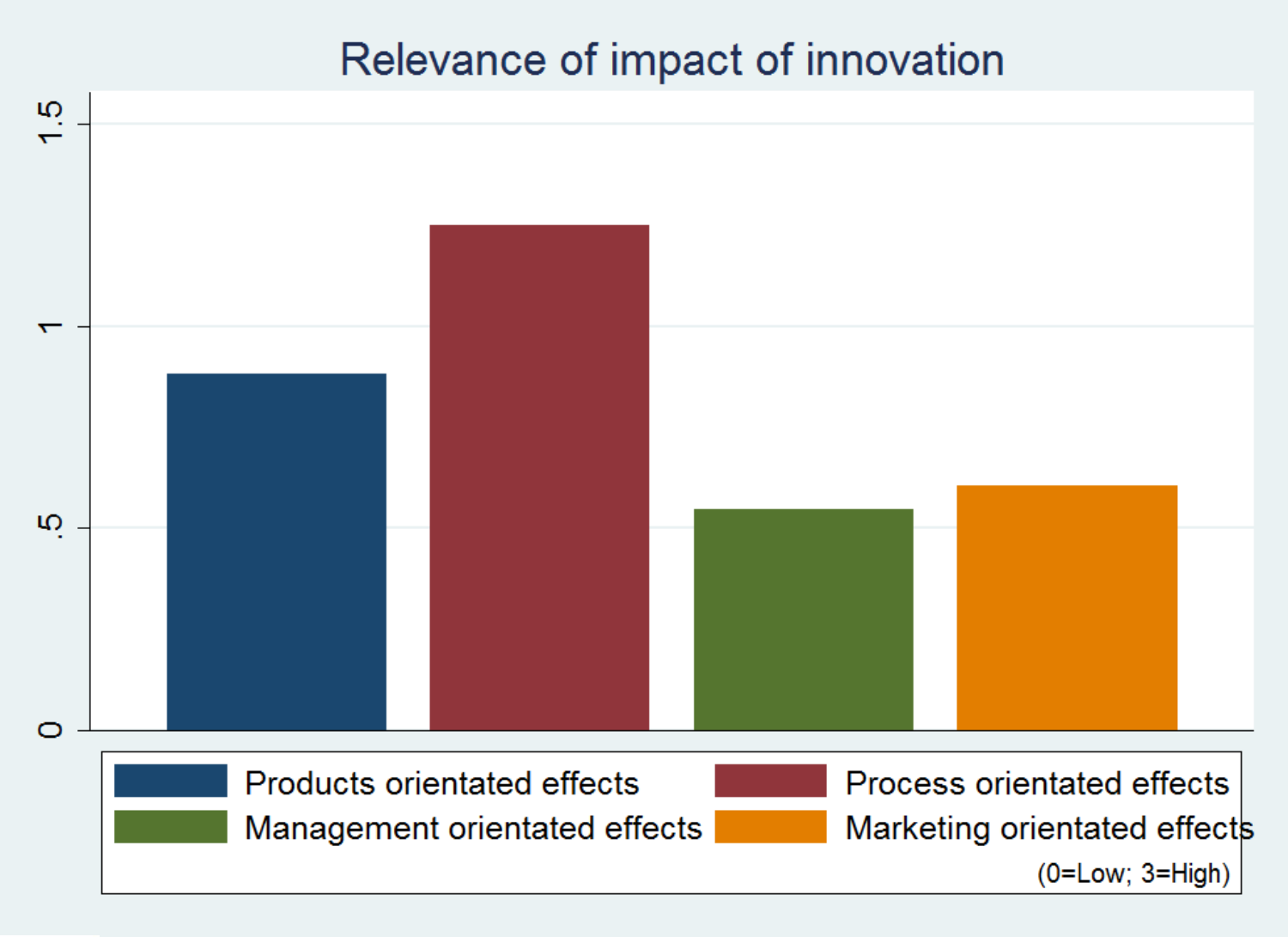
- Areas for stronger policy intervention
  - Training of workers
  - Strengthening knowledge transfer from outside
  - Incentives for innovation (managers and workers)
  - Policies to promote “Made in Ghana”

Survey

- Unique survey questionnaire seek information on the sources and diffusion channels of innovation *in* and *to* LICs
- A national survey of manufacturing firms, food processing (25%), mineral process (13%), wood processing furniture (25%), textile & apparel (25%).
- Include all sizes including micro firms
- 502 valid responses including 70% micro firms (<9).
- employed 10 local survey assistants, training.
- Face-to-face interview, using PDA to collect & monitor.
- Response rate: 83%


Percentages
0
.2
.4
.6
Product innovation
Process innovation
Organisational innovation
Marketing innovation

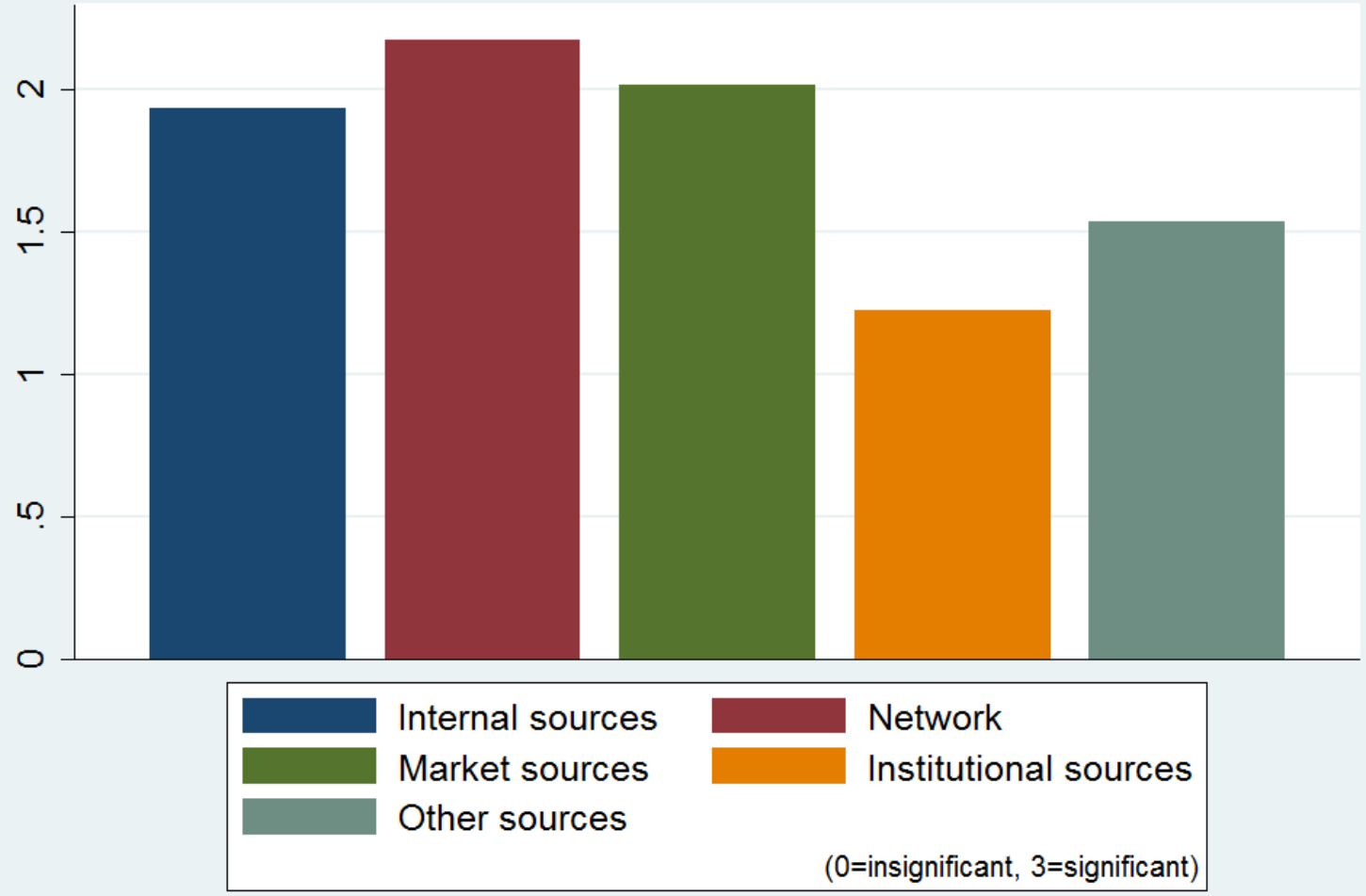

Obstacles of innovation
3
2
1
0
Cost factors
Knowledge factors
Market factors
Other factors
(0= irrilevant; 3=significant)


