



Radboud University



DFID Research Project:
*'Enabling Innovation and Productivity Growth in Low
Income Countries (EIP-LIC)'*

Country Report Indonesia



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<http://www.tilburguniversity.edu/dfid-innovation-and-growth/>

Acknowledgments

In 2013, the Department for International Development (DFID) awarded a grant to Tilburg University and Radboud University Nijmegen for a 4-years research project ‘Coordinated Case Studies – Innovation for Productivity Growth in Low Income Countries’ (PO 5639)¹. The sizeable research project, implemented in cooperation with academic institutions in Asian and African countries, resulted in an extensive series of scientific papers and reports, databases and more practical policy oriented documents. Indonesia is included as one of the countries of study. Although Indonesia is classified by the World Bank as a middle income country, the data and insights collected provide very informative and useful insights for the research and policy materials developed under the project, in particular the outcomes related to the randomized control trials (RCTs) in Jakarta.

On behalf of Tilburg University and Radboud University Nijmegen I would like to thank the British people and DFID, in particular the Growth Research Team, for the support in this project. The research output on Indonesia was amongst others the result of a fruitful RCT research cooperation with the Abdul Latif Jameel Poverty Action Lab (J-PAL) in Jakarta. Moreover, Tilburg University collaborated with the University Indonesia (UI) for the qualitative research component. We are grateful to Prof. Djajal Nachrowi, who facilitated the initial contacts and agreements, and Dr. Nuzul who organised the qualitative research activities in Indonesia and sharing his valuable observations and thoughts.

This report presents the findings of the research activities in Indonesia. We hope that it is informative for policy makers within governmental agencies, donors and NGOs involved in the promotion of innovation in manufacturing SMEs in Indonesia and the region. It is also targeted at SME owners and SME branch organisations who could use the report as reference material for reflecting on and formulating the management and business strategies. For the academic community with similar research interests, it may provide useful insights to providing ideas or supporting them to identify and/or validate research questions and hypotheses.

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Disclaimer

This material has been funded by UK aid from the UK government; however the views expressed do not necessarily reflect the UK government’s official policies.

¹ The research project was later renamed into Enabling Innovation and Productivity Growth in Low Income Countries’ (EIP-LIC).

Basic data of the project

Project title	‘Enabling Innovation and Productivity Growth in Low Income Countries’ (EIP-LIC). Formerly: ‘Coordinated Case Studies – Innovation for Productivity Growth in Low Income Countries’.
DFID RP reference number	PO 5639
Project objective	To fill research gaps in the understanding of factors, institutions and policies that can increase innovation and productivity in low-income countries in Africa and Asia.
Project period	1 May 2013 – 30 September 2018
Lead partner	Tilburg University Project Director: Prof. Lex Meijdam (e-mail: a.c.meijdam@tilburguniversity.edu) Coordinator: Jaap Voeten (e-mail: j.voeten@tilburguniversity.edu)
Partner	Radboud University Nijmegen Prof. Patrick Vermeulen (e-mail: p.vermeulen@fm.ru.nl)
Countries of study	Kenya, Tanzania, Vietnam, Ethiopia, Uganda, Ghana, South Africa, India, Indonesia, Bangladesh
Project website	www.tilburguniversity.edu/dfid-innovation-and-growth

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Executive summary

From 2013 to 2017, the British Department for International Development (DFID) funded a research project on innovation and productivity growth with special reference to low income countries (LICs), implemented by Tilburg University and Radboud University Nijmegen. The project focused on understanding the factors, institutions, and policies that can increase business innovation and productivity growth, particularly in manufacturing small and medium sized enterprises (SMEs). The research was organised within two thematic areas: ‘Innovation Systems’ and ‘Finance for Productivity Growth’. Research teams conducted the field work in ten low and (lower) middle income countries in Africa and Asia, including Kenya, Tanzania, Vietnam, Ethiopia, Uganda, Ghana, South Africa, India, Indonesia and Bangladesh. Various academic institutions and World Bank offices in these countries were actively engaged as partners in the research.

A key feature of the project is the combined quantitative and qualitative research approaches involving enterprise surveys, randomised control trials (RCTs) and case studies. The collection of original data resulted in a series of scientific papers, reports, policy briefs and open-access databases. The research output is targeted at academics in development research as well as at innovation policy makers within governments, businesses and development agencies, with a view to valorising research outcomes and promoting evidence-based policy making.

The research was structured around the following set of research questions, initially formulated by DFID to frame the research:

- What firm-level and regional-level factors hinder or foster the engagement of firms in innovative activities and commercialise the outcomes of their innovative activities?
- What is the impact of in-house innovation activities versus collaborative innovative activities or technology acquisition activities on the innovative performance of firms in developing countries?
- What is the role of economic spillovers within clusters of firms in fostering economic growth and innovation?
- What are the most critical barriers to the process of innovation and the diffusion of technology?
- What types of links between the public/private sectors, universities, governments, NGOs and the private sector are most conducive to innovation activity?
- What is the role of demand side versus supply side policies?

In the course of the project implementation, new research questions emerged. Both original and emerged research questions were addressed in the various scientific outputs.

This ‘Indonesia Country Report’ presents an overview of the scientific output and policy implications relating to Indonesia as a (lower) middle income country. Since the number of studies and papers is different for each country of study, the report discusses studies involving research data from Indonesia, such as randomized control trials (RCTs) and some additional studies of other countries as well; the latter contain relevant and useful insights for Indonesia. In short, the scientific output in this report comprises a qualitative research part (chapter 3), four papers within the ‘Finance and Productivity Growth’ theme (chapter 4) and four papers within the ‘Innovation Systems’ theme (chapter 5).

In Annex 1, a comprehensive list of all research working papers written in the framework of EIP-LIC is presented. The key DFID/World Bank survey findings within the ‘Innovation Systems’ theme for Indonesia are presented in Annex 2 and the research addressing the original DFID questions is presented in Annex 3.

Qualitative research

The qualitative research findings are written down in a report accessible via the project website. It is based on data collected through open semi-structured interviews with owners and managers of SMEs in Jakarta, the surrounding area and the town of Cirebon. The qualitative report provides context to the other research activities to validate, compare and complement existing theory in literature and research design and hypothesis development with contemporary bottom-up realities on the ground in Indonesia, as perceived by manufacturing SME owners and managers. Specifically, the case descriptions illustrate the different ways in which companies in Indonesia introduce new products, processes, technology, or machinery.

Most interviewed owners and managers in the companies in different ways, introduced new products, processes and technology in order to improve and expand their business operations. Taking a broader and economic perspective on innovation, viewing it in terms of incremental adoption and adaptation or of new combinations of existing technologies creating value, it is evident that the new elements introduced in the interviewed companies resulted in improved and expanded business operations. Many cases introduced management, organisational and marketing innovations at firm level. From an economic and development point of view, their importance is evident in terms of value creation, assuring the survival or expansion of the firm while generating employment opportunities.

These micro level innovations have significant positive impact on the direct actors involved. Owners are aware of the importance of introducing new products and technology to raise productivity and efficiency to maintain their level of competitiveness. The ideas for new products are mainly acquired from the market. Customers come with requests and suggestions, or the owners talk with clients. It is therefore mostly demand-driven innovation. All interviewed SME owners and managers indicate that the business environment is challenging in Indonesia. At the same time, there is not much concern about government rules and regulations. These cause some hindrance but the regulatory framework does not obstruct business operations. The tax policies and regulations are straightforward and as long as entrepreneurs comply with the rules, there is little trouble. Applying for permits can be more cumbersome in terms of bureaucracy and corruption. The perception of the government is quite positive, in particular the new president.

DFID/World Bank EIP-LIC survey in Indonesia

The EIP-LIC survey in Indonesia, conducted in collaboration with the World Bank, focused on the salient features firms to provide a detailed layout of the innovation context. Two waves of data from the 2015 World Bank Enterprise Survey (WBES) and the 2016 Innovation Capabilities Survey (ICS) were used for preparing the survey report in Annex 2 and 3.

The survey report in Annex 2 and 3 highlights some important descriptive statistics capturing variables such as turnover, number of fulltime employees, labour productivity, and gender diversity of firms in nine provinces in Indonesia. These variables are used in for data analyses in the subsequent sections in order to deepen our understanding of the context of innovation in manufacturing firms in Indonesia. Export status and origin of material inputs and supplies is contrasted with that of economies in various regions with the aim of providing a background to the context of innovation in Indonesia. Essentially, it is observed that the firms in this sample report larger proportions of direct exports. This suggests that firms operate in an environment with a strong trade and customs regulatory environment. Furthermore, firms in Indonesia generally rely on domestic inputs. Some possible explanations include availability of alternative local suppliers and purchasing from local importers that may reduce cost of inputs.

The survey report also highlights the topic of innovation where reported measures of innovation, innovation activities, sources of information for innovation, and barriers to innovation are discussed extensively. The difference between the percentage of firms reporting innovation in Indonesia and the EU-28 firms is striking with Indonesia reporting relatively low levels of innovation. Regarding innovation activities, it is observed that R&D activities are regarded as less important innovation activities relative to new equipment and formal training. Hence, firms are more likely to acquire physical assets and invest in human capital as opposed to internal R&D and external R&D. It is worth noting that customer feedback is the most important source of information for innovation. This observation suggests that a high premium is placed on customers as a source of ideas for innovation. This section also reveals that high costs of innovation, lack of internal funds, lack of qualified personnel, lack of information on markets and market dominance by established firms are perceived as the most critical barriers to innovation in Indonesia. Firms in Indonesia therefore experience varied obstacles to innovation.

Dynamic capabilities, trust, and relationship with external actors including institutions are described in the context of the firm's operational environment. Firms report high levels of knowledge acquisition and commercialization of innovation. In addition, a striking observation arises from the two measures of trust where we observe that on average, firms in Indonesia trust their business partners much more than they trust government institutions. This suggests that business dealings with the government pose major impediments to a majority of firms in their operations. Thus, firms are likely to perceive that they operate in an environment with weak institutions. In addition, a relatively high degree of embeddedness of firms is observed. This indicates that firms have a relatively high likelihood of gaining from information and opportunities within their sphere of economic operations.

Gender diversity is observed to be context specific to a large extent. The role of gender diversity is of importance in fostering innovation performance. Female workforce enhances innovation performance in Indonesia. This indicates that the role of women in driving the innovation process should not be overlooked especially in the manufacturing industry which is likely to be male-dominated at all hierarchical levels.

In conclusion the enterprise size is a very important firm-level factor that fosters innovation activities including internal R&D, external R&D, and acquisition of new equipment. Furthermore, larger firms have a higher likelihood of successfully commercializing innovative output. This suggests that large firms are likely to have more resources for innovation and commercialization activities. Collaborative innovation activities are positively associated with innovation. Furthermore, cooperating with customers significantly affects innovation performance revealing the positive influence of vertical spillovers. Linkages with affiliated and non-affiliated enterprise groups are also vital for innovation activities including internal R&D, external R&D, formal training, and acquisition of new equipment in the context of Indonesia.

Finance for productivity growth

In the framework of the 'Innovation Systems' research theme, four scientific papers (downloadable from the project website) were developed with particular relevance to Indonesia. The first scientific paper within the 'Finance for Productivity' theme, involving an extended RCT in Jakarta addresses the issue of poor effectiveness of entrepreneurship training programs in LICs. Numerous business training programs have been developed and implemented across the globe to foster entrepreneurship through better business skills. Yet, the results from these training programs have not yielded consistently positive impacts. One plausible reason for the lack of success of existing training programs is that they gather very little insight about locally useful business practices. In this paper, the researchers take a

different approach to improving business skills. They recognize the value of locally relevant information as a crucial input when encouraging the adoption of business practices. Instead of teaching set courses, the study design focuses on helping businesses learn profitable practices from their successful peers. This paper shows that it is possible to improve the profitability of small firms by disseminating information on the best practices of successful peers and using low-cost facilitation methods such as role models and personalized counselling to promote adoption. While the results show improvements in sales, the research team does not detect changes in business expenses or the number of customers, which suggests that the improvement in performance outcomes is driven by the adoption of profitable business practices and the resulting efficiency gains. The results further show that simply providing information on profitable local practices in the form of a handbook is not sufficient for achieving performance gains or promoting the adoption of profitable practices. Instead, the experiential learning in the form of business role models for personalized counselling is necessary for achieving success. The team also finds evidence consistent with a business-skills-based poverty trap, as our interventions are only successful for businesses who already were in the high end of the business practices distribution. In terms of policy and program implications, all interventions implemented in this study can be scaled up and replicated relatively inexpensively.

The second scientific paper within the 'Finance for Productivity' theme addresses the issue of entrepreneurial aspirations as a predictor for business development. A key policy question is whether small firms have the potential to grow, or whether they merely represent a source of subsistence income for individuals unable to find alternative work. One unexplored factor that could rationalize both low take-up and low business growth is entrepreneurial aspirations. Aspirations motivate greater effort to raise future standards of living. The research addresses the question to what extent aspirations matter with a unique data set involving business surveys on the aspirations for business growth among a representative sample of small-scale urban retailers in Jakarta. The research team finds that on average entrepreneurs in the sample aspire towards positive business growth on all dimensions. Despite the high average levels of growth aspirations in the sample, the team observes a pronounced heterogeneity too. On entrepreneur characteristics, the research finds that older, female, and low perceived agency owners have lower aspirations to grow their businesses. Finally, significant association is observed between aspirations and measures of future-oriented behavior such as business savings, plans for credit, business expansion, and process and product innovation. The research outcomes help to better understand a population that is often the target of policies aimed at releasing external constraints, taking for granted (unobserved) entrepreneurial aspirations. It may help policymakers better target their policies, by distinguishing the type of entrepreneur who has the potential and aspiration to grow; from one who has a business to subsist.

The third scientific paper within the 'Finance for Productivity' theme studies small poor entrepreneurs in the developing world, vulnerable to a range of negative shocks and constraints associated with a lack of development. The research explored the issue of income variability in Vietnam, which is comparable to Indonesia in terms of the businesses of poor entrepreneurs, and which possibly impedes the cognitive functioning of low-income individuals. The research was conducted through a field experiment inducing thoughts about finances to a sample of small low-income retailers in their local setting. The results suggest that a lack of financial resources does not necessarily impede cognitive functioning. Cognitive performance in financially stressful situations is not affected by absolute poverty as measured by wealth or income. Instead, what seems to create cognitive stress is the subjective feeling of poverty together with the variability of income. Cognitive performance in financially stressful situations has an inverted U-shaped relationship with income variability: being exposed to very low or very high income variability can be detrimental for cognitive capacity. There seems to be an optimal income variability which maximises the cognitive capacity of the retailers when they face financially stressful situations, which impede their cognitive functioning. The research has policy implications to safeguarding the cognitive functioning of people on low incomes. Assuring an optimal amount of income variability to

assure maximum cognitive functioning: the effectiveness of policy and programmes that focus on the beneficiaries' lack of financial resources, for instance, could be increased if income variability is also given careful consideration. Stability and maintaining the status quo of income variability is also an issue to be considered in new policies and programmes.

The fourth paper within the 'Finance for Productivity Growth' theme analyses the interplay between informality and access to finance. The research explored financial sector development in the formal and informal manufacturing sector in neighbouring country India, which is comparable with Indonesia in the sense that both countries have a large informal sector and informal ways of finance. Actually, a large share of private sector activity in LICs takes place in the informal sector, which almost always has negative economic and development consequences. There is among others a large productivity gap between formal and informal firms. The research focussed on the effect of financial development on formal and informal manufacturing firms and explores two dimensions of financial development namely outreach (the ease of access to financial services, including credit) and depth (the overall formal credit volume in the economy). Overall, the empirical findings suggest two positive effects of financial deepening on the incidence of formality in manufacturing: reducing barriers to formality and increasing productivity. The research results show that both depth and outreach are important but in a different way. Financial outreach - measured in the research as branch penetration - helps to reduce formality barriers and thus increases the number of formal firms. Financial depth mainly affects informality through increasing productivity of industries dependent on external finance. The paper confirms the policy assumption that promoting the informal manufacturing sector to become formal will raise productivity and economic growth. The research suggest that government policies towards financial deepening can play an important role in reducing informality, though with important differences across industries. In terms of promoting raising productivity, a policy implication is to focus on financial depth; increasing the overall formal credit volume in the economy.

Innovation systems

In the framework of the 'Innovation Systems' research theme, four scientific papers (downloadable from the project website) were developed with particular relevance to Indonesia. The first paper within the 'Innovation Systems' research theme using data from Indonesia amongst others analyses the relationship between gender diversity and innovation output of firms. The research shows that gender diversity at all levels in the organisation has a positive effect on innovation. Furthermore, the research illustrates that a country's level of economic opportunity for women plays an important role in the relationship between gender diversity and innovation. Policy makers must acknowledge the value of gender diversity for innovation and create awareness among managers and employees that innovation emerges and blossoms from gender diversity at the firm level. Government agencies could develop special policies and programmes which encourage and support firms to hire a more gender-balanced workforce, secure more female top managers, and develop a gender diverse ownership structure. This could take the form of awareness raising programmes explaining the particular benefit of gender diversity for a firm's likelihood to innovate. Furthermore, the introduction of tax advantages, subsidies or other incentives targeted at increased gender diversity at all hierarchical levels within a firm could be a driver for increased gender balance. An additional avenue for policy makers is to encourage a social perception of women as being equally valuable members of society, with the same rights and obligations as men.

The second scientific paper investigated the impact of different knowledge sources relating to product innovation using small firm-level data from Vietnam, and emerging economy that many similarities to Indonesia in terms of economic growth and industrialisation. Specifically, the team analysed the separate impacts of (i) internal knowledge, (ii) collaborative knowledge, and (iii) regional knowledge. The research finds that some knowledge sources are more strongly associated with innovation than

others. Knowledge sources from internal R&D have a positive influence on product innovation. The stronger a firm's collaborative knowledge gained from inside the supply chain, the higher the likelihood of product innovation (it might be specific to developing countries that firms need to create a network with customers, suppliers and competitors to enhance product innovation). However, there is no significant relationship between collaboration with universities or research institutes and innovation. Policies and programmes could raise awareness of and facilitate management training and education encouraging the institutionalising of explicit R&D capacity in a company. Moreover, it is important to differentiate between the level of technology required by large technologically advanced enterprises and their smaller counterparts that mostly adopt or adapt existing technology. Innovation is fundamentally the task of the private sector and entrepreneurs, and occurs through business horizontal and vertical linkages, spill-over and actors' networks involving subcontracting, interactive learning within supplier and buyer value chains and foreign direct investment

The third scientific paper within the 'Innovation Systems' theme concerns a study on innovation and export in South Africa. As a middle income country, South Africa shares many similarities with Indonesia in terms of innovation challenges, export characteristics and both countries are efficiency-driven economies rather than factor-driven economies. The study analysed the firm-level relationships between product and process innovation on the one hand and export on the other. Specifically, the research focused whether exporting raises the probability that firms innovate in the context of an emerging economy. The study finds that The research finds that exporting firms are significantly more introducing product innovation in the South African context; product innovation is positively associated with the export status of firms. The link between exports and process innovation is much weaker or absent all together. This is broadly in line with previous research and could suggest that the product characteristics are a more crucial for foreign markets than the cost dimension. Although there is a significant relationship between exports and product innovation, the question remains whether innovation stimulates firms to export, or whether it is the other way around. This 'causality' issue was difficult to isolate in the research, partly because both activities are interconnected and mutually influencing each other. Regardless the absence of a strong causality, innovation and export do mutually strengthen each other within a firm. A more pragmatic policy approach is including an innovation dimension in export policies, and including export dimension in innovation policies. In fact for a policy the end result that counts is that both innovation and export increase.

The fourth scientific paper within the 'Innovation Systems' theme assesses the effect of different forms of labour flexibility on innovation during downsizing across nine developing countries in Africa and South Asia. The results of the study suggest that downsizing a firm's workforce negatively impacts process innovation in SMEs in emerging nations. However, the study indicates that labour flexibility can be a way for firms to overcome the innovation challenges associated with downsizing. The researchers find that both numerical flexibility, namely the use of temporary employment, as well as functional flexibility such as employee training, can alleviate the negative impact of downsizing on innovation. Regarding policy implications, the research suggests that managers of SMEs in developing countries might wish to take functional flexibility into account in their business strategies, because an increasing percentage of employees having received training will positively moderate the relationship between downsizing and innovation. Focusing on the psychological impact downsizing has on the remaining employees, employability as a human resources management strategy could be a substitute for employment security during downsizing to protect their psychological contract with the firm. Managers could thus consider functional flexibility as a means to mitigate downsizing's negative effect on innovation. In particular, firms might consider training a core group of staff to distribute existing knowledge among the remaining firm members, to create new knowledge as well as to increase employees' employability.

Research and policy dissemination

Based on the research outcomes, EIP-LIC produced series of policy briefs on promoting innovation in manufacturing SMEs in LICs, targeted at a broad audience of policy makers. Innovation policy makers are usually understood to be government officials and staff within various ministries (S&T, industrialization, higher education and economic planning). However, innovation policies and strategies are equally designed and implemented by managers, business owners and branch organizations in the private sector. Likewise, development agencies, donors and NGOs also consider and integrate (inclusive) innovation policies in their programs and projects. All these actors mutually interact and could be enrolled in networks that promote and enable innovation in manufacturing SMEs in LICs. It is envisaged that all these various stakeholders will make use of the EIP-LIC policy output.

The research output is accessible at the project website www.tilburguniversity.edu/dfid-innovation-and-growth. The output includes the academic reports and papers, the open access databases, a series of policy briefs and videos illustrating some key research findings and policy messages.

1 Introduction

The promotion of innovation in Low Income Countries (LICs) and emerging economies has recently appeared on the agenda of policy-makers and international development agencies. Many agree that innovation is crucial in these countries, because it is fundamental for growth in order to catch up with middle and high income economies (Chaminade et al., 2010). Current research, theory development and policy formulation to promote innovation, however, have mainly focused on innovation in the more advanced economies, whilst investigation of these issues in low income countries to date has been limited.

The 5-year research project '*Enabling Productivity and Innovation in Low Income Countries (EIP-LIC)*,' funded by the British Department for International Development (DFID) and commissioned to Tilburg University and Radboud University, aims to fill research gaps on innovation in LICs from an economic perspective. EIP-LIC aims to deliver robust high quality evidence from Africa and Asia on how to increase innovation and raise productivity in manufacturing SMEs, through a coordinated set of thematic and country case studies providing internationally comparable data. The research has been organized within two thematic areas: 'Innovation System' and 'Finance for Productivity Growth'. The countries of study include Kenya, Tanzania, South Africa, Ghana, Ethiopia, Uganda, Vietnam, Indonesia, India and Bangladesh.

EIP-LIC focuses on manufacturing Small and Medium-sized Enterprises (SMEs) in LICs. Promoting innovation in these enterprises has a particularly positive impact on development (Szirmai et al., 2011): SMEs are usually operating on the boundary of the formal and informal sector and have low levels of productivity and competitiveness. Compared to the agriculture and services sectors, manufacturing in LICs is typically characterised by a limited share of the total GDP. Innovation within SMEs in manufacturing enables these enterprises to raise productivity and grow, resulting in a better-balanced economic structure while generating employment opportunities for poorer groups and contributing to poverty reduction. Moreover, promoting innovation in domestic manufacturing is a way towards import substitution and increases the competitive (export) position of firms on the world market.

The project collected primary data via enterprise surveys in collaboration with the World Bank, conducted randomized control trials (RCTs) and carried out qualitative case studies in all countries of study leading to a series of research papers and articles published in top journals and policy briefs. All written output is available at the project website: www.tilburguniversity.edu/dfid-innovation-and-growth

This 'Indonesia Country Report' presents a summary of the key findings of EIP-LIC research of Indonesia and the associated policy implications. Chapter 2 sets out the overall project approach of EIP-LIC. In chapter 3, the report introduces the SME manufacturing sector by providing some key finding and context of the qualitative study. Chapter 4 presents summaries of four research papers and policy implications developed within the 'Finance for Productivity Growth' theme. Chapter 5 presents the main findings of the EIP/LIC innovation surveys. The policy implications in chapters 3 to 5 are intended for government agencies, donors, NGOs, branch organization or others to could take into consideration in their efforts to promote innovation in manufacturing SMEs in Indonesia. Annex 2 and 3 present the key survey findings as well as the data addressing the research question articulated by DFID in the original project proposal.

2 Project approach and methodology

In 2012, DFID identified the need for research in this field, and set the terms of reference for project proposals. Tilburg University's successful proposal focused on an overall goal to contribute to innovation and growth and raise productivity in low income countries (LICs), leading to job creation and poverty reduction. The project aims to strengthen evidence-based policy making on innovation and productivity issues in developing countries. At the direct operational and output level, its framework comprises three areas of activity:

1. Research: open-access datasets and written research output (working papers, submitted articles and reports) on productivity and innovation applicable to developing countries.
2. Policy and research uptake materials and dissemination.
3. Capacity development, to train and engage researchers in developing countries in policy relevant innovation research. The project includes a capacity building component including PhD seminars on research methods applied in the DFID project.

The approaches and methodologies involved in 'Research' and 'Policy and Research Uptake' are further described in paragraphs 2.1 and 2.2 respectively. The capacity development component was of lesser importance in the project and is not discussed in this report.

Project organisation

In terms of organisation and implementation, Tilburg University is the lead partner of the project, with Radboud University Nijmegen (RUN) the main Dutch project partner. Within these universities, teams of researchers were formed to prepare and manage the data collection and develop the academic output. In every country of study, the research teams concluded cooperation agreements with academic partners for joint implementation of fieldwork, data analysis, and paper and report writing. This cooperation also incorporated research uptake and policy activities, involving interactions and stakeholder meetings with policy makers within government, donors, NGOs and SME owners/managers. With regard to capacity development, the Dutch project partners organised research methodology seminars for local academic staff and students, in collaboration with their partners in the countries of study.

Partnerships were formed with the University of Nairobi (Kenya), University of Pretoria (South Africa), University of Dar es Salaam (Tanzania), University of Ghana, National Economics University Hanoi (Vietnam), University Indonesia, Ahmedabad University (India), Chittagong Independent University (Bangladesh), and Makerere University (Uganda). A cooperation agreement was concluded with the World Bank for quantitative data collection in the 10 countries of study. For randomised control trials within the 'Finance for Productivity Growth' research theme, a collaborative agreement was concluded with The Abdul Latif Jameel Poverty Action Lab (J-PAL) in Jakarta, Innovation for Poverty Action (IPA) in Accra and the National Board for Small Scale Industries (NBSSI) in Ghana, amongst others.

2.1 Research

The first output area of EIP-LIC focuses on the development of high quality research output, data and academic papers, examining ways to increase innovation in manufacturing SMEs in LICs. In particular, the research teams addressed internal capabilities and external institutional factors, institutions and policies that support or hinder the diffusion and adoption of innovation and finance raising productivity. The research implementation was organised within two thematic areas: 'Innovation Systems' and 'Finance for Productivity Growth'.

The written output of the research is systematically organised in a repository accessible via the ‘Publications and Reports’ menu on the project website. The repository is integrated into the overall Tilburg University repository, established and maintained by its library. In addition, three types of open access datasets are produced: (i) qualitative datasets, (ii) quantitative datasets under the ‘Innovation Systems’ theme, and (iii) randomised control trial (RCT) quantitative datasets under the ‘Finance for Productivity Growth’ theme. These are also accessible via the project website.

Research methodology challenges: combined qualitative – quantitative approach

Overall, the project involved a combined qualitative-quantitative research methodology, including *qualitative* explorations in each country of study into policy and research issues, and *quantitative* data collected through large scale surveys and RCTs. In the quantitative component, the project took an ‘economics’ perspective on innovation, and involved econometric analysis of a set of variables concerning barriers at firm, regional and national levels and their causalities with the innovative behaviour/capability of entrepreneurs and subsequently innovation and productivity. This constitutes a reductionist and deductive approach in defining variables for analysis, in which the impact of individual factors on innovation is assessed by applying quantitative econometric methods. The quantitative analysis served as a basis for identifying relationships between internal capabilities, external institutional factors and finance on the one hand and innovativeness and productivity growth on the other.

Applying quantitative methods in development research brought some limitations and challenges. In EIP-LIC, conceptual issues emerged, in terms of the definition and measurement of innovation and productivity in LICs. These may seem straightforward variables at first glance, but their measurement can be more complicated in the LIC context. Innovation may be manifested differently, not via high profile technological and radical breakthroughs, usually measured by R&D expenditures or patents (OECD, 2005), but by more incremental adoption and adaptation or new combinations of existing technologies (Szirmai et al., 2011). These forms of innovation are equally important for raising the productivity and competitiveness of SMEs in LICs.

Moreover, innovation research and theory development in recent decades have typically involved empirical material from advanced economies, such as the innovation systems literature of Lundvall (1992) and Freeman (1987), where innovation takes place within a relatively stable institutional and Science, Technology and Innovation (STI) policy context, ‘controlled’ and supported by established innovation system actors and innovation policies. In LICs, however, the contemporary institutional realities and formal/informal dual economic contexts are different and may involve other less visible or less commonly known factors and policies around SMEs affecting their innovativeness and how innovation manifests itself.

Therefore, the theory and associated policies of how innovation evolves within an innovation system in the institutional contexts in LICs may be different, which is increasingly acknowledged in recent innovation systems literature (Lundvall, 2009; World Bank, 2010). For instance, entrepreneurs are innovating by Doing, Using and Interacting (DUI) in fast-changing contexts, enabled by informal institutions and informal (social) learning. Applying the research variables on innovation and productivity in LICs from existing literature and theory (deduction) based on advanced economies, therefore, might not take all relevant variables into account. A more precise identification of variables might be obtained by complementing the selection with a broader understanding of contemporary realities and context on the ground in LICs.

Qualitative studies

In an effort to manage these challenges, EIP-LIC included a complementary qualitative research component, involving an exploration and description of contemporary realities of innovation in

manufacturing SMEs in LICs and emerging economies. This sought to inductively identify actual and relevant research and policy issues as input for the EIP-LIC research themes as well as for additional explanatory evidence supporting research outputs. This material could help researchers to validate, compare and complement existing theory in literature and research design and hypothesis development with contemporary bottom-up realities on the ground, as perceived by manufacturing SME owners and managers.

In operational terms, Tilburg University and partners conducted a series of case studies of manufacturing SMEs in each of the 10 countries of study in the project. The holistic case study approach and method involved interviews capturing original insights, views and perceptions of SME owners and managers. A similar report format and comparable data was used for all countries of study in EIP-LIC, enabling cross-country comparison to identify overall trends and patterns in innovation. Indonesia are presented in chapter 3.

In each of the 10 countries of study, 15 to 20 semi-structured interviews were held with owners and managers of SMEs in manufacturing, textiles, metal processing, food processing etc. The interviews discussed types of innovation, the firm's history, its innovation processes, internal capabilities, and the external business and institutional context. The owners and managers also shared their stories outside this framework and advanced issues that are relevant and interesting for current scientific work. 170 interviews in total were recorded, transcribed and stored in a qualitative research database. The concluding qualitative reports of all 10 African and Asian countries of study are downloadable from the project website. Chapter 3 provides some key insights from the qualitative study in Indonesia.

In line with DFID's policy, the original intention was to publish the qualitative database as an open access resource via the project website. However, in contrast to the numerical data, the qualitative data contained some confidential information that owners and managers might not wish to have in the public domain. This ethical consideration means that the interviews and transcripts are not freely available on open access, but may still be used subject to a strict confidentiality agreement, in consultation with Tilburg University.

Innovation systems research

The 'Innovation Systems' theme focused on understanding innovation in the manufacturing sector in LICs, its processes and critical factors hindering or stimulating its diffusion, including innovation policies and governmental institutions. The research involves the quantitative analysis of a set of variables concerning barriers at firm, regional and national levels and their causalities with the innovation capacity of firms. SMEs in manufacturing find it harder to survive than large firms, which are typically more productive and more likely to innovate in the long term, securing employment and economic growth. Regional conditions and infrastructures differentially affect levels of innovation and technological and industrial development in developing countries.

The 'Innovation Systems' team obtained data in close cooperation with The World Bank, particularly focusing on the World Bank Enterprise Survey (ES) and the Innovation Capabilities Survey (ICS). The ES is an ongoing project covering over 155,000 firms in 148 countries, collecting data based on firms' experiences and enterprises' perception of the business environment and investment climate. The whole population of the ES data is the non-agricultural economy, comprising firms from the manufacturing, construction, services, transport, storage, and communication sectors.

The ICS is a follow-up and complementary to the ES, comprising a randomly selected subset of respondents from the ES sample. It focuses on the innovative activities and capabilities of manufacturing firms, and is a collaboration between the World Bank, Tilburg University and Radboud University Nijmegen, funded by DFID through EIP-LIC.

The primary and secondary data enabled the ‘Innovation Systems’ researchers to produce a series of working papers downloadable from the project website. The titles and full details of the papers are listed in Annex ... The data are available on open access for other researchers at the project website. All working papers have been submitted to high quality journals, with some published and some still under review at the time of writing this report. The primary and secondary data also enabled the team to address the original DFID research questions underlying EIP-LIC, which are presented in chapters 4 and 5.

Finance for productivity growth

The ‘Finance for Productivity Growth’ theme focuses on understanding the effects of access to finance in determining the productivity of SMEs and how constraints to investment finance influence growth. The team identified interactions between firm-level characteristics, such as entrepreneurial traits, country-level factors (such as industrial structure, institutional framework etc.) and access to finance.

Contrary to the research approach within the ‘Innovation Systems’ theme, the finance team conducted four extensive RCTs in Vietnam, Ghana, Indonesia and Kenya. The interventions and associated baseline and endline data collection were implemented with local partners including the Abdul Latif Jameel Poverty Action Lab (J-PAL) in Jakarta and Innovation for Poverty Action (IPA) in Accra as well as the National Board for Small Scale Industries (NBSSI) in Ghana. A series of academic papers has been developed from this, listed in Annex 1. The dataset for each country, combining the listing, baseline and endline data, will become available on the project website for future research and follow-up RCTS or endlines.

2.2 Policy and research uptake

In following up on the research of EIP-LIC, the dissemination and uptake of the research evidence is essential to justify the value for money of the project. The underlying principle of the project’s engagement with potential users is to ensure that the research insights in the published output are useful, accessible, actively disseminated and communicated in a way that enables potential users to engage and make use of the research information in their own work (research valorisation). There are four target groups of potential users of the EIP-LIC research outcomes:

- Local policy makers of governmental agencies, international donors and development agencies and NGOs, who may gain new insights into promoting innovation and productivity growth in the manufacturing sector.
- SMEs owners and SME branch organisations, who may learn from the management implications of the research.
- Researchers within the academic development research community, for whom the research outcomes serve as a source of ideas and reference to develop their own research questions and methods.
- The general public worldwide interested in development and poverty alleviation issues. The dissemination will inform the public about DFID’s innovation and growth approach to alleviating poverty.

Policy and research uptake strategies

The project includes several strategies to interact with potential users. At the project start, the partners organised a series of innovation policy stakeholder meetings in Kenya, Tanzania, South Africa, Vietnam, Ghana, Indonesia, India and Uganda. Policy makers from government agencies, donors,

NGOs and SME owners and managers discussed the relevance of innovation and identified policy and research issues. These issues were then followed up in the qualitative research component of the project.

A further dissemination mechanism has been the production of a series of EIP-LIC policy briefs in which the findings and implications for policy of the academic papers are discussed. Each policy brief is typically a 2-page presentation of key findings, practical suggestions and implications, accessible via the project website.

The final collection of all research outputs is concluded in a series of country reports, which draw together all the research findings for each country and are an important vehicle to disseminate the policy messages. The last chapter of the report includes and elaborates on the country-specific policy recommendations.

Lastly, three short videos were produced, focusing on key research findings and policy messages, using high quality footage filmed in Accra, Nairobi and Kampala. The videos present a policy theme illustrated by interviews with several SME owners and managers, tell the entrepreneurs' story, provide an idea of the realities they face on the ground, and show the resilience of the SME owners. They provide policy makers with a sense of the difficulties of the local context, and suggest policy solutions from the DFID research findings.

3 Qualitative study in Indonesia

3.1 Case study method and fieldwork

The objective of the qualitative study of EIP-LIC is to identify relevant policy and research issues concerning innovation in manufacturing SMEs within contemporary realities in Indonesia. Applying a case study approach is particularly useful in this respect, since this method is an approach for inductively exploring and identifying concepts, noticeable similarities, trends and patterns of socio-economic phenomena (Yin, 2003).

The case study research in Indonesia involved a series of ..interviews with managers and/or owners of manufacturing SME in Jakarta and the secondary town Cirebon. The qualitative data collection through interviews took place from 17 to 25 October 2016. The number of interviews may seem a limited number to justify research validity. However, the approach usually involves in-depth rich and detailed descriptions and a multidimensional analysis of the complexities and linkages of a few cases to gain an understanding of the (socio-economic) mechanisms and processes of the case subject. In the case descriptions, innovation as an economic phenomenon is the case 'subject', whereas the unit of analysis is a manufacturing SME. The case description holistically explores the type and basic features of innovation within the SME, and reviews the impact on productivity and competitiveness over the past 2 to 5 years.

The data for the case descriptions are obtained via 'semi-structured' interviews with SME owners and managers. Of particular interest is what innovation means in the manufacturing SMEs in their context, and the less known favourable and unfavourable institutional conditions and barriers enabling or preventing it.

The selection criteria are defined in such a way that the selected cases represent the EIP-LIC target group: manufacturing SMEs understood as a company with 10-150 employees. Moreover, the criteria assure a certain homogeneity within the selected cases, which will enable comparison of cases while supporting a certain validity of the identified trends or patterns. At the same time, allowing some heterogeneity, by including deviant cases, provides more contrast, and thus enables the research team to better construct and highlight divisions in the innovation process, linkages, system or mechanisms.

An essential element of the selection is the notion that types of SME innovation in LICs are not confined to technological (radical) inventions resulting from particular R&D investments and efforts. Innovation in manufacturing SMEs in LICs more often encompasses incremental adoption and adaptation or new combinations of existing technologies, products, marketing, management or business practices. Moreover, innovation often does not concern one type only. More often, an initial innovation enables and/or triggers other types of innovation within a firm; a new technology allows the introduction of new products, for instance. From the eight cases in the comprehensive qualitative report of Indonesia, accessible via the project website, three cases are presented below to provide some insight on the daily realities of SMEs in manufacturing.

3.2 Selected cases

Case 1: Wood processing – rattan furniture (60 employees)

This company produces rattan furniture and was established in 1978. It started to export to other Asian countries shortly after this, notably to Japan. The company is located on the eastern side of Jakarta. On its premises, there are several large production halls with basic saw and sanding machines "because the work is basically manual." The interview is held with the marketing manager, who is de facto the managing director of the company.

The company produces rattan chairs, tables and sofas to order for the export market. The rattan products are combined with other materials such as (goat) leather, textiles, metal and even banana leaves. The processing of these additional materials is not much of a problem and does not require extra skills.

The raw rattan materials are sourced from Kalimantan and Sumatra and purchased from middlemen in Jakarta. There is little price fluctuation – “it only increases with the labour price” – and sufficient supply – “it is not a limiting factor.”

There were originally a lot of rattan companies in Jakarta – “like more than 1,000 or so. But now we’re left with no more than 50.” The marketing director explains that Cirebon, a secondary town some 150 km east of Jakarta, is the centre of rattan production in Indonesia today. Cirebon has lower labour costs than in Jakarta, “but we are more organised.” The company also managed to remain in business because they changed their staffing system (further explained below) – “otherwise we would not have survived.” The company’s main market used to be the US, but now it is the UK.



Via an importer in the UK, the company supplies 80% of its production to Mark & Spencer. The supply used to be big but “over the past 2 years, it has dropped a lot, just half of the previous export volume.” Supplying to Marks & Spencer means that the company is subject to an international audit every year, which covers a set of environmental, social and safety regulations, to which “it is not easy for the company to comply.” The audit team comes, checks and, if the outcome is positive, the company gets an audit report.

The remaining 20% of production is exported to Asian countries. The marketing manager is trying to diversify the client base. She finds that it takes a long time, “especially because we aim at the middle to upper market.” After presentations at exhibitions, it sometimes takes 2 years before interested traders actually place orders.

The rattan furniture market fluctuates a lot – “sometimes our orders for supplying furniture are low for months and then go up again.” The number of workers is therefore flexible: on average, 60 workers have worked in the production team over the past 5 years. In the 1980s, the company had about 700 daily workers. At that time, the company was producing furniture of medium quality. Today it is more the middle and upper end – “we sell less quantity but at a higher price.” The turnover is lower but still generates a profit.

Internal capabilities and innovation

The company is owned by an Indonesian holding company in Jakarta. The shareholders all belong to one family – “it’s a kind of family business.” The holding company has other businesses as well, such as distribution of shoes and health and cosmetic products.

Because the business is slow at the moment, the holding company is not seeking to hire a director – “maybe later, once the business growing again.” The marketing manager runs the business and discusses management issues with one of the family members of the holding company – “I handle everything in the factory.” The marketing manager learned management skills by experience. Previously, foreign experts from Greece and the Philippines were hired as directors. She used to work with them and learned how to run the operation and export.

Five years ago, the company changed its human resources practice from permanent day workers to piece workers in order to survive in the fluctuating market – “when there are no orders we don’t keep the production workers. It is too expensive.” Only 13 staff in management and administration have permanent contracts. The shift to piecework was the result of the increasingly competitive market. Recent years have seen new competitors from Vietnam, China and other developing countries “and the cost of wages has increased while the rattan furniture market has gone down.”



When the company shifted from permanent work contracts to piece work, the employees were not happy – “because it affected the way they worked, but we have to go that way, otherwise we can’t compete. Most companies work like this.” The instructions and HR policies associated with international audit are posted on boards in the workshop – “all the workers can read them.”

Once an order is received, it now takes longer to start up the production process. The marketing manager is in close contact with the buyer in the UK to coordinate yearly planning. Usually at the year-end period, demand drops, “but I ask them to outline the planning for the next year. Then I can start preparing the stock of material and the planning of workers.” Sometimes the company loses skilled workers.

The marketing manager has noticed that productivity has increased compared to the past arrangement with daily workers – “workers are not like machines. They do not always work. If we do not supervise them, they work very slowly.” In the past, the company had to appoint a supervisor, which meant higher labour costs. Today, there is a quality team that prevents the workers producing too fast with low quality. The quality team explains to the workers how the furniture and new designs are to be constructed, providing a sample to follow.

When new workers are recruited, the company has to train and instruct them. The company has a probation period – “we first pay the new worker daily during their training.” After 3 months, they evaluate the worker and, if they are satisfactory, the person becomes a piece worker. The recruiting strategy is to ask existing employees – “when we need more workers, we ask them if they have friends or family looking for jobs.”

The UK buyer usually provides designs, or sometimes the marketing manager will propose one.

She presents the drawing and develops a sample. The marketing manager goes to fairs in the US, UK and Germany – “we are trying to collect ideas and see current trends in furniture design.” From the ideas picked up at fairs, the R&D department suggests designs and manufactures samples.



The company cannot make the production process more efficient with machines or technology because most of the products are handmade – “if we use machines, the end product will not be the same.”

External business and institutional environment

The holding company is considering new investments in production capacity, but there are some regulatory issues with the government. The company was established at its current location when the area was not designated as a residential area, but since the government changed the designation to residential, “now we have a problem extending our licence.” The company is thinking about moving to a cheaper location, but there is a lot of cost involved – “at the moment we still trying to work here.” The government is not assisting them to find another location, “which they have to, according to the regulations, they have to help. But in fact, it’s not happening.” They now have a licence extension for a further 3 years. But after that, the future is uncertain – “if there is a change in government, it will change the regulations too.” There is also conflicting understanding between central and local government – “the central government says it’s ok to stay here, but local government says it’s not.”

The company has credit from the bank and they can afford it. The interest rate is manageable.

Sometime they undertake subcontracted jobs for other companies, depending on the order portfolio. “If I can help, I will help. If we’re already full with our own work, then we cannot.” They are currently doing a subcontract order to help out a friend from Cirebon – “they supply to IKEA, but they have a capacity problem, and they asked us to help.” The marketing manager does not want to produce for IKEA, since “they give a price that is really too low.” The IKEA agent has visited many times, but she never agreed with the price.

The position of women in the Indonesian business environment has become quite normal, according to the marketing manager. Women can speak and “men accept that women can do everything.” She does not really see gender issues – “like here in our factory, we also have a supervisor who is a woman. She is accepted here by the workers.”

Regarding the future, she is confident that the furniture industry in Indonesia will not disappear. However, she sees the importance of changing products and production techniques – “we have to be more flexible. Right now we are always prepared to accept any request from the buyer.”

Case 2: Textiles – batik (40 employees)

This company produces batik in Cirebon, a secondary city some 150 km east of Jakarta. The owner, who has a good reputation in Cirebon, started the company 40 years ago, as a batik production workshop and shop. Today, the owner has extended the premises to incorporate a restaurant and some tourist attractions, such as a workshop where visitors can make batik themselves. The interview is held with the owner.

The production of batik has a long tradition in Indonesia. It is considered as a craft and an art, but also has practical uses. Its diversity of patterns, colours and textures reflects the different Javanese local cultures. The batik from the company in Cirebon is more colourful, with red and green dominating, than the batik from Solo and Yogyakarta, “which is more brown and mahogany.”

The company produces two different types of batik. The first is traditional batik according to standardised motifs or pakems. The traditional pakem method is rich in patterns, very labour intensive and difficult to produce – “like jazz music, it has its own particular style.” Pakem batik is considered an art form and its production requires a high degree of skill. The second is a new type of batik, which involves “simple non-traditional patterns.” It is not about technology but about using non-standardised designs with fast production techniques – “it’s kind of the cheap version of batik.”

Some 10 years ago, the owner added the simplified batik to the company’s portfolio, and today only 15% of production is traditional pakem. The owner regrets that this figure is quite low. The problem is

not related to demand, which is still high, but to the limitations of his production capacity – “with my current labour force, it’s not easy to maintain our standards and strict regulations for pakem batik.”

There is a decline in production because “women are not interested any more in working in batik using the traditional method.” His experience is that most of the younger generation do not understand the meaning behind the pakem batik. The change in batik production from traditional to the new fast way is happening automatically – “it is a huge change.” The owner feels that the women who come to him looking for work “have no interest or concentration to do traditional pakem.”



This phenomenon is happening not only in Cirebon but all over Indonesia, including traditional batik centres such as Yogyakarta and Solo – “making easy batik was a trend that came in.” The owner provides training for new staff, but he finds that when he offers them a job making standardised batik after completing their training, the trainees turn down the offer. “Actually the problem is not their ability, but their willingness to pursue it as a profession. Making standardised batik is about patience.” The owner sees a change in the employment structure in Indonesia today – “the young ladies are more interested in working in the shopping centres.” Despite the change to “cheap and easy” batik, the company’s profits have not been affected over the years.

The high quality pakem products, sold in low volumes because it is not possible to mass produce them, still provide a high profit margin. In the case of a limited edition, the price can be very high. A pakem batik sheet can sometimes fail during the production work. Although in these cases the original idea failed, “the end product is sometimes still very good, because it’s a work of art.” One pakem batik can compensate for the loss of another. The price depends on the value that the customers place on the work. For the cheap batik, it is the other way around – “the productivity of this company increased a lot because we produce the same amount with fewer people.”



Internal capabilities and innovation

Although there is still a lot of demand, “I have a real problem with finding workers.” Some 10 years ago, the owner employed 120 people, but today the workforce is only 40. To make things more difficult, there is also a high staff turnover. In the past year, half of his staff have left. They have no formal employment contract, “so they can quit at any time.” The government does not require a formal contract – “legally yes, but practically, no.” The labour union in Indonesia does not intervene.

The owner feels that using job advertisements to find new labourers is not effective. His approach is to ask employees whether they have friends or family who need work, recruiting via word of mouth. He feels that his loyal workers come not only for the wage, but also for the positive and well-organised working environment. He organises an annual family trip for the staff and every four months they have a company dinner together.

In the past five years, he has invested in more effective marketing, launching a website and refurbishing the shop and showroom. In addition, he has extended his shop to incorporate a restaurant and a children's playground – “I want to attract shoppers here, who come here as tourists, not only for the batik but also for the workshop, restaurant and to sit and relax. This is my innovation.” He serves traditional food in the small restaurant. He regrets, however, that this kind of outlet in Cirebon is unable to attract as many tourists as those in Bandung, for instance.



He feels that it is hard to attract tourists to Cirebon, but “our new target customers are schools, where 200-300 students come here on school trips.”

Recently, he also introduced several computerised production and stock management systems. One new technology is product barcodes, which the company is relatively late in adopting. This is because the price is incorporated in the barcode, whereas the tradition in batik sales is to bargain – “in the village, we have a very strong tradition of bargaining.” Since the barcode sets the price, there is no need for bargaining.

In the new, simplified batik production, the owner still aims to develop high quality designs, and has produced several original ideas and initiatives. For instance, being a Harley Davidson fan, he created a batik with the Harley logo – “it is a new batik design. There is a lot of demand because many of our customers like Harley Davidson a lot.” Inspired by Australian aboriginal designs, he has created another batik in this style and hopes to sell it to Australia.

As well as new batik patterns, he now also develops new products, such as cushions, children's clothes and shoes, the latter because he saw some visitors wearing them. Some of the batiks designs use dollar symbols.

For his investments in the business, he never sought credit from a bank, following advice from his parents. When he was young, his father always said, “Don't rely too much on the bank.”

In the future, the owner expects that his four children will take over the business. His daughter is a designer already and works for him. His son recently graduated from the *École supérieure des arts et techniques de la mode* (ESMOD), a design school in France.

External business and institutional environment

“In the golden era” of his company, 1988-1997, demand for his batik was very high – “some customers even paid up front to guarantee delivery.” At that time, he had a representative office in Singapore and exported to Burma. 60% of the batik imported from Indonesia to Burma came from his firm in those days. However, the office closed because of the Asian crisis in 1998, and now he no longer exports on a regular basis, although international buyers do come occasionally. They ship the batik to neighbouring Asian countries, mostly non-pakem batik because “it's difficult to export the traditional pakem batik.”

There is a lot of competition in Cirebon, but he was the first entrepreneur to develop his shop into a more recreational attraction. For him, “competition is positive.” There is no cooperation between the batik shops “because we have our own labour, techniques and clients.” All the producers in Cirebon monitor each other's products – “it's normal, it's competition” – but every company has their own

speciality, which makes it difficult to copy each other's designs – “they all try to follow me, but they can't do it.” Sometimes other companies try to poach his employees.

The government does not make his business operations more difficult. He understands why the government imposes taxes and follows the rules accordingly. However, the government does not support the batik industry – “they just acknowledge the importance of our industry.” The local government sees his company as one of the key firms in Cirebon. Indeed, the owner is proud that many Indonesian presidents have visited his company, and photos are on display of Siapa, Soeharto and Megawati, although “Jokowi has not yet come.”

Case 3: Food processing – fruit juices (13 employees)

This business processes mango, lemon, tamarind, soursop and other tropical fruits into purée and juices. The owner started the business in 1996 with only 7 employees and limited capital, but with “enthusiasm, spirit and hard work.” His first product was coconut jelly. Shortly thereafter, he started processing tamarind into purée and juices.

In 2003, the owner participated in a training course on food processing run by the Ministry of Agriculture, as part of an agricultural post-harvest research programme – “I was doing the training on mango processing.” After the workshop, which provided him with important knowledge, he began processing mango and soursop into purée, which was new to him. The purée is an intermediate product used for fruit candy, jam and jelly. He involved a group of neighbouring farmers as suppliers. The first trials were not successful – “we failed because we didn't use the technology properly and did not keep the product in cold storage.” The production techniques were not hygienic. To overcome these problems, he developed his own cold storage facility (an example of ‘frugal innovation’), described below.

After 2012, he started to produce ready-to-drink fruit juice in small bottles as a finished product, which he still does today. The clients for the fruit purée are the large food processing companies in Indonesia (CV Berry Indo Sari and Cila Sasosino Perdana). These companies process the purée further into drinks for the end consumers. Due to the different season of each fruit, the owner provides a schedule to large companies of the available fruit. He has signed an MoU with several buyers. If one type of fruit is only available in certain months, he gives priority to processing that fruit.

He also sells the fruit directly to supermarkets, hotels, restaurants and cafés. His production depends on the purchase orders – “I will not produce if there is no order.” He first sends a sample to the customer. After approval, he starts production. The company packages the juice in containers of 5 and 20 kilos, and at present employs 13 people.

The production process is quite straightforward for mango, lemon and soursop. The owner buys the fruit from middlemen, who source it from farmers, mostly from central Java. The workers wash and manually cut or slice the fruit. The fruit is then pressed and filtered by machine. After the fruit is pressed, “some customers need pasteurisation and others can do without. Most of it is non pasteurised.” The process is slightly different for each type of fruit in terms of pressing and filtering, but the machines are the same – “the fruit washing machine is the same for all the fruit, as the brushes are adjustable.”



The plastic containers and bottles are filled by hand, production levels being too low to merit automation.

The company is officially registered as a CV (Commanditer Venootschap), which means that the company's assets are mixed with personal assets. It is a matter of choice whether an entrepreneur wants to register as a CV or PT (Perseroan Terbatas, limited liability company). In this case, “we still use family assets in the business.”

The owner is happy with the location of the business –“the location is our heritage, so I have to keep this land.” The firm is close to the fruit farmers and accessibility is good because it is on a major road. The juice and purée are transported in the company’s small trucks.

Innovation

As mentioned, the hygiene challenge was that the products’ storage life was only 3 months. Lacking investment money to buy a cold storage facility, in 2003 he constructed his own cold storage room by wrapping and isolating a small room with styrofoam and putting in two old air conditioners – “I used a modified room, air-conditioned to make it cold.” The self-constructed cold storage only helped slightly because the temperature was not below 14 degrees – “however it was not according to the regulation, which was 2 degrees.” He used this traditional storage until 2012, while saving money for a more advanced facility.



In 2012, he had sufficient savings to buy a 3.5 x 3.5 m cold storage facility, in which he can store 11 tons of products. The investment required for this was 150 million rupiah (12,000 USD).

There is an even newer ‘aseptic’ technology available that the owner is aware of, a machine that packages the juice into small bottles free of micro-organisms. The process does not involve pasteurisation, which reduces the taste quality. The machine costs approximately 5 billion rupiah (375,000 USD). With this technology, it is possible to store the product for 1 year outside without cold storage. The quality is better and there is no need to transport it in a refrigerated vehicle. “It is more cost efficient, but the capital investment is huge. It would be good to invest in the machine, and save the cold storage electricity costs.”

Internal capabilities

The owner has a degree in food processing, but he says that the food processing course in 2003 was very useful for gaining practical knowledge. The company does not have a formal organisational structure for the owner and the workers. The owner does all the management and administrative work.

The skills of the workers are “not very specialised.” They live nearby in the agriculture areas. There is very little staff turnover – “some of my staff are very loyal and have been working here since the beginning.” The owner has concluded formal employment contracts with the workers, because of bad experiences in the past – “people from farms have low education levels and are sometimes aggressive. That’s why we have to educate them by having formal contracts.”

The workers offer ideas to improve the business –“during the noon prayer, they’re all there and we pray together. After they pray, I ask my workers for ideas to improve the business.” The owner motivates

the workers – “after we sign the contract, I tell them to be honest and responsible.” If the workers work for 40 hours a week or more, the owner gives them a bonus.

His product has been certified for health safety by the provincial health department – “we don’t add any chemicals to the purée and juice.” The health auditor comes every 2 years. The products also have a halal certificate, which is issued by an institution called MUI (Majelis Ulama Indonesia) – “they do a test: no drugs, no bad content, the material is certified as halal.” Both certificates are printed on the bottle. The company did export some quantities to Japan, where the juice was tested – “we got repeat orders from them. So our product is okay. Japan is very demanding.” Other large companies, such as Sun Fresh, conduct the same process in examining the company. The large food processing companies also regularly check the hygiene practices.

The owner is aware that there are many other final products possible from his fruit purée. He would like to expand his ability to produce new products and try new marketing techniques. He has a franchise idea for juice counters in shopping malls, but to do so, he will have to increase production – “I realised that if we do the franchise, we need to expand capacity and storage.” Then again, he is almost 60 and thinking of retiring. He has a son who studied food technology and will take over the business soon. His two daughters will get married and will probably not work in the business.



External business and institutional context

The company has little interaction with the government about permits or tax. The owner pays income tax only, which presents no difficulties. He does not have to pay corporate income tax because his revenues are too low. He never sought bank credit for investment capital, as his family and his faith do not allow it – “because of shariah laws, we don’t want to be in debt.”

The owner attended several exhibitions in Indonesia and established links with the big companies who are now his main customers.

He is a member of a food processing value chain association called Masterbo. The 80 members of the association include farmers, food processors and food selling companies, uniting all actors of the value chain. The association helps farmers, for instance, with problems regarding seeds or plantations, engaging experts from Universitas Pasundan (UNPAS) and Universitas Padjadjaran (UNPAD) near Bandung. Masterbo also organises meetings for fruit processing producers with entrepreneurs, fruit farmers and retailers – “we come together and discuss processing formulations, label designs or packaging. We complement and help each other.” He is the coordinator of these meetings for the nearby regions of Indramayu, Majalengka, Cirebon, and Subang. Masterbo covers only West Java because it is a programme funded by the agricultural department of the provincial administration.

He participated in a short training course on a food safety management and product quality certification system called HACCP (Hazard Analysis and Critical Control Points). The trainer encouraged the participants to invest in more advanced machines, but these are costly: the initial investment would be around 25 million rupiah (1,800 USD) for the initial stage of the system.

The owner is not aware of the implementation of innovation policies for small businesses in Cirebon. He knows about an innovation programme in another region of Java, which provides financial assistance

for machines, equipment and operational vehicles –“the question is, why is it not happening in this region?” The local government does not help him, for instance, in promoting products, “but that’s ok.”

3.3 Key findings qualitative research

A first overall observation during the preparation of the fieldwork in Indonesia, which is comparable with Kenya, Ghana, Tanzania and Vietnam, was the issue of the large numbers of informal companies with less than 10 employees in the manufacturing sector in Jakarta and Cirebon. These enterprises do not belong to the target group of the research. Moreover, there is also a relatively high number of large companies. The observation previously made of the so-called ‘missing middle’ of SMEs² (see paragraph 2.1), is also an issue in Indonesia.

Another complicated issue was determining the exact number of employees of SMEs. Unlike firms in many other countries, where employees have fixed or formal contracts, the number of employees is often very flexible and depends on the order portfolio. The rattan and the crab processing cases are good examples. The company has a core staff for management and administration and holds a pool or network of employees.

Some Indonesian companies deliberately do not wish to expand to over 100 employees. They actively encourage workers to leave the company and start for themselves as subcontractors. The small companies are then mentored by the larger contracting company.

Innovation definition

Most interviewed owners and managers in the Indonesian companies described in chapter 3, in different ways, introduced new products, processes and technology in order to improve and expand their business operations. Some would clearly qualify as innovation, while others would not, depending on how innovation is defined and assessed.

In advanced economies, innovation is typically measured by R&D expenditures and number of patents of new products or processes, as proposed in the Oslo Manual³ (OECD, 2005). From a radical technology perspective, much of the ‘newness’ introduced in the Indonesian cases would not qualify as innovation. Such an assessment would in any case have been impossible because the owners do not systematically record R&D expenditures and have not registered patents.

Taking a broader and economic perspective on innovation, viewing it in terms of incremental adoption and adaptation or of new combinations of existing technologies creating value (Szirmai et al., 2011), it is evident that the new elements introduced in the interviewed companies resulted in improved and expanded business operations. As described in emerging innovation theories on LICs, much innovation depends on an aggregation of small insights and advances through ‘learning by doing’ rather than on major technological inventions (Carayannis et al., 2003).

Despite increasing interest in the literature, the exact definition of innovation in LICs remains an issue in theory (Çapoğlu, 2009) and for its application by the researchers in EIP-LIC. The broadest possible definition of innovation, from an economic perspective, referred to in the qualitative research section, is everything new that the company does to raise productivity and/or to stay ahead of its competitors. Or, as Fagerberg et al. (2010) put it, “*Innovation is often seen as carried out by highly educated labour in R&D intensive companies with strong ties to leading centres of excellence in the scientific world. Seen from this angle, innovation is a typical ‘first world’ activity. There is, however, another way to*

² This phrase has been used relatively loosely in economic development discussions, meaning a lack of SMEs particularly in the developing world. See: http://www.africa.com/blog/investing_in_africa_defining_the_missing_middle/

³ <https://www.oecd.org/sti/inno/2367580.pdf>

look at innovation that goes significantly beyond this high-tech picture. In this broader perspective, innovation – the attempt to try out new or improved products, processes or ways to do things – is an aspect of most if not all economic activities. In this sense, innovation may be as relevant in the developing part of the world as elsewhere.”

Assuming the broader perspective on innovation in EIP-LIC, box 1 presents several definition elements to assess innovation in an LIC context for the analysis of the cases in this report. Moreover, Kaplinsky and Morris (2001) identify five types of innovation: (i) process innovation, aiming at improving the efficiency of transforming inputs into outputs; (ii) product innovation, leading to better quality, lower price and/or more differentiated products; (iii) business practice innovation, implying new ways to organise the business and attract new clients; (iv) functional innovation, assuming responsibility for new activities in the value chain, such as design, marketing and logistics; and (v) inter-chain innovation, moving to new and profitable chains. These types of innovation are taken into account in the analysis in this report.

In many innovation definition and measurement documents, such as the OECD Oslo Manual (OECD, 2005), an explicit distinction between product, process and other types of innovation is made. However, distinguishing the types of innovation in the manufacturing SME cases interviewed in the framework of EIP-LIC so far (Kenya, Ghana, Tanzania, Vietnam, Indonesia, India and Uganda) was not such a clear and simple matter. It is more common to see an integrated combination of several types of innovation, where one type of innovation triggers or enables another, such as the introduction of a new process (technology) that results in the launch of new products, requiring the reorganisation of the workshop and staffing.

Box 1: Innovation newness, process and value creation

A cross analysis of definitions in innovation theory from recent decades (Voeten et al., 2011) shows that innovation is repeatedly typified by three key elements: newness, process and value creation.

Addressing the first element, Kotabe and Swan (1995) argue that innovation can be investigated in terms of both **newness** to the company and newness to the market or world.

Regarding the second element, the innovation **process**, all owners and managers themselves initiated, managed and owned the innovation process within the unit of analysis, their company. They developed the idea, sometimes inspired by others, started to run small experiments and trials and eventually implemented the new product or production technique on a commercial scale. As is often the case in incremental innovation in developing countries, this was not a planned and formalised process involving a pre-defined innovation strategy and an R&D department.

The third element, **value creation** of innovation, is evidenced either through lower input costs or higher sales revenues (Porter, 1985). Higher profit through new premium products of better quality, or appealing to a certain fashion, increases competitiveness.

Analysing the Indonesian cases for newness, process and value creation, as suggested in box 1, is one possible way to assess whether the observed new phenomena within the companies qualify as innovation or not.

1. The rattan case did not innovate in terms of new products, new processes or technological innovation. However, the company has introduced a quite ‘radical’ new human resources policy which modified the HR practices of having a number of permanent staff into contracting day workers, which saves on production and labour costs. This is an example of management innovation to maintain competitive position.
2. Batik is a traditional craft in Indonesia. The owner does not have other options than to introduce and produce cheap batik as a practical solution to address the shortage of workers. Moreover, he

extended his premises with a restaurant and playground to provide the clients with a more ‘recreational experience’, which is a marketing innovation. This assured his position as the ‘special place for batik shopping’ in Cirebon. The owner updates designs on a regular basis, involving artistic work. The question arises as to whether the new designs could be labelled as product innovation, or simply product ‘improvement’.

3. The fruit juice producer struggled with the cooling issue and creatively developed a cold storage facility by himself from an old AC and an isolated room (an example of ‘frugal innovation’). Later, he bought professional cold storage equipment, which is considered a technology innovation. The new equipment enabled the company to broaden the range of higher quality products. The introduction of the new technology and products was an incremental innovation, which was ‘new to the firm’.

Trends and patterns in the cases

The cases show various similarities and differences, which are informative and relevant for EIP-LIC and other innovation related research and policy projects on manufacturing SMEs in LICs.

It is notable that all new types of products and processes in the cases involve ‘new to the firm’ and incremental innovations. The innovations were not the result of radical technological inventions and were not at the technological frontier, except for the drone technology. Most cases involved management, organisational and marketing innovations at firm level. From an economic and development point of view, their importance is evident in terms of value creation, assuring the survival or expansion of the firm while generating employment opportunities. These micro level innovations have significant positive impact on the direct actors involved.

The management and ownership of the innovations in the cases was within the company, except for the crab processing firm. Ownership of the process makes it more likely the firm itself will be able to appropriate the value created. This was not the case in the crab processing plant, where the dominant actor in the value chain, the exporting firm, appropriates most of the value chain profit.

Most companies produce goods to order. Ideas for new products are mainly acquired from the market: customers come with requests and suggestions, or the owners talk with clients. Innovation is therefore mostly demand-driven as opposed to supply-driven.

The Global Competitiveness Report 2015-2016 of the World Economic Forum suggests that Indonesia is becoming more industrialised and competitive on the global market and qualifies as an efficiency-driven economy. Firms have become larger and are starting to exploit economies of scale. The idea is that productivity has to increase because wages rise with advancing development and firms innovate accordingly.

The characteristics of an efficiency-driven economy are clearly seen in the car parts and rattan cases, where the firms are trying to do more with less people. The other interviewed firms are still struggling with processing raw materials and getting the right technology and machinery in order to produce on a competitive scale. This is more in line with a factor-driven economy. These companies are competing on factor endowments, unskilled labour and natural resources, as earlier described in Kenya, Ghana and Tanzania. The cases in the latter countries are more involved in trade (export) and processing of basic products based on their endowments. These activities are labour intensive, requiring unskilled low-cost labour and low productivity. Against this background, the set of Indonesian cases explored fits in the Porter et al. (2002) economic stage classification of both a factor-driven and an efficiency-driven economy.

Internal capabilities

The motivation to start a business is similar for several owners in the cases: to have something of their own and to have more control in lives. Most owners have past working experience in their current line of business. Once they acquired sufficient skills and a network of clients, they opened their own business. Some owners have a technical background and prefer to stay close to the technical and design process. Others have a management background and are more likely to consider expansion. Survival and expansion of the business goes hand in hand with innovation. The owners are constantly looking for solutions to improve quality and efficiency.

In all cases but one, the crab processing firm, it is the owner who initiates, coordinates and manages the new ideas, including preparations for the innovation, technical details, and the product launch. Few companies have a design or R&D department or a specialist employee with this function.

The labour force is flexibly organised in many of the interviewed companies. Permanent staff are kept at a minimum. In the event of large orders, workers are temporarily hired for day jobs. There are no labour unions active in the cases. Although this 'management innovation' may have a direct positive effect for revenues, there are also some downsides. For instance, there will be less feeling of ownership and less commitment from the employees to contribute to the survival or expansion of the company.

The workforce in the companies are mostly unskilled and skilled labourers in the production workshop on the one hand, and well-educated staff in management and marketing on the other. Several owners face the difficulties of a high turnover rate of unskilled production workers. In fact, there are plenty of employment opportunities in Indonesia for lower educated workers, as reported by several of the managers and owners.

All companies have some form of a rewards and bonuses system. The younger generation of Indonesian workers are not interested in craftsmanship or manual work. Some companies keep their production outside Jakarta because of the improved availability and low cost of unskilled and motivated labour in these areas.

The Indonesian education system does not deliver workers trained in the skills required for production work in the firms interviewed. Graduates from colleges and universities do have theoretical knowledge but lack practical skills, so most companies have to provide additional in-house training.

The interviewed owners and managers are well-informed about technological possibilities though the internet or informal contacts. They have ideas and plans for upgrading and expanding their companies. Typically, the companies possess technology and machinery that they have owned for a long time. The technology is still able to deliver a certain minimum product quality. Occasionally, new machinery is bought from profits and savings.

The cases also show the active involvement of women in the management of enterprises. There are many female owners and managers, and they do not face many 'gender issues' in Indonesia. Some of the female workers are expected to stay at home after marriage. The female managers all consider women ultimately responsible for raising children and running the household.

External business environment and formal and informal institutions

All the interviewed SME owners and managers indicate that the business environment is challenging in Indonesia. At the same time, they are not really concerned about government rules and regulations. These cause some hindrance but the regulatory framework does not obstruct business operations. The tax policies and regulations are straightforward and as long as entrepreneurs comply with the rules, there is little trouble. Applying for permits can be more cumbersome in terms of bureaucracy and corruption. The perception of the government is quite positive, in particular the new president.

None of the interviewed owners complain about corruption, although at the lower governmental levels it is still prevalent. The central government takes serious steps to combat corruption, which is appreciated by the enterprise owners.

No interviewed company received government support for innovation. Some of them enjoyed other forms of support, including export promotion and technical training. The owners and managers see the benefit of these activities, which enable them to make big steps forward.

Several owners have practical problems with the government concerning urban planning and zoning of economic activities. Three of the eight cases report that their business is no longer tolerated at their current location. The government does not provide alternative locations, or the designated zones are much too expensive for small or medium sized business, which prevents the businesses from investing and innovating.

Companies are reluctant to borrow money from banks, for various reasons. Some have religious reasons not allowing them to pay interest on credit. Banks actively contact entrepreneurs to offer loans, but generally it is not considered an attractive source of finance for SMEs due to the high interest rates and complex paperwork. SME entrepreneurs find investment money from savings and via informal loans from family members. They usually invest incrementally just before or after receiving large orders.

Branch associations are an important source of information and business contacts and contracts for the owners and managers of the cases. Most of them are members of an association. Interaction with formal technology institutions, as suggested in the innovation systems literature (Lundvall, 1997), does not happen. Many SME owners and managers indicate that they would like to cooperate with universities to undertake research at their premises, sharing research insights, for instance. There is very little spill-over of technology as a result of co-operation between firms, subcontracting or other forms of collaboration within value chains, business clusters or networks.

Policy issues – insights for policy makers to consider

Various ministries within the Indonesian government have defined and implemented innovation policies, but these seem not to reach the SME owners that were interviewed, although some have participated in government programmes aiming at technology development for SMEs. A possible barrier may be a technocratic top-down view of technology in such programmes, an issue that is also the case in Kenya and Vietnam, for instance. The target companies are seldom consulted, and in fact they prefer to stay at a distance from the formal institutions, with the result that, in the interviewed cases, SME owners do not benefit from any innovation policies. An alternative bottom-up approach is one idea to address this problem.

The interviewees are aware of state of the art technology but cannot afford the high costs of such machines. Moreover, those that do have the money available are reluctant to invest it, because of uncertainty in both micro and macroeconomic terms. The policy challenge is to support the businesses to invest in advanced technology, enabling them to process local basic materials into high quality manufactured goods for internal consumption and export. Locally made products still have the reputation of being of lower quality.

Another issue is whether the overall policy approach, directing Indonesia towards an innovation-driven economy, is the most effective and appropriate means to develop the manufacturing SME sector. This relates to the relatively low levels of product and process innovation in the cases. Policy makers may wish to consider supporting SMEs in other forms of innovation, such as business practice (management and organisation), functional innovation, etc. As argued in the introduction to this report, it is desirable to develop innovation within manufacturing SMEs. Some believe that technological innovation is critical for SME development and catch-up with advanced economies. Technological innovation has,

however, been traditionally concentrated in developed countries, given the costs and risks involved in stimulating technological innovation. Foreign sources of technology account for a large part of productivity growth in most countries, also witnessed in the Indonesian cases. Therefore, the technology development process could be supported by tapping existing technical and product knowledge.

Moreover, the stories and experiences of the owners and managers raise the issue of whether an innovation-driven and new to the world innovation approach should be the way forward in innovation policy. Most of the required technology is already available, but elsewhere in the world. In fact, all owners in the cases are well informed about the technological possibilities of their business. Without too much difficulty, the owners and managers find the technology themselves by drawing on various sources of information (the internet, informal business contacts and trade fairs). Moreover, the companies themselves refine and adapt the existing technology once acquired. So, although setting up technology development projects and programmes may help SMEs, the availability of technology is not perceived as a barrier to innovation by the owners and managers.

It seems that the notion of growth as ‘manna from heaven’ as reflected in convergence theory, see the earlier rejected exogenous growth model of Solow and Swan (Fagerberg et al., 2010), might work after all because of the free and widespread access to knowledge and technologies via the internet. The knowledge itself is available to local companies in Indonesia. The institutional context, providing trust, predictability, stability and access to finance is more of a problem in preventing investment in technology and innovation and thus hindering ‘convergence’. However, the ‘manna from heaven’ of technology developed elsewhere may not address the local needs or issues in Indonesia.

Innovation climate

How then can the innovative capacity of SMEs in Indonesia be increased? According to the World Bank (2010), an efficient government innovation policy should address the overall innovation climate, which goes beyond traditional science and technology policy. At the same time, government action can usefully focus on a few generic functions to help SMEs to grow. In particular, it can facilitate the articulation and implementation of innovative initiatives, since innovators need basic technical, financial and other support.

The government can also reduce obstacles to innovation in competition and in regulatory and legal frameworks. Government-sponsored research and development structures can respond to the needs and demands of surrounding communities. Finally, the education system can help form a receptive and creative population. Regarding actual innovation policy development, there has been a considerable amount of work in developing countries, such as the World Bank (2010) report ‘Innovation Policy: A Guide for Developing Countries’.

The lack of relevant education is a problem for the companies interviewed, who feel there are insufficient skilled workers and operators to work with modern machines. SME owners and managers complain that university and college graduates lack the required technical and craftsman’s skills, exposure to modern technologies, and an entrepreneurial and creative attitude.

As mentioned earlier, several ministries and agencies are engaged in efforts to develop and promote innovation policy, usually labelled as Science, Technology and Innovation (STI) policy. Despite considerable efforts in developing strategies and plans, actual implementation is challenging, due to the limited availability of public budgets and knowledgeable staff. The various ministries, including those responsible for science and technology, industrialisation and export, typically have to sort out how the implementation of the policies should be organised, which remains a subject of debate.

Nearly all SME owners and managers suggest that creating a stable and predictable institutional context would be an efficient and effective way to promote innovation in Indonesia. Whatever innovation

policies and programmes are developed, the results of such policies will be undermined by the weak and unreliable wider formal institutional context.

Another policy idea emerging from the DFID project is that several owners and managers suggest focusing not on governmental policy makers only, but on direct advice to SMEs on how to improve their business. One idea is to develop non-governmental business information exchange networks and platforms, establishing contact between entrepreneurs in Indonesia and beyond, to facilitate discussion and deals within the various sectors. SME owners suggest that the DFID project could establish a network of all SME owners and managers contacted during the implementation of EIP-LIC and create a website for them to stay in touch with each other.

There are also ideas proposed by external parties to spur MSME productivity growth over the medium term. One route would be to encourage the formalisation of small firms. Lessening red tape through simplification of the licensing process and lower tax compliance costs would help. Avoiding excessive rises in the minimum wage in provinces where it is already at a reasonable level would also be important. Looking forward, it would be useful to remove rigidities in the formal labour markets, while moving to some form of unemployment benefit system to insure workers against job-loss risks. A second route would be to boost investment. Clarifying property rights for real estate, and making the information collected by the credit bureau available to all financial institutions would ease access to finance. At the same time, the development of financing alternatives such as venture capital, leasing or micro-finance would enhance credit supply. The poor state of infrastructure, in particular in the transportation and electricity sectors, is also perceived as an important impediment to investment and could be remedied by increasing public infrastructure spending on cost-effective projects. A third route would be to enhance the quality of human resources. The country suffers from a lack of skilled workers, and policies should aim both at increasing the pool of workers and making education and training institutions more responsive to evolving labour-market demand. Indonesia has a long tradition of supporting MSMEs, but responsibilities between the different levels of government and within the central government need to be clarified to minimise overlap and inefficiencies. A rigorous assessment of existing programmes would allow schemes to be consolidated and scarce public funds to be directed to their most cost-effective uses (Mourougane, 2012).

4 Finance for productivity growth

The ‘Finance for Productivity Growth’ team produced four scientific papers with special significance to Indonesia. The first paper reports the findings of an RCT on business training in Jakarta. The second paper addresses aspirations of business owners using survey data from Indonesia. The third paper addresses income variability in a field experiment in Vietnam, a country comparable to Indonesia. The fourth paper analyses informality and access to finance in neighboring India. The research findings of each paper are discussed and policy implications reviewed in the paragraphs below. The associated policy briefs and many others are listed in the project website.

4.1 Learning business practices from peers

The first scientific paper within the “Finance for Productivity Growth’ theme, involving an extended RCT addresses the issue of poor effectiveness of entrepreneurship training programs in LICs. A large body of literature highlights the external constraints small businesses face, such as credit, savings and institutional. A recent growing literature additionally stresses the importance of managerial and business skills for MSE growth. As a result, numerous business training programs have been developed and implemented across the globe to foster entrepreneurship through better business skills. Yet, the results from these training programs have not yielded consistently positive impacts. Most research studies conclude with small and statistically insignificant effects of managerial training on sales and profits, and in particular on the adoption of business practices.

One plausible reason for the lack of success of existing training programs is that they gather very little insight about locally useful business practices. Instead, most offer formal and standardized courses on marketing and finance based on modules developed by specialized scholars from the western world. In this research, the researchers take a different approach to improving business skills. They recognize the value of locally relevant information as a crucial input when encouraging the adoption of business practices. Instead of teaching set courses, the study design focuses on helping businesses learn profitable practices from their successful peers. The research paper is entitled ‘Learning Business Practices from Peers: Experimental Evidence from Small-scale Retailers in an Emerging Market’ (2018) by Patricio Dalton, Julius Rüschepöhler, Burak Uras and Bilal Zia.

In the first stage of the RCT, the team identified business practices that best predict profitability among a cross-section of 1,301 small-scale retailers in urban Jakarta, Indonesia. Through multi-variate cross-sectional regressions, they estimated the returns to each business practice and identify the ones with most predictive association with profits. The knowledge on returns and implementation guidance was written down in a professionally developed handbook. This handbook is the main ingredient of the randomized controlled trial (RCT) in the second stage of research. As part of this RCT, 1040 retailers out of the baseline sample are provided a free copy of the handbook while the remaining 261 serve as a control group. The research team interprets the handbook treatment as a pure information shock on (i) best local business practices and (ii) implementation know-how.

The team combines the handbook treatment with two additional experiential-learning treatments. First, a sub-set of handbook recipients is exposed to business role models from the Jakarta retail sector, who in a video describe their own trajectory of business growth after having implemented a subset of the best practices that are highlighted in the handbook. A second sub-set of handbook recipients is provided individualized business assistance by trained counselors (hereafter Counseling). These counselors provide one-on-one implementation guidance and troubleshooting for the business practices highlighted in the handbook, hence facilitating learning through own experience. Finally, in order to test for

complementarities the research team offered a third sub-set of handbook recipients both Role Models and Counseling treatments.

The first set of results characterize the local best practices at baseline. The research finds that while there is large variation in both business performance measures and business practices across the sample, there are certain types of business practices that strongly predict business profitability.

For example, implementing record-keeping practices is associated with additional monthly profits of between 26% and 45%. Likewise, developing a fixed schedule for the purchase of the firm's main products, never running out of stock of these main products, and stocking up daily rather than weekly, are associated with higher monthly profits in the range of 25% to 37%. In terms of marketing practices, consulting former customers, using discounts, and product innovation show the strongest association with business profits - adoption of one of these practices predicts an increase in profits between 23% and 29%. Finally, making business decisions together with others stands out as a particularly profitable practice, especially when the decision is about the introduction of new products and the use of new business practices, a profit increase in the range of 27% and 35%.

Our second set of results come from the impact analysis of the dissemination of interventions on business outcomes and practices. Six months after the interventions, the study finds no significant effects of offering the Handbook alone, but significant and positive effects on sales and profitability for firms assigned to Counseling and All Three. The effects are large in magnitude and economically meaningful. Businesses assigned to these two treatments increase profits by 40% and sales by 15% over Control. This is equivalent to an increase in monthly profits of at least USD 330. Firms assigned to Role Model also increase their sales and profits with respect to Handbook and to Control, but the latter difference is not statistically significant.

We also find a significant improvement in the adoption of business practices across all experimental groups. Moreover, the channels through which social learning occurs are specific to the type of practices and treatment. Businesses assigned to Role Model are more likely to adopt marketing and sales practices. For example, these businesses become significantly better than Control at always having the top selling products in stock, offering discounts to customers, comparing sales with competitors, consulting former customers, offering new products for sale, and setting sales targets. These are all practices that can be learned by observing others' experience, and which do not necessarily need hands-on experience. In contrast, firms assigned to Counseling become relatively better at record-keeping and joint decision-making, practices which, arguably, are better learned with guidance and through own experience. Compared to Control, these firms are more likely to calculate businesses revenues, expenses, and profits, to separate business and household finances, and to discuss business matters with others. They are also less likely than Control to waste stock. In addition, the team find that none of the treatments significantly affect total expenses or the number of customers. This result, together with the high treatment impact on practice adoption, suggests that the increase in sales and profits arises from efficiency gains brought about by the adoption of better business practices.

Finally, heterogeneity in treatment effects was addressed and it was found that the retailers who benefit the most from our treatments are those who are better at implementing business practices at baseline. This finding suggests the existence of a business-skill-driven poverty trap as our soft interventions are effective only for those who are close to the poverty trap threshold. Overall, these findings show that business growth can be achieved through innovative and simple channels that are cost effective and scalable. Moreover, the team confirms that socializing peer information alone is not enough to achieve social learning, at least in this sample of Indonesian businesses. Social learning is possible when retailers are able to either observe successful peers implementing the practices or to implement the practices with personalized assistance.

In terms of policy and program implications, all interventions implemented in this study can be scaled up and replicated relatively inexpensively. The Handbook intervention cost approximately USD 100, the Role Model intervention cost and additional USD 25 and the Counselling cost an additional USD 25. Many of the costs are fixed and sunk, particularly the cost of developing the handbook. For any scale-up, the costs would therefore be considerably lower. The benefits that the team identified after

six months are up to USD 330 per month in profits, along with a high adoption rate of profitable practices. Hence, by all measures, business learning through the channels proposed in this paper is feasible for scale-up and wider use.

4.2 Aspirations of small-scale entrepreneurs

The second scientific paper within the “Finance for Productivity Growth” theme addresses the issue of entrepreneurial aspirations as a predictor for business development. The paper is entitled "Aspirations of Small-scale Entrepreneurs: Evidence from Urban Retailers in Indonesia" (2018) by Patricio Dalton, Julius Rüschenpöhler and Bilal Zia.

The paper sets the stage with the observation that small-scale and informal enterprises are the source of employment for more than half the labor force in developing countries. A key policy question is whether these firms have the potential to grow, or whether they merely represent a source of subsistence income for individuals unable to find alternative work. A very important question is why this happens? Is it that these entrepreneurs lack the financial, technical, managerial, or informational resources to grow or is it that they do not aspire to grow their businesses? The available evidence is not yet conclusive but it hints at the fact that solely providing external resources such as credit, cash or in-kind capital, or business training do not always lead to business growth. One plausible unexplored factor that could rationalize both low take-up and low business growth is entrepreneurial aspirations. Aspirations motivate greater effort to raise future standards of living. Without aspirations for growth, there may be no reason to have business savings, obtain credit, attend a business training program, introduce product or process innovations, or implement new profitable business practices.

Indeed, the association between poverty and low aspirations has been empirically documented across a wide range of countries and settings. Despite its importance in the poverty literature, we know very little (if anything) about the aspirations of small-scale entrepreneurs in developing countries. Do they aspire to grow their businesses? If so, on which dimensions? How many employees do they aspire to have, what business size, how much revenue? Is there heterogeneity in aspirations across businesses, and if so, what are the determinants of such heterogeneity? What is the typical time horizon for setting and achieving aspirations? Finally, do aspirations predict forward-looking behavior tied to firm performance and growth, such as savings, credit use, and product and process innovation?

Research approach and findings

The research addresses these questions with a unique data set involving business surveys on the aspirations for business growth among a representative sample of small-scale urban retailers in Jakarta, Indonesia. First, research identifies whether these entrepreneurs even aspire to grow in size, number of employees, number of customers, and sales. This exercise allows to discern “imagination failure”, which is defined as the failure to imagine an ideal business in the long-term. The research then distinguishes between short-term (in one year) and long-term (in a life time) business aspirations. This distinction allows the researchers a) to present a realistic picture of entrepreneurial aspirations in a relatively short period of time and b) to learn about the aspiration horizons entrepreneurs have in mind when they think about the ideal business they aspire toward. Based on these findings, the ‘planning failure’ is identified, defined as the failure to imagine a time-frame to achieve an ideal business. Both imagination and planning failures are novel contributions to the literature and aim to capture behavioral biases in setting

aspirations, which have been deemed important for aspirations-based poverty traps. In addition, the researchers collect measures of the entrepreneurs' level of agency by eliciting self-efficacy and locus-of-control beliefs. This allows to distinguish pure hope from aspirations grounded in beliefs. This distinction is very important, in particular for the context of this paper, since the research team poses aspirations as a predictor of deliberate future-oriented actions.

The research team finds that on average entrepreneurs in the sample aspire towards positive business growth on all dimensions. Within one year, the average business aspires to grow in size by 23%, to have 17% more employees, 24% more customers, and 160% higher sales. In the long term, the average entrepreneur sees the ideal business 95% larger in size, with 42% of more employees, and 54% more customers. The average time horizon to achieve aspirations is less than three years, with a high level of perceived agency. Although the research team does not have a benchmark to compare the relative magnitude of these aspirations, whether they are realistic or not and whether entrepreneurs will fail to live up to their aspirations, is an important and open empirical question. Unrealistically high aspirations can generate frustration and discourage investment in future betterment.

Despite the high average levels of growth aspirations in the sample, the team observes a pronounced heterogeneity. More than half the sample does not aspire to grow beyond current levels in size, employees, or customers in the next 12 months. Moreover, in the long-term, a non-trivial proportion (16%) of entrepreneurs depict imagination failure and 28% show planning failure. In addition, consistent with the literature on poverty and aspirations, the researchers find that businesses with lower profits are more likely to depict imagination failure. In a similar vein, businesses with less employees, low credit use, and low scores on indices of business practices, especially marketing and stocking-up, are significantly more likely to have imagination and planning failure. These findings are in line with the literature on management practices, which finds that marketing skills can spur an expansionary mindset.

On entrepreneur characteristics, the research finds that older, female, and low perceived agency owners have lower aspirations to grow their businesses. Finally, significant association is observed between aspirations and measures of future-oriented behavior such as business savings, plans for credit, business expansion, and process and product innovation. Entrepreneurs that depict imagination failure are 7% less likely to have business savings, 11% less likely to apply for a loan in the next 12 months, 7% less likely to expand their business, 15% less likely to improve record-keeping, and 21% less likely to develop a business plan. The team finds similar significant effects for entrepreneurs with planning failure. These results persist even after controlling for the entrepreneur's business practices and a comprehensive set of firm- and individual-level characteristics.

Policy implications

The research outcomes help to better understand a population that is often the target of policies aimed at releasing external constraints, taking for granted (unobserved) entrepreneurial aspirations. It may help policymakers better target their policies, by distinguishing the type of entrepreneur who has the potential and aspiration to grow; from one who has a business to subsist. It could also help reconcile why some seemingly profitable opportunities are not taken up, and why policies aimed at raising aspirations, for example by changing mental models, can be an effective way to break a poverty trap.

The research findings have implications for policy and future research in terms of reconciling why policies aimed at alleviating physical and human capital constraints are often unsuccessful at spurring business growth. The heterogeneity in the research findings make a strong case for better targeting of business aid programs based on aspirations for growth. Given that aspirations are a strong predictor of forward-looking behavior, they are likely to complement policies targeting business investment, savings, credit use, and business innovation. It is expected that these policies will be more effective for

entrepreneurs with higher aspirations for growing their businesses. In terms of future research, the findings motivate further work on the causal implications of entrepreneurial aspirations. In particular, research on understanding what kinds of policies and programs boost aspirations, and mapping the causal channel that leads to successful impacts on business growth, would be a valuable extension of this work.

4.3 Income variability – a field experiment

The third scientific paper within the ‘Finance for Productivity Growth’ theme, involving a field experiment, analyses income variability in Vietnam, a country similar to Indonesia in terms of economic structure and development. Small poor entrepreneurs in the developing world are vulnerable to a range of negative shocks and constraints associated with a lack of development. They spend most of their lives coping with frequent income disruptions, balancing expenses, and making difficult trade-off decisions. This is not without implications; some studies suggest that entrepreneurs' preoccupations with pressing budgetary concerns and income variability could leave them with a reduced mental capacity to guide their decision making in business management.

In the framework of the EIP-LIC, a team of researchers from Tilburg University explored the issue of income variability in Vietnam and which possibly impedes the cognitive functioning of low-income individuals. The research was conducted through a field experiment inducing thoughts about finances to a sample of small low-income retailers in their local setting. The intervention consisted of asking retailers to think about scenarios describing a financial situation they might encounter in their daily lives.

The experiment was carried out in May 2015, in Tam Bac Market, one of the biggest markets in Hai Phong, in northern Vietnam. The original working paper is entitled ‘The Right Amount of Income Variability: Evidence from Small Retailers in Vietnam’ (2016) by Patricio S. Dalton, Nguyen Nhung and Julius Rüschenpöhler .

Research approach and findings

The results, confirmed in earlier literature, suggest that a lack of financial resources does not necessarily impede cognitive functioning. Cognitive performance in financially stressful situations is not affected by absolute poverty as measured by wealth or income.

Instead, what seems to create cognitive stress is the subjective feeling of poverty together with the variability of income. Cognitive performance in financially stressful situations has an inverted U-shaped relationship with income variability: being exposed to very low or very high income variability can be detrimental for cognitive capacity. There seems to be an optimal income variability which maximises the cognitive capacity of the retailers when they face financially stressful situations, which impede their cognitive functioning.

This points to the existence of an optimal degree of income variability. Retailers who are used to facing some intermediate degree of fluctuation in their revenues reach the highest cognitive performance when they are confronted with financially stressful situations. The effect of income variability on the cognitive function of low-income retailers remains valid even for the poorest retailers.

Policy implications

The research has policy implications to safeguarding the cognitive functioning of people on low incomes. The underlying idea is to avoid their cognitive functioning being unintentionally harmed as a result of financial, fiscal or income generating policies and programmes.

Assuring an optimal amount of income variability to assure maximum cognitive functioning: the effectiveness of policy and programmes that focus on the beneficiaries' lack of financial resources, for instance, could be increased if income variability is also given careful consideration.

In concrete terms, it is preferable for policies and programmes to include an assessment of the optimal (context-specific) income variability. This depends, amongst other factors, on the macro-economic environment and beneficiaries' educational background. Finding, monitoring and assuring the right amount of income variability may substantially increase the effectiveness of a given policy or programme.

Alternatively, in measuring the impact of finance policies and programmes, an indirect indicator of success can be an increase in cognitive capacity in combination with income variability. This equally relates to entrepreneurial activity. Risk taking is central and related to cognitive capacity in terms of understanding and interpreting the economic context. Thus maximum cognitive capacity, risk taking and innovation are all linked to optimal income variability.

Stability and maintaining the status quo of income variability is also an issue to be considered in new policies and programmes. For instance, new fiscal policies can in fact create additional cognitive stress if they bring lower or higher income variability. This is the case if government regulations change often or are unclear, which often happens in LICs, and was signalled in the various cases in the EIP-LIC qualitative studies in Indonesia. Entrepreneurs complained a great deal about unclear and constantly changing government policies and regulations, which brought changes in income variability – “time and again the government regulation is a headache.”

4.4 Informality and access to finance

The fourth scientific paper within the “Finance for Productivity Growth’ theme analyses the interplay between informality and access to finance. The research explored financial sector development in the formal and informal manufacturing sector in India, which is comparable with Indonesia in the sense that both countries have an large informal sector and informal ways of finance. The original working paper is entitled ‘Informality and Access to Finance: Evidence from India’ (2014) by Thorsten Beck and Mohammad Hoseini.

Actually, a large share of private sector activity in LICs takes place in the informal sector, which almost always has negative economic and development consequences. There is among others a large productivity gap between formal and informal firms. The productivity is higher in the formal manufacturing sector due to access to better formal services. However, firms have to pay ‘entry costs’ to overcome the barrier to formality. This barrier includes registration costs, indivisibility of investment and formal property claims, where the latter enables entrepreneurs to use assets as collateral and thus gain access to formal finance. Informality can indirectly hamper firm growth through the lack of provision of public services and infrastructure caused by deficits in the government revenue.

Research approach and outcomes

The informal sector suffers from the lack of access to formal sources of external finance too. One of the important differences between formal and informal enterprises, is that around 44 percent of informal enterprises considers access to financing as the main obstacle of doing business, whereas this number is 21 and 14 percent for small and large formal enterprises. It is not clear, however, whether the lack of access to formal finance discourages entrepreneurs from entering the formal economy, or whether informality prevent them from accessing formal finance.

Better access to financial services is assured through financial sector development, also referred to as financial deepening. This constitutes an increased provision of financial services and institutions with a wider choice of services geared to all levels of society. Beck and co-authors earlier found a positive relationship between financial deepening and economic growth in LICs, a relationship that goes more through productivity growth than capital accumulation.

Other previous research work and theory suggest an impact of financial deepening on pulling more firms into the formal sector as well as increasing total production of the formal sector.

The DFID research of Beck and Hoseini focussed on the effect of financial development on formal and informal manufacturing firms and explores two dimensions of financial development namely outreach (the ease of access to financial services, including credit) and depth (the overall formal credit volume in the economy). The research involves firm-level data between 1989-2010 from different regions in India with different levels of depth and outreach allowing a cross-regional comparison with regard to incidence of informality.

Overall, the empirical findings suggest two positive effects of financial deepening on the incidence of formality in manufacturing: reducing barriers to formality and increasing productivity. The research results show that both depth and outreach are important but in a different way.

Financial outreach - measured in the research as branch penetration - helps to reduce formality barriers and thus increases the number of formal firms. Theory already suggested that one effect of access to finance enables firms to overcome the costs of formality. This is especially the case in industries with a higher demand for external finance. Given the importance of geographic proximity in lending relationships especially of smaller firms, small firms stand to benefit more from financial outreach than large firms. There is no significant effect on productivity for branch penetration.

Financial depth mainly affects informality through increasing productivity of industries dependent on external finance. There is a lesser effect on reduced informality. Thus in conclusion, financial deepening increases the productivity of formal sector and reduces informality.

Summary research outcomes

	Outreach	Depth
Reduced informality	++	+
Productivity	0	++

Policy implications

The working paper of Beck and Hoseini confirms the policy assumption that promoting the informal manufacturing sector to become formal will raise productivity and economic growth. A formal sector, and entrepreneurs choosing to become formal, implies more commitment to the firm's survival and consequently a more stable economic sector. Formality also means tax revenue with government can use for developing public services and institutional stability. A formal economy brings benefits for its workforce too. Formal companies usually have an organised system of employment with written rules and has a standardised relationship between the employer and the employee is maintained through a formal contracts.

The research suggest that government policies towards financial deepening can play an important role in reducing informality, though with important differences across industries. A key insights of this paper is that broadening access through outreach plays will have a more important effect on reducing informality than financial depth. In particular, access to bank account makes the operation of firms at least partly observable and reduces the information asymmetry between firm and formal agency. This particularly the case for smaller firms that face high entry barrier to the formal sector. Decentralisation policies of the banking sectors, establishing easy accessible small branches in the more remote areas, is one way forward. Policy of government, but also the policies and strategies within state or private banks, may focus on the ease of access to financial services, including credit.

In terms of promoting raising productivity, a policy implication is to focus on financial depth; increasing the overall formal credit volume in the economy. The working paper demonstrates that financial depth promotes economic growth in LICs via increased productivity of firms.

The working paper is also informative for policy makers with regard to their expected impact of their policies. Policy makers should not expect that policies aimed at outreach will increase productivity. The same holds true for the development of financial depth, such policies will have a modest effect on reducing informality of enterprises.

In addition, the outcomes of the working paper can be further discussed in the context of the different stages of economic development. In factor-driven economies, where informal labour intensive enterprises compete in terms of factor endowments. These informal enterprises process raw materials and have low productivity, while the urgency for efficiency is not so evident. Then outreach oriented policies seems to be the logical way to promote formality. In the next stage of economic development, efficiency-driven economy, more enterprises are formal while the incomes the skilled labour force have risen. In this stage, price competition by production efficiency and products services quality is critical, so raising productivity becomes important. Policy making within an efficiency-driven economy aiming at raising productivity, developing financial depth is a more effective option than outreach.

5 Innovation Systems

The ‘Innovation System’ team produced three scientific papers with relevance to Indonesia. The research findings of each paper are discussed and policy implications are reviewed in the paragraphs below. The full working papers including scientific analysis details and associated policy briefs are listed in the project website.

5.1 Gender diversity and innovation

The first scientific paper within the ‘Innovation Systems’ theme analyses the relationship between gender diversity in the ownership, management and workforce structure at the firm level and women’s economic opportunity at the country level to improve innovation outputs. In present theory, there is an implicit assumption that higher levels of women’s economic opportunity at a country level enable firms to better render the benefits gender diversity can bring for innovation. The original working paper is entitled ‘Gender Diversity and Innovation: The Role of Women’s Economic Opportunity in Developing Countries’ by Daniela Ritter-Hayashi, Patrick Vermeulen and Joris Knobben.

Research Findings

The research shows that gender diversity at all levels in the organization has a positive effect on innovation in the firms surveyed in low and lower-middle income countries in South Asia, Africa and the Middle East - despite their below-average performance on a world-wide scale of measuring women’s economic opportunity. Furthermore, the research illustrates that a country’s level of women’s economic opportunity plays an important role in the relationship between gender diversity and innovation.

On the one hand, the results put forward that the positive effect of gender diversity on firms’ innovation likelihood is amplified with increasingly equal opportunities for women. On the other hand, both gender diversity in the ownership structure and in the overall workforce can have a negative effect on a firm’s likelihood to innovate if the firm is operating in a country with very little economic opportunity for women.

It needs to be however pointed out that, extrapolated from this study, gender diversity only has a potential negative effect on innovation in a handful of countries worldwide, ranging at the bottom of the women’s economic opportunity ranking (lowest 5 countries for gender diversity in the workforce and lowest 15 countries for gender diversity in the ownership structure).

Policy Implications

Based on the research results, it is essential to acknowledge the value of gender diversity for innovation and to create awareness among managers and employees that innovation emerges and blossoms from gender diversity at the firm level. Government agencies could develop special policies and programs which encourage and support firms in hiring a more gender-balanced workforce, having more female top managers and supporting firms with a gender diverse ownership structure. This could take the form of awareness raising programs explaining the particular benefit of gender diversity for a firm’s likelihood to innovate.

Furthermore, the introduction of tax advantages, subsidies or other incentives targeted at increased gender diversity at all hierarchical levels within a firm could be a driver for increased gender balance. Once awareness is raised at the top ranks of firms, it is pivotal that managers initiate a change of attitude

and organizational culture top-down, encouraging women to voice their opinion, urging men to value women's viewpoints and knowledge in the innovation process, and reassuring management on the importance of promoting both men and women based on their performance rather than their gender.

It is crucial to encourage increased levels of women's economic opportunity at a country level as a prerequisite for gender diversity to benefit innovation. Potential avenues are increased access of women to education to decrease the gap in knowledge between men and women. Governments could initiate country-legislation enabling women to better balance family and work demands such as improved childcare as well as maternity and paternity leave. An additional avenue for policy makers is to encourage a social perception of women as being equally valuable members of society like men, with the same rights and obligations.

On a practical level, supporting networking activities through women entrepreneurship associations seems an effective instrument to strengthen women's determination to pursue ambitions. Moreover, establishing programs in which women entrepreneurs lend support to girls on their way of obtaining education can be of advantage. This can take the form of financial support and motivational reinforcement for the girls themselves. Similarly, successful women entrepreneurs can serve as a role model to girls' families, which may be hesitant to invest in their daughters schooling based on traditional gender norms and expectations. Moreover, to change the overall public perception of women entrepreneurs while aiming at a ripple down effect to their immediate surrounding and support system, campaigns celebrating the success of women starting a business can be a further avenue to strengthen their societal position.

5.2 Internal, collaborative, and regional knowledge sources of product innovation

The second scientific paper within the 'Innovation Systems' theme focuses the impact of different knowledge sources relating to product innovation using small firm-level data from Vietnam, an emerging economy similar to Vietnam in terms of economic growth and industrialisation,. Specifically, the team analysed the separate impacts of (i) internal knowledge, (ii) collaborative knowledge, and (iii) regional knowledge. The original working paper is entitled 'Made in Vietnam: The Effects of Internal, Collaborative, and Regional Knowledge Sources of Product Innovation in Vietnamese Firms' (2017) by Thuy Phung, Patrick Vermeulen, Joris Knobens and Dat Tho Tran.

Even though knowledge is crucial for all type of firms, the exact type of knowledge that is most useful might differ between larger and smaller firms. Large companies engaged in internationalisation pay particular attention to internal knowledge as a source of innovation. SMEs operating in a local context, on the other hand, need to draw on knowledge networks that tie together a broad set of partners, customers and suppliers to take advantage of innovation resources.

Research approach and findings

The three types of sources are characterised as follows. Internal knowledge sources might be generated by firms through in-house R&D activities, employee training or managers' experience. Collaborative knowledge could emerge from partnerships between firms and their counterparts, either from inside the supply chain (e.g. competitors, suppliers or customers) or outside the supply chain (e.g. universities or research institutes). Regional knowledge sources might come from other firms in the local area, as knowledge tends to spill over across firms, especially when the distance between them is small.

The analysis reveals that some knowledge sources are more strongly associated with innovation than others. Knowledge sources from internal R&D have a positive influence on product innovation. The

stronger a firm's collaborative knowledge gained from inside the supply chain, the higher the likelihood of product innovation (it might be specific to developing countries that firms need to create a network with customers, suppliers and competitors to enhance product innovation). However, there is no significant relationship between collaboration with universities or research institutes and innovation. One explanation as to why regional knowledge sources are not effective in Vietnam is that national knowledge-producing organisations and State agencies are slow and reluctant to exchange information and knowledge.

Policy implications

The qualitative studies of EIP-LIC show examples of companies that do not have explicit R&D activities, yet having internal R&D capacity strengthens their product innovation. A policy to raise awareness of and facilitate management training and education would encourage the institutionalising of explicit R&D capacity in a company. A more critical implication is the acknowledgement that innovation occurs naturally in a good business climate and most of all through effective interactions in the business system.

It is important to differentiate between the level of technology required by large technologically advanced enterprises and their smaller counterparts that mostly adopt or adapt existing technology. Universities and research institutions have a significant role to play in the transfer of advanced technologies. However, this is not relevant for the smaller firms as the research shows.

More importantly, innovation is fundamentally the task of the private sector and entrepreneurs, and occurs through business horizontal and vertical linkages, spill-over and actors' networks involving subcontracting, interactive learning within supplier and buyer value chains and foreign direct investment. From this perspective, government innovation policy should be broader than simply providing R&D incentives and patent systems, for instance. The business sector should enjoy an institutional environment that provides information, confidence, trust and stability, which will directly and indirectly support entrepreneurs in taking risks and making investment and innovation decisions.

Most Western advanced economies adopt a policy approach based on innovation systems theory, the foundation for most Science, Technology and Innovation (STI) innovation policies. These policies strengthen the network of formal innovation systems institutions, including technology development and research centres, universities and technical education and training, finance and regulatory patent systems. The outcomes of this research indicate that this approach is unlikely to be effective in less advanced economies.

5.3 Exports and innovation in emerging economies

The third scientific paper within the 'Innovation Systems' theme examined the link between exports and innovation within SMEs. Firm level evidence from South Africa. The authors believe that the conclusions hold for emerging economies such as Indonesia. Specifically, the research focused whether exporting raises the probability that firms innovate in the context of an emerging economy. The research resulted into an original working paper entitled 'Exports and innovation in emerging economies Firm-level evidence from South Africa' by Gonzague Vannoorenberghe.

One possible way to promoting innovation in emerging countries is to further opening up the local economy in the globalizing world and promote international trade. In fact, liberalizing international trade and attracting foreign direct investment are at the core of many economic development policies in LICs. The underlying idea is that foreign competition increases the pressure on domestic firms to cut

inefficiencies, while access to foreign markets can raise their productivity by increasing their scale, exposing them to foreign technology or raising their incentives to innovate. Although there is some research evidence that exporting firms are more productive and innovate more than non-exporters, clear insight is lacking whether exporting does trigger innovation, in particular for low or middle income countries.

There are several ideas whether and why export induces firms to innovate. One is that innovations reduce the cost of production per unit or raise the price obtained per unit (quality). Reaching a higher scale through exports makes it more profitable to invest in innovation. Another insight is that an export market may be different from the home market in many ways, as foreign consumers may have different preferences. These features of foreign markets may induce firm to concentrate on some products, adapt some of their product attributes or develop new products. There is now evidence that, in particular for firms located in LICs, selling on (typically more developed) export markets requires the firm to upgrade its product or that firms only sell their best products on export markets. Additionally, exporting exposes firms to international best practices and spillovers from abroad, potentially raising the returns to investing in the absorption capacity of these technologies.

Research approach

The research compares exporting with non-exporting South African SMEs in terms of how they were engaged in product and process innovation. The research defined product innovation as “the introduction to market of a new or significantly improved good or service” and a process innovation as “the use of new or significantly improved methods for the production or supply of goods and services”.

The research analysed the firm-level relationships between product and process innovation on the one hand and export on the other. The research used a new rich dataset, collected within the DFID EIP-LIC project framework, on the innovation and exports of 500 South African SMEs collected between 2011 and 2013. The survey focuses on firms in six core manufacturing industries.

Research findings

The research finds that exporting firms are significantly more introducing product innovation in the South African context; product innovation is positively associated with the export status of firms. The link between exports and process innovation is much weaker or absent all together. This is broadly in line with previous research and could suggest that the product characteristics are a more crucial for foreign markets than the cost dimension. Although there is a significant relationship between exports and product innovation, the question remains whether innovation stimulates firms to export, or whether it is the other way around. This ‘causality’ issue was difficult to isolate in the research, partly because both activities are interconnected and mutually influencing each other.

The research further address this issues by exploring the firm’s motivation to innovate and export. The analysis shows that exporters typically report very different motives to innovate than non-exporters. In particular, foreign competition and foreign clients provide strong incentives for exporters to innovate. The exporters are also more likely to state that they introduce product innovation to enter new markets, increase their market shares or meet standards and regulations. These answers thus suggest that exporting provides additional incentives to innovate.

Lastly, the research tests for a causal effect of exports on innovation using an instrumental variable approach. It shows that the distance between the location of a firm and the nearest transport hub predicts

whether a firm exports. Firms with a higher probability to export because of their location do however not appear more likely to innovate, and this approach therefore fails to provide evidence for a causality from export to innovation.

It is worth noting that the research used traditional measures of process and product innovation and asked firms to provide exact descriptions of these innovations as well. It appeared that there was conceptual confusion among the SME owners of the how to define product and process innovations, which often did not correspond to the researchers' definition. '...We confirm that product innovation is strongly associated with exports, even though other measures of innovation are not (e.g. process innovation). Exporters typically report very different reasons to innovate than non-exporters, which suggests that exporting provides additional incentives to innovate, and that the causality runs at least partly from exporting to innovating...'

Policy implications

An important outcome of the research is that successful exporters in emerging economies are mostly involved in product innovation and less in process innovation. While the different tests do not suggest that causality goes particularly in one way or the other, the association between exports and product innovation appears robust. This suggests that policies aiming to promote innovation and exports should be thought of hand in hand rather than designed in fully separate ways.

Then again, the research reveals conceptual fuzziness between product and process innovation too. Often, firms combine process and product innovation; new technology or production processes enable the launch of new products. The qualitative study in the framework of the DFID EIP-LIC project also show various firm cases where product and process innovation go hand in hand in firms in both Vietnam and South Africa. Usually one type of innovation comes first, then triggering, enabling of necessitating other types of innovation.

Policy therefore should not distinguish too strictly between the product and process innovation. In fact, from a development economic perspective, the distinction may not be that relevant; if value is created leading to higher productivity or better competitiveness – whether through product or process innovation - then it will contribute to economic growth.

A notable outcome of the research is that there is no clear cause-effect relation identified between innovation resulting in more export, or the other way around. The expectations of innovation policy should be realistic in terms of directly resulting into more export as well. Regardless the absence of a strong causality, innovation and export do mutually strengthen each other within a firm. A more pragmatic policy approach is including an innovation dimension in export policies, and including export dimension in innovation policies. In fact for a policy the end result that counts is that both innovation and export increase.

The research further explores the underlying motives of exporters, which offers some informative insights for policies. The exports mention that foreign competition and foreign clients provide strong incentives for them to innovate. Trade liberalization policies could therefore may thus generate some benefits in terms of innovation.

The research lastly shows that exporting firms import inputs and collaborate with multinational firms. That provides the idea of policies facilitating local firms to collaborate with multinational firms further strengthens the local innovative capacity. Government policy instruments could focus on the establishment of initial contacts through for instance match making events, business fairs or other

platforms. The extent to which imports complements or substitutes for local production is however one dimension that deserves further investigation.

5.4 Innovation, downsizing and labour flexibility

The third scientific paper involving data from 5 neighbouring Asian countries within the ‘Innovation Systems’ theme focuses innovation and labour flexibility. Firms increasingly engage in downsizing their labour force with a view to increase their efficiency and to cut costs. However, recent research in developed countries found that downsizing firms do not always enjoy the desired increase but rather frequently experience a decrease in organizational performance, efficiency and profitability: Downsizing is frequently associated with increased feelings of job insecurity among the remaining employees, resulting in lower levels of motivation and commitment and ultimately a decrease in innovative behaviours and performance. Given the frequent use of downsizing, the importance of innovation for firm competitiveness and the negative impact of the former on the latter, researchers and practitioners alike are intrigued by the question how firms can remain innovative despite undergoing downsizing.

Taking the special importance of innovation for developing countries into account, the researchers assess the effect of different forms of labour flexibility on innovation during downsizing in a quantitative study across nine developing countries in South Asia and Africa. As such, the research team broadened the focus from the thus far primarily European and American context to emerging economies. In answering the question whether labour flexibility can be a means to lessen the negative effect of downsizing on innovation, the researchers focus on process innovation. Downsizing poses a special challenge for process innovation given its particular dependence on knowledge exchange and collaboration across firm networks and technology institutions, which suffer immensely during downsizing. Similarly, the focus on the predominant organizational form of small and medium enterprises (SMEs) in developing countries offers an interesting research setting: For reasons associated with proximity, interpersonal links in SMEs are much stronger than in large companies, which can be expected to additionally amplify the negative effect of downsizing on innovation. The original working paper is entitled ‘Success belongs to the Flexible Firm: How Labor Flexibility Can Retain Firm Innovativeness in Times of Downsizing’ (2017) by Daniela Ritter-Hayashi, Joris Knoblen and Patrick Vermeulen.

Research findings

The study focuses on process rather than product innovation because downsizing poses particular challenges for the latter given its dependence on knowledge exchange and collaboration across firm networks and technology institutions. The results of the study suggest that downsizing a firm’s workforce negatively impacts process innovation in SMEs in emerging nations. However, the study indicates that labour flexibility can be a way for firms to overcome the innovation challenges associated with downsizing. The researchers find that both numerical flexibility, namely the use of temporary employment, as well as functional flexibility such as employee training, can alleviate the negative impact of downsizing on innovation. Moreover, independent of whether or not a firm is downsizing its workforce, wage and reward flexibility in terms of performance bonuses for managers and employees positively impact innovation regardless of other factors.

Policy implications

Casual work is a common practice in emerging nations, and was regularly observed in the qualitative studies of EIP-LIC, in particular in SMEs with irregular order portfolios. Casual employment in these

SMEs involves low-skilled labour as part of the periphery workforce. The fact that casual workers frequently rotate allows them to transport best practices and tacit knowledge from one firm to another. The casual workers usually lack specialised expert knowledge, so the benefit of numerical flexibility does not concern higher level knowledge supporting innovation. SME owners and managers could take both considerations into account in their staffing strategy. Despite the overall lower education and thus knowledge levels in firms, the loss of firm-specific and tacit knowledge associated with downsizing confronts firms with considerable innovation challenges.

Following the research findings, managers of SMEs in developing countries might wish to take functional flexibility into account in their business strategies, because an increasing percentage of employees having received training will positively moderate the relationship between downsizing and innovation. Focusing on the psychological impact downsizing has on the remaining employees, employability as a human resources management strategy could be a substitute for employment security during downsizing to protect their psychological contract with the firm.

Managers could thus consider functional flexibility as a means to mitigate downsizing's negative effect on innovation. In particular, firms might consider training a core group of staff to distribute existing knowledge among the remaining firm members, to create new knowledge as well as to increase employees' employability.

A final policy or management strategy implication for managers concerns providing performance bonuses. This management practice is highly efficient in the emergent country context. Bonuses also moderate the effects of a high rate of staff turnover, which is considerably higher in emerging compared to developed countries. Wage and reward flexibility can, if designed accordingly, be a means for motivating employees to remain with the firm given the prospect of monetary incentives.

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Annexes

Annex 1: Series of EIP-LIC working papers

Innovation systems

1.	Bos, M. J. D., B. V. G. Goderis and G. C. L. Vannoorenberghe. 2014. Inter-industry Total Factor Productivity Spillovers in India. DFID Working Paper. Tilburg: Tilburg University.
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3.	Osoro, O., G. Kahyarara, J. Knobens and P.A.M. Vermeulen. 2015. Effect of Knowledge Sources on Firm Level Innovation in Tanzania. DFID Working Paper **)
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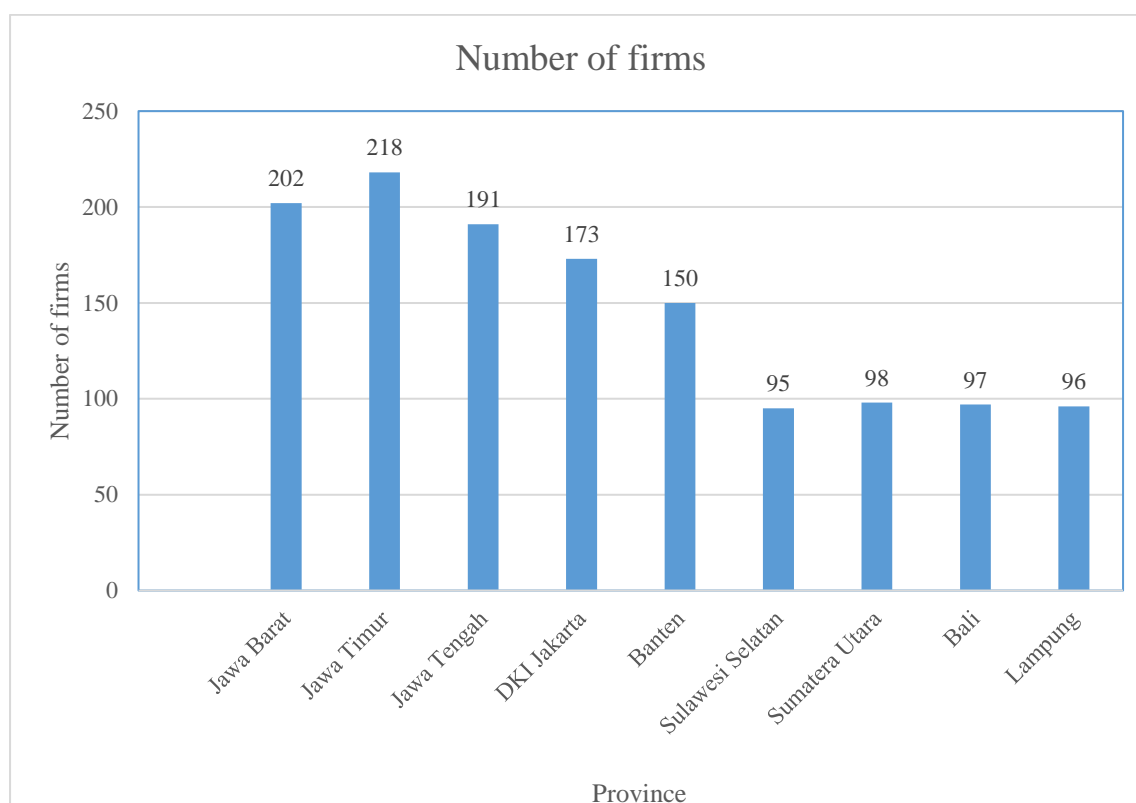
All papers are accessible at the EIP-LIC project website: <https://www.tilburguniversity.edu/dfid-innovation-and-growth/>

Annex 2: Highlights of the EIP-LIC and World Bank innovation survey in Indonesia

Introduction

This report describes the salient features firms in Indonesia to provide a detailed layout of the innovation context in Indonesia. Two waves of data from the 2015 World Bank Enterprise Survey (WBES) and the 2016 Innovation Capabilities Survey (ICS) were used for preparing this report. The WBES collects data focusing on an economy's business environment and investment climate. The World Bank has conducted firm-level surveys since the 1990's, however, since 2005 data collection efforts have been centralized and instruments standardized for establishing comparability of data across countries. The WBES involves administering firm-level surveys to a representative sample of firms in the non-agricultural formal sector in an economy comprising firms in the manufacturing, retail and service sector. In addition, WBES are stratified according to the firm size, sector of activity, and geographical location of the firm (www.enterprisesurveys.org). The WBES includes 1320 firms. The ICS is a follow-up and complementary to the WBES. The ICS comprises 300 randomly selected manufacturing firms in the WBES sample making its sample a subset of the WBES sample. Unlike the WBES, the ICS sample is stratified according to firm size and location only. The ICS focuses on innovative activities and innovative capabilities of manufacturing firms, and is a collaboration between the Enterprise Analysis Unit (DECEA) of the Development Economics Group of the World Bank, Tilburg University, and Radboud University Nijmegen within the 'Enabling Innovation and Productivity Growth in Low Income Countries' project funded by the United Kingdom's Department for International Development (DfID).⁴ The raw dataset used in this report was created by merging the two waves of data collected from the WBES and the ICS by means of the unique firm identifiers for firms in nine provinces. Figure 1 reports the number of firms in each province after merging the two datasets. Jawa Timur has the largest number of firms.

Figure 1. Distribution of firms by region



⁴ This project was undertaken to study the innovative capability of manufacturing firms in ten case countries including Ghana, Tanzania, Uganda, Kenya, South Africa, and Ethiopia from Africa, Bangladesh, and India from South Asia and, Vietnam and Indonesia from East Asia and Pacific <http://www.tilburguniversity.edu/dfid-innovation-and-growth/>.

General description of the sample

Distribution of firms by sector and province

Table 1 shows the sectoral distribution of firms in each province as reported in the WBES. The distribution of firms is similar for the nine provinces with the largest number of firms falling in the manufacturing industry. Table 1 also reveals that the food sector, leather sector, and basic metals sector dominate the manufacturing industry. The chemicals sector has the lowest number of firms in the entire sample.⁵

Table 1. Distribution of firms by sector and province

Industry	Code	Sector	Jawa Barat	Jawa Timur	Jawa Tengah	DKI Jakarta	Banten	Sulawesi Selatan	Sumatera Utara	Bali	Lampung	Total
Manufacturing	15	Food	21	26	27	14	18	15	17	13	21	172
	16	Tobacco	0	3	1	0	0	0	0	0	0	4
	17	Textiles	19	21	19	7	12	7	8	4	12	109
	19	Leather	30	20	22	26	21	8	9	25	6	167
	20	Wood	11	9	9	10	10	0	2	1	0	52
	21	Paper	0	2	5	1	2	3	2	3	4	22
	22	Publishing, printing, and recorded media	0	1	0	0	3	0	0	1	0	5
	23	Refined petroleum product	1	1	4	7	0	2	0	2	0	17
	24	Chemicals	0	0	0	0	0	0	0	0	1	1
	25	Plastics & rubber	20	17	10	10	13	8	2	4	9	93
	26	Non metallic mineral products	15	22	18	17	17	6	16	5	11	127
	27	Basic metals	26	24	26	7	21	20	11	10	10	155
	28	Fabricated metal products	6	9	4	5	3	5	1	0	1	34
	29	Machinery and equipment (29 & 30)	2	5	3	8	11	0	2	0	2	33
	31	Electronics (31 & 32)	2	0	0	4	2	0	0	0	3	11
	33	Precision instruments	2	0	0	2	0	0	2	1	0	7
	34	Transport machines (34 & 35)	2	0	1	2	0	1	1	0	0	7
36	Furniture	3	9	6	0	5	3	4	3	2	35	
37	Recycling	4	7	0	1	2	1	2	1	0	18	
Retail	52	Retail	22	20	16	25	4	6	8	11	6	118
Other services	51	Wholesale	1	3	4	7	2	3	1	1	1	23
	72	IT	0	0	0	2	0	0	0	0	0	2
	55	Hotel and restaurants: section H	8	7	4	4	0	1	4	6	0	34
	50	Services of motor vehicles	0	2	4	5	3	2	3	0	3	22
	45	Construction Section F	4	8	4	8	0	2	2	5	2	35
	60	Transport Section I: (60-64)	2	2	4	3	0	2	1	1	2	17
		Total	201	218	191	175	149	95	98	97	96	1,320

⁵ Due to missing observations, the number of firms in the subsequent sections does not always add up to 1320.

Descriptive statistics

Table 2 reports the descriptive statistics on some of the variables of sampled firms using data from the WBES. A majority of the firms are small and medium sized. Table 2 shows that one half of the firms have less than 30 fulltime employees in 2015. A quarter of the firms have more than 110 fulltime employees. The largest firm reported having 7000 fulltime employees. Sales turnover in 2015 exhibits heterogeneity. The minimum sales turnover was 5 million Indonesia Rupiah (Rp). The median firm in the sample reported a sales turnover of Rp.2 billion whilst the average sales turnover in the same period was Rp.810 billion. Table 2 also shows that one half of the firms have been in operation for less than 19 years with the average age of firms being about 21 years. Hence, most of the firms in our sample are relatively young. Labour productivity, calculated as sales turnover divided by the number of fulltime employees also exhibits heterogeneity. The minimum labour productivity is about Rp.49,590. The median firm reports a labour productivity of Rp.72 million against a mean of about Rp. 5 billion. The maximum value for labour productivity is Rp.1.72 trillion. An interesting observation is that one quarter of the firms experienced a decrease in turnover growth over the period 2012-15. Lastly, 703 firms report the same number of employees over the period 2012-15.

Table 2. Descriptive statistics

Variable	min	p25	p50	p75	max	mean	N
Turnover 2015*	5,000.00	571,200.00	2,000,000.00	15,000,000.00	72,000,000,000.00	810,000,000.00	1320
Employment 2015**	1.00	10.00	30.00	110.00	7000.00	141.56	1320
Age	2.00	13.00	19.00	27.00	95.00	20.80	1320
Labour productivity ***	49.59	35,491.94	72,000.00	200,000.00	1,720,000,000.00	5,190,471.00	1320
Turnover growth 2012-15	-1.00	-0.09	0.02	0.33	1249999.00	3804.39	1320
Employment growth 2012-15	-0.90	0.00	0.00	0.00	5.80	0.03	1320

*Turnover is reported in Indonesia Rupiah and is divided by 1000

**Firms are categorized as small (1-19 employees), medium (20-99 employees), and large (100+ employees)

***Labour productivity is calculated as Turnover 2012 divided by number of fulltime employees in 2012

Sales and exports

Table 3 reports the proportion of sales that are exported directly and indirectly (i.e. by third parties). These measures give an indication of the intensity of foreign trade as reported in the WBES. DKI Jakarta province reports the highest percentage of direct exports (12.1%) whilst Jawa Barat reports the highest percentage of indirect exports (6.2%). Jawa Timur on the other hand reports relatively low direct exports (0.8%) and indirect exports (0.2%).

Table 3. Export status

Province	Direct exports	Indirect exports	N
Jawa Barat	10.5%	6.2%	201
Jawa Timur	0.8%	0.2%	218
Jawa Tengah	2.6%	2.5%	191
DKI Jakarta	12.1%	5.2%	175
Banten	11.2%	5.2%	149
Sulawesi Selatan	4.4%	0.4%	95
Sumatera Utara	8.5%	4.3%	98
Bali	6.9%	3.2%	97
Lampung	2.2%	4.9%	96
Total	6.6%	3.6%	1320

Table 4 reports export status of manufacturing firms located in different regions in the world (www.enterprisesurveys.org). In comparison to the values reported in Table 4, we observe the proportion of total sales that are exported directly in Indonesia (6.6%) is only surpassed by that of Middle East & North America. Similarly, it can be observed that indirect exports (3.6%) shown in Table 3 is relatively high in our sample given that only South Asia reports a higher value (4.0%) as reported in Table 4.

Table 4. Export status by region

Region	Direct exports	Indirect exports
East Asia and Pacific	6.5%	2.1%
Europe & Central Asia	5.4%	2.7%
Latin America & Caribbean	4.7%	2.5%
Middle East & North America	8.5%	2.5%
South Asia	5.0%	4.0%
Sub-Saharan Africa	4.2%	2.9%

Supplies and imports

Table 5 reports the proportion of material inputs and supplies purchased from domestic or foreign origin. These measures are also reported in the WBES. DKI Jakarta and Banten report the highest percentage of imported inputs (14.1% and 13.2% respectively). Contrastingly, Jawa Timur reports the lowest percentage of imported inputs (0.4%). Nevertheless, all the provinces report that more than one half of the inputs are of domestic origin. This may suggest that sampled firms face large number of alternative suppliers domestically. Firms may also have the alternative of purchasing their inputs from local importers.

Table 5. Origin of inputs and supplies

Province	Foreign origin	Domestic origin	N
Jawa Barat	13.2%	86.8%	164
Jawa Timur	0.4%	99.6%	176
Jawa Tengah	2.8%	97.2%	155
DKI Jakarta	14.1%	85.9%	121
Banten	11.7%	88.3%	140
Sulawesi Selatan	1.2%	98.8%	79
Sumatera Utara	5.2%	94.8%	79
Bali	0.8%	99.2%	73
Lampung	1.8%	98.2%	82
Total	6.3%	93.7%	1069

Table 6 shows the proportion of total inputs by origin for firms located in different regions (www.enterprisesurveys.org). We observe that relative to firms in all the regions shown in Table 6, firms in Indonesia rely on inputs of foreign origin to a much smaller extent. Notwithstanding, firms in Indonesia and those located in different regions heavily rely on domestic inputs.

Table 6. Origin of inputs and supplies by region

Region	Foreign origin	Domestic origin
East Asia and Pacific	25.8%	74.2%
Europe & Central Asia	38.4%	61.6%
Latin America & Caribbean	35.7%	64.3%
Middle East & North America	43.1%	56.9%
South Asia	24.0%	76.0%
Sub-Saharan Africa	37.5%	62.5%

Innovation

Product and process innovation

Measures reported in this section are from also from the WBES. As shown in Table 7, a majority of firms report on whether they have introduced new or significantly improved products or services, and processes. Jawa Barat province has the highest percentage for both product innovation (27.4%) and process innovation (25.4%). Hence, more than one quarter of the firms in Jawa Barat province reported product innovation. Lampung province had the lowest rate of product innovation (2.1%) whilst Jawa Timur province had the lowest rate of process innovation (3.7%). The firms report lower rates of product innovation relative to process innovation. A comparison between the rates of innovation in the sample and those of the EU-28 enterprises based on the Community Innovation Survey (CIS) for the period 2012 through 2014 (ec.europa.eu) reveals that the average rate of both product and process innovation in Jawa Barat is similar to the average rate of innovation observed in EU-28. Yet, the reported rates of innovation for the remaining provinces are relatively lower than the rates reported by EU-28 enterprises. Notwithstanding, the definition of innovation in both the WBES and CIS is guided by the Oslo Manual

(2005) which defines innovation as the introduction of new or significantly improved products and services.

Table 7. Product and process innovation

Province	Product innovation	Process innovation	N
Jawa Barat	27.4%	25.4%	201
Jawa Timur	10.1%	3.7%	218
Jawa Tengah	4.7%	5.8%	191
DKI Jakarta	14.9%	18.9%	175
Banten	12.8%	16.1%	149
Sulawesi Selatan	6.3%	13.7%	95
Sumatera Utara	14.3%	13.3%	98
Bali	8.2%	9.3%	97
Lampung	2.1%	6.3%	96
Total	11.2%	12.5%	1320
EU-28	23.9%	21.6%	

Table 8 shows the market orientation of product innovations from the ICS.⁶ A large percentage of firms indicate that both product innovations are new to the local market. A very small proportion of the firms report that innovations are new to the international market. This may indicate that innovations have a relatively low degree of novelty. Furthermore, Lampung province leads in product innovation that is new to the local and international market. It is also striking that Jawa Tengah province does not report any product innovation that is new to the local market or international market.

Table 8. Product innovation market orientation

Province	Product innovation		
	Local	International	N
Jawa Barat	18.6%	9.3%	43
Jawa Timur	2.1%	0.0%	47
Jawa Tengah	0.0%	0.0%	40
DKI Jakarta	2.8%	2.8%	36
Banten	8.1%	0.0%	37
Sulawesi Selatan	11.1%	0.0%	27
Sumatera Utara	12.5%	8.3%	24
Bali	25.0%	8.3%	24
Lampung	40.9%	22.7%	22
Total	13.5%	5.7%	300

⁶ The sampled firms in the ICS from Jawa Tengah province do not report any innovation.

Objectives of innovation

Figure 2 describes the reasons for firms introducing their main innovative products and services from the ICS. The main objective for product innovation is to open up new markets or increase market share which exhibits very little variation between the provinces. Furthermore, extending the range of products or services is also an important reason for product innovation. Few firms report replacing a product or service already offered by the firm as a reason for product innovation. Notwithstanding, this objective seems more important for firms in Jawa Barat Province.

Figure 2. Objectives of product innovation

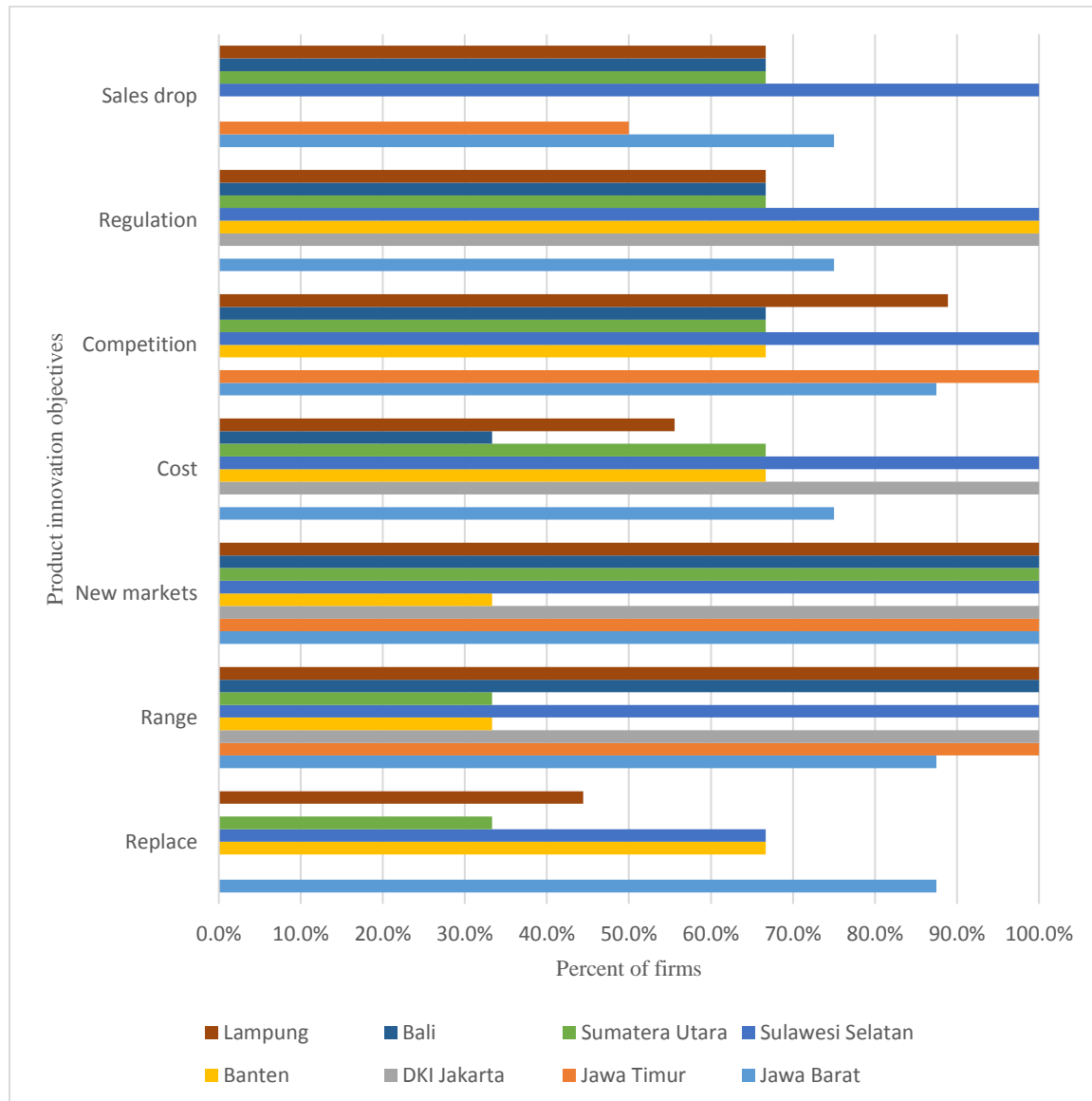
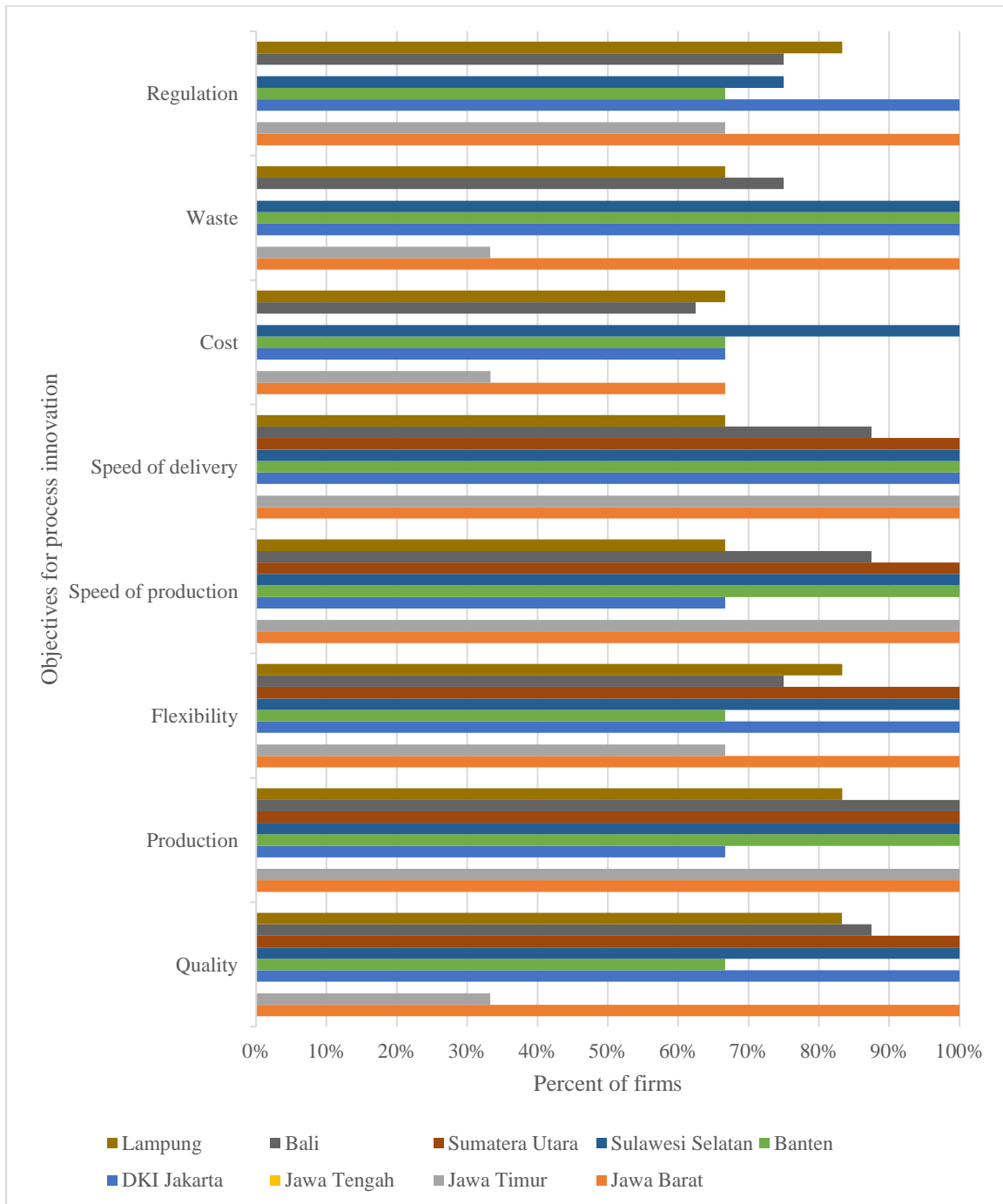


Figure 3 reports the main reasons for introducing process innovation in the firm from the ICS. A high percentage of the firms report that the main reason was to increase productivity of goods and services and to increase the speed of delivery to customers. Increasing the speed of production or offering services is also a major reasons for introducing process innovations. There are no marked differences between the provinces in these three objectives. A much smaller percentage of firms report decreasing the cost of production or of offering services as a reason for process innovation. This suggests low costs of production in Indonesia.

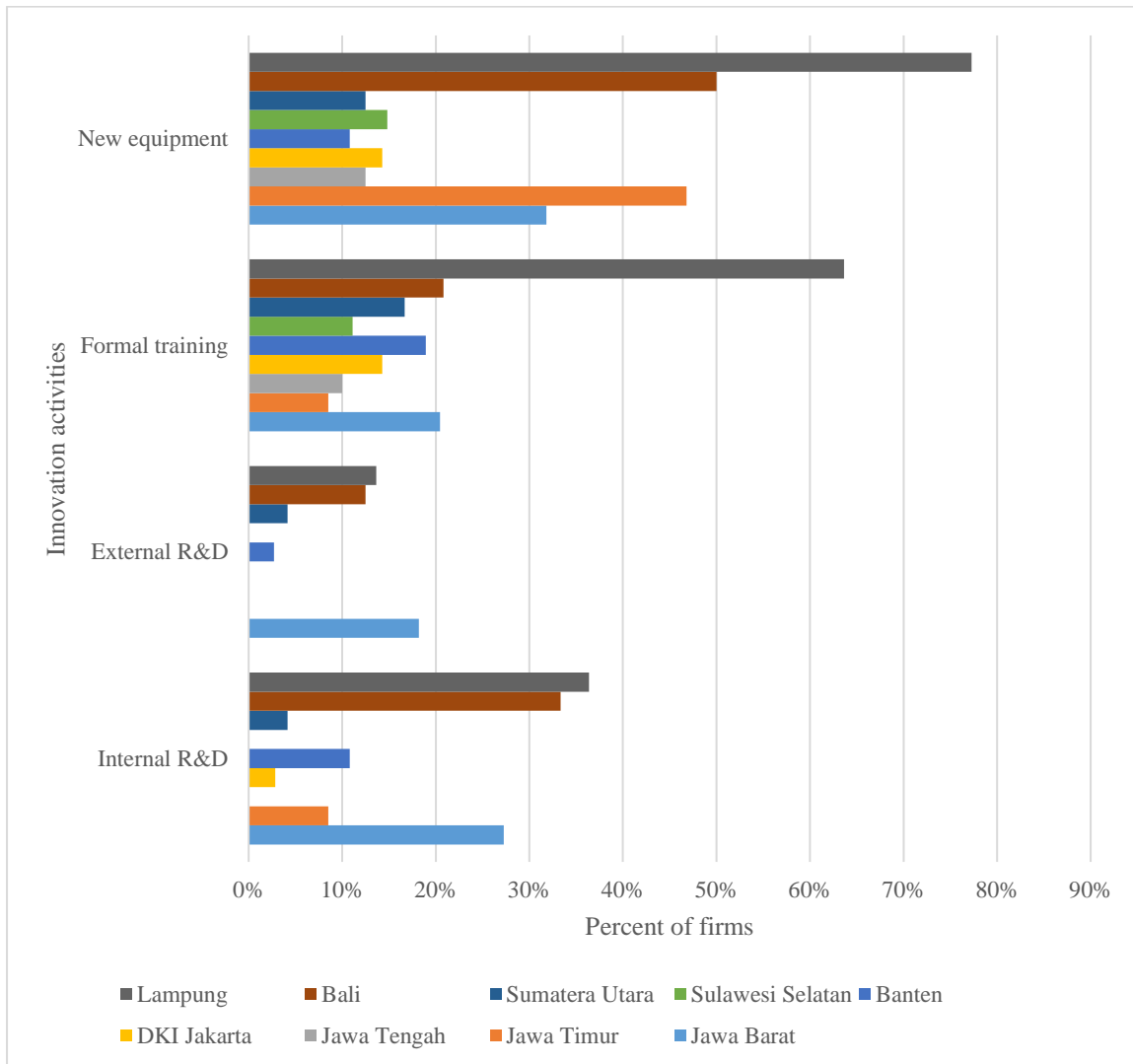
Figure 3. Objectives of process innovation



Innovation activities

Figure 4 reports on the activities associated with the development or production of product/service or process innovations reported in the ICS. The provinces exhibit relatively small differences in the reported measures. The most important innovation activity is the purchase of new equipment, machinery or software, followed by formal training, internal R&D, and external R&D respectively. External R&D relating to creative work undertaken by other public or private enterprises that are paid for the development of innovations seems to be of very low importance in all the provinces. It is likely that the costs associated with external R&D are high.

Figure 4. Innovation Activities



Sources of information for innovation

The most important sources of information or ideas for innovation activity by province as reported in the ICS are shown in Figure 5. A majority of firms rely on customer feedback for innovation. The second most important source of information is products or services that are already available in the market followed by the internet. The least important sources of information or ideas for innovation include knowledge from the parent, and universities and research institutes. This may imply weak linkages between parent firms and their establishments, and firms and universities/research institutes, and government ministries.

Figure 5. Sources of information for innovation by province

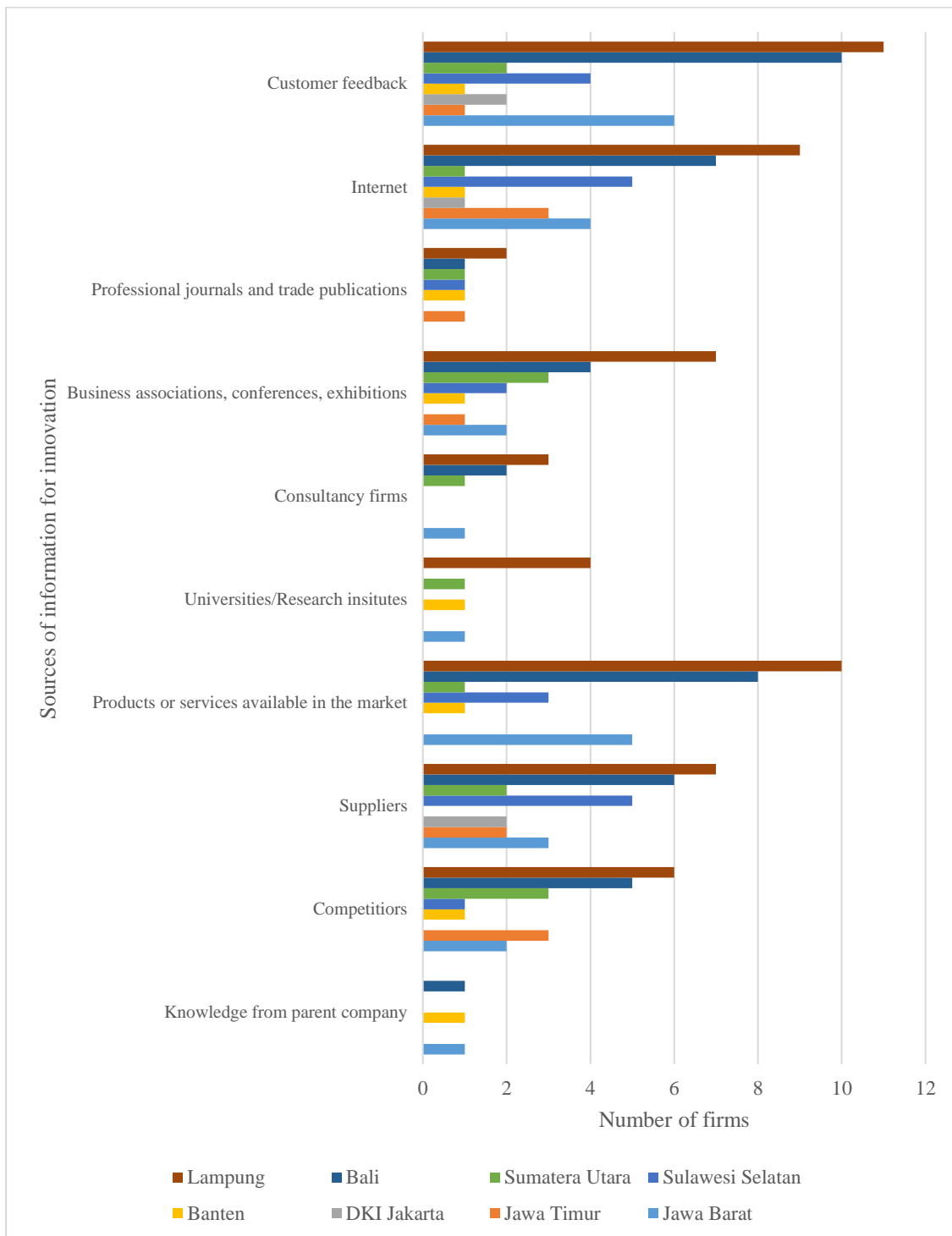
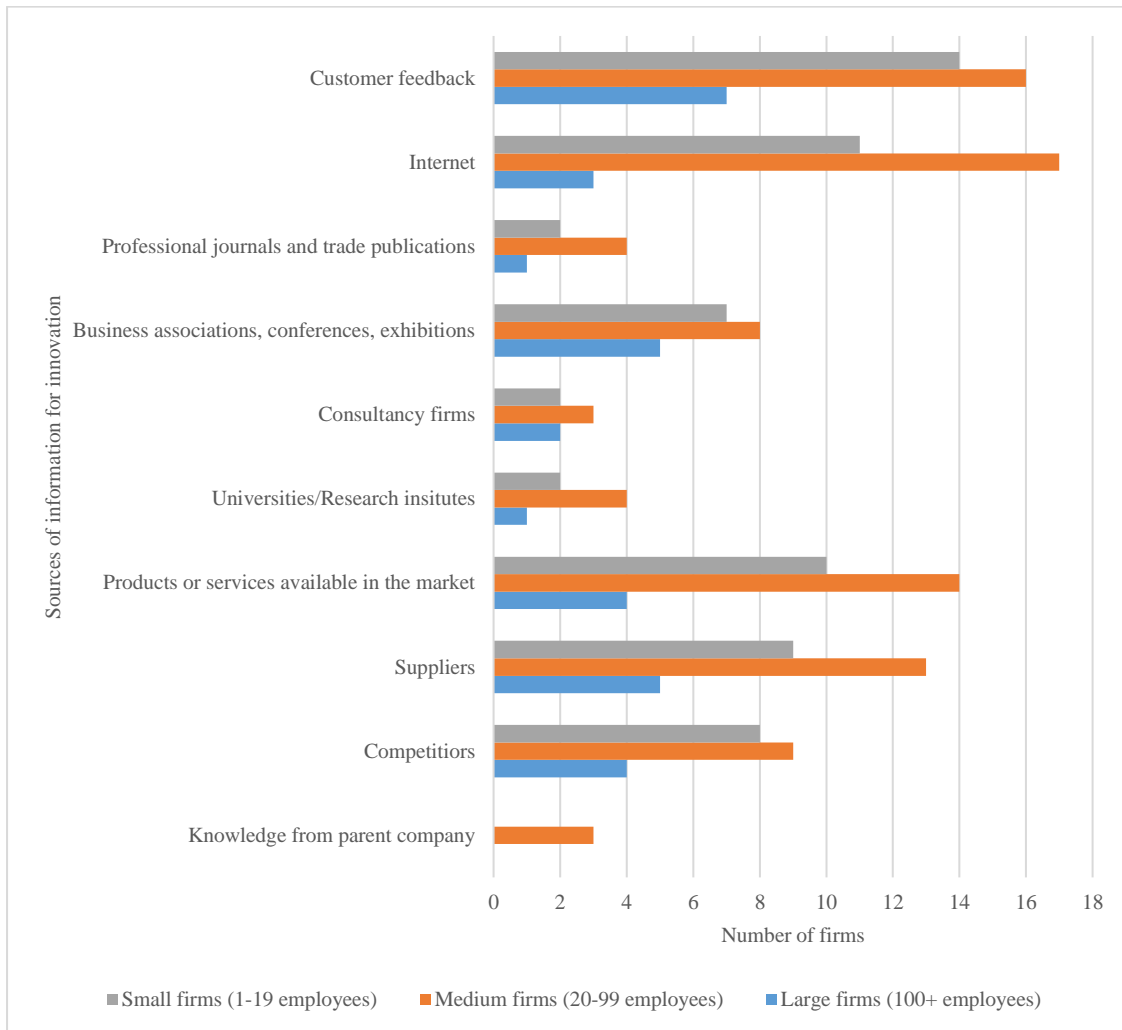


Figure 6 shows the distribution of the source of information for innovation activity by size of the firm. The internet, customer feedback and products or services available in the market remain the most important sources of information for all categories of firms consisting of small, medium, and large firms. The least important source of information for innovation activity for all sizes of firms remains knowledge from the parent company.

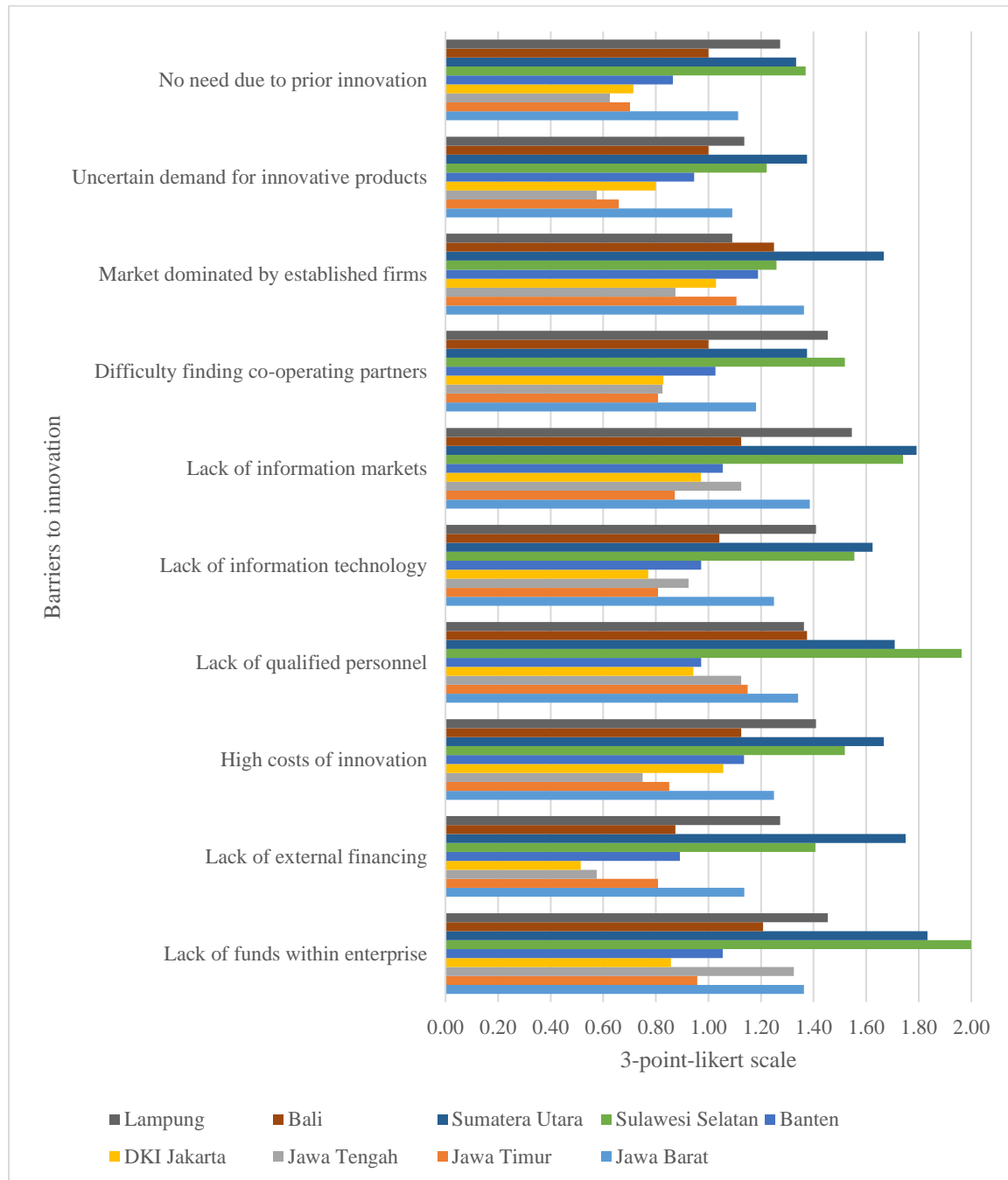
Figure 6. Sources of information for innovation by size



Barriers to innovation

Figure 7 reports on factors hampering innovation. A 3-point-likert scale ranging from not important to very important in the ICS instrument is used to measure factors that impede innovation. A majority of firms in Jawa Tengah, Sulawesi Selatan, and Sumatera Utara report that lack of funds within the enterprise is a very important barriers to innovation. Firms in DKI Jakarta report high costs of innovation as the most important barriers to innovation. Contrastingly, the most important barriers to innovation for firms in Jawa Timur and Bali include lack of qualified personnel. In addition, a majority of firms in Jawa Barat and Lampung report that lack of information on markets is an important innovation barrier. Lastly, firms in Banten report that market dominance by established firms is an important barrier to innovation. These observations indicate that firms attach varying importance to different obstacles. The least important barriers to innovation for a majority of firms in all the provinces include uncertain demand for innovative products and no need for innovation due to prior innovation.

Figure 7. Barriers to innovation

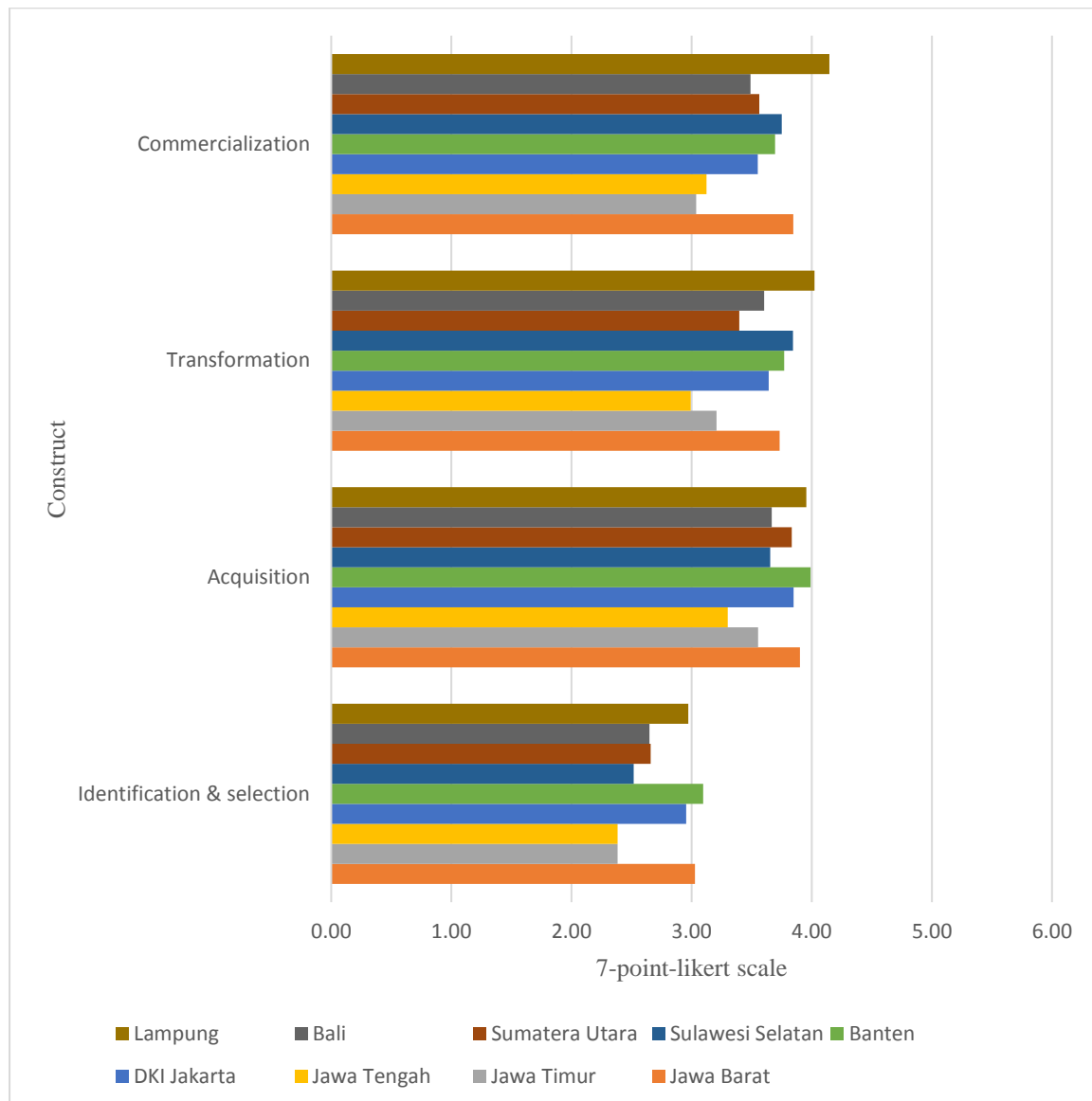


Dynamic capabilities

The role of firm capabilities has become more important in developing economies in recent years (Fainshmidt, Pezeshkan, Frazier, Nair, & Markowski, 2016). A dynamic capability refers to the capacity of an organization to purposefully create, extend, or modify its resource base (Helfat et al., 2007). In our survey, dynamic capabilities are reported using four constructs including identification and selection of knowledge, knowledge acquisition, knowledge transformation, and commercialization of products. Various items in the ICS instrument measured on a 7-point-likert scale ranging from completely disagree to completely agree are used for measuring each construct. Specifically, 5 items are used for measuring the firm's ability for identifying and selecting knowledge, 3 items are used for measuring the firm's ability for acquiring knowledge, and 4 items are used for measuring both the ability of transforming knowledge and commercializing products. The average values of the items within each

construct measuring dynamic capabilities are shown in Figure 8. Banten scores highly on identification & selection of knowledge and knowledge acquisition. Notwithstanding, Lampung scores highly on the remaining two constructs including knowledge transformation and commercialization. Jawa Timur posts the lowest scores on identification & selection of knowledge and commercialization whilst Jawa Tengah has the lowest score on knowledge acquisition and knowledge transformation. On the overall, firms report a high ability of knowledge acquisition, and transformation. Contrastingly, they report a much lower ability of identifying and selecting knowledge. A high mean value on knowledge acquisition indicates that firms have a high ability of acquiring new and relevant knowledge from external sources for perceiving market opportunities. Additionally, a high ability of knowledge transformation suggests that firms recombine knowledge due to sound knowledge management systems. Furthermore, firms may have departments or coordinators who diffuse and disseminate knowledge effectively indicating that different departments work together with ease. A low ability for identification and selection of knowledge on the other hand may indicate poor networks between firms and scientific and research institutes coupled with poor access to specialised journals and magazines. It may also be the case that firms conduct technological audits ineffectively or that firms lack the ability for monitoring customers and client’s needs.

Figure 8. Dynamic capabilities



Trust

Table 9 reports the extent to which a firm trusts its partners, and other organizations in their business dealings. Four items measured on a 7-point-likert scale ranging from completely disagree to completely agree in the ICS instrument relating to the extent to which firms regard their partners as trustworthy, frank and truthful, honest, and including the extent to which firms trust other organizations are used to construct an averaged value for measuring trust. Lampung reports the highest mean value on trust. On the other hand, Jawa Timur reports the lowest mean value on trust. It is noteworthy that the mean values are above average implying a relatively high level of trust. Nevertheless, none of the firms in all the provinces reported that they completely disagreed that their business partners were trustworthy. This indicates relatively similar levels of trust among firms in the nine provinces.

Table 9. Trust

Province	min	max	mean	sd	N
Jawa Barat	2.75	5.25	3.93	0.5969	44
Jawa Timur	0.50	4.25	3.13	0.9012	47
Jawa Tengah	2.00	5.75	3.66	0.5765	40
DKI Jakarta	2.50	4.75	3.92	0.3524	35
Banten	0.75	4.75	3.74	0.9222	37
Sulawesi Selatan	3.00	5.00	3.98	0.5368	27
Sumatera Utara	2.75	4.25	3.77	0.3290	24
Bali	2.25	4.25	3.56	0.5329	24
Lampung	0.75	5.50	4.22	0.9645	22
Total	0.50	5.75	3.73	0.7415	300

We compare mean values of trust in partners, and other organizations in their business dealings with mean values of political trust reported in Table 10 to establish whether there is a general attitude of trust or distrust in government. We use the ES instrument to construct a measure of political trust that relates to the respondents' evaluation of business-government dealings. This is also a measure of regional institutional quality (RIQ) that we examine in the second section of the report. An average of six items including tax rates, tax administration, business licensing and permits, political instability, corruption, and courts measured on a 5-point-likert scale ranging from "no obstacle" to "very severe obstacle" indicating the "degree to which e.g. corruption is an obstacle to the operations of the firm" is used for measuring political trust. Government performance relating to perceived corruption, judicial efficiency, and bureaucratic quality has been found to be associated with trust (La-Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997). Hence, government institutions will most likely not be perceived as an obstacle where we have high levels of trust. Table 10 strikingly reveals that the mean values for political trust are below average for all the provinces. This implies poorly-functioning government institutions. Notwithstanding, Table 10 shows that Sulawesi Selatan reports the highest level of political trust. This may suggest that government institutions are relatively transparent in their dealings in this province. Jawa Timur on the other hand reports the lowest level of trust. A comparison of mean values of trust in business partners (Table 9) and political trust (Table 10) reveals that Lampung reports high levels of trust in business partners, but a much lower level of trust in government institutions. Jawa Timur on the other hand reports the lowest level of trust in business partners and in government institutions. On the whole, the provinces retain relatively stable rankings in both measures of trust implying consistency in trusting business partners, and government institutions.

Table 10. Political trust

Province	min	max	mean	sd	N
Jawa Barat	0	3.83	1.41	0.8803	201
Jawa Timur	0	0.83	0.08	0.1610	218
Jawa Tengah	0	3.17	1.25	0.9511	191
DKI Jakarta	0	3.17	0.59	0.5655	175
Banten	0	2.33	0.40	0.4968	149
Sulawesi Selatan	0	4.00	1.91	0.9907	95
Sumatera Utara	0	3.33	1.07	0.8708	98
Bali	0	1.33	0.12	0.2274	97
Lampung	0	2.33	0.72	0.5992	96
Total	0	4.00	0.81	0.8954	1320

Relationship with customers and institutional actors

Relationships with buyers, suppliers, competitors, and institutional actors indicate the degree of firm embeddedness in local networks of economic activity. Four items measured on a 7-point-likert scale ranging from completely disagree to completely agree from the ICS instrument are used to construct an averaged value measuring whether the firms “have very well established relations” with these external actors. Table 11 shows that Lampung reports the highest mean value on this indicator. Hence, firms in Lampung have relatively close relations with external actors. On the other hand, Jawa Timur has the lowest mean value suggesting relatively distant relations with external actors. It can also be observed that none of the provinces completely disagree that they have well established relations with external actors. Moreover, all the provinces score mean values that are above average. This implies a relatively high degree of embeddedness suggesting that firms are likely to benefit from information and opportunities in their local networks of economic activity.

Table 11. Relationship with external actors

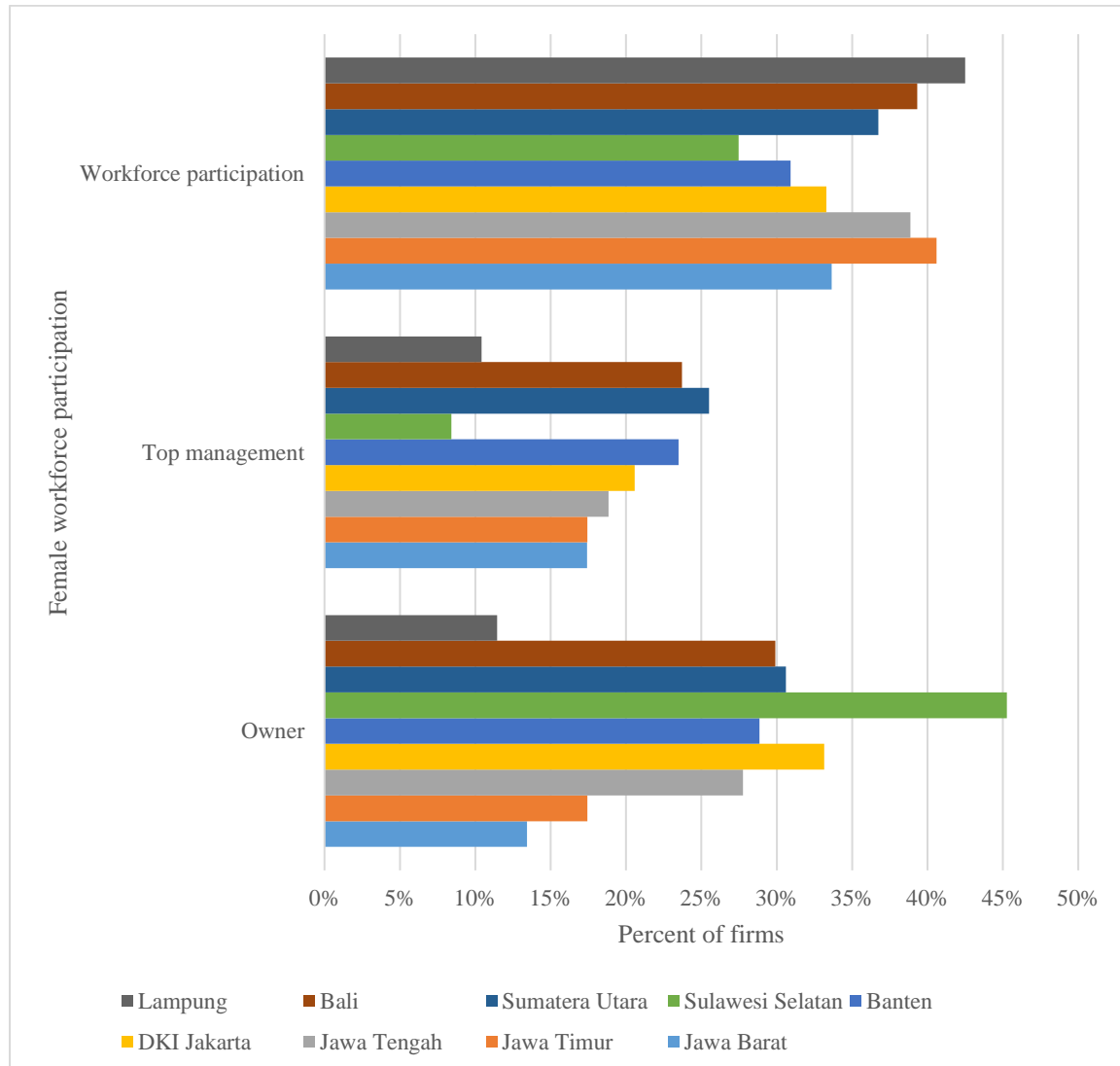
Province	min	max	mean	sd	N
Jawa Barat	2.25	4.75	3.93	0.5293	44
Jawa Timur	2.50	4.25	3.53	0.4651	47
Jawa Tengah	2.50	4.75	3.63	0.4385	40
DKI Jakarta	2.25	4.50	3.69	0.5157	35
Banten	3.00	4.75	3.76	0.3795	37
Sulawesi Selatan	2.75	5.00	3.69	0.6147	27
Sumatera Utara	3.25	4.25	3.72	0.3067	24
Bali	2.75	5.25	3.61	0.5053	24
Lampung	3.50	5.25	4.23	0.5228	22
Total	2.25	5.25	3.74	0.5083	300

Gender diversity

Figure 9 reports female participation at three hierarchical levels in the organization comprising ownership of the firm, participation in the top management, and participation in the overall workforce as reported in the WBES. A very large percentage of firms in Sulawesi Selatan are owned by women. DKI Jakarta and Sumatera Utara post the second and third highest score respectively. We note that Lampung scores reports the lowest score on female ownership. Sumatera Utara reports the highest score

on female composition of top management, whilst Sulawesi Selatan reports the lowest score on the same measure. Furthermore, Lampung reports the highest score on workforce participation by females whilst Sulawesi Selatan has the reports the lowest score. Female workforce participation is below average for all the provinces in all the three measures and particularly in top management participation.

Figure 9. Female workforce participation



Annex 3: EIP-LIC evidence addressing the original DFID research questions

This part of the report seeks to answer several questions relating to firm-level and regional-level factors that drive innovation in Indonesia by means of simple regressions. In addition, we examine how public-private sector linkages influence the development of innovations. This section examines the significance of factors that firms perceive as critical barriers to the process of innovation and the diffusion of technology.

Firm characteristics, regional factors and innovation activities

In this section we address the following research question: “What firm-level and regional-level factors including size, ownership, market orientation, labour skills availability, gender, firm location, ties between public/private sector, role of intermediaries etc. hinder or foster the engagement of firms in innovative activities?” As such, this section examines the firm-level and regional-level factors that are associated with firms engaging in innovation activities.

Firm-level factors include age, size, percentage of foreign ownership, percentage of fulltime employees with high school education, and access to a line of credit or loan from a financial institution. Regional-factors comprise location of the firm which includes urban or rural, regional level of knowledge creation, and RIQ. A clustered robust standard errors logit model is used for examining whether these factors foster or hinder innovation activities including internal R&D, external R&D, formal training, and purchase of new equipment for the development of innovations. Standard errors are clustered at the regional level (province) to account for correlation between residuals at the firm-level and at the regional-level. Table 12 reports the results of our estimation. For the firm-level factors we observe that the coefficient for size is positive and significant across three models indicating that larger firms have a higher likelihood of engaging in innovation activities.

Table 12. Logistic regression coefficients (n = 300)

Variable	Internal R&D		External R&D		Formal training		New equipment	
<i>Firm-level factors</i>								
Age (log)	0.504	(0.464)	0.291	(0.223)	0.252	(0.223)	-0.424*	(0.232)
Size (log)	0.329***	(0.118)	0.532***	(0.141)	0.015	(0.145)	0.367***	(0.090)
Foreign ownership	-0.006	(0.022)			-0.009	(0.008)	-0.008	(0.015)
Education	-0.005	(0.006)	-0.004	(0.006)	-0.005	(0.004)	-0.011***	(0.003)
Access to credit	0.138	(0.401)	-0.118	(0.359)	-0.257	(0.399)	-0.080	(0.348)
<i>Regional-level factors</i>								
Location	-0.200	(0.378)	-0.519	(0.442)	0.538	(0.337)	-0.406	(0.248)
Knowledge creation	0.091***	(0.013)	0.104***	(0.022)	0.057***	(0.015)	0.059***	(0.020)
RIQ	0.486***	(0.188)	-0.552*	(0.305)	0.672	(0.437)	0.242	(0.314)
Constant	-7.525***	(1.554)	-5.568***	(1.584)	-4.599***	(1.757)	-2.267	(1.401)

Clustered robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

The coefficient for age and education are negative and significant in relation to purchase of new equipment. Hence, older firms and firms with a large proportion of employees with high school education have a lower likelihood of purchasing new equipment for innovation. Considering the regional-level factors, knowledge creation is significant across all the models. Knowledge creation relates to the regional internal R&D by firms. A possible explanation for this could be that there are many knowledge sharing channels within a region, which increase firms’ ability for benefitting from

each other's knowledge that increase the likelihood of firms engaging in innovation activities. The coefficient for RIQ is positive and significant in the internal R&D model but negative and significant in the external R&D model. Hence, a high degree of RIQ increases the likelihood of engaging in internal R&D. A probable explanation for this may be that a high degree of RIQ suggests the presence of strong institutions that foster investments in creative work aimed at increasing knowledge for innovation. Contrastingly, the negative relation between RIQ and external R&D suggests that a high degree of RIQ negates the need for paying research organizations for creative work undertaken for innovation.

Hence, from these results we conclude that the size of the firm is an important firm-level factor across all innovation activities. Furthermore, knowledge creation fosters innovation activities in context of manufacturing firms in Indonesia. It is also striking that RIQ has opposing effects the likelihood of firms engaging in internal R&D and external R&D.

Commercialization of product and service innovation

This section answers the following research question: "Which firm-level and regional-level factors hinder or foster the extent to which firms successfully commercialize the outcomes of their innovation activities?" We examine the relationship between firm-level and regional-level factors, and commercialization of innovation by means of an OLS regression model. The measure of the extent to which firms can commercialize its innovative output is described in section I. This measure relates to the ability of firms capturing value from innovation. Hence, commercialization is conditioned upon innovation activities yielding successful outcomes. Nonetheless, we run a simple OLS regression to explore this relationship.

Table 13. OLS regression coefficients (n = 300)

Variable	Commercialization	
<i>Firm-level factors</i>		
Age (log)	-0.063	(0.063)
Size (log)	0.167***	(0.024)
Foreign ownership	0.002	(0.002)
Education	0.000001	(0.001)
Access to credit	0.076	(0.083)
<i>Regional-level factors</i>		
Location	-0.065	(0.084)
Knowledge creation	0.016***	(0.003)
RIQ	-	(0.057)
Constant	3.654***	(0.256)
Robust standard errors in parentheses		
* p<0.10, ** p<0.05, *** p<0.01		

Table 13 reports the results of our estimation. We observe that size is the only firm-level factor that has a significant effect on commercialization. Hence, larger firms have a higher likelihood of successfully commercializing their innovative output. A probable explanation could be that larger firms are likely to have sales and marketing departments.

Among the regional-level factors, knowledge creation has a positive and highly significant effect on commercialization. Considering that knowledge creation is conditioned on regional internal R&D, one may argue that firms engaging in internal R&D develop their products with the aim of capturing value from innovation. RIQ on the other hand has a negative and highly significant effect on commercialization. Hence, we may infer that firms have a lower ability of appropriating returns from innovation in an environment with strong institutions. This result is counterintuitive and suggests that

there are other factors that may influence how institutions interact with commercialization that are unobserved.

Thus, as a firm-level factor, the size of the firm is important for commercializing innovation. Furthermore, knowledge creation and RIQ are a crucial regional-level factor for successful commercialization of innovative products and services. Notwithstanding, RIQ seems to hinder the extent to which firms can successfully commercialize innovation.

In-house innovation, collaborative innovation, and technology acquisition

This section addresses the following research question: “What is the impact of in-house innovation activities versus collaborative innovation activities or technology acquisition activities on the innovation performance of firms in developing countries?” In-house innovation activities relates to a firm developing innovative products or services entirely on its own. Collaborative innovation activities on the other hand indicate that firms cooperated with other external actors including firms, universities/research institutes, private consulting companies, individuals or government enterprises to develop their innovative output. Table 14 shows that firms engaging in-house innovation activities have a lower likelihood of innovation relative to those that engage in collaborative innovation activities. This suggests that firms in Indonesia are benefit from collaborating with other firms and organizations in developing innovation. Based on the results of this estimation, collaboration with other organizations is critical for increasing innovation relative to in-house innovation activities.

Table 14. Logistic regression coefficients (n = 300)

Variable	Innovation	
<i>Firm-level factors</i>		
Age (log)	1.169*	(0.602)
Size (log)	0.274***	(0.084)
Foreign ownership	0.005	(0.009)
Education	-0.021***	(0.003)
Access to credit	-1.092*	(0.587)
<i>Regional-level factors</i>		
Location	0.340	(0.552)
Knowledge creation	0.022	(0.013)
RIQ	-0.634***	(0.168)
<i>Innovation activities (Reference: In-house activities)</i>		
Collaborative activities	1.060*	(0.542)
Constant	-3.946**	(1.773)

Clustered robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Economic spillovers and innovation

This section answers the following research question: “What is the role of economic spillovers within clusters of firms in fostering economic growth and innovation?” Table 15 reports on our estimation of the effects of spillovers generated by cooperative relationships with customers and suppliers on innovative performance. Cooperative relationships relate to the number of firms reporting that the main

important source of information or idea for any innovative activity in their firms was from customers or suppliers.

Table 15. Logistic regression coefficients (n = 300)

Variable	Innovation	
<i>Firm-level factors</i>		
Age (log)	1.301**	(0.645)
Size (log)	0.300***	(0.112)
Foreign ownership	0.003	(0.010)
Education	-0.025***	(0.004)
Access to credit	-1.338*	(0.744)
<i>Regional-level factors</i>		
Location	0.413	(0.628)
Knowledge creation	0.014	(0.015)
RIQ	-0.755***	(0.162)
<i>Cooperative relationships</i>		
Customer	2.646***	(0.907)
Supplier	-1.609	(1.132)
<i>Cooperation for innovation</i>		
Firms	-0.087	(2.017)
Private consulting company/universities	0.275	(1.042)
Constant	-3.888**	(1.841)

Clustered robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Additionally, spillovers arising from cooperating with other firms, universities/research institutes, and consultancy firms in developing main innovative products are also reported. Innovation performance is a binary variable which indicates whether a firm introduced any new product or service. The coefficient for cooperating with customers is statistically significant. Nevertheless, the coefficients for cooperating with suppliers with other firms and consultancies and universities are not statistically significant. This implies that spillovers arising from cooperating with customers for innovation is important for Indonesia.

Based on our estimation, we conclude that vertical spillovers arising from customers are more critical for innovation performance relative to horizontal spillovers arising from firms and consultants. In particular, innovation ideas from customers have significant effects on innovation performance for manufacturing firms in Indonesia.

Barriers to innovation and technology diffusion

This section addresses the following research question: “What are the most critical barriers to the process of innovation and the diffusion of technology in low income country setting?” Table 16 reports the results of our estimation of the relation between barriers of innovation, and technology diffusion. Technology diffusion relates to firms adapting or reproducing a product or service already sold by another firm. We observe the most critical barriers to the innovation process include lack of external financing, and lack of information on markets. Notwithstanding, there are no significant barriers to technology diffusion.

Table 16. Logistic regression coefficients (n=300)

Variable	Innovation		Technology diffusion	
<i>Firm-level factors</i>				
Age (log)	1.148*	(0.619)	-0.577*	(0.343)
Size (log)	0.178	(0.141)	0.643***	(0.168)
Foreign ownership	-0.001	(0.009)	0.019*	(0.009)
Education	-0.022***	(0.002)	-0.004	(0.005)
Access to credit	-0.689	(0.605)	1.170***	(0.343)
<i>Regional-level factors</i>				
Location	0.272	(0.600)	-0.225	(0.392)
Knowledge creation (log)	0.030**	(0.013)	-0.006	(0.017)
RIQ	-0.657*	(0.395)	0.174	(0.661)
<i>Barriers to innovation</i>				
Lack of funds within enterprise	-0.013	(0.498)	-0.267	(0.164)
Lack of external financing	-0.472*	(0.248)	0.055	(0.299)
High costs of innovation	0.425	(0.319)	0.190	(0.165)
Lack of qualified personnel	-0.365	(0.391)	0.014	(0.274)
Lack of information technology	0.347	(0.564)	0.069	(0.225)
Lack of information on markets	-0.418**	(0.177)	-0.098	(0.146)
Difficulty finding co-operating partners	0.113	(0.077)	0.109	(0.171)
Market dominated by established firms	0.573	(0.563)	0.058	(0.124)
Uncertain demand for innovative products	-0.148	(0.193)	0.007	(0.153)
No need due to prior innovation	0.247	(0.196)	0.075	(0.073)
Constant	-3.783	(2.578)	-2.573	(2.349)

Clustered robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

We therefore conclude that the most critical factors hampering innovation activities include lack of external financing and lack of information on markets. This implies that external finance is important for innovation in the context of Indonesia. In addition, markets seem to lack information for enhancing innovation activities and the capacity to innovate in Indonesia.

Linkages with external agents and innovation

The research questions addressed in this section is as follows: “What types of links between public/private sector, universities, government, NGOs and the private sector are more conducive to innovation activity? What is the role of universities for facilitating/propagating innovation in LICs? What is the role of the private sector?” In some instances, firms collaborate with external agents for realizing the development of innovative products or services. External agents comprise affiliated firms or non-affiliated firms. Relatively few firms report on these measures of co-operation in the development of innovations. Table 17 reports the results of the estimation of the relation between the highlighted linkages and innovative activity in the firms.

Table 17. Logistic regression coefficients (n = 300)

Variable	Internal R&D		External R&D		Formal training		New equipment	
<i>Firm-level factors</i>								
Age (log)	0.594	(0.495)	0.400	(0.683)	0.296	(0.291)	-0.398	(0.305)
Size (log)	0.489***	(0.170)	0.621***	(0.235)	0.044	(0.106)	0.409***	(0.122)
Foreign ownership	-0.004	(0.013)	0	(.)	-0.007	(0.011)	-0.005	(0.012)
Education	-0.003	(0.006)	-0.001	(0.010)	-0.005	(0.004)	0.011***	(0.004)
Access to credit	-0.064	(0.439)	-0.354	(0.666)	-0.398	(0.314)	-0.203	(0.353)
<i>Regional-level factors</i>								
Location	-0.008	(0.486)	-0.273	(0.706)	0.548	(0.351)	-0.415	(0.362)
Knowledge creation	0.079***	(0.018)	0.089***	(0.029)	0.048***	(0.012)	0.049***	(0.014)
RIQ	0.620	(0.427)	-0.520	(0.659)	0.747***	(0.252)	0.306	(0.295)
<i>Linkages</i>								
Affiliated firms	1.895***	(0.581)	1.373*	(0.746)	1.451***	(0.487)	1.289***	(0.485)
Non-affiliated firms	3.403***	(1.048)	2.734**	(1.275)	0.152	(0.931)	0.592	(0.971)
Constant	-		-		-		-	
	9.248***	(2.220)	-6.719**	(2.795)	5.039***	(1.234)	-2.660**	(1.250)

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Firms developing innovations with affiliated enterprise groups have a higher likelihood of engaging in all the four innovation activities including internal R&D, external R&D, formal training, and purchase of new equipment. Developing innovations with non-affiliated firms exerts significant effects on internal R&D and external R&D only.

Thus, different types of linkages matter for different innovation activities in the context of innovation in LICs. Linkages with affiliated enterprise groups have significant effects across all innovation activities in firms in Indonesia. It is also observed that linkages with non-affiliated groups have relatively large effects on internal R&D and external R&D suggesting that non-affiliated enterprises may be important for stimulating R&D in firms.

The role of demand side versus supply side policies

In this section we address the following research question: “What is the role of the demand side versus the supply side policies (e.g. AMC, tax credit on R&D, technoparks, export processing zones, trade preferences). In what sectors/contexts can they be applied? What are the lessons? Governmental support for innovation activities is reported by few firms in the sample. Specifically, firms report receiving non-financial support from government departments or agencies for innovation related activities. Non-financial support includes training in the use of innovation equipment, and assistance in research and product development. Table 18 reports the results of our estimation of the relation between non-financial government support and innovation performance. The coefficient for non-financial government support is positive but statistically nonsignificant.

Table 18. Logistic regression coefficients (n=300)

Variable	Innovation	
<i>Firm-level factors</i>		
Age (log)	1.146*	(0.616)
Size (log)	0.221**	(0.094)
Foreign ownership	0.005	(0.009)
Education	-	
	0.021***	(0.003)
Access to credit	-0.971*	(0.559)
<i>Regional-level factors</i>		
Location	0.303	(0.534)
Knowledge creation	0.027**	(0.013)
RIQ	-	
	0.667***	(0.176)
<i>Government support for innovation activities</i>		
Non-financial support	0.712	(0.483)
Constant	-3.556*	(1.818)

Standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Gender diversity and innovation

The research question of interest in this section is: “What is the role of gender diversity in fostering innovation performance for firms in developing countries?” Table 19 provides an overview of how gender diversity impacts innovation performance which is measured as the introduction of new products or services.

Table 19. Logistic regression coefficients (n=300)

Variable	Innovation	
<i>Firm-level factors</i>		
Age (log)	1.111*	(0.586)
Size (log)	0.232**	(0.091)
Foreign ownership	0.00531	(0.011)
Education	-0.0212***	(0.003)
Access to credit	-0.943	(0.582)
<i>Regional-level factors</i>		
Location	0.316	(0.555)
Knowledge creation	0.0244*	(0.013)
RIQ	-0.726***	(0.137)
<i>Gender diversity</i>		
Female ownership	-0.639	(0.727)
Female top manager	0.715	(0.569)
Female workforce participation	1.765**	(0.786)
Constant	-3.719**	(1.562)

Clustered robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Gender diversity relates to female participation in the ownership of the firm, top management and overall workforce. Relatively few firms report female ownership and female participation in top management. The coefficient for female workforce participation is positive and significant. Notwithstanding, the coefficients for female ownership and female participation in top management are not significant.

These results suggest that firms with a more gender diverse workforce are significantly more likely to introduce a new product or service. Essentially, firms with a higher degree of female workforce participation have a higher likelihood of introducing innovations in the context of developing countries. Hence, female participation in the overall production and nonproduction workforce is imperative for innovation in the context of manufacturing firms in Indonesia.

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Appendix. Variable measurement

Variable	Measurement	Source
<i>Innovation performance</i>		
Innovation	Firm introduced any new product or service: "1" Yes "0" No	WBES
<i>Firm-level factors</i>		
Age (log)	Year of survey (2013) less the year the establishment began its operations	WBES
Size (log)	Number of permanent full-time employees at the end of the last fiscal year	WBES
Foreign ownership	% owned by private foreign individuals, companies or organizations	WBES
Education	% of full-time workers completed high school	WBES
Access to credit	Establishment has a line of credit or loan from a financial institution: "1" Yes "0" No	WBES
<i>Regional-level factors</i>		
Location	City with population over 1 million: "1" Urban "0" Rural	WBES
RIQ	Composite measure of mean of standardized firm-level scores of corruption, rule of law and regulatory quality in each region	WBES
<i>Corruption</i>		
	Corruption as an obstacle is measured: five-point scale (0 = not an obstacle, 4 = very severe obstacle).	WBES
<i>Rule of law</i>		
	Courts as obstacle: five-point scale (0 = not an obstacle, 4 = very severe obstacle)	WBES
	Political instability as obstacle: five-point scale (0 = not an obstacle, 4 = very severe obstacle)	WBES
	Crime, theft, disorder as obstacle: five-point scale (0 = not an obstacle, 4 = very severe obstacle)	WBES
<i>Regulatory quality</i>		
	Tax rates as obstacle: five-point scale (0 = not an obstacle, 4 = very severe obstacle)	WBES
	Tax administration as obstacle: five-point scale (0 = not an obstacle, 4 = very severe obstacle)	WBES
	Customs and trade regulations as obstacles: five-point scale (0 = not an obstacle, 4 = very severe obstacle)	WBES

	Business permits and licensing as obstacles: five-point scale (0 = not an obstacle, 4 = very severe obstacle)	WBES
Knowledge creation	% of firms conducting internal R&D within a region	ICS
<i>Innovation activities</i>		
Internal R&D	Dummy variable: "1" Yes "0" No	ICS
External R&D	Dummy variable: "1" Yes "0" No	ICS
Formal training	Dummy variable: "1" Yes "0" No	ICS
New equipment	Dummy variable: "1" Yes "0" No	ICS
<i>Commercialization</i>		
	Average value of items in commercialization construct	ICS
	Extent to which firm can successfully commercialize products: 7-point-likert scale (0= completely disagree, to 6=completely agree)	ICS
	Extent to which firm can commercialize completely new products: 7-point-likert scale (0= completely disagree, to 6=completely agree)	ICS
	Extent to which firm can commercialize new products in existing markets: 7-point-likert scale (0= completely disagree, to 6=completely agree)	ICS
	Extent to which firm can commercialize new products in new markets: 7-point-likert scale (0= completely disagree, to 6=completely agree)	ICS
<i>Collaboration</i>		
Collaborative activities	Innovation with firms, universities/research institutions, private consulting companies, individuals: "1" Yes "0" if otherwise	ICS
In-house activities	Innovation developed entirely by the firm: "1" Yes "0" if otherwise	ICS
<i>Spillovers</i>		
Customers	Number of firms reporting most important source of information/knowledge to be from customers	ICS
Suppliers	Number of firms reporting most important source of information/knowledge to be from suppliers	ICS
Other firms	Number of firms reporting most important source of information/knowledge to be from parent or another firm	ICS
Consultancy firms/Universities	Number of firms reporting most important source of information/knowledge to be from private consulting company/individuals	ICS
<i>Barriers</i>		

Lack of funds within enterprise	3-point-likert scale (0= not important, to 3=very important)	ICS
Lack of external financing	3-point-likert scale (0= not important, to 3=very important)	ICS
High costs of innovation	3-point-likert scale (0= not important, to 3=very important)	ICS
Lack of qualified personnel	3-point-likert scale (0= not important, to 3=very important)	ICS
Lack of information technology	3-point-likert scale (0= not important, to 3=very important)	ICS
Lack of information markets	3-point-likert scale (0= not important, to 3=very important)	ICS
Difficulty finding co-operating partners	3-point-likert scale (0= not important, to 3=very important)	ICS
Market dominated by established firms	3-point-likert scale (0= not important, to 3=very important)	ICS
Uncertain demand for innovative products	3-point-likert scale (0= not important, to 3=very important)	ICS
No need due to prior innovation	3-point-likert scale (0= not important, to 3=very important)	ICS
Technology diffusion	Use of technology licensed from a foreign-owned company: "1" Yes "0" No	ICS

Linkages

Affiliated firms or enterprise groups	Innovation developed with affiliated firms or enterprise groups: "1" Yes "0" No	ICS
Non-affiliated firms or enterprise groups	Innovation developed with non-affiliated firms or enterprise groups: "1" Yes "0" No	ICS

Demand vs supply side policies

Non-financial support	Government agencies or departments source of non-financial support for innovation activities: "1" Yes "0" No	ICS
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Gender diversity

Female ownership	Ownership of firm: "1" if female, "0" if otherwise	WBES
Female top manager	Top manager of firm: "1" if female, "0" if otherwise	WBES
Female workforce participation (log)	Ratio of number of female full-time employees to the number of full-time employees both at the end of the last fiscal year	WBES
