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Publication of ***Artha Beekshan***, the quarterly referred journal of Bangiya Arthaniti Parishad, that is, the Bengal Economic Association, is one of the most important academic activities of the Association. The present volume, **Volume 27, No. 2** of the Journal, is published containing the selected papers contributed by scholars . We are thankful to the authors and members who have helped in one way or other in the preparation of this volume.

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I would like to extend my whole-hearted thanks to the Editorial team, the Publisher, and all who have helped in the publication process, and especially the office bearers of Bangiya Athaniti Parishad for their kind endeavours to make this issue of **Artha Beekshan** viable and **Kolkata Mudran** for bringing out the present issue.

Editor in Chief

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ASHOK MITRA, THE ECONOMIST

Abhirup Sarkar*

Abstract

This paper is a tribute to late Professor Ashok Mitra who has made pioneering contributions to the study of structuralist macroeconomics in general , and political economy of inter-sectoral terms of trade in the Indian economy in particular during the 1970s and afterwords.

Keywords :Terms of Trade, Demand Problems for Indian Industries, Income Distribution.

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The recently deceased leftist economist Ashok Mitra is remembered by his admirers more as a leftist than as an economist. After he had voluntarily given up active politics, his popular writings were the main vehicles through which he communicated with the masses. His regular columns in dailies and periodicals and less frequent pieces in Bengali little magazines had a sizeable set of dedicatedreaders who not only cherished his lyrical prose but appreciated his rage and derision against social wrong-doings.They also adored his obstinate leftist self which, every now and then,raised its angry head through his writings.Many of his readers were aware that Ashok Mitra had the lineage of Jan Tinbergen, the first Nobel laureate in economics.Many also knew that he was once the Chief Economic Advisor of the Union Government and had served as the Chairman of the Agricultural Price Commission. For his followers, these identities were enoughto hold him in awe.It was neither necessary nornatural for the common reader to ask exactly how his contributionsenhanced the understandingof the Indian economy, or whether he had any contribution at all.

Notably, the academic community, except perhaps a few of his very close associates, has also remembered Ashok Mitra primarily for his newspaper articles. For example, celebrated social scientist Partha Chatterjee, in a recent open letter, has categorically classified him as a journalist, albeit a good one. One can, of course, argue that there is no dishonor in getting identified as a good journalist, but still it seems odd and certainly unfortunate that an economist of such a noble decent should be remembered merely for his newspaper columns.

Ashok Mitra had never been a prolific researcher though. He did not publish more than a couple of books in pure economics. His presence in academic journals, conference volumes or professional anthologies was hardly visible. Supported by a fellowship from ICSSR, he

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worked on his last and certainly the most important research monograph, *Terms of Trade and Class Relations*, during 1972-1975. The book came out two years later in 1977. Since then he had trodden uneven paths ¯ indulged into full-time politics, served as the finance minister of West Bengal, served as a member of the Rajya Sabha, had written piercing post-editorials, passionate reminiscences and creative literary appreciations ¯ but had never come back to research again. There are several instances of history where research, poor in volume but rich in quality, has gained fame and permanence. Could we put Ashok Mitra's research in that category?

When Ashok Mitra was writing his book, the industrial sector of the Indian economy was going through a period of long recession. Ashok Mitra's immediate concern was to find an explanation of this. There was a traditional explanation which pinned down the problem to lack of capital. It was believed that a poor country like India could not save much and therefore was unable to accumulate capital at the desired rate. This, in turn, led to a scarcity of productive resources which was taken to be the main factor responsible for sluggish industrial growth. The prescription for coming out of this stagnation was to save and accumulate more capital.

Based on this understanding, the country embarked upon a massive programme of public accumulation since the inception of the Second Five Year Plan. What could not be achieved through private enterprise had to be taken up by the state. Consequently, heavy industries including giant steel plants, dams generating hydro-electricity, colossal establishments producing atomic energy were all installed under state initiativewith the objective of relaxing supply side constraints to the growth of the industrial sector. Unfortunately, in spite of all these endeavors, the industrial sector remained stagnant.

In 1970, Amiya Bagchi, in a pioneering paper, observed that throughout the country, production units are running on huge excess capacity, firms are piling up unsold inventories, especially in mass consumption goods, and the pace of private investment is faltering. The problem, therefore, is not with the supply side, but with effective demand. For the first time attention was shifted from supply to demand and that in itself was an important step to understand the structural problems of the Indian macro-economy.But it begged an obvious question: why is demand for industrial goods deficient in a country like India? In his 1975 paper, Amiya Bagchi offered a list of possible reasons. The list was somewhat long and included a host of factors like unequal income distribution, lack of product and process innovation, weak agriculture. The list seemed too long to satisfy either the practitioner or the theorist. For the practitioner the most important thing was to distinguish major issues needing immediate attention from relatively minor ones which could be ignored for the moment.The theorist needed a rigorous framework through which lack of demand for industrial goods could be understood.

