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Exploring exclusion in innovation systems: case of plantation agriculture in India

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In the context of the inclusive development discourse to extend the benefits of economic growth to disadvantaged groups, this paper postulates that innovation is the key driver of development and that the underlying systems of innovation in general and the learning, innovation and competence-building process in particular should become inclusive. Innovation is generally assumed to apply to the industrial and high-tech sectors; however, in order to achieve inclusion, this paper argues that knowledge intensification for innovation could strengthen and reach sectors that are labour-intensive and labour-extensive in developing countries. Building on the taxonomy of social exclusion developed by Amartya Sen, the study evolves new conceptual categories such as subordinated inclusion, illusive inclusion, sustained exclusion and transient exclusion. The case of innovation system in India's plantation sector, despite concerted policies, presents the empirical evidence for the prevalence of the varied forms of exclusion articulated by Amartya Sen and throws light on the new forms of exclusion. The study finds the persistence of active exclusion along with subordinated inclusion in the organization of commodity boards and institutional innovations for the promotion of production and marketing. Subordinated inclusion appears to prevail in the institutional arrangements for research and development and institutional innovations in the labour market result in illusive inclusion.

Keywords: India; innovation system; inclusive innovation; social exclusion; plantation agriculture

1. Analytical background

Drawing from the empirical evidence that 13 developing economies have been able to record a growth rate of 7% a year or more for 25 years since 1951, the Commission on Growth and Development (2008) argued that the road to rapid growth is no more an uncharted terrain for the developing countries. The Commission has identified certain distinctive characteristics of high-growth economies that could be emulated by the laggards. High growth is possible, it has been argued, *inter alia,* because the world economy is now more open and integrated. Therefore, the division of labour is much less constrained today by the extent of the market than during the times of Adam Smith. While the Commission acknowledges that 'no generic formula exists', it indicates that for developing countries, an open-world economy facilitates the import of ideas, technologies,[1] and know-how from rest of the world to hasten the catching up process. The Commission further maintains that, since learning something is easier than inventing it, fast learners can rapidly gain ground on the leading economies.

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The growth episodes under globalization, however, are found to be lopsided because the returns to growth have been mostly confined to select sectors of the economy and sections of the society. As Freeman (2011) argued, structural adjustment induced growth has also been characterized by 'crises of structural adjustment'. There has also been growing unemployment, a main source of inequality and poverty, and mismatch between skills and institutions specific to older technologies and those needed for the new wave of technologies. The inevitable outcome in almost all the fast-growing developing countries has been increasing marginalization and inequalities that coevolved along with higher GDP growth rates (Wade 2004; Soares, Scerri, and Maharaj 2013) raising serious concerns about the quality of the growth. India's experience has been no exception. Studies have presented empirical evidence for the growing inter-personal inequality in income (Sen, Abhijit and Himanshu 2004a, 2004b; Himanshu 2007), increasing marginalization of women and minorities and a steep rise in inequities at different levels, for example, across regions (Joseph, Singh, and Abraham 2013). As observed by the Planning Commission (2008) and Vaidyanathan (2010), among others, notwithstanding an unprecedentedly high GDP growth rate of 7.7% during the 10th plan (1992–1997), growth of agricultural sector that accommodated the bulk of India's labour force remained almost stagnant at 2% and the country had to live with the largest number of poor in the world. No wonder, the issue of inclusive growth today takes centre stage in development discourse and the focus of the policy pendulum has shifted from growth to inclusive growth.

The pioneering work on the national systems of innovation (Freeman 1987, Lundvall 1992, Nelson 1993) and the subsequent developments in the literature on systems of innovation at the regional (Asheim and Gertle 2004), sectoral (Malerba 2005), technological (Carlsson and Stankiewitz 1995) and corporate levels (Granstrand 2000) deviated from the conventional linear approach to technological progress, placing innovations at the micro-, meso- and macro-level as the forces driving growth. To the extent that innovation system perspective is based largely on the empirical evidence and experience of industrial sectors of developed countries, its relevance in the case of the agricultural sector of less developed countries is an issue of immense analytical significance. A related issue of import for our discussion, if innovation breeds growth, could it also be instrumental in fostering inclusive development? While the linkage between innovation and growth appears fairly straightforward, the issue becomes more complex when it comes to innovation and inclusive development. Cozzens and Sutz (2012) argue that for development to be inclusive, the innovation that drives it has to be inclusive in at least two ways: inclusive in terms of the process by which it is achieved and inclusive in terms of the problems and the solutions it is related to. Focusing on (in)equality and poverty, the twin foundations of inclusive development, Cozzens and Kaplinski (2009) show that while innovation is of course not the only or even main influence on inequality, it is nonetheless often causally linked to poverty and inequality through many different economic, social and political processes, though not in just one direction. It has also been argued that a broader approach to the innovation systems is desirable in developing countries while linking innovation to development, especially inclusive development. The innovation systems, it is held, should include innovations in the sphere of institutions, organizations and social sectors, rather than focusing only on technological innovations (Lundvall et al 2009).

Economists have, since long, considered a dollar worth of potato chip as different from a dollar worth of microchip, implying that product structure and sectoral composition do matter in growth and development (Passinetti 1981). Thus viewed, we cannot consider the different sectors of an economy as equally positioned in nurturing 'innovation induced growth' or in fostering inclusive development and the facilitation of the process of 'innovating out of poverty and inequality'. While some sectors, given their comparatively higher technological opportunity (on account of their deep science base) and monopoly rent could be growth boomers, the outcome

may not be broad-based, pro-poor or inclusive. On the other hand, there are sectors which could only grow at a snail's pace (*inter alia* on account of the nature of demand), but the returns could be more inclusive. Such variation across sectors in terms of their ability to foster inclusive development needs to be seen in terms of their underlying innovation system. Hence, much could be gained from the search for micro-foundations of inclusive growth at the sectoral level. Therein lies the relevance of the current inquiry that intends to explore the spheres of exclusion in the institutional architecture for innovation in India's plantation sector. This is, however, not to underplay the relevance of such enquiries at the regional or national level for locating the factors that generate and sustain the varied forms of exclusion with the belief that for development to be inclusive, the innovation system that breeds development has to be inclusive.

Neither exclusion, both economic and social, nor the attempt towards understanding its dynamics, as argued by Sen (2000), is new. When Adam Smith referred to the inability to appear in public without shame, he was describing nothing but exclusion. In the Indian context, though the term inclusive development assumed currency only in the recent past, the need for socially and economically equitable growth has been underlined in the Directive Principles of the Indian constitution and was at the heart of the different Five Year Plans.

In dealing with the issue of exclusion in the innovation systems, Amartya Sen's taxonomy of exclusion is especially illuminating (Arocena and Sutz 2012). Sen (2000) considers four situations. (i) Constitutive exclusion happens when being excluded is in itself a deprivation which can be of intrinsic importance on its own. Cases of such exclusion include inability to read and write or not being able to join the labour market due to physical disabilities. (ii) Instrumental exclusion refers to causally significant exclusions that may not be impoverishing by themselves, but can lead to impoverishment of human life through consequences of great instrumental importance; Sen says 'not using the credit market need not be seen by all to be intrinsically distasteful. But not to have access to the credit market can, through causal linkages, lead to other deprivations, such as income poverty, or the inability to take up interesting opportunities that might have been both fulfilling and enriching but which may require an initial investment and use of credit' (12). (iii) Active exclusion happens when exclusions come about through policies directly aimed at that result (e.g. denial of voting right to refugees or migrants). (iv) Passive exclusion is the result of policies that have not been devised to bring about that result but nevertheless has such consequences. The prevalence of illiteracy in India while its constitution provides for free primary education for all the children illustrates this situation.

Of the above-mentioned exclusions, the first two appear to be based on the outcome of exclusion, whereas the latter two on the causes of exclusion. Sen (2000) also recognized that "while exclusion is one route to capability failure and poverty, what may be called 'unfavourable inclusion' can also be a considerable danger … many problems of deprivation arise from unfavourable terms of inclusion and adverse participation (28). If one takes this view forward, we could have *subordinated inclusion and illusive inclusion* depending on how the returns to inclusion are distributed. The former occurs when inclusion takes place in a way that the gains from inclusion are not equally distributed. Instances of subordinated inclusion could be observed in a wide range of contexts from international agreements to local level policy-decisions concerning ordinary citizens. *Illusive inclusion* occurs when inclusion is ensured but the outcome is not different from that of being excluded. To the extent that those included hardly derive any benefit inclusion is illusive.

On the basis of the nature of exclusion, there could be *transient exclusion and sustained exclusion.* Very often development strategies necessitate certain extent of exclusion, especially in the context of an unbalanced growth strategy as proposed by Hirschman (1958). Such strategies, by design, involve inevitable exclusion of some sectors of the economy or sections of the society for some length of time. This may be called 'transient exclusion'. However, if exclusion does not

remain a short-term phenomenon and becomes exclusion for a longer period, it may be termed as sustained exclusion which is socially more painful. While the existence of the forms of exclusion/inclusion discussed thus far could be a manifestation of the capabilities and freedoms enjoyed by the people, from the perspective of innovation systems this could be reflection of the absence of, or the presence of weak, learning, innovation and competence-building systems at the level of individuals and organizations. We hasten to state that these conceptual categories are not always mutually exclusive. For scholars involved in exploring the innovation system from the perspective of inclusive development, they might serve as pedagogical scaffoldings to understand the varied spheres of exclusion and their multifaceted dimensions.

The rest of this article is organized as follows: Section 2 locates the plantation sector in India in the context of the ongoing discourse on inclusive development by highlighting some of its characteristics to argue that it is a key sector in India's inclusive development strategy. Section 3 begins with a discussion on the current arrangements for institutional and technological innovations and proceeds to search for the empirical evidence for the different conceptual categories of exclusion that we have highlighted in this section. Finally, the concluding observations are presented.

2. Plantations in the landscape of India's inclusive development

To justify the choice of plantation sector for the empirical verification of the issue at hand, let us begin by examining the role of plantation sector in the inclusive development agenda as envisioned in India's 11th (2007–2012) and 12th (2012–2017) Five Year Plans. Towards this end, we shall highlight some of the characteristics of the plantation sector like its livelihood importance by examining their contribution to employment generation, especially for women, as well as the income-earning opportunities provided for the small and marginal growers. We also examine the significance of the plantation sector in promoting balanced regional development as envisaged in the country's inclusive growth strategy. We shall argue that though the role of plantation sector as a foreign exchange earner declined significantly, it has emerged as a key sector in India's ongoing inclusive development agenda on account of its high labour intensity (especially women labour), contribution towards livelihood of millions of small growers and its bearing on fostering balanced regional development.

2.1. *Plantations in India's merchandise exports*

Remarkable success of India in building a fairly diversified economic structure and unprecedented growth performance under globalization notwithstanding, primary commodity production in general and plantation crops in particular play a significant role. The system of innovation in the plantation sector evolved in a context wherein the plantation sector has been contributing significantly to India's export earnings. In 1950–1951, for example, three major plantation crops (tea, coffee and spices) accounted for as high as 20.8% of India's total export earnings (Sigh 1964). The focus of innovations in the sector – technological, institutional and organizational – at that time had been to enhance the international competitiveness of these crops. With the emergence of a vibrant service sector and diversified industrial sector, the share of plantation crops in total merchandise exports declined significantly over the years from over 10% during 1970–1975 to only about 1.2% in 2010–2011 (Table 1).

Today, the export earnings from the leading software firms like Tata Consultancy Services and Infosys are much higher than that from the plantation sector. To the extent that there has been a significant decline in the role of the plantation sector as an export earner, the key issue is to explore its current role in the national economy in the context of the inclusive development strategy.

Table 1. Plantation crops in India's merchandise exports.

Period	Exports of plantation crops (Rs million)	Merchandise exports (Rs million)	Share of plantation crops (%)
1970–1975	2333.94	21,934.40	10.64
1975–1980	5830.87	53,462.80	10.91
1980–1985	7621.34	89,668.80	8.50
1985–1990	11,679.00	1,73,820.00	6.72
1990–1995	20,065.20	5,65,426.40	3.55
1995–2000	45,455.40	13,09,171.00	3.47
2000–2005	44,528.20	26,72,865.20	1.67
2005–2010	86,338.40	67,40,698.80	1.28
2010–2011	1,39,127.20	1,15,74,746.00	1.20

Source: Reserve Bank of India, Handbook of Statistics (different years).
Note: Except for 2010–2011, the estimates are the average for five years.

2.1.1. *Plantations and workers' livelihood*

Despite India's remarkable growth performance, a major point of concern, as in other emerging economies, has been the quantity and quality of the employment generated (Nagaraj 2000; Kannan 2007; Neethi 2008; Kannan and Raveendran 2009; Uma, Abraham, and Joseph 2010). In this context, the Planning Commission (2008) of India highlighted the need to ensure that growth is widely spread so that its benefits, in terms of income and employment, are adequately shared among the poor and weaker sections of the society, especially the scheduled castes (SCs), scheduled tribes (STs), other backward classes (OBCs) and minorities.

Though plantation crops in India account for only about 5% of the net sown area, they contribute about 10% of the income from agriculture and about 13% of agricultural exports. The estate sector alone is estimated to provide about 2.5 million days of employment and is a source of livelihood for almost an equal number of small and marginal growers for whom plantation crops are the only source of income. From the national perspective, these figures may not look immensely impressive, but from the point of view of regional economies where the plantain sector is concentrated, it is a major source of livelihood for their population (Joseph and George 2010). What is more, as is evident from Table 2,[2] in almost all the leading plantation crops,

Table 2. Trend in the share of women workers in plantation sector.

Crops	Estimated no. of workers	Women workers	Share of women workers in total (%)	Estimated no. of workers	Women workers	Share of women workers in total (%)
1958–1959				1985–1986		
Tea	7,66,473	3,93,201	51.3	612,079	300,531	49.1
Coffee	95,700	43,735	45.7	**	**	**
Rubber	11,900	3048	25.6	24,824	8961	36.1
Total	8,74,073	4,39,983	50.3	636,903	309,492	48.6
1974–1975				2006		
Tea	6,12,079	3,00,531	49.1	811,854	440,350	54.2
Coffee	**	**	**	105,288	57,603	54.7
Rubber	24,824	8961	36.1	61,270	25,917	42.3
Total	6,36,903	3,09,492	48.6	978,412	523,869	53.5

Source: Labour Bureau, Occupational Wage Surveys – Report on Plantation (different years).
**Not available.

women workers account for a substantial share of the total labour force engaged in a context of low and declining labour participation by women. According to the employment and unemployment survey during 2004–2005 to 2009–2010 women's labour force participation declined from 33.3% to 26.5% in rural areas and from 17.8% to 14.6% in urban areas (NSSO 2011). But for the three leading crops put together, women labour intensity increased from a little over 50% in 1958–1959 to 53.5% in 2006 (Table 2). This may be compared with 20% in India's organized manufacturing sector during 2000–2001 to 2009–2010. Chaudhuri and Panigrahi (2013) observed that the industries with highest women labour intensity in India are the wearing apparel (52.56%) and the tobacco products (50.70%) in 2008–2009. Thus viewed, the women labour intensity in the plantation crops like tea and coffee is even higher than the manufacturing industries with highest women labour intensity. Studies also indicate that there is a concentration of backward communities in the plantation labour force. In 2008, the share of backward communities (SCs, STs and OBCs) is found to be as high as 75.6% in the case of female labour and 73.9% in the case of male labour with variation across crops (Government of India 2009).

2.1.2. *Livelihood for small and marginal holders*

One of the most disappointing aspects of development under globalization in India, the Planning Commission (2008) notes, has been the deceleration in agricultural growth since the mid-1990s. This, needless to say, would have had an adverse effect mainly on small and marginal landholders which accounts for a high proportion of the number of agricultural holdings.[3] Hence, the 11th Five Year Plan acknowledged that improved performance of marginal and small holders in agriculture is necessary if the growth is to be inclusive. In this context, an examination of the role of small and marginal holders in the plantation sector assumes importance to locate their significance in inclusive growth.

Going by the historical evidence, India's plantation sector had been in the hands of foreign companies and later on with large holders (Table 3) of domestic origin. Plantation-based production arose, as argued by Hayami and Damodaran (2004), in a context where virgin land had to be cleared and developed and physical infrastructure such as roads, irrigation systems, bridges and other basic facilities had to be constructed. Hence, to induce planters undertake lumpy investment for infrastructure development large estate-based production systems were encouraged. In addition, the agrarian reforms in states like Kerala wherein plantation crops were exempted from land ceiling also facilitated the perpetuation of estate-based production.

Table 3. Concentration of area under tea in Kerala and Tamil Nadu by foreign controlled companies.

	Kerala			Tamil Nadu		
Year	No. of companies	Area under their control (ha)	Area under control as % of total area under tea	No. of companies	Area under their control (ha)	Area under control as % of total area under tea
1925	5	19,702.37	77.23	6	9427.12	59.23
1940	5	28,071.58	73.69	6	15,470.50	59.72
1950	5	27,606.36	70.14	6	14,021.10	53.05
1960	5	25,248.86	63.29	6	13,245.83	41.20
1970	5	22,749.08	62.20	6	14,778.46	41.17
1978	3	16,778.54	46.90	5	10,187.21	27.77

Source: George and Tharakan (1985).

Table 4. Trends in the share of small holders in the area cultivated under tea and natural rubber in India.

Natural rubber			Tea		
Year	Total area (ha)	Share of small holders (%)	Year	Total area (ha)	Share of small holders (%)
1955–1956	18,289	21.81	1998	4,74,026	14.5
1960–1961	38,340	29.51	1999	4,90,200	17.0
1965–1966	51,433	31.22	2000	5,04,366	19.4
1970–1971	68,470	33.71	2001	5,09,866	19.9
1975–1976	81,938	36.51	2002	5,15,832	20.6
1980–1981	1,32,650	47.70	2003	5,19,598	21.0
1985–1986	2,17,150	58.79	2004	5,21,403	21.2
1990–1991	3,32,401	83.63	2005	5,55,611	25.7
1995–1996	3,75,957	83.64	2006	5,67,020	27.2
2000–2001	4,12,574	83.29	2007	5,78,458	28.1
2005–2006	4,55,483	85.61			

Source: For rubber, Rubber Statistics, published by the Rubber Board of India (different years). For Tea, Tea Statistics published by the Tea Board of India (different years).

However, with the establishment of infrastructure facilities and the development of hitherto underdeveloped plantation areas, there was a large-scale migration of farmer families to these areas. Moreover, various promotional measures were initiated by the commodity boards especially oriented towards small holders. This led to increased participation of small holders in production plantation crops. The flexibility and economies associated with family-based production has also contributed to the emergence of small holder domination in the plantation sector (Hayami and Damodaran 2004). The growing importance of small holders is best illustrated by taking the case of natural rubber wherein the share of small holders in the total area under cultivation steadily increased from 21.8% in 1955–1956 to over 85% in 2005–2006 (Table 4). If the available evidence is any indication, during the last five years the share of holdings of less than 2 ha further increased to reach over 90% in 2010–2011. According to the estimates by the Rubber Board of India, the share of the estate sector in total area declined from 63% in 1950 to 10% in 2008. With a 10% share in area under cultivation, the share of large holdings in output is only about 7%, suggesting an inverse relation between farm size and productivity. In the case of tea, which is traditionally known for large estate-based production, also there has been an increasing trend in the share of small holders. From Table 4 it is evident that the share of area under small growers almost doubled from 14.5% in 1998 to 28.1% in 2007. It is also to be noted that the average size of holdings under small growers was only 0.79 ha in 1998 and this increased marginally to 1.03 ha in 2007. The message for our discussion is that the plantation is no more the forte of large estates but a source of livelihood for a large number of small and marginal growers.

2.1.3. *Plantations and balanced regional development*

As India is a country with greater diversities than most others, balanced regional development has always been a major concern of the planners. With recent evidence of growing inter-state and intra-state inequities (Joseph, Singh, and Abraham 2013), spatial balance in growth has emerged as one of the key agendas of inclusive development. Historically, the plantation sector has been considered as an instrument of modernization, as it helped the opening up of underdeveloped areas and in the creation of social overhead capital in such areas. However, even today,

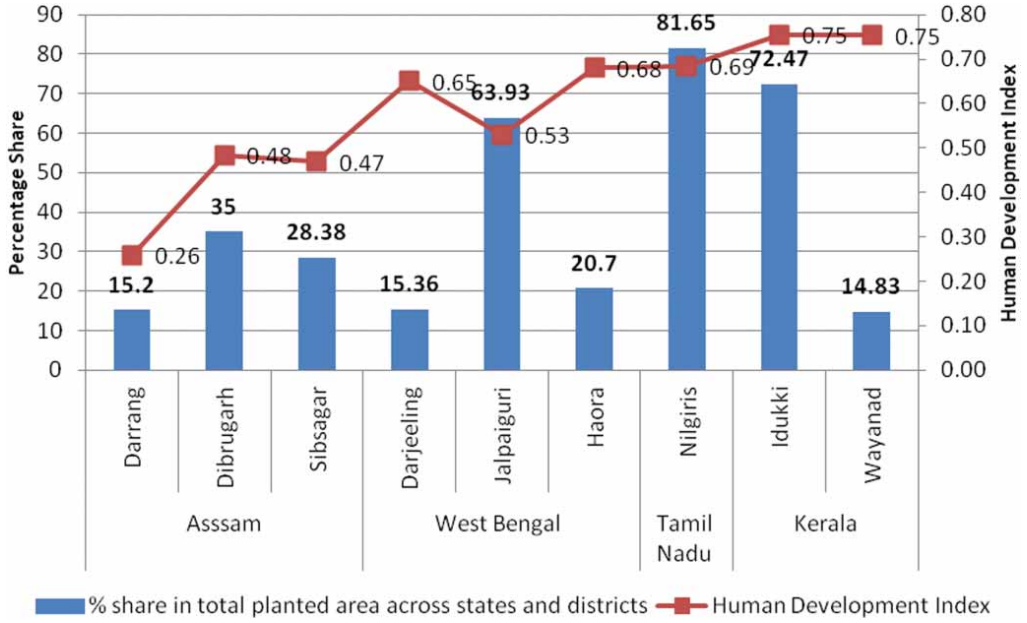

Figure 1. Human development indices of the states and the districts with tea cultivation.

infrastructure facilities in the plantation areas are limited and undermine the ability of the plantation sector to withstand import competition in the context of the removal of various barriers to trade (Das 2013). Plantation sector in the country is concentrated in the northeast states which are known to be backward and other states like West Bengal, Kerala, Karnataka and Tamil Nadu. Figure 1 presents the human development indices of the states and the districts with higher share of area under tea cultivation. It is evident from the figure that the human development indices of the districts with higher share of area under tea cultivation are relatively at a lower level. To be more specific in the state of Kerala two districts (Idukki and Wayanad) together accounts for over 87% of the total area under tea in the state and these districts have the lowest rank in terms of human development index. Hence, any strategy towards achieving spatial balance in development could hardly afford to ignore the plantation sector that is the main stay of development in some of the least-developed regions of the country.

3. Exclusions explored

In this section, we begin with a brief discussion on the major innovations in the plantation sector and explore the plausible forms of exclusion therein. Given its role as a foreign exchange earner, the plantation sector in India received considerable attention from the government during the post-Independence period. This was manifested in the establishment of an institutional architecture for innovations in the sphere of production and marketing (including trade) mainly to promote international competitiveness. This included, among other things, the setting up of commodity boards and legislations which empowered them to undertake various activities for plantation development. Thus, the Coffee Board was set up by an Act of Parliament in 1942, the Rubber Board under the Rubber Act of 1947 and the Tea Board in 1954 by the Tea Act in 1953. The Cardamom Board was set up in 1964 and later amalgamated with the Spices Export Promotion Council to form the Spices Board in 1986, with all the 52 major and minor spices under its purview. Agriculture is a State subject under the Indian constitution. However, on account of their role in export earnings (and import substitution, in the case of natural rubber), these

commodity boards come under the Ministry of Commerce of the Central Government and not under the Ministry of Agriculture.

There have been series of innovations – technological, institutional and organizational – relating to all aspects of plantation sector mainly at the instance of the commodity boards. These include various innovations in the sphere of production such as subsidized replanting/new planting schemes, certified nursery schemes and water harvesting and irrigation schemes, along with institutional arrangements for financing these innovations (Joseph and George 2010). In addition, research institutes have been established under all the commodity boards to undertake R&D on all aspects of the crops concerned. In addition, the Indian Council for Agricultural Research (ICAR) and state universities are also undertaking R&D for facilitating technological innovations relating to these crops. These institutes were instrumental not only in developing high-yielding varieties but also in evolving a new cultivation practices oriented towards increasing productivity. Moreover, an elaborate extension network has also been established at the instance of the commodity boards for the diffusion of R&D outcomes among the growers.

Institutional innovations in the sphere of marketing included the formulation of various rules and laws for regulating the functioning of different actors involved in marketing with a view to ensure a fair share for the producers in the consumer's rupee. Given the high instability associated with the price of most of the commodities, the marketing innovations also aimed at ensuring stability in prices and income for farmers (Narayana 1994). Institutional innovation related to the labour market was the enactment of the Plantation Labour Act (PLA) of 1951.[4] This Act dealt with the wages, working conditions and general welfare of plantation labour. Thus viewed, innovations in the plantation sector were not confined to technological innovations resulting from the research and development undertaken by the research institutes but also a series of institutional and organizational innovations for the promotion of production, marketing, international competitiveness and labour welfare. In the following section, we examine whether exclusion prevails in these innovations.

3.1. *Constitution of commodity boards: active exclusion and subordinated inclusion*

As already noted, commodity boards are the key organizations established with a view to deal with all the aspects relating to production, processing, marketing and R&D in plantation crops and protect the interests of the small holders and thus to foster inclusive development. However, the constitution of these boards itself appears to be not adequately inclusive. Let it us take the case of Rubber Board. Out of the 29 members in Rubber Board, there are 4 members representing large growers though they account for just 10% of the area and only about 7% of the production. The small growers, who account for nearly 93% of the production with 90% of the area, have only three representatives. This indicates the prevalence of exclusion which could be termed active exclusion as it resulted from the way the Rubber Act was formulated. It is also to be noted that the growers from the non-traditional areas like the northeastern states, where rubber cultivation is on an expansionary path, are not represented in the Board.

Incidence of active exclusion could be seen in the constitution of other commodity boards as well. In the case of tea, the small growers who account for over 28% of the total area under cultivation have no representation at all in the board. As per the Spices Board Act of 1986, the Spices Board has the mandate to deal with 52 spice crops. It has 32 members of whom 6 represent the interest of the growers. Of these, four members represent small cardamom. It is evident that large number of crops, including chilly, presently the largest export earner among the spices, has no representation indicative of the presence of active exclusion. The mandate of the Spices Board is also illustrative of subordinated inclusion for most spice crops. This is because the Spices Board is expected to deal with all aspects of cardamom, whereas in the case of other spices,

the Board is expected to help only trade promotion. Thus viewed, all the spices except cardamom are subjected to subordinated inclusion as the benefit of being included in the Spices Board is unequally distributed. How such an institutionalized exclusion influences innovation and production is an issue that needs further exploration.

3.2. *Exclusion in the sphere of research and development*

As already noted, every major plantation crop under the Ministry Commerce has at least one R&D institute to undertake research on different issues relating to the crop concerned. The Central Coffee Research Institute, established in 1925, undertakes research on coffee and the Rubber Research Institute of India, established in 1955, undertakes research on rubber. Research on spices by the Spices Board, confined mostly to small cardamom and large cardamom, is undertaken by the Indian Cardamom Research Institute (ICRI) established in 1978. Tea research is undertaken by the three tea research institutes, namely Darjeeling Tea Research and Development Centre; Tea Research Association and United Planters Association of Southern India-Tea Research Foundation. All these institutes undertake basic and applied research relating to plant breeding, agronomy, agricultural chemistry & soil science, plant physiology, pathology, entomology, post-harvest technology and other related issues. With a view to addressing the region-specific issues, regional research centres have been established by all the institutes. Though these institutes have much to claim in terms of developing new plant varieties, productivity improvements and post-harvest operations, spheres of exclusion appear to exist. It is noteworthy that the average salary of the scientists employed in these research institutes is lower than that of scientists with comparable qualifications either in the institutes under the ICAR or the university system in the country. It is therefore highly unlikely that the R&D system in the plantation crops is able to attract and retain the best scientists – a typical case of subordinated inclusion.

Each of these institutes is found engaged in areas from basic research to applied research, despite the fact that universities might have a comparative advantage in basic research while applied research could be better handled by these institutes. Notwithstanding the fact there is immense scope for interactive learning and cost/risk reduction in research through collaborative research among these institutes, such interaction hardly exists today. Given the resource constraints, the present strategy of spreading the limited resources too thinly across different activities along with limited commitment for interactive learning seems to have had the effect that the plantation sector has not emerged as a vibrant, knowledge-intensive sector (Joseph 2011).

The suboptimal outcomes of research by these institutes could be better illustrated by taking the case of Cardamom.[5] During the 1970s and 1980s, India's production of cardamom per hectare (yield) was only around 70 kg/ha as compared to 300–350 kg/ha in Guatemala which was a major competitor to Indian cardamom in the world market. Though the ICRI came up with different varieties of cardamom to achieve higher yield, the outcome was far from satisfactory. But thanks to a variety developed by a small holder, the average yield in Kerala at present has crossed 300 kg/ha (some growers even record yield levels as high as 600–700 kg/ha)[6].

While the plantation sector has the potential for evolving a vibrant learning innovation and competence-building system, through greater interaction across different research institutes within and outside the plantation sector such initiatives are yet to form the key agenda of commodity boards. This, in a sense, has led to the exclusion of the sector as it remains a backward sector devoid of much needed modernization and capabilities intensification. Hence, the challenge for the commodity boards is to emerge as the facilitators of interactive learning, innovation and competence-building while the present role of being the source of objects (read as subsidies) is relegated to the back seat.

3.1.1. *Innovations for promotion of production: subordinated inclusion and active exclusion*

One of the unique characteristics of the plantation crops is that, being perennial crops, there is a gestation lag between planting and harvesting which varies vary from one crop to another. These crops are also characterized by a yield cycle that involves broadly four phases, though the duration of each phase varies from one crop to another. In general, there is an initial pre-bearing phase followed by an early harvesting phase. During the third phase (which may be called the peak bearing phase), yield reaches the highest level. This is followed by the last phase wherein the yield declines. Since the age structure of the plants has a crucial bearing (along with other factors) on the yield and production, timely replanting is needed to maintain the age profile of the plantations in a way that the share of older plants is minimized. The planting subsidy scheme is a major innovation by the commodity boards to induce the growers to undertake timely replanting and to bring new areas under cultivation. The planting subsidy, both for replanting and new planting, is a fixed amount that varies from crop to crop and is disbursed in installments depending on crop characteristics like the gestation lag and cost of cultivation.

In the sphere of innovations for production and promotion, exclusion appears to take place in terms of selection criteria for the eligibility to receive planting subsidy which could be considered as active exclusion. Planting subsidy for spices is provided mainly for cardamom and to a limited extent, for black pepper. Thus, a large number of crops, which have more small holder participation intensity and export earnings higher than cardamom, are excluded from the planting subsidy altogether. The subsidy is provided only to growers having lands with title deeds. However, for historical reasons, a large number of small holders who cultivate cardamom and tea, for example, do not have a title deed for the land they cultivate and are therefore excluded from the planting subsidy. In the case of natural rubber, the Board has certain clearly laid-out planting protocols for disbursing the planting subsidy. A major stipulation, with the benign objective of achieving higher productivity, is that the grower should resort to mono-crop culture. If the growers resort to mixed cropping in order to spread risk or for other reasons, it will result in exclusion from the subsidy scheme – another case of active exclusion which could be addressed if the provision of subsidy is based on the number of trees planted rather than the area cultivated.

The underlying objective of the subsidy scheme is to ensure the higher productivity levels by inducing farmers to undertake new planting or replanting on time. The subsidy provided compensates the growers for their loss of income during the pre-bearing period and thus acts as an inducement for planting. The present system of subsidization, however, is leading to subordinated inclusion. As of now, the subsidy is provided *expost*. The growers are expected to invest first and a part of the cost incurred is reimbursed in the form of subsidy. In such a context, growers who are not able to invest initially in planting are excluded, yet another manifestation of subordinated inclusion.

3.3. *Exclusion in marketing innovations*

Institutional innovations in marketing vary from one crop to another[7] and a careful examination of the present system reveals the existence of the multiple forms of exclusion. In the case of cardamom, innovations in marketing took the form of an auction system where the products offered for sale by growers are auctioned individually. The auction procedure as well as the entry of different actors in market like auctioneers and bidders was regulated by the Cardamom (Licensing and Marketing) Rules (1977) of the erstwhile Cardamom Board. However, an earlier study (Joseph 1985) has shown that the auction system has not been effective in ensuring reasonable prices for all the growers as the price received by the small holders has been found to be significantly lower than that obtained by the larger holders (Table 5). This could be considered a typical case of subordinated inclusion.

Table 5. Price variation across different lot sizes sold under the conventional auction (Rs/kg).

	1979–1980		1980–1981		1981–1982		1982–1983		1983–1984	
Size class (kg)	Peak season	Lean season	Peak season	Lean season	Peak season	Lean season	Peak season	Lean season	Peak season	Lean season
0–20	145.01	86.45	80.17	69.15	106.07	101.82	137.23	187.04	362.1	346.28
20–40	159.93	88.77	91.89	76.79	109.74	112.82	140.83	174.87	346.98	363.46
40–60	169.23	96.31	100.5	94.81	118.6	119.79	143.61	182.7	353.12	375.75
60–100	174.25	100.39	108.26	89.84	124.45	122.45	149.5	185.21	351.89	385.26
100–150	178.87	116.3	120.76	109.23	134.02	132.12	148.73	213.99	372.68	412.41
150–200	179.51	135.8	127.76	111.38	135.07	135.42	152.84	202.85	363.88	408.72
200–250	185.76	136.5	132.87	113.59	136.35	138.6	153.81	187.58	359.06	421.08
250	187.49	142.63	133.56	129.61	132.84	158.44	168.49	202.67	387.65	426.99
Price difference	29.29	64.99	66.60	87.43	25.24	55.61	22.78	8.36	7.06	23.31
Production (MT)	4500		4400		4100		2900		1600	

Source: Joseph (1985).

Note: Price refers to average price and price difference refers to the difference between the price of smaller and larger lots (%). Peak season: September and October; lean season: February and March.

With the introduction of an e-auction system at the instance of the Spices Board, the situation seems to have undergone major change. An analysis of the price formation in e-auctions using data from two auction centres (Puttadi in Kerala and Bodinaikannur in Tamil Nadu) during 2009–2011 indicates no evidence of such price discrimination as the price variation across different sizes of lots sold through e-auction reduced considerably. For the whole data, the estimated model indicated that the price realized in the auction has a negative (and statistically significant) relationship with the lot size and a positive relationship (statistically significant) with the number of bids (indicating the extent of competition) made per lot (Joseph 2012). Going by this evidence, it could be inferred that innovation in the form of e-auction by harnessing information communications technologies appears to have helped by addressing the subordinated inclusion that prevailed.

Yet, active exclusion still appear to prevail because of certain provisions built into the institutional innovations in marketing that excludes the small growers from the auction system and forces them to approach the village traders. For example, the payment for the output sold through the auction is made only after 14 days.[8] This in turn deters small holders without waiting power from entering the auction market and could be treated as an example of active exclusion. Another case of active exclusion arises on account of the practice of taking a fixed quantity (500 g)[9] of sample from all the lots regardless of the size of the lot pooled for the auction, as laid down by the Cardamom Marketing Rules. This in turn reduces significantly the effective price received by the small holders and they are forced to approach the exploitative village traders for disposing of their output. Further, the access to e-auction is limited to growers with the cardamom registration certificate which is issued only to the growers having title deeds for the land that they cultivate. As already noted, a large number of small holders do not have title deeds for the land on which they grow cardamom and therefore are excluded from the e-auctions.

3.4. *Labour market innovations: a case of illusive inclusion*

The paper now turns to reviewing institutional innovations in the labour market and investigates whether these have resulted in inclusive social and economic outcomes. The major institutional innovation in the labour market, aimed at the welfare of plantation labour, is manifested in the PLA of 1951. The Act is administered by the State Governments and is applied to any land used as plantations, which measures 5 ha or more in which 15 or more persons are working. The State Governments are however free to declare any plantation land less than 5 ha or with less than 15 workers to be covered by the Act. The Act stipulates that plantations covered under the Act shall provide medical facilities for the workers and their families as may be prescribed by the State Government. The Act also provides for the setting up of canteens, crèches, recreational facilities, suitable accommodation and educational facilities in the plantations for the benefit of plantation workers. There is also provision for the supply of woolen clothes in plantations located in cold climates.

For the planters, the cost of providing labour welfare (social cost) is a double-edged sword. On the one hand, they have to incur an additional burden to meet the cost of the labour welfare.[10] This certainly eats into their profits. On the other hand, the welfare provisions of education, health and other facilities would capacitate the workers and their families such that these workers and their next generation may not be ready to continue as plantation workers. Hence, these provisions may act as a potential deterrent to labour supply and deplete the existing stock of labour as well. Given these problems, the planters are hesitant to adhere to the PLA leading to a situation of illusive inclusion. Empirical evidence for such illusive inclusion is evident from the poor compliance levels by the estates. The total

Table 6. Estates submitting returns in the total number of estates covered under PLA (%).

States	1999	2003	2006	2010
Assam	88.2	72.8	71.6	75.3
Himachal Pradesh	47.4	22.7	40.9	87.5
Karnataka	22.8	36.5	15.4	14.2
Kerala	77.6	75.7	58.6	64.6
Tamil Nadu	73.4	82.5	81.7	NA
Tripura	34.2	28.9	75.8	56.6
Uttarakhand	100	100	55.6	NA
West Bengal	68.1	65.8	NA	68.4
Andaman & Nicobar	100	NA	100	100
India	54.9	62.9	46.7	38.5

Source: Labour Bureau, Ministry of Labour and Employment, Govt. of India.

numbers estates registered under PLA increased from 3814 in 1999 to 4039 in 2010. However, the percentage of estates submitting returns as per PLA during the same period declined from 55% to 38.5% with significant variation across states (Table 6).

Table 7 presents the results of a survey (Government of India 2009) of 132 estates (47 from tea, 34 from coffee, 33 from rubber and 18 from cardamom) out of 1655 estates submitting returns regarding the compliance of PLA by the estates. To the extent that the survey was conducted among those estates submitting returns the actual situation might be much different from what is presented in the table. Yet it is evident that for the plantation sector as a whole, only less than 50% of the estates are providing medical and educational facilities. The table further provides evidence for the poor compliance with other welfare facilities specified in PLA. However, when it comes to housing and maternity benefits the compliance level is higher at 77% and 73.5%, respectively. Though it is difficult to draw definite conclusions on the bearing of PLA on the living and working conditions of plantation labour from the limited data presented in the table, a recent study presents some evidence of illusive inclusion. Drawing from a Primary survey, Thappa (2012) highlighted the human development status in terms of educational attainments and health status of the plantation workers classified as permanent, casual and self-employed

Table 7. Compliance of the provisions of PLA by the estates registered under the PLA.

	Percent of estates providing in				
Select provisions of PLA	Tea	Coffee	Rubber	Cardamom	Total
Medical facility	89.4	14.7	33.3	33.3	48.5
Creche	76.6	14.7	18.2	11.1	37.1
Education facility	40.4	–	9.1	–	16.7
Housing	97.9	70.6	69.7	50.0	77.3
Maternity benefits	91.5	73.5	66.7	38.9	73.5
Other welfare facilities					
Drinking water	78.7	11.8	84.6	–	64.4
Washing	36.2	2.9	48.5	–	25.8
Urinal	10.6	2.9	21.2	–	9.8
Latrine	10.6	2.9	21.2	–	9.8
Rest shelter	46.8	0.0	30.33	–	25.0
Recreation	31.9	0.0	21.2	–	16.7

Source: Government of India (2009).

workers (small growers). The study observed relatively lower level of educational attainments for the children of permanent workers as compared to those of casual workers and self-employed workers. Further a higher percentage of permanent workers have poor health status and suffered from major ailments in the last two years from the year of survey (Thappa 2012). This outcome needs to be seen in the context of an institutional innovation that enabled the state to shy away from its prime responsibility of facilitating human development in general and learning, innovation and competence-building, in particular, of plantation workers by entrusting such responsibilities to the private estates for whom the competence-building of plantation workers is inimical to their own interests.

4. Concluding observations

It appears that since innovations – technological, institutional, organizational and others – are the driving force in the development process, achieving inclusive development requires that the underlying systems of innovation has to be inclusive. For evolving an inclusive innovations system there is the need for locating the factors that give rise to the genesis and sustenance of different spheres of exclusion at the national, regional or sectoral levels. Building on the taxonomy of social exclusion developed by Amartya Sen, this study articulates new conceptual categories such as subordinated inclusion, illusive inclusion, sustained exclusion and transient exclusion and examined the relevance of these conceptual categories in India's plantation sector.

The innovation system in India's plantation sector emerged in a period when the plantation commodities were important items the country's export basket. With the emergence of a more diversified economic structure, the importance of this sector as an export earner declined significantly over time. Yet the present study presents empirical evidence to suggest that the plantation sector is a key sector in India's inclusive development strategy being upheld today. This is on account of its high labour intensity, especially of women labour, bearing on the livelihood of small and marginal holders and potential to facilitate balanced regional development on account of its backward area focus. There is hardly any sector in India wherein all these dimensions coincide while facing intense competition under globalization from desperate exporting countries with a very limited domestic market.

Innovations in the plantation sector were aimed at promoting international competitiveness and protecting the interests of plantation workers and small holders. Yet, the innovation system as it exists today has multiple spheres of exclusion. The active exclusion along with subordinated inclusion prevails in the organization of commodity boards, institutional innovations for the promotion of production and innovations in the sphere of marketing. Examination of labour market innovations and research institutions provided evidence that illusive inclusion in labour markets and subordinated inclusion from the knowledge generation and diffusion responsibilities of the R&D labs result in the continuous subordination of this sector to others in the national innovations infrastructure. While the innovations, mainly oriented towards the small holders and workers, were intended to foster inclusive development multiple forms of exclusions emerged and sustained. For fostering inclusive development, the challenge, therefore, is to address the observed forms of exclusion through facilitating interactive learning, innovation and competence-building process at the level of organizations and individuals. This study is by no means exhaustive of all the forms of exclusions in the innovation systems. However, through developing new concepts that describe exclusion, even if unintended, this paper has highlighted different forms of exclusion in the India's plantation sector, with possible relevance to innovation systems at different levels, that policies could redress to facilitate inclusive development.

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Notes

1. It is, however, important to note, 'Technologies cannot be taken off the shelf and simply put into use anywhere. Without infrastructural investment in education, training, R&D and other scientific and technical activities, very little can be accomplished by way of assimilation of imported technologies' (Freeman 2011).
2. Please note that the data presented in Table 2 presents only a partial picture as it refers only to those plantations coming under the PLA (1951).
3. The average size of operational holdings in India has diminished progressively from 2.28 ha in 1970–1971 to 1.55 ha in 1990–1991 to 1.23 ha in 2005–2006. The proportion of marginal holdings (area less than 1 ha) has increased from 61.6% in 1995–1996 to 64.8% in 2005–2006. This is followed by about 18% small holdings (1–2 hectares), about 16% medium holdings (more than 2 to less than 10 ha) and less than 1% large holdings (10 ha and above) (Government of India 2012).
4. For a discussion on varied state initiatives undertaken at the instance of commodity boards like Rubber Board and the Spices Board, see Joseph (2010) and Joseph and George (2010).
5. This is not to underplay the achievements of the research institutes under the commodity boards. For example, thanks to the new clones developed by the Rubber Research Institute of India, the productivity of natural rubber in India is the highest in the world.
6. This variety, Njallani Gold, named after the small holder who developed it, accounts for over 85% of the area under cultivation in Kerala. The small holder, Joseph Njallani, was awarded an innovation award by the National Innovation Foundation in 2001.
7. In the case of coffee, the market intervention in the earlier period took the form of monopoly procurement where only the Coffee Board was entitled to purchase coffee from the growers (Indira 1993). Incidentally, such market innovations have been adopted in other developing countries as well. In Brazil, for example, the Brazilian Coffee Institute under a high ranking Government Minister carried out the intervention; in Colombia, the Federation of Coffee growers was the body which bought coffee from the producers. In Uganda, Kenya and Tanzania, like in India, government-controlled marketing boards were the sole buyers of coffee from producers (Mwandha et al. 1985 as quoted in Narayana 1994).
8. We understand that one of the auctioneers, of late, has started spot payment.
9. To get an idea of the loss to the farmers by way of taking sample, it may be noted that the price per kilogram of cardamom was as high as Rs 1800/kg in 2010.
10. For a detailed discussion on PLA and the social cost in a historical perspective, please see John and Mansingh (2013).

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