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*Social and Political Economy of Modern and Traditional
Technologies: Some Conceptual Perspectives*

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Social and Political Economy of Modern and Traditional Technologies: Some Conceptual Perspectives¹

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Abstract

Modern technologies have their roots in latest global developments in concept-based basic sciences and their practical laboratory based applications for economic and social needs. The global society's access to these applications is determined by their technical as well as their global economic and commercial viability. The institutions which influence these applications include the tastes and preferences of consumers, national and global input and output markets, globally networked scientific and R & D organisations, the industrial, service and agricultural organisations in the private and public sectors, and the national, international and multilateral S & T and economic policy-making bodies.

Traditional and indigenous technologies, on the other hand, have their roots in local markets, and expertise and experience accumulated and transmitted over generations of their practitioners. The society's access to these traditional technologies is determined by their technical viabilities, as well as by their local social and economic acceptability. The institutions which influence the society's access to traditional technologies are local consumer awareness and preferences, the networks promoting sustenance and development of traditional skills, and increasingly, due to the challenging convenience and economy of modern technologies, support from local, sub-regional and national public-governmental bodies.

This paper conceptually explores the socio-economic, developmental and environmental implications of modern and traditional technologies, illustrating them through distinguishing characteristics in selected products and processes. It concludes by suggesting the need to consider a balance between modern and traditional technologies in the background of their socio-economic, political-economic and environmental sustainability over the long run.

I Introduction

The basic objective of this paper is to conceptually delineate psychological, social, economic and political-economic distinctions between Modern Technologies (MT) and Traditional/ Indigenous Technologies (TIT). Admittedly, MT and TIT increasingly interpenetrate each other in a continuum. The paper attempts to highlight the contrasts, nevertheless, by focusing the discussion on selected illustrative extremes of this continuum.

Sections II and III outline the generally perceived definitional, conceptual and historical dimensions of the MT and TIT, respectively, to elicit their broad contrasting contexts for the following discussions. Beginning with a brief discussion of selected illustrative extremes of the TIT-MT continuum, Section IV draws on field-based local "artisanal" and global perspectives of their producers and users. Section V highlights the non-participatory bias in MT, and in the recent Science and Technology (S&T) policy formulation process in India. This is followed in Section VI by a brief discussion of how the S&T policies can be alternatively conceptualised in society-based perspectives. The paper concludes in Section VII with some suggestions about integrative strategic approaches in

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a framework of regional co-operation.

II Modern Technologies

To begin with, we confine our understanding of MT to applications of basic scientific knowledge to economically and socially viable and useful purposes over say the last two-three centuries. The development of basic scientific knowledge, especially in Europe, precedes the development of MT by at least 500 years, if not longer. Historically, the increase in the development and spread of MT during the recent centuries has been associated with the advent of the Industrial Revolution in northern Europe in the 18th and 19th centuries, particularly in England and Germany, followed by the development of the US in the 19th and 20th centuries.

This historical period was characterised in the West by the gradual displacement of the monarchic-oligarchic-feudalistic regimes with more democratic ones. This also resulted in relative decline of the historically and traditionally dominant feudal economic classes and the rise of the new market and technology driven economic and industrial elites, particularly in northern Europe. The political and economic liberalisation was aided by the gradual philosophical shift from Catholicism based “other- worldly” world views to Protestantism and Calvinism based “this-worldly” ones, and the advent of the “Age of Reason and Enlightenment.” The latter drew strength from the spread of scientific ideas, and increasing democratisation, commercialisation and marketisation of economies. These political, philosophical and economic developments, from our point of view, accelerated the spread of increasingly commercialised, mechanised, non-renewable resource and energy intensive and labour displacing MT.

The new profit-seeking elites, with their increasing economic, organisational and modern technological strengths, overwhelmed the sustainability of Traditional and Indigenous Technologies (more on TIT later) not only within Europe but also in the increasingly accessible regions outside Europe which were colonised by their governments. Thus, the access to material and labour inputs required for MT based production and markets for the outputs expanded globally, leaving TIT-based production and consumption to local fragmented input and output markets.

Who are the drivers and beneficiaries of MT? To begin with, they are the consumers of MT based products. As rational consumers they welcome MT, which provides standardised, cheaper, more convenient, accessible and even often qualitatively better products and services. MT also offers more choices than what TIT can. Given these basic consumer preferences and tastes, buttressed by organisationally created demands for increasing wants rather than needs, the private and public suppliers of such MT-based products and services attempt to maximise their personal, organisational and public benefits, within the limitations of input and output short-term and long term market dynamics, and policy and geo-political constraints. They include private and public, national and multi-national manufacturing, service and agricultural organisations, financial institutions, S & T and R & D institutions, and policy- making bodies, with varying degrees of influence across sectors, countries and regions.

III Traditional and Indigenous Technology

Traditional and Indigenous Technology (TIT) evolved over the centuries mostly through local experiential and contextual learning and undocumented transfer of relevant knowledge, technology and skills across generations through families and informal craft communities and guilds. TIT based production involves great deal of manual work. There were (are) no scientific theories on the basis of which TIT developed. Pre-modern science

was (and is) too esoteric and far-removed from the common masses to influence the development and practice of TIT. During the pre-industrial period - say preceding the 19th century - TIT facilitated the production of all the goods and services required not only by the feudal / monarchic ruling elites and middle classes but also by the common people all over the world. A great deal of outputs facilitated by TIT were for consumption by self/ family or geographically accessible neighbouring communities. One would surmise that TIT-based activities were so rooted in local economic, social and environmental contexts that changes in the larger systems of philosophy, polity and economy could have had no positive or negative impact on them. They were locally sustainable economically, ecologically and socially. This was because they were based on relatively limited local demands, and on more naturally renewable and locally available inputs.

With the advent of MT, however, the challenges to TIT-based production increased in many respects. TIT could not match the low-cost mass-production for mass-consumption engendered by MT, catering increasingly to the demands of the rising middle income classes across countries and regions. Given this structural shift in demand for products, and consequently for labour, from TIT to MT, the younger generation of the mostly rural TIT based producers were (and are) increasingly forced to seek livelihood in urban factory based sectors (the “push factor”). But they were (and are) also attracted by the lure of urban life and mechanised time-bound work in MT-based factories, and better economic and social infrastructure in urban areas (the “pull factor”). The family, crafts-guild and other networks for continuing and sustaining TIT consequently weakened. In an atmosphere dominated by MT-based global and national producers and their supporters and consumers, many governments and civil society organisations (e.g., producers' co-operatives) have over time recognised that TIT-based production needs to be sustained and encouraged for economic, geographical as well as cultural reasons, including the promotion of decentralised and dispersed employment and input provision, and preservation and promotion of local handicraft and culture-specific products, skills and trades.

IV Characteristics of MT-based and TIT-based Products

We now attempt to broadly come up with distinguishable characteristics of TIT and MT based products and processes in terms of their psychological, sociological and political-economic implications. It goes without saying and further elaboration that there is no sharp conceptual or empirical line one can draw between MT and TIT products. But it is possible to conceptualise the differences by selecting products or processes placed closer to the extreme ends of the TIT- MT continuum.

To help more sharply delineate the characteristics and ambiance of TIT and MT, we can visualise TIT-based local products such as home-made or tailor-made clothing, pottery and utensils, ethnic food items, home accessories and furnishings, etc. mostly for self or local consumption, at one end of the continuum, and MT-based mass-produced products such as factory-made clothing, utensils, ceramics and pottery, personal accessories, packaged/pre-cooked “microwaveable” meals for mass consumption, at the other.

Keeping these examples of TIT-based and MT-based products, we attempt in the table below to more sharply distinguish between the respective characteristics of the products, production processes, marketing and demand, and broader ambience of these two sectors. The table highlights the distinguishing characteristics as bought out by Asim (2010), who had extensive on-site discussions with some 20 artisans and their families in Italy on TIT and MT based products in local contexts, and by Ritzer (2004) , who conceptualises MT-based products as approaching “nothing” and TIT based products as approaching “something” in global consumption markets and frameworks.

Table 1: Comparison of TIT and MT based Products.

	TIT based Products (e.g. A home-made or chef cooked meal)	MT based Products (e.g. A factory packaged pre-cooked meal)
A	Product	Product
	Unique, peculiar, distinctive, unpredictable, heterogeneous, not easily replicable, unbranded	Standardised, uniform, homogeneous, predictable, replicable, branded
	Locally produced, distributed and consumed	Mass-produced, mass-distributed and mass-consumed across national/global markets
	Locally random designs, content and quality	Centrally conceived and standardised designs, content and quality
B	Production Process	Production Process
	Involves locally skilled manual labour for whole product, labour intensive	Involves globally semi-skilled labour with mechanisation/ automation for product components – capital, technology, transport and energy intensive
	Rising (opportunity) costs of local skilled labour	Increasing global access to cheaper and globally standardised labour
	Uses mostly locally produced hand-made renewable natural material inputs	Uses mostly globally produced, machine-made synthesised material inputs, derived from non-renewable resources and energy
	Local producer initiated, directed and monitored process which is time and location-specific	Centrally-organisationally initiated, directed and monitored process which is time-less and place-less
	Local specialised skills transferred informally through family, craft guilds etc., experience-based learning over generations	Relatively universal standardised skills transferred formally through organisational/corporate training and orientation programmes.
C	Product Marketing and Demand	Product Marketing and Demand
	Producer and consumer in closer proximity, based on more personal human contacts and local relationships	Producer-worker far removed from customer in time and space, impersonal centrally-organisationally programmed contacts and relationships
	Own shop/ workshop and locally linked establishments as marketing outlets producers as primary knowledgeable sales-persons	Centrally organised malls, supermarkets, departmental stores, TV and internet sales etc
	Markets increasingly unfavourable due to stiff competition from MT-based products, changing customer preference and tastes, higher costs and limited accessibility	Markets increasingly favourable due to changing customer preferences and tastes, lower costs and relatively unlimited expanding accessibility.
	Mostly to meet demands of family, local community, elitist declining demands	Almost entirely to meet increasing global mass (manufactured) demand
	The imperative to produce is the livelihood of the producer through local demand	The imperative to produce is profits through global (manufactured) demand
D	Ambience	Ambience

	National and global technological and policy-legal frameworks increasingly unfavourable – producers too small and unorganised to have effective lobbies	Increasing favourable technological and policy-legal frameworks – large and organised producers with effective lobbies
	Due to limited market access, inherent producer bias in favour of thrift sustainability, balance between needs/ wants and availability of natural resources	Due to expanding market access and competition, inherent bias in favour of profitability, cost efficiency, and imbalance between society's needs/ wants and availability of natural resources
	Much greater scope for creativity, ownership, passionate involvement, self satisfaction, innovation in production for the producer-worker, apart from monetary benefits	Centrally-organisationally programmed and scripted production , with little or no room for individual creativity, innovation and self-satisfaction for the producer-worker except from wages, perks and profits (except in management of operations, marketing, sales and product development)
	Self-programmed production cycles provide greater scope for self time management, time for the family etc.	Organisationally programmed time-management at work place and at home

We can broadly conclude from the table that there are identifiable psychological, social, economic and political-economic distinctions between TIT and MT-based products, production processes, marketing approaches and micro and macro level ambience. These distinctions have implications for psycho-social and economic life-styles and well-being of the respective producers, workers and consumers, as brought out in the table. In the next section we highlight selected aspects of science and technology policy formulation processes in India which have broad political-economic and welfare implications for MT and TIT-based sectors.

V Democracy and Science Policy in India

Prasad (2008) has elicited the broad non-democratic contours of science policy (SP) formulation in India. According to him SP in India is “by and for” the scientists. The SP formulation process in the government largely bypasses any notions of democratic public engagement and debate, critical thinking, and broad-based knowledge dialogues and learning alliances. It is heavily biased in favour of MT in atomic energy, space, and defence, which together were allocated 78 per cent of Rs. 25,500 crores of the 10th Plan S & T budget, while technology development for the rural poor received only 0.23 per cent (ibid., pp 92-93). Furthermore, it ignores the developmental aspirations of the economically poor but traditional knowledge- and technology- rich and practically capable masses. Relying heavily on MT, Indian SP pays scant attention to diverse and alternative traditional knowledge and technological practices especially in the areas of agriculture, textiles and health. This is mostly because - as brought out in the earlier table - producers and users of TIT based products are unorganised and scattered and economically much less powerful than those of MT based products. (The primary producer and user of space, atomic energy and defence is the government itself.)

While MT-driven innovations do result in development of new products, they are disproportionately concentrated in management of operations, sales and marketing. Only in the case of handloom-khadi sector has the people's participation resulted in more equitable co-production of knowledge and technology, and inter-penetration of TIT and MT. But generally, the consideration of TIT- MT relationship and inter-dependence, and their cultural, social and economic diversities and ramifications have been neglected, due to the obtaining national and global power dynamics. Though the National Knowledge

Commission has recently argued for a much more pluralistic and inclusive approach to SP formulation, the singular MT-based mindsets - a legacy of the Nehru era - continue to largely promote MT and neglect TIT.

The next section addresses some conceptual approaches to help integrate MT and TIT in societal perspectives.

VI Alternate Perspectives on Science and Society

Waqif (1984) observes that organised natural science ideally relies on repeatability, confirmability, uniqueness and objectivity (value-freeness) of scientific approaches and solutions. But in reality, there are often differing or even conflicting scientific views, and scientists' pursuits and values are not independent of their personal views, education and training, career aspirations, institutional settings in which they work, and science sponsors' political- economic agendas - witness the debates on global warming and climate change, or nuclear energy, for instance. Thus, modern science and technology can be viewed as a political-economic commodity or public good, depending on who produces MT, for whom, who gains, who loses, and their relative bargaining powers, as partly brought out in the previous section.

At the same time, modern science's bias in favour of universalism, determinism, centralism and urban elitism results in a dominant focus on economic and material needs, to the neglect of psychological, cultural, social and even spiritual needs of producers, workers and consumers of MT. Predominantly manual skill-based, self-contained, self-directed, self-satisfying and relatively ecologically non-violent work based on TIT gets replaced by mechanised, centrally-directed, fractionalised, co-ordinative and integrative work based on MT. Uniqueness, particularity and substantiveness of locally produced TIT based products give way to uniformity, standardisation and soullessness of mass-produced MT based products - along Ritzer's continuum of "something" and "nothing" - and relatively monolithic life-styles and consumption patterns across the globe.

But, as per Jacques Ellul's observation quoted by Waqif: "By sheer numerical proliferation and velocity, (modern) technological means of production (and consumption) unavoidably surpass man's relatively unchanging biological, emotional and spiritual capabilities" (ibid, p 226). Aided by their political economy, society becomes increasingly controlled by the MT establishments. But, as per E.J. Mishan's observation quoted by Waqif: "Man should adjust the technological environment to his natural needs and capacities. Technological progress may appear to be inevitable and unstoppable, but man should consider the possibility that the needs of men and needs of commerce and (modern) science and technology may sometimes prove to be irreconcilable" (ibid. pg 227).

VII Some Suggestions for Integration of TIT and MT

Hence, there is a conceptual and strategic need to facilitate the inter-penetration and integration of TIT and MT, and to balance their social benefits and costs. Such facilitation has to go beyond what Ritzer has called "glocalisation" (op cit, pp 78-79 and chap 5) - that is, beyond the corporate driven vegetable burgers in fast food chains, or herbal tooth pastes, or packaged ethnic foods.

Creation of technological, economic and social space for TIT based products needs to be considered though increasing and effective social marketing and awareness generation among producers and consumers, provision of affordable inputs and infrastructure, market access, and promotion of participatory and decentralised technology and skill development. Though a lot of lip service is paid to these aspects by the political and administrative establishments, resource allocation leaves much to be

desired. Relentless expansion global and national producers and retail chains needs to be checked to provide space for local producers and retailers. Inter-penetration of global MT and local TIT needs to be encouraged, e.g. in management of agricultural pests through integrated (organic and chemical) pest management, partial non-commercial energy intensive mechanisation of household production, post-harvest crop processing by farmers, etc. The possibility of imparting skills for TIT through the industrial and vocational training institutes is also worth considering. Furthermore, modules on TIT could be introduced in science and technology and social science and management curricula in colleges and universities, and even in executive training programmes.

At the intra-regional and regional co-operation levels, there is a great deal of scope for promoting cross-border experience-sharing and technology and skill development and transfer in TIT. These would entail suitable support from sectoral, national and regional organisations (such as SAARC). The regional economic cooperation frameworks (such as the South Asian Free Trade Agreement) could also incorporate specific provisions for regional trade and investment and market development in TIT. Sub-national, national and regional (SAARC) chambers of commerce and industry and export promotion organisations could have special cells to promote trade and investment in TIT, especially in household, micro and small enterprises. All these efforts would need to be actively supported by civil society and labour organisations and networks at local, national and regional levels.

The approaches to sustain and promote TIT and TIT-MT inter-penetration for economic and socio-cultural reasons have to go beyond pious policy intentions and statements. They need to be translated into effective and reasonably resourced sector-specific participatory and organisationally coordinated programmes and projects at local, national and regional levels.

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