SESSION 2.3 (LOW CARBON INNOVATION)

Dunking the Dust: Innovation Diffusion and Informality in a Polluting Cluster, Odisha, India

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Abstract: Diffusion of innovation, especially, in the developing economy context has continued to elude scholars, civil society organisations and policy makers alike in terms of devising a contextualized strategy mostly agreeable to the local users for whom it is meant. It has been recognized that while the literature on factors influencing diffusion, adoption and adaption is heavy on developed country cases much remains to be known regarding the same in developing or low income countries. The lapse to recognize *failures* in innovation diffusion in developing economies reflects an inability to appreciate the dynamics of the overwhelming presence of informality in these economies. As Altenburg (2009)[1] observes, innovation in developing economies is deeply context-dependent compared to developed nations and it is determined largely by the specificities of the sector in question as the institutional capacity and level of economic performance of the local economy. Importantly, while structural constraints and institutional inadequacies act as significant barriers to innovation diffusion, it remains to be examined if the innovation *per se* has been relevant to the local context and acceptable to the users. This is particularly the case even where the innovation diffusion is 'orchestrated' by the state. It has often been noted that despite an improved or better technology made available there has been either a resistance or reluctance to adopt the new technology. The disincentives to adopt and/or adapt innovation in the developing country context are, possibly, the least addressed in the literature.

Even as micro, small and medium enterprises (MSMEs) have emerged as the drivers of industrial dynamism and contributed to income and job generation in large developing economies as India, the overwhelming informality in both the production and labour processes raise serious questions if the high performance of MSMEs has largely been possible by compromising quality parameters, particularly, those concerning the living and

[1] Altenburg, Tilman (2009), 'Building Inclusive Innovation Systems in Developing Countries: Challenges for IS Research', in Bengt-Åke Lundvall, K.J. Joseph, Cristina Chaminade and Jan Vang (Eds.), *Handbook of Innovation Systems and Developing Countries: Building Domestic Capabilities in a Global Setting*, Edward Elgar, Cheltenham. Northamption, pp. 33-56.

working environment. There has been a growing recognition of the adverse effects of the so-called polluting industries on the environment and health of those working in the firms and those living in the locality, both in the short and long run. The introduction of relevant technological innovations (clean or green technology) often has, as experiences have shown, been conditioned by institutional and economic factors.

What are the incentives and disincentives in adopting a given technological innovation? What facilitates or constrains innovation diffusion in low-end informal enterprises or industrial clusters? This paper discusses the trade-off between environment gains and informality in the production process highlighting the case of innovation diffusion dilemmas in a highly polluting MSME stone crushing cluster in the underdeveloped state of Odisha, India. The huge dust that rises in the entire process has seriously polluted the air and settled on the farmlands, trees, buildings, homesteads, animals and humans in the surrounding region resulting in farming decline, road accidents due to poor visibility, school drop-outs, out-migration and various ailments affecting lung, heart, eyes and skin. Abetment of dust control has been an important concern of the State Pollution Control Board, which has enforced use of water sprinklers designed to soak the dust as it emerges during crushing by the machine. Introduction of relevant clean technological innovations often has been conditioned by institutional and economic factors. Due to dysfunctional institutional arrangements, absence of collective responsibility by the cluster enterprises and the pecuniary gains of informality the local business have no incentive to opt for a cleaner technology in the larger interest of pursuing sustainable development goals. The empirical core of the research draws upon interviews with 50 enterprises spread over the cluster using structured questionnaire. This has been supplemented by information collected from secondary sources and discussions with various state and non-state stakeholders.

The Capacity Building in the Wind Energy Sector: A Case Study of Suzlon

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Abstract: Wind energy is the backbone of India's renewable energy programme. Since the early 1990s, India has been promoting wind power development. This reflects the growth trajectory of Indian wind energy sector having favourable institutional support and encouraging policy structure which has supported the capacity building in terms of strong R&D base, manufacturing capacity of wind turbines and equipments, skilled manpower, and others. The main focus of this paper is to understand the process of capacity building at the firm level as the wind energy sector of India has developed due to the 100%

involvement of private sector and also, unravel the influence of various factors such as leadership, knowledge base (skilled human resources and technological capabilities), and entrepreneurship on this building process. A case study of Suzlon has been undertaken to comprehend the influence and nature of these factors on its growth as it is a leading firm with more than 40% share in the Indian wind energy market. The efforts put by the company have helped India to be a leader in this fast growing sector due to its huge manufacturing units and R&D centers spread across the world. The favorable environment at the national level has given the impetus to the private sector without which the capacity building at the firm level could not take place. The growth in this sector is the result of three decade-long policy and institutional support of the Indian government.

Innovation ecosystem and knowledge production in Indian solar energy sector

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Abstract: In 2010, government of India introduced National Solar Mission to promote our country's energy security challenge, aims to become a leader in solar power generation, supporting R&D activities, develop trained human resource for solar industry. Knowledge production here refers to the research outcomes such as patents and research publications from the various R&D institutions, university, firms, etc. and innovation ecosystem is one of the perspective where the sense of environment or ecology of various institutions, actors and various other factors surrounding the activity of research and innovation. The study shows that research outcomes specially patents, research publications and R&D investment has become a more essential area after the announcement of the solar mission in the country. It highlights the number of research publications and patents has been increased and there is a significant presence of productive academia, R&D institutions and supportive policy initiatives in the country. This paper also addresses the research trust area in various solar technologies, the current solar energy scenario in the country and explores the ways in which various actors, agencies and policies shape the solar sector from different perspectives on innovation literature.