During the course of the next two decades or so a well-accepted theoretical framework did emergeto analyze the problems of sluggish industrial growth in a country like India. Several bright minds and a good amount of research effort had gone into this. But we shall argue that the basic structure which emerged was not only anticipated but quite clearly spelt out by Ashok Mitra in his 1977 book.

To comprehend the demand problem it was first necessary to understand whether the problem was internal to the industrial sector or externally imposed on it. For Keynes the demand problem was internal, originating from a lack of investment expenditure by pessimistic firms. This hardly seemed to be the case in India in the sixties and the seventies. Here installed capacity was so low that it had the potential to be fully employed andthe lack of private investmentwas substituted by public expenditure. Yet excess capacities were widely visible. The answer to this puzzle seemed to lie outside the industrial sector and so it was necessary to add some additional structure to the theoretical construct of Keynes.

Michal Kalecki, who was also primarily concerned with the effective demand problem, in his 1955 insightful paper titled *The Problem of Financing of Economic Development*had identified agricultural output, apart from industrial demand, as one of the constraining factors for a developing economy. To fully understand the demand problem of the Indian industrial sector, it was, therefore, necessary to look at the agricultural sector.

In *Terms of Trade and Class Relations,* Ashok Mitra did exactly that. He observed that between the years 1961-62 and 1973-74 two important trends emerged in the Indian economy. First, during this period, the rise in industrial prices had been outstripped by the rise in agricultural prices leading to a steady movement of the terms of trade in favour of agriculture and against industry. Second, during the same period, growth of agriculture had remained above that of the industrial sector. For example, between the years 1965-66 and 1970-71 while agricultural output had increased by 25%, industrial output increased by 20%. From these observations Ashok Mitra came to the conclusion that the secular movement of the terms of trade against the industrial sector was the main cause of industrial stagnation.

The mechanism through which it happened was clearly spelt out by Mitra. Since demand for food is inelastic, a rise in food prices compelled industrial workers to spend more on food. A rise in expenditure on food reduced expenditure on industrial mass consumption goods, which, in turn, reduced the demand for these goods leading to industrial stagnation. But what about the industrial demand coming from the agricultural sector?A rise in agricultural prices ought to increase agricultural income and normally a part of this income should flow to the industrial sector creating demand for industrial goods. This would indeed be the case if agricultural markets were competitive and prices in the agricultural markets were determined by free demand and supply forces. Clearly that was not the case. During the period under

consideration, a rise in the relative price of agriculture was accompanied by a relatively higher growth rate of agriculture, which ran counter to a simple demand-supply argument.Ashok Mitra pointed outthat the agricultural market was distorted and the fruits of favorable prices were *designed* to be enjoyed only by the large farmers of the country. More specifically, on the pretext of giving support to the Green Revolution,the union government set procurement prices of food grains at unreasonably high levels and kept on accumulating stocks. This also protected agricultural prices in the free market from falling. Large farmers of Punjab, Haryana and Western Uttar Pradesh reaped the benefits of this procurement policy. On the other hand, small and marginal farmers suffered because they typically sold their produce to large traders immediately after the harvest at pre-contracted low pricesto repay their outstanding loans andlike agricultural workers, they also had to buy from the market at high prices after the busy season was over.Since the benefit of high prices did not percolate to the marginal and small farmers or to the agricultural workers but actually became a burden for them, increasing their food bill and reducing their expenditure on industrial mass consumption goods, industrial demand coming from the agricultural sector did not grow either. Of course, incomes of large farmers and traders were increasing. But this category of income earners spent mainly on luxuries which had a small market and a limited employment generating capacity. So it was not possible to have an industrial take-off based on luxury production alone.

Ashok Mitra's hypothesis was well-accepted by the academic community in the nineteen seventies. Parts of the argument may seem familiar today, but they were novel and fresh four decades back.Unfortunately, however, Mitra's explanation of industrial stagnation gradually started fading out from the collective memory of economists and practitioners. One can think of two reasons behind this. First, from 1974 the terms of trade between industry and agriculture exhibited a reverse trend, that is, it moved gradually in favour of industry and against agriculture. So much so that by 1984, the terms of trade had almost reached its 1961-62 level, the level from which Ashok Mitra had started his observations. Since 1984, neither a rising nor a falling trend is visible in the terms of trade movement. In other words, deteriorating terms of trade for industry was no longer an empirical reality.