Relevance of impact of innovation
0
.5
1
1.5
Products orientated effects
Process orientated effects
Management orientated effects
Marketing orientated effects
(0=Low; 3=High)

How the innovations materialize
Top 6 sources

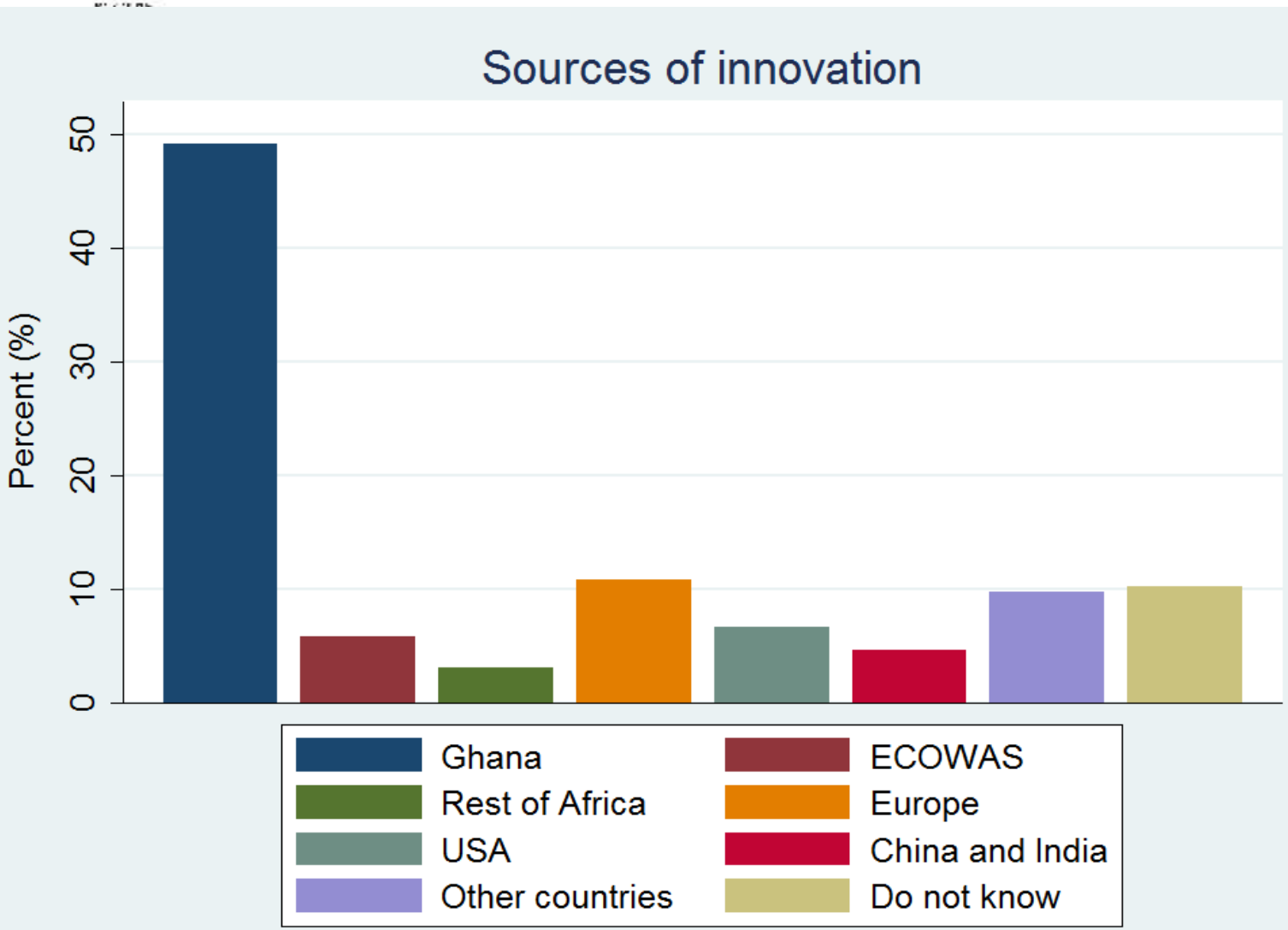
1. You modified the product in response to customers' requirement.	60 %
2. The product or process was mainly developed within the enterprise	58 %
3. Your firm observed/or heard of new products or production process or new ways of organising production and marketing by other companies and imitated it with some modification.	46 %
4. Your enterprise created it together with customers	46 %
5. Your firm observed/or heard of new products or production process or new ways of organising production and marketing by other companies and imitated it directly.	30%
6. Skilled workers in the company find out a better way for the production process after some experiments.	26%

Importance of source of information for innovation activities



Importance of information sources for innovation activities: Top 6 sources

1. Clients or customers
2. Internet (Conditional on being connected)
3. Sources within your enterprise (colleagues)
4. Member of cluster
5. Member of associations
6. Competitors or other enterprises in your sector


Sources of innovation
Percent (%)
0
10
20
30
40
50
Ghana
ECOWAS
Rest of Africa
Europe
USA
China and India
Other countries
Do not know

Collaboration & Universities

	Yes (1)	No (0)
1. During the three years 2011 to 2013, did your enterprise co-operate on any of your innovation activities with other enterprises or institutions?	8%	92%

	Yes (1)	No (0)
27A. Do you have the intention to collaborate with universities?	30%	70%

2. If you have NOT collaborated with universities, why? Please tick all that apply.	
A. We do not have such need	205 (43%)
B. They are not interested	113 (24%)
C. We are not connected	325 (68%)

3. How was the connection with the University established?	
Personal network (1)	74%
University approached us (2)	0%
Governmental initiative (3)	26%

Vertical SME production chain

	Yes (1)	No (0)
1. Is your firm a part of a vertical production chain consisting of SMEs?	51 (0.1)	451 (0.9)

34C. Which is the nature of the leading firm?	
Small local firm (1)	46%
Large local firm (2)	50%
University (3)	0%
Foreign firm (4)	1%

	Your region	Ghana	ECOWAS	Africa	Globally
Where is the network mainly located?	44%	54%	0%	0%	2%

	Yes (1)	No (0)
2. Is such network formed to produce something that firms in the country would otherwise not be able to produce?	46%	54%
3. Is such network formed to make existing products cheaper or better quality?	67%	33%

Top 10 important foreign knowledge sources
(1-5, Insignificant=1 , Crucial = 5)

		MEAN
A.	Imported machinery and equipment	2.18
B.	Imported goods in the same industry	1.73
C.	Imported goods that input as intermediary goods into your production	1.72
D.	Foreign customers	1.64
E.	Observing and imitating competitors in export market	1.54
F.	New product or quality requirement raised by customers in export market	1.50
G.	Foreign firms in the same industry	1.52
H.	Foreign firms In downstream industry	1.51
I.	Information found via internet	1.55
J.	Attending international trade fairs	1.52

Importance of the policy measures:
Top 3 most important policies in Ghana

1.	Provide cheaper interest loans	4.17
2.	Provide fiscal subsidies	3.94
3.	Lower corporate taxes	3.79

Events and outreach

	Month	Event
1	1	Meeting of all partners, policy makers/researchers for another 'reality check'.
2	6	Workshop on DILIC project in Ghana (with policy maker, researcher & business); visiting policy makers, managers and researchers
3	12	Workshop on diffusion of innovation in low income countries (Oxford/AIE conf)
4	22	Conference in Africa presenting case study and survey findings (res., managers, policy makers, NGOs, students)
5	22	Joint workshop with African Globelics Doctoral Academy (researcher & students)
6	22	A two-day course for LIC policy makers and practitioners
7	24	Workshop in the UK presenting and discussing research findings
8	35	Survey data to deposit in ESRC online database
9	36	High level conference in the UK presenting findings of the project
10	1-36+	Project website
11	1-36+	Engagement of Cambridge-Oxford Engineering for Dev. initiative
12	1-36+	Seminar series on innovation

More to do

- Communicate the research to policy makers and practitioners
- To monitor and evaluate the results and contribution.
- Continue the work by developing multi-country, multi-year study

Thank you!

We look for collaboration with more African countries and other organisations

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