



Ultrafast Biophotonics. P. Vasa and D. Mathur. Springer International Publishing, Switzerland. 2016. xi + 227 pages. Price: US\$ 129. ISBN 978-3-319-39612-5.

The importance of optical techniques in biology, biophysics and biochemistry is currently increasing at an enormous rate. Many variants of super-resolution microscopy are now commonly used in numerous research laboratories; single-molecule spectroscopy techniques are routinely applied and provide insight into energy transfer and other dynamical processes in biological systems. Electron microscopy is on the verge of probing the structure of individual proteins and – in combination with ultrafast laser sources – may even provide insight into their dynamics. Also, ultrafast spectroscopy provides further insight into the coherent dynamics of electrons and nuclei in biomolecules, in natural and artificial light-harvesting systems or – more generally – during light-induced charge-separation processes. This has initiated a lively debate about the role of quantum coherence in biology. Even spin coherence is argued to play a dominant role in migratory bird navigation by some researchers.

With so many recent developments, a book that covers the main underlying physical concepts, introduces the basics of the most relevant experimental tools and gives an overview of the recent achievements is urgently needed. This is exactly the aim of the book under review. The authors look at the emerging field of ‘ultrafast biophotonics’ from a fresh physical perspective and explain many of the underlying physical concepts in clear and pictorial terms. They also describe the most relevant experimental methods and provide an excellent overview of recent developments in different fields. The research topics that are covered in the book are naturally selected through the eyes of a physicist.

Quantum-coherent processes are covered in substantial detail and even the effects of strong laser fields on, for example, molecular photoionization are discussed. As such, the book introduces several concepts that are known in physics but are likely much less familiar to biologists. Thus the book definitely contributes to bridging an important gap between the two scientific communities, in particular also because the chosen list of references provides excellent resources for further reading.

In general, the book aims at young graduate students and researchers in ultrafast optics and biophotonics who need a timely and sufficiently broad overview of the field. It is clearly written and starts with a ‘nuts and bolts’ chapter that introduces the relevant physics background at a sufficiently elementary level. I expect that readers with a Master’s degree in physics will be able to follow most of the material. Also, those with a more biology-oriented background will certainly benefit from being introduced to the many optics techniques that are covered in the book, and their applications in biophotonics.

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Informal Sector Innovations: Insights from the Global South. Mammo Muchie, Saradindu Bhaduri, Angathevar Baskaran and Fayaz Ahmad Sheikh (eds). Routledge, London. Hardcover, 2016. 161 pp. Price: INR 9586. ISBN 13:978-1-138-94352-0.

Ever since the ‘discovery’ of informal sector by Keith Hart in the 1970s while

studying rural migrants from northern Ghana, this sector has gained prodigious attention from academics and policy-makers. Studies on the informal sector were largely confined to labour, wage, unemployment and poverty issues. Despite some studies and hotly contested debates, the knowledge potential of this sector was seldom recognized. It is only recently that this sector is viewed as a reservoir of knowledge and innovative activities. The dearth of appreciation for the innovative capacity of this sector was also due to lack of any available metrics or indicators which could have revealed the innovations in the informal economies to the outside world. This edited volume brings together 15 chapters by 28 researchers originally published in the *African Journal of Science, Technology, Innovation and Development*. It is a welcome contribution to the scant literature on the innovation potential of the informal sector of developing countries. It is organized into three parts, each dealing with different insights to the understanding of the informality within an economy and empirical evidence of innovativeness and innovation potential within it.

Part I of the book titled ‘Perspectives of informal economy’ addresses some contemporary viewpoints related to the informal sector that engender or contravene the innovative potential within it. It starts with Rivera-Huerta (chapter 2) exploring the conventional economic theories that have examined the informal sector till now. The author proposes that a better theoretical analysis of the informal sector is required to support policies by incorporating variables like institutional arrangements and modifying some assumptions related to agent rationality. The informality within an economy is often attributed to the low levels of formal education and skills of the workforce. Obeng-Odoom and Ameyaw (chapter 3) counter this argument by revealing a new informal economy in Ghana as ‘in formal informal economy’ comprising actors, who despite being highly educated and skilled, are failing to get formal jobs just like the cohort of informal workers who are failing to find jobs because they are not qualified. The contribution of the informal sector to the GDP of the developing countries is a fact. It is a source of major economic activities and hence the study by Akinwale (chapter 4) reveals the entrepreneurial potential of the undergraduate students of a private

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university in north-central Nigeria, profusely interested in entrepreneurship and self-employment in the informal economy. Urban informality is viewed as a hindrance to the traditional craft and artisanal production. This view is reflected in the study by Harris (chapter 5) of two clusters in Nairobi's handicraft sector on how the urban informality might interfere with the production of the clusters, revealing how both innovation and specialization are lacking in the cluster production due to informal institutional context.

In Part II of the book, the focus shifts to insights of the informal sector innovations from Africa. The importance of social networks in the informal sector as a contributor to production and innovations is well highlighted here in this part of the book. Links *et al.* (chapter 6) explore the nature of innovation from the formal and informal enterprises in rural South Africa and argue for a rethinking on the traditional understanding of innovations by classifying them as formal and informal. Ramoroka *et al.* (chapter 7) provide evidence of how actor networking among the enterprises in rural areas improves their innovation performance by obtaining new products, processes and marketing strategies, as it does not bind them to any rigid contracts or agreements. Despite the evidence of innovations in the non-formal and unstructured sectors, this knowledge remains hidden from the outside world due to lack of any proper indicator or metric that can capture or measure these innovations. Taking note of this, Letty *et al.* (chapter 8) study 'grassroots' innovations led by farmers in the South African villages and suggest indicators that measure the impact of such innovations on farmers' livelihoods, which might support policy. Korzun *et al.* (chapter 9) examine the versatile nature of agricultural innovations and place them together with African conditions to propose that technological insufficiencies in Africa require the creation of an enabling environment which could utilize the indigenous approach to agricultural innovations. The informal economy is completely ignored when it comes to climate

change and mitigation debates. The effects of climate change on spurring innovations in the informal sector are evident from the study of Lawanson *et al.* (chapter 10), and Manyati (chapter 11). The former adopts a case study to explore the effects of climate change on agricultural activities in a Nigerian farming community and reveal how people are engaged in informal enterprises to mitigate the effects of urban growth and erratic weather patterns. The latter investigates the causative factors stimulating technological innovations by the informal innovators in Harare and reveals that demands and socio-economic conditions of farmers together with climate change have fostered innovations in the informal sector.

In Part III, the book provides evidence of informal sector innovations and their dynamics from India. Hemant Kumar (chapter 12) studies the relationship between networks built by the informal 'grassroots' innovators at different stages, and how they are changing and affecting the innovations in the informal sector. Though the literature on innovation has seen a fundamental growth, there is an exclusion of discourse on innovations from the informal sector. This gap is addressed by Kumar and Bhaduri (chapter 13) in their study by analysing the two concepts of 'jugaad' and grassroots innovations often overlapping each other while explaining the innovative nature of India's informal sector. The informal sector is an area where communities rather than individuals play a dominant role in the development and diffusion of innovations. Taking the case of Kashmir pashmina shawls, this aspect is highlighted by Sheikh (chapter 14) by studying the extent to which communities in the informal sector are primary agents of innovations, and the appropriate mechanisms used by them to protect and share their knowledge. The workforce in the informal economy is also discussed in this part of the book. Labourers in the informal sector are often faced with the technological change leading to enormous amount of lay-off. Though these changes do not go untested, rarely do we see any opposition

by the informal workforce to large-scale mechanization leading to the creation of new technological choices. This facet of social shaping of technology is presented by Krishnan (chapter 15), in which she details the experiences of a workers' cooperative in Central India, proposing an alternate model of technology that is semi-mechanized as opposed to the fully mechanized technology that was offered to replace it in the iron-ore mines. Coming back to the topic of grassroots innovations that represent informal innovators, the impact and benefits of these innovations to the poor are often discussed. In this light, the diffusion models of the 'grassroots' innovations in India are studied by Abrol and Gupta (chapter 16), who argue that these innovations by informal innovators could have diffused far quickly through a platform of open sharing rather than by investing financial resources seeking intellectual property protection and commercialization of these innovations.

The book has appropriately presented the innovative strengths of the informal economy. It provides a new lens for viewing this sector in the developing countries as a knowledge repository. These studies require serious thought by policy-makers on how to use this capacity of the informal sector in increasing its productivity and reducing the informality at the same time. This book, however, has limited itself to cases from India and Africa. It would have been far more convincing to highlight the innovative potential of this sector from Latin America, Middle East and other transition economies of East Asia. Nevertheless, the book has significantly contributed to the innovation discourse by presenting key issues, prospects and constraints of innovations in the informal sector.

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