Second, though he had all the ingredients of expressing his ideas in terms of a mathematical model, Ashok Mitra chose to confine himself to strictly verbal arguments. Posterity did not kindly take to this. The generation which followed witnessed mathematical modelling not only as the dominant style or technique but as an absolute necessity. However stupid it may sound, it is probably true that if Mitra had written down his ideas using a few symbols and equations, they had a better chance of being remembered.

Yet his ideas were pioneering.What emerged as the dominant macro model of a less developed economy, had much in common with Ashok Mitra's ideas. A 1977 unpublished but well-

known working paper of the Indian Statistical Institute by Arup Mallik, which put together a mathematical modelof a demand constrained industrial sector a la Kalecki and a supply constrained agricultural sector, used exactly Mitra's arguments to develop a mechanism through which food prices affected industrial demand. The same mechanism is used to establish the link between industry and agriculture in another elegant and well-known paper by Amitava Bose. Indeed, a whole bunch of other macro modelswere written on a similar vein which recognized agricultural production as a major constraining factor.Unfortunately, nowhere in the literatureAshok Mitra's work is cited.

One may admit that due to lack of empirical support, the deteriorating-terms-of-trade explanation of industrial stagnation does not hold much ground.But one must also realize thatagricultural outputs and prices continue to be important determinants of industrial growth in India, as was perceived by Ashok Mitra. Even today, the quality ofthe monsoon has its effect and toll on industrial demand which points to the fact that in Indiaone cannot, as yet, think of industry without thinking about agriculture. Ashok Mitra was a pioneer in conveying this basic message and while doing so he thought like an economist. Let us remember him as one.

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Announcement : 39th Annual Conference of Bangiya Arthaniti Parishad(Bengal Economic Association)

The 39th Annual Conference of Bangiya Arthaniti Parishad(Bengal Economic Association) as a National Conference , shall be organized by Deshbandhu College for Girls, 45 C, Rashbehari Avenue, Kolkata-700026 during March 9-10 , 2019. The Focal Theme of the Conference is Education, Bio Diversity and Sustainable Development , and Inclusive Growth in India.There shall be four technical Sessions (a)Education, Learning and Development,(b)Bio –Diversity and Sustainable Development,(c)Inclusive Growth in India; and (d) Challenges before Indian Industries.

Registration Fee :Rs 800/ for Members of Bangiya Arthaniti Parishad, and Rs 1000/ for Non-Members.

Call for papers:Papers along with Abstracts in MS Word/PDF to be submitted by 31st January, 2019 to President Bangiya Arthaniti Parishad at bchatterjee.presidentbea@gmail.com. Selected papers shall be published in the Conference issue of the quarterly referred journal Artha Beekshan.

Artha Beekshan, Volume 27, No.2, September 2018

Robert Torrens and the Rise of Classical Political Economy*

Alaknanda Patel

I feel greatly honoured that you have elected me as the Conference President of the Bengal Economic Association this year, and I do thank you for it. The

BEA has a special meaning for me because from the very start, the Patel-Dasgupta family has been associated with it. But it is a most daunting task to give this address here, specially when I think of my predecessors like Professor S.N. Sen, Professor A.K. Dasgupta and other eminent economists, some of whom were also my teachers. Because it is daunting it is challenging; that makes it worrisome but also enjoyable. So, here I am, with yet another story from the days of Classical Political Economy: Robert Torrens and his milieu. Ever since I wrote on Edward West, I had a wish to write on his contemporary, Torrens. Thank you for giving me a chance to do so.

Robert Torrens is not a familiar name to students of economics. Since most books on the history of economic thought pass him by, even to students interested in this field he is not a figure in the limelight. Yet in the early 1800s Robert Torrens, along with T.R. Malthus and David Ricardo, was one of the three major theoreticians in the field of classical political economy, stalwarts who discovered

new theoretical tools to devise a fresh roadmap for Great Britain's continued growth. Theorists, yes – their main intent was economic theory – but theory and policy went together; the ultimate objective was to recommend economic policy with a solid theoretical basis. On Torrens, Lionel Robbins comments, "although he loved abstract speculation, most of his propositions were developed in the course of debates having some bearing on contemporary policy."[1]

I first came across the name Robert Torrens when I was working on Edward West and looking at the Corn Law Pamphlets. A word about these pamphlets. Laws regarding import and export of corn and their effect on the domestic market were extremely important to the British economy. As the price of corn had been steadily rising since 1808, in 1813 the House of Commons appointed a Select Committee to evaluate the existing Corn Law of 1804 and suggest changes if necessary. The Committee alleged that the price of corn was high because imports had been encouraged and exports restrained. It recommended a high duty on the import of corn.

In the month of February, 1815, Thomas Robert Malthus, Edward West, David Ricardo and Robert Torrