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Introduction

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Innovation-driven growth is now firmly on the agenda of developing countries. Numerous national innovation policies are being designed to foster innovation and harness it for growth. But importantly, innovation policies and programs need to be mindful and inclusive of the distinctive features and needs of middle- and low-income countries.

A vital specificity of many developing countries is the ubiquity of the informal sector and its demonstrated contribution to economic output and employment. In developing countries, the informal economy is often a greater source of innovation than the formal sector. Small or larger family entities and enterprises that constitute the informal economy produce new products or processes under conditions of scarcity in very diverse sectors, ranging from automotive and health to household appliances. In informal manufacturing clusters, products range from simple goods like kitchenware and furniture to more complex tools and machines. This type of innovation is rarely the result of research and development (R&D); rather, it tends to be driven by knowledge gained through adopting, adapting and improving existing good ideas, best practices and technologies in novel ways to solve problems in light of available materials and customers' limited budgets. Moreover, it has been argued that the informal economy also constitutes a low-risk test bed for innovations.

However, too little is known about the innovation systems surrounding the informal economy. Most evidence relies on anecdotal studies rather than systematic research based on solid analytical frameworks. As a result, policy makers face a dearth of data or rigorous analysis to support their policy decisions when it comes to innovation in a developing-country context.

This book aims both to provide a more rigorous assessment of how informal innovations are generated, monetized and diffused, and to encourage and support further research on these crucial issues. It seeks to understand what drives innovation in the informal economy, and whether and how innovative actors secure some return on their innovations. Firms in the formal sector that invest in innovation commonly aim to reap a return on their investment by maintaining some form of exclusivity over their know-how. This is done by being first to market, by keeping innovations secret or by using formal intellectual property rights (IPRs). But the role of IPRs and appropriation mechanisms such as secrecy, contracts and social norms of local communities in the informal economy are poorly understood. On the one hand, the absence of more formal appropriation systems might lead to information and knowledge diffusing more freely in the informal economy. On the other hand, actors may have fewer incentives to invest in machines or human capital and may be unable to scale up innovations to a sufficient level and reach. The absence of branding, for instance, may make it harder for consumers to distinguish between products by different producers within the sector, reducing the possible rewards to producers of good quality.

What policies will best foster innovation in the informal economy and harness its impacts? Neither current policy documents nor the academic literature propose a policy framework in this regard. This book assesses whether traditional innovation policy approaches are relevant in the informal context and highlights the objectives that a new innovation "policy mix" must address. Finally, the book proposes a measurement agenda for statisticians, in order to capture informal innovation in developing countries, its drivers and related barriers.

A number of prominent books and articles stress the importance of the informal economy for economic development. Yet the literature on the informal economy does not directly address issues of innovation, and the literature on innovation pays little attention to the informal economy. As a result, there are few studies relating to informal sector innovation, and those there are typically call for more research in this field (Srinivas and Sutz 2008; Daniels 2010; Gault 2010; Kraemer-Mbula and Wamae 2010; Muchie *et al.* 2015). This book responds to that call and pushes the boundaries of research in the field of informal economy innovation, first by conceptually integrating so-far separate analyses of innovation and the informal economy, and second by using research methods not often used by those studying the economic and employment aspects of innovation or the informal economy. In addition, this book provides unprecedented coverage of knowledge appropriation in the informal economy. Many questions arise regarding appropriation mechanisms in the informal economy: are incentives for innovation, diffusion and impact different in the formal and informal economies? Does the informal economy rely on different appropriation mechanisms than the formal sector? Indeed, are there efforts to appropriate in the informal economy, or is there any opposition to appropriation? Are innovation outputs and technical know-how communicated differently in the informal economy than the formal economy? In sum, this book contributes to the general debate on innovation, IP and development, which now attracts keen academic interest.

The book consists of eight chapters, which, variously, elaborate on conceptual aspects, review existing literature, analyze evidence and recommend new approaches for innovation policy and research.

Chapter 1 by Jacques Charmes examines how the definition of the informal economy has evolved over recent decades and introduces some estimates of its size in different regions of the world. Charmes argues, in line with most recent research, that economic activity is best understood as taking place within a formal–informal continuum; with different activities and actors occupying different points along the continuum. In other words, rather than seeing the informal economy as a separate economic sphere, the focus should be on understanding the complex inter-relationships between formal and informal activities. Drawing on a range of sources, he provides long time series of statistics to portray the size of the informal economy in terms of its contributions both to employment and to gross domestic product (GDP). These figures include the latest statistics by regional breakdown and in selected developing countries, making this one of the most complete and up-to-date depictions of the informal economy in developing countries available. As Professor Charmes shows, estimates suggest that over the past two decades informal employment or employment in the informal economy made up more than half of non-agricultural employment in most middle- and low-income countries. Sub-Saharan Africa is the region where the informal economy is believed to make the largest contribution to GDP – nearly two-thirds of GDP, including agriculture and half of non-agricultural gross value-added. It is followed in Southeast Asia by India, with around 50 percent of total GDP, then come countries in the Middle East, North Africa and Latin America.

Descriptive statistics suggest a negative correlation between the percentage of employment in the informal sector and GDP per capita. Employment in the informal sector is also positively correlated with poverty across countries. However, there is no evidence that informal employment does or does not cause low GDP or high poverty or that informality will fade away with economic development. Indeed, in most regions studied there has been a marked increase in informal employment along with pronounced economic growth. Professor Charmes' analysis supports finding elsewhere in the literature that the informal economy is a "permanent feature" of regions such as Latin America and Africa.

Each chapter of this book is accompanied by comments from academics or policy makers, reflecting our desire as editors to include as many viewpoints as possible and provide breadth as well as depth. Chapter 1 is complemented by comments from Rafael Diez de Medina and Adriana Mata Greenwood of the Department of Statistics of the International Labour Organization (ILO) and Johannes Jütting of the Organisation for Economic Co-operation and Development (OECD). The comment from the ILO provides additional insights into the definition of the informal economy, highlighting a persistent lack of harmonization and consensus regarding measurement which limits the international comparability of the data. The OECD comment points out interesting areas for future research such as the exploration of the role of the informal economy as a "shock absorber" in times of economic recession, the gender dimensions of informal employment and the perceptions and legitimacy of state institutions over marginalized communities in the context of developing countries.

Chapter 2 by Jeremy de Beer, Kun Fu and Sacha Wunsch-Vincent reviews "what we know and do not know about innovation in the informal economy." It makes a valuable attempt to integrate the literatures on innovation studies and the informal economy, which have traditionally remained disconnected. This disconnect can be explained partly by the emphasis that the literature on innovation has given to formal scientific and technological components of the innovation system while neglecting aspects that are central to developing countries, such as the informal economy. The literature on the informal economy has recognized its central economic and social role in developing countries, but has largely equated informality with survivalist activities with little or no potential for innovation. In order to develop a fuller picture, the chapter addresses several key questions. Who is the archetypical innovator in the informal economy? What types of innovation are generated? What is different from what one would encounter in the formal economy? The authors argue that innovation within the informal economy should be conceptualized within an innovation systems framework, putting particular emphasis on the geographical territory in which informal activities take place, usually at the local level.

As well as conceptually integrating two scholarly literatures, the chapter also synthesizes evidence discussed in the subsequent chapters on three African countries. This reveals several key findings: (1) the informal economy is as diverse as the formal economy. Furthermore, in each of these diverse activities the incidence and role of innovation, including the interactions with innovation in the formal sector, are likely to be different; (2) innovation does take place in the informal economy in the form of new products, product improvements, process improvements and the utilization of new tools. This type of innovation has been characterized as "quick responses to market demand and supply," solving problems to overcome shortcomings of the formal economy and/or to adapt foreign products to local conditions. (3) Adaptation and imitation are more frequent than original invention in the informal economy. (4) Firms in the informal economy tend to operate in clusters that facilitate a rapid transfer of skills and knowledge across firms. This seems to have a dual impact on innovation. On the one hand, information diffuses rather freely in the informal economy, and specialized resources are often shared. However, clustering can also have a negative impact on the appropriation of innovation activities, as competition over a similar product and quality range can be fierce, making it impossible to prevent others from copying one's innovation. (5) Many micro-firms in the informal economy demonstrate low capital intensity and face limitations on technical upgrading and limited skills. These constraints affect the scale at which innovation-related production and trade occur in the informal economy. (6) Actors in the informal economy draw significantly on external agents as sources of innovation – a phenomenon also described as "inbound open innovation." (7) Skills are acquired through early formal education, learning by doing through work experience and learning by training through apprenticeships in the informal or formal sector. A combination of some formal education, specific vocational training and work experience is relevant in building innovative capacity within informal economy firms.

A comment on this chapter by Colin C. Williams of the University of Sheffield outlines the treatment of the concept "informal economy" in the literature. Professor Williams highlights the underlying views of hierarchy shaping the "subordinate" status of the informal economy and how these views have also manifested in a restricted understanding of the possibilities of innovation in the informal economy. Another comment, by Fred Gault of UNU-MERIT and IERI-TUT, raises important questions about the assumptions made in the literature in relation to informal economic activities, calling for the need to revisit the concepts of "firm" and "market" in the context of informality. Professor Gault stresses that certain features of innovation in the informal economy, such as the role of users and the importance of learning, require further attention in order to design innovation policies that are more suitable for entrepreneurs in developing countries.

Chapters 3, 4 and 5 in this book are dedicated to three case studies conducted in Kenya, South Africa and Ghana, respectively. The three country studies follow a similar methodology, based on a systemic view of innovation, examining informal entrepreneurs in three different sub-sectors: metal workers in Kenya, manufacturers of home and personal care products in South Africa and manufacturers of traditional medicines in Ghana. Comparable first-hand evidence was collected in the three countries, allowing us to identify commonalities in terms of learning, innovation and knowledge flows. However, the analyses also indicate significant differences between sectors and countries, suggesting not only the diversity of the informal economy, but also the importance of understanding the local context in order to better appreciate the priorities and behavior of informal entrepreneurs.

Chapter 3 by Christopher Bull, Steve Daniels, Mary Kinyanjui and Barrett Hazeltine explores the flow of ideas and innovations in the informal metalworking sector of Nairobi, Kenya. The goal of this chapter is to explore how products and processes are developed and disseminated, and whether and how formal and informal intellectual property (IP) appropriation mechanisms are used. Data were gathered using a scripted interview with workers in the Kamukunji cluster in Nairobi, informal interviews with workers and business people outside the cluster, meetings with government and NGO officials, and by documenting product taxonomies and reviewing policy documents and government communications. Key findings include a significant gap between formal appropriation mechanisms and the informal sector, a host of policies that offer opportunities for informal enterprises and poor documentation of programs that implement those policies.

The accompanying comment by Joseph K. Kiplagat of Kenya's Ministry of Industrialization and Enterprise Development emphasizes the key role that the *jua kali* (informal) sector plays in the social, cultural and economic life of Kenya. As the son of a *fundi* (the term used for "makers" or "informal workers"), Kiplagat is well placed to highlight the creative and entrepreneurial potential of the Kenyan informal sector.

Chapter 4 by Erika Kraemer-Mbula is concerned with the informal manufacturing of home and personal care products in South Africa. On the basis of primary data, the chapter explores various types of innovation by informal manufacturers, paying close attention to the context in which innovations emerge. Kraemer-Mbula identifies connections between the formal and informal economies, leading to knowledge being shared, exchanged, combined and applied to create new products, services and processes. The chapter does not examine informal manufacturers in isolation, but as part of the broader economic, social and institutional system in which they operate. It maps the innovation system around informal manufacturers, exploring relationships and interactions across the productive chain of home and personal care products, and with an array of formal and informal organizations. From this analysis, Kraemer-Mbula develops several policy recommendations.

Chapter 4 is complemented by a comment from Nonhlanhla Mkhize of the Department of Science and Technology, Ministry of Science and Technology, South Africa. She calls for evidence on innovation dynamics in the informal economy to be linked more closely to existing policy frameworks guiding education, economic and innovation activities in South Africa. There is still a perception that innovation is exclusive to the formal domain of the economy, indicating that further evidence-informed decision and policy making is needed in order to pave a more inclusive development path for South Africa.

Chapter 5 by George Owusu Essegbey and Stephen Awuni analyzes the practice of traditional herbal medicine in Ghana. The authors conducted a survey of traditional herbalists in Ghana to assess, among other things, their modes of operation and any product, process and institutional innovations in their practice. They found that there has been a significant improvement in the manufacturing of traditional herbal medicine in Ghana over the years through innovation. The authors elaborate on the drivers of innovation such as policy initiatives taken to enhance traditional medicine practice, regulations, training and competition in the marketplace. They argue that traditional herbal medicine practice cuts across the continuum of informal–formal economic activity, and policies aimed at promoting traditional herbal medicine and stimulating innovation need to take account of this. According to their findings, IP mechanisms have potential to foster innovation. However, work is needed both to raise awareness of IP and to review IP systems and knowledge appropriation mechanisms to ensure that they are suitable for the sector.

In his comment on the chapter, Peter Arhin, Director of Traditional and Alternative Medicine Directorate (TAMD), Ghana, outlines the regulatory reforms experienced by the traditional health system in Ghana in recent years. He highlights not only some achievements but also some remaining challenges, in particular difficulties that manufacturers of traditional medicines experience in accessing financial resources, technical expertise and support for knowledge appropriation. On the basis of these observations, he suggests concrete policy recommendations, including the promotion of local manufacturing and the development of a suitable institutional infrastructure able to push the manufacturing of traditional medicines to international levels of competitiveness while maintaining their relevance to users.

Chapter 6 by Jeremy de Beer and Sacha Wunsch-Vincent explores how innovation is protected in the informal sector. Firms that invest in innovation commonly aim to reap the returns from it by maintaining some form of exclusivity over their know-how related to new processes or products or by selecting other means of gaining a competitive advantage. Mirroring the spectrum from formality to informality that characterizes the informal economy generally, a range of formal, semi-formal and informal appropriation mechanisms is used to appropriate innovation. Formal mechanisms of appropriation take the form of IPRs. Semi-formal means of appropriation include secrecy, publishing, non-competition clauses, non-disclosure agreements, contracts and others. Informal forms of appropriation may include lead time, complexity of design or technology, after-sales and services, and customer loyalty. The authors emphasize that even in the formal economy, different firms deploy diverse strategies to appropriate returns from innovation.

