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Introduction

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Technology and Development in the Third Industrial Revolution

Introduction

By the mid-1970s it was becoming clear that traditional Keynesian demand-management could no longer cope with growing imbalances in the global economy or revitalise the slowing engine of economic growth. In place of demand management, monetarism became increasingly fashionable, especially in the political realm, emphasizing the efficiency of markets in resource-allocation and highlighting rent-seeking behaviour and other forms of 'state failure'. Its growing influence on policy led to concerted attempts to roll back the state, initially in the rich countries and subsequently in the Third World.

An alternative response to the declining attractiveness of Keynesian theory was provided by the neo-Schumpeterian structural analysts. Focusing on the supply-side of economic activity, they emphasized the central role played by technological change in economic growth. Some of these neo-Schumpeterians – notably Chris Freeman and his colleagues at the University of Sussex – added to these analyses a conception of radical technological discontinuities. They argued that since the mid-eighteenth century a series of historically distinct 'heartland technologies' had evolved, and each was associated with epochs ('long waves') of economic growth. In this view, not only technological change, but the revolutionary character of certain technological changes, played central roles in the growth process.

Whilst the political influence of monetarism was rising – especially in the 'old industrial centres' of Western Europe and North America – there also arose a growing constituency of support for the neo-Schumpeterians. Unlike the monetarists who were intent on 'rolling back' the state, these analyses called for a restructuring of this role, one in which the state facilitated and 'enabled' the corporate sector's attempt to come to grips with revolutionary technological change. Given their identification of microelectronics technologies as the latest heartland technology, the neo-Schumpeterians believed that policy ought to be oriented towards maximising the diffusion of electronics-related technologies and selectively promoting the development of the electronics sector itself.

These neo-Schumpeterian perspectives were seen to be of particular significance for LDCs, and for two apparently contradictory reasons. On

the one hand, it was believed, the productivity improvements offered by the introduction of this new family of technologies were so great, that they threatened to reopen the technological gap between LDCs and DCs.

Without state intervention, they foresaw that comparative advantage reversal would ensue, and formerly labour-intensive industries would migrate back to the high wage economies, assuming that LDCs would find it relatively more difficult to adopt these radical technological advances. But against this view, others argued that the new radical technological discontinuities provided an opportunity for technological leap-frogging, and hence favoured LDCs. 'Greenfield' LDC sites might offer a more favourable environment for the adoption of new technologies than 'brownfield' DC sites.

By the end of the 1970s research began into the implications of radical technical change for LDCs. Although no adequate survey has yet been undertaken, it would seem that the DC-based researchers focused on comparative-advantage reversal while in the LDCs researchers concentrated more on the opportunities for leap-frogging. Because of the relative vacuum in this area of research, the Technology Working Group of EADI decided to convene a workshop to discuss these issues. This workshop was supported by the Norwegian and British aid agencies and was held at the Institute of Development Studies at the University of Sussex in July 1987. The papers presented at this workshop are now published in this first issue of the *European Journal of Development Research*.

A number of themes were highlighted at the conference. First, is the global economy really experiencing a technological revolution and, if so, what are its implications for the Third World? Chris Freeman argues that the new microelectronics technologies are indeed revolutionary, but there is no need why this should necessarily operate to the disadvantage of LDCs. By contrast, Ron Dore (who has studied Japanese society and economic growth for many years) is sceptical of the existence of a *technological revolution*, and argues instead that the global economy is experiencing a multi-focused period of technological change in which the dominant feature is the growing science-content in technology. Unlike the Japanese and the first latecomers who found that there were many advantages to being 'followers', Dore argues, LDCs are now faced with an almost insuperable technological gap and is thus somewhat pessimistic about the implications for LDCs.

Constantine Vaitsos focuses on what might loosely be called the 'regime of accumulation' of the current and previous paradigms of technology. He argues that with radical technological change the international dimensions of production are altering, leading to a collapse of historic sectoral boundaries. From the policy perspective, one of the most important concerns is that relating to property rights over production. The

complex nature of these property rights raises new barriers to entry to newcomers and stimulates foreign direct investment, especially in the service sector. Both would seem to be adverse to the interests of LDCs. The role which GATT is playing in this international restructuring is given particular prominence.

Raphael Kaplinsky addresses the notion of 'technology', arguing that the traditional neo-Schumpeterian perspective on embodied technologies was too narrow to capture the essence of the current phase of innovation. In contrast, he develops a more explicit conception of 'social technology' with somewhat different implications for LDCs. The economics and the politics of location are changing as a consequence of innovations in both embodied and social technology. Whilst this does not necessitate a backward step for LDCs, it does suggest a somewhat different insertion of LDCs into the international division of labour in manufacturing.

In LDCs there is less reticence about the role which the state has to play in supporting the electronics industry itself. Ashoka Mody compares the preparedness of a number of Asian NICs and Brazil to take advantage of new opportunities in the electronics sector. He illustrates the key role played by the state in Korea and considers the desirability and appropriateness of state interventions in a number of crucial areas, including trade policy, technology policy and the role of foreign direct investment.

This workshop opened a series of important questions and provided few answers. Although reference is made to a number of completed research projects in relevant fields, it is clear that much research is still required before clearer analytical and policy judgements can be reached. It is because this research-terrain is so rich and because the policy implications are so significant that the *European Journal of Development Research* has devoted its first number to an exploration of these issues.

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