INNOVATION AND PERFORMANCE IN THE CAPE TOWN'S SOFTWARE AND ICT SERVICE SECTOR

Proposal by Zuzana Brixiova, University of Cape Town

Our research proposal concentrates on an important – yet largely unexplored – source of growth in South Africa, namely the adoption and use of information and communication technology (ICT), especially in Cape Town's software and ICT services sector (or 'creative software design and development sector'). We aim at understanding of drivers of performance (growth, productivity) of this sector, factors that facilitate ICT adoption, and the role of ICT in innovation and growth.

A key component of this research would be a survey of about 40 - 50 companies operating in the ICT services sector in Cape Town, specifically those listed in 'Digital Gateway to Africa: Cape Town's Creative Software Design and Development Sector'. While the list in this publication is not exhaustive, it focuses on 'some of the start-ups that have already grown substantially or have the ability to grow substantially'. As such, this group of enterprises would provide useful insights into the role of ICT in their performance, as measured by profits, productivity and growth.

I. Background

A vibrant private sector is key for growth and may lead to innovation, increased employment, and poverty reduction. Innovative entrepreneurs have over the past 20 years driven expansion in internet and mobile usage worldwide.[1] In developing and emerging countries in particular, digital entrepreneurship has major implications for socio-economic progress, and in particular inclusion and productivity. At the same time, adoption of ICT is influenced by both public policy (e.g., incentives, regulations) and the business environment. The factors driving technology adoption and the ICT impact, especially the inclusive aspect of technology adoption, thus need to be better understood.

According to a recent report, "e-Transform Africa", Africa is leapfrogging in adoption and use of ICT. In Cape Town the software and ICT services sector has been booming with more than Rand 1.5 billion invested since 2006. The sector has been supported by a completion of Rand 125 million, 500km optic fiber network project, which increased the Cape Town's bandwidth by 1,000 times (Wesgro, City of Cape Town and Pwc; 2013). This network further connects people to new technologies and facilitates emergence of new tech-entrepreneurs in the city and region.

Given a very high youth unemployment in South Africa (around 50% of the relevant labor force), the ICT service sector provides opportunities for greater involvement of young innovators in the economy, recognizing that young people are often more tech-innovative than adults. Improved ICT's ecosystem would encourage innovation, youth entrepreneurship and employment. The following issues need to be addressed to support ICT innovations among the African youth:[2]

- Collaboration between universities, ICT research centers, governments and private sectors.
- Conditions for developing ICT clusters.
- Enabling innovation climate.

[1] Please see http://www.inc.com/michael-chui-james-manyika/how-digital-startups-will-develop-the-world.html. In Africa, these include young tech-entrepreneurs such as Ronnie Apteker of Internet Solutions (South Africa).

[2] Improved ICT's ecosystem to boost youth entrepreneurship, innovation and youth employment in Africa at: https://ideas.itu.int/post/29519.

- Access to credit, funds, and loans to ICT innovation (Venture Capital (VC), Business angels, Funds to supports young innovators)
- Structures that support and manage ICT innovation in Africa

II. Motivation and Objective

Studies of entrepreneurship and ICT innovation in Africa have been scarce, and in particular on utilizing mobile technology among entrepreneurs. Our study contributes to closing this gap by directly gathering and analyzing data of about 40-50 entrepreneurs in Cape Town (Sou7h Africa). Cape Town is particularly suitable for study of innovation given the support to digital entrepreneurship and comparisons with Silicon Valley. We examine the extent to which the ICT driven innovation activity reflects the characteristics of the entrepreneur, the internal competencies of the firm, and the business environment in which the firm operates.

The objectives of the research are twofold. ***First*** is to find out which factors (institutional, social or personal) are impacting ICT entrepreneurship in Cape Town. Such evidence could inform policy-making about aspects that are working and areas requiring improvements. ***Second*** objective is to study the impact of ICT adoption and use on firm performance (innovation and productivity).

III. Data and Methodology

The research will utilize a survey that of 40-50 business owners of ICT service firms that are growing or have a potential to grow through face-to-face interviews. It will be complemented by interviews with the relevant public and private sector stakeholders and be supplemented by two focus group discussions (FGDs) with digital entrepreneurs. The survey and FGDs will seek to answer the following key questions:

A. Who are the innovative entrepreneurs in Cape Town? What are the main constraints (institutional, social, personal) that they face?
   - How do education, access to credit and personal characteristics impact young innovative entrepreneurs, especially their commitment and performance?
   - How did the business environment and approaches of the main technology providers impact adoption and the use of the ICT?
   - Are entrepreneurs that either have foreign ownership or cooperate with foreign firms adopting and using more ICT?

B. What is the impact of technology adoption and use on firm innovativeness and productivity?
   - Is ICT an important driver of innovation in the innovative Kenyan firms?
   - What type(s) of innovation does the ICT drive? (product, process, marketing, and organization)
   - Is the interaction between ICT use and innovation an important factor for increased productivity?

The data will be analyzed using robust econometric techniques (Annex) to facilitate answers to the above questions.

ANNEX I -- EMPIRICAL METHODOLOGY

To answer questions in section B, the following (2-step) quantitative analysis will be carried out:[3]

a. Estimating probit models (4 equations, one for each type of innovation):

$$\Pr(y_i = 1 \mid x_i, Z_i) = \phi(\alpha + \beta \cdot ICT_i + Z_i + \delta_j) \quad (1)$$

Where y_i is the probability (taking on value *0* of *1*) that firm *i* innovates, Z_i is the vector of firm's control variables (number of employees, exporter status, foreign ownership present, etc.), and δ_j stands for sector fixed effects (to control for the fact that firms in different sectors have different innovation levels).

To account for the possibility of interrelated effects, we also estimate 2 equations (one for demand and one for supply side innovation):

$$\Pr(y_{1i} = 1, y_{2i} = 1 \mid x_i, Z_i) = \phi(\alpha + \beta.ICT_i + Z_i + \delta_j) \quad (2)$$

Where y_i , *i = 1, 2* are the two innovative activities within demand and supply type of innovation. Specifically, product and marketing innovation are part of demand innovation and organizational and process innovations are supply innovations. While equation (1) has 2 possible outcomes, equation (2) has 4 possible outcomes.

We also carry out cross-sectional analysis to investigate whether differences in innovation lead to differences in productivity:

$$\ln(VA_i) = \alpha + \beta_1 \ln(K_i) + \beta_2 \ln(L_i) + \beta_3 innov_i + \beta_4 educmix_i + \delta_j \quad (3)$$

The *innov* variable will be taken from (1) and (2). Further it can also be constructed from answers to the following questions: whether (1) the firms introduced ICT and (2) the firms made organizational changes.

[3] This section builds on Fosse et al. (2013).

ANNEX II –BUDGET

BUDGET

Activity	Details		US$
Statistician 1	To help design, program the Questionnaire, testing	3 days	500
Statistician 2	To process the collected data for Excel and STATA	5 days	1,000
Communication	Airtime for enumerators, supervisors, coordinators		1,000
Project Coordinator	Overall management of the project	8 days	5,000
Training of enumerators	Training of enumerators and pilots -- 10 participants	3 days	2,000
Data collections	Fieldwork, transport	5 days	10,000
Reserve			500
TOTAL			20,000

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Current:

University of Cape Town, March 2015 – now: Adjunct Associate Professor at the School of Economics and Research Affiliate at the Southern Africa Labor and Development Research Unit

Previous work experience:

African Development Bank, Abidjan, Tunis, Mbabane, September 2009 – July 2015:
Advisor to the Chief Economist and Vice President, Feb 2013 – July 2015
Economic Advisor, Swaziland (on leave at UNDP), May 2011 – January 2013
Principal Research Economist, Research Department, September 2009 – April 2011

Organization for Economic Cooperation and Development, Paris, April 2008 - May 2009:
Senior Economist and the Head of the Czech Republic and Estonia Unit, Economics Department

Addis Ababa University, Addis Ababa, September 2007 – March 2008: Fulbright Scholar

International Monetary Fund, Washington DC, Minsk, Vilnius, October 1996 – August 2007:
Senior Economist, Policy Development and Review Department, January 2005 – August 2007
Resident Representative in Belarus and Lithuania, November 2002 – December 2004
Economist, African, European and Middle East Departments, 1997 – 2002

PlanEcon, Inc., Washington DC, (now part of Global Insight/IHS), 1989 - 1990

Other Professional Affiliations:

IZA *(Institute for the Study of Labor),* October 2011 - now: Research Fellow

Education:

Ph.D. in Economics, University of Minnesota, 1996
B.A. in Finance, Prague University of Economics, 1988

Research Grants and Awards:

UNDP Africa grant for research on Youth Entrepreneurship in Swaziland (2012)
Wits University/IDRC grant for research on Youth Employment in Swaziland (2012)
Fulbright Scholar, Addis Ababa University (2007/08)
Institute for the Study of World Politics Dissertation Fellowship (1995/1996)
National Science Foundation Dissertation Enhancement Grant; for research abroad (1995)
Association for Women in Science Educational Foundation Citation of Merit Award (1995)

Journal Articles and Book Chapters:

Research on Entrepreneurship and Inclusive Growth

1. 'Gender and Constraints to Entrepreneurship in Africa: New Evidence from Swaziland', *Journal of Business Venturing Insights*, forthcoming (with T. Kangoye)

2. 'Skills and Youth Entrepreneurship in Africa: Analysis with Evidence from Swaziland', (2015) *World Development*, Vol. 67(C), 11 – 26, (with M. Ncube and Z. Bicaba)

3. 'Youth Employment in Africa: New Evidence and Policies from Swaziland', (2014) in *Disadvantaged Workers: Empirical Evidence and Labour Policies,* edited by M. A. Malo and D. Sciulli, AIEL Series in Labour Economics, Springer, (with T. Kangoye)

4. 'Modeling Productive Entrepreneurship in Developing Countries', (2013) *Small Business Economics,* Vol. 41(1), 183 – 194.

5. 'Business Environment, Start Ups and Productivity during Transition', (2012) *Macroeconomic Dynamics,* Vol. 16, Suppl. 2 (with B. Égert)

6. 'Unlocking Productive Entrepreneurship in Africa's Least Developed Countries', (2010) *African Development Review,* Vol. 22 (3), 440 – 451

7. 'Private Sector Development in Transition Economies', (1997) *Carnegie-Rochester Conference Series on Public Policy,* Vol. 46, 241 – 279 (with N. Kiyotaki)

Research on Open Macroeconomics in Emerging Markets

8. 'Public Debt Sustainability in Africa: Building Resilience and Challenges Ahead', (2015) *Development Policy Review,* Vol. 33 (5), 555 – 580 (with M. Ncube)

9. The Real Exchange Rate and Growth in Emerging Markets: The Case of Zimbabwe', (2015) *Review of Development Economics,* Vol. 19 (3), 564 - 576 (with M. Ncube and Z. Bicaba)

10. 'The Real Exchange Rate and External Competitiveness in Egypt, Morocco and Tunisia', (2014) *Review of Middle East Economics and Finance,* Vol. 10 (with B. Égert and T. Essid)

11. 'Remittances and their Macroeconomic Impact: Evidence from Africa', (2013) *World Economics,* Vol. 14 (4), December (with M. Ncube)

12. 'The Global Financial Crisis and Africa: The Effects and Policy Responses', (2013) in *Handbook of the Political Economy of Financial Crises,* edited by J. Epstein and M. Wolfson, Oxford University Press, (with L. Ndikumana)

13. 'Africa: Africa's Counter-cyclical Response to the Crisis', (2010) *Journal of Globalization and Development,* Vol. 1, Art. 16 (with L. Kasekende and L. Ndikumana).

14. 'Capital Flows and the Boom Bust Cycle: The Case of Estonia,' *Economic Systems,* (2010) Special Issue on Future of Capitalism, Vol. 34 (1), 55 – 72 (with L. Vartia and A. Wörgötter)

15. 'Can Fiscal Decentralization Contribute to Poverty Reduction in Low Income Countries?' (2003) *Topics in MENA Economies,* Vol. 5(1), September (with E. Gemayel and M. Said)

Research on Regional Integration

16. 'Can Intra-Regional Trade Act as a Global Shock Absorber in Africa?', (2015) *World Economics,* Vol. 16 (3), 141 – 162 (with Q. Meng and M. Ncube)

17. 'Macroeconomic Shock Synchronization in the East African Community', (2013) *Global Economy Journal,* Vol. 13 (2), 261 – 280, (with A. Mafusire)

18. 'On the Road to Euro: How Synchronized Is Estonia with the Euro Zone?' (2010) *European Journal of Comparative Economics,* Vol. 7 (1), 203 – 227 (with M. Morgan and A. Wörgötter)

Research on Labor Markets in Transition

19. 'Labor Market Reforms and Outcomes in Estonia', (2012) *Comparative Economic Studie*s, Vol. 54(1), 103 – 120 (with B. Égert)

20. 'Labor Market Institutions and Policies in Developed and Emerging Market Countries', (2012) *Comparative Economic Studies*, Vol. 54(1), pages 1-3, March (with B. Égert)

21. 'Skill Shortages and Labor Market Outcomes in Central Europe', *Economic Systems*, (2009) Vol. 33 (1), 45 – 59 (with W. Li and T. Yousef)

22. 'Labor Markets in Belarus', *Problems of Economic Transition*, Vol. 48, May 2005 (with V. Volchok)

23. 'Performance Slowdown under Central Planning: A Model of Poor Incentives', (2003) *Economic Systems*, Vol. 27 (1), 27 – 39 (with A. Bulir)

24. 'Labor Market Adjustment in Transition Economies with On-the-job Search', (2000) *Economics Letters*, Vol. 67 (2), 223 – 229 (with T. Yousef)

25. 'Labor Market Institutions and Unemployment Dynamics in Transition Economies', (1998) *IMF Staff Papers*, Vol. 45 (2), 269 – 308 (with P. Garibaldi)

Other Publications and Selected Reports:

'Ensuring Public Debt Sustainability in Africa: Prospects and Policies', *The European Center for Development Policy Management Briefing Note No. 66* (August 2014) and *Great Insights* Magazine, 22/09/2014 (with M. Ncube)

Opportunities and Constraints for Youth Entrepreneurship: Perspectives of Young Entrepreneurs in Swaziland, (January 2013), UNDP Swaziland: Mbabane (with M. Sukati, P. Dlamini, T. Fruhwirth, R. Shongwe, R. Fakudze and D. Sardiwal)

Rapid Assessment of the Impact of the Fiscal Crisis in Swaziland, (March 2012) UN Swaziland: Mbabane (with N. Dlamini, R. Fakudze, R. Masuku and L. Mkhabela)

'Closing Africa's Infrastructure Gap: Innovative Financing and Risks', (2011) in *Commonwealth Heads of Government Meeting 2011* (with E. Mutambatsere, C. Ambert, D. Etienne)

'Competitiveness, Trade and FDI in Africa', (2011) in *Africa Competitiveness Report 2011*, World Economic Forum, World Bank and African Development Bank (with J. Blanke; U. Dadush; T. Gurcanlar and G. Iarossi)

'Globalization and Growth in Recent Research', (2004) in *Proceedings of Conference on Innovation and Management Changes under Globalization*, Kaunas, Lithuania, March (with D. Treigiene)

'Promoting Economic Reforms in Belarus', (2003) *EcoWest* (Institute of Privatization and Management, Belarus), September

'Economic Prosperity in the Baltic Region: What More Can Be Done?' (2002) in *Belarus: Choice of Direction*, the Institute of Privatization and Management, Belarus (with M. Horton).

Working Papers and Ongoing Research

'The Business Environment, Education and Entrepreneurship in Low Income Countries', presented at the 4th ISCEF (2016) and 2015 IZA/Kauffman Foundation Workshop (with B. Égert and M. Ncube)

'Start-Up Capital and Female Entrepreneurship in Africa: Evidence from Swaziland', presented at the 2016 Conference of the Royal Economic Society (with T. Kangoye)

'Capital Account Policies, IMF Programs and Growth in Developing Regions', IZA Discussion Paper No. 8774 (with Z. Bicaba and M. Ncube)

'Credit Constraints and Productive Entrepreneurship in Africa', IZA Discussion Paper No. 6193 (with M. Baliamoune and L. Ndikumana)

Selected Conference and Workshop Presentations (since 2010):

2016: 4th International Symposium on Computational Economics and Finance (Paris; with B. Égert and M. Ncube); Conference of the Royal Economic Society (Brighton; with T. Kangoye)

2015: IZA/Kauffman Foundation Workshop on Entrepreneurship (Washington, DC); CSAE Conference on Africa's Development (Oxford); Allied Social Science Association Meetings (Boston)

2014: African Economic Conference (Addis Ababa); 9th IZA/World Bank Conference on Employment and Development (Lima); Allied Social Science Association Meetings (Philadelphia)

2013: UNU-WIDER Conference on Inclusive Growth in Africa (Helsinki); Allied Social Science Association Meetings (San Diego)

2012: African Economic Conference (Kigali)

2011: African Economic Conference (Addis Ababa); Conference of the South African Economic Association (Stellenbosch); Allied Social Science Association Meetings (Denver)

2010: Conference on 'Impacts of the Global Financial Crises on Low Income Countries' (Copenhagen); 5th IZA-World Bank Conference on Employment and Development (Cape Town)