Innovation appropriation in the informal economy specifically is an under-explored topic. A review of existing literature creates the first impression that actors in the informal economy either give little consideration to appropriating returns on their innovations or rely on semi-formal or informal rather than formal appropriation mechanisms. Analysis of the evidence provided by the case studies supports two points. First, the majority of innovation appropriation mechanisms in the informal economy are informal in nature, with lead-time, sales or service efforts, customer loyalty and after-sales efforts being the most important mechanisms. Moreover, the innovation system around informal economic activities largely rests on “collective learning experiences” based on low entry barriers and free flows of knowledge. Appropriation efforts must also be considered in light of the social systems in which informal economic activity occurs, with knowledge flows characterized by trust, reputation, reliability, social and cultural signaling, and a willingness to pool resources and collaborate. Second, however, constant copying and the absence of appropriation mechanisms may constitute a barrier to scaling up innovative activity in the informal economy. Entrepreneurs are unable to grow their businesses beyond a certain stage, as they lack control over their innovations. As the authors conclude, the crucial policy question is not whether appropriation methods are relevant in the informal economy, but rather which mechanisms (formal and/or informal) may be most appropriate or promising in the specific case and sector under consideration.

This chapter is complemented by three comments: Emmanuel Sackey, Chief Examiner of the African Regional Intellectual Property Organization; Dick Kawooya of the University of South Carolina; and Shamnad Basheer of Nirma University, India, and SpicyIP.

Sackey corroborates the picture of low awareness and uptake of IP among informal innovators. To some extent, he argues, this is the case with micro, small and medium enterprises in general, especially in Africa. While there may be some differences between formal and informal small businesses in terms of attitudes toward and awareness of IP, the evidence remains insufficient. He highlights the need for IP offices in developing countries that are more proactive and understanding of the informal economy, and also notes a connection with traditional knowledge and indigenous knowledge, where the IP system has similar shortcomings.

Kawooya raises important questions concerning the sustainability and scalability of informal enterprises, and the possibilities offered by vertical integration and linkages with the formal sector. He highlights the role of intermediaries as key drivers of collaboration between formal and informal enterprises, opening opportunities for knowledge transfer and innovation.

In the final comment to this chapter, Basheer encourages a creative exploration of newer models of incentivizing innovation in the informal economy. He provides examples from India of alternative ways in which regulation and policy can manage issues of knowledge appropriation, especially in relation to traditional knowledge. He also cautions against "formalizing" the informal economy, indicating that the informal economy may have important lessons for the formal economy on a variety of fronts.

Chapter 7 by Erika Kraemer-Mbula and Almamy Konté explores whether current policy approaches to the informal economy aim to foster innovation and whether current approaches to innovation policy take into consideration the informal economy. The authors explore concrete alternatives to improve the distributional impact of innovation policies, particularly as regards to informal economic actors. They highlight problems in ensuring policy coherence when dealing with informality in developing countries, in that economic development resources are concentrated at the national level while regulatory and management responsibility for the informal economy rests with local government.

Traditionally, the declared policy objective has typically been to suppress, regulate or formalize the informal economy. However, experts and policy makers are starting to see the need for a more coordinated and structured approach to the informal economy. This shift in policy thinking has been gradual, with a small number of countries developing more inclusive and integrated policies recently. Nevertheless, systemic interventions remain rare, and the nature of intervention models at the national level is often inadequately suited to local needs on the ground, with coordination between national and local levels often misaligned.

On the basis of empirical evidence from the three country studies, the authors identify a range of policy interventions with the potential to positively affect innovation in the informal economy. This analysis leads them to explore an integrated framework for innovation policy that serves transformational change – a systemic policy approach that recognizes the importance of inclusion, demand-led innovation and learning processes including policy learning. They argue that an integrated framework for innovation policy must respond to the reality of developing countries, focusing on the capacity of policy frameworks to deliver in terms of institutional forms and target all economic and social actors including those operating informally.

The chapter is complemented by comments from Judith Sutz of the University of the Republic in Uruguay and Anneline Morgan, Senior Technical Advisor on Science, Technology and Innovation at the Southern African Development Community (SADC) Secretariat. Sutz emphasizes the universality of some of the conclusions of the chapter, providing interesting examples from Latin America, in particular Uruguay. She highlights the important role of intermediaries in channeling collective action by informal actors and stresses the importance of unlocking the great potential that universities have to contribute to social developmental needs, including the needs of informal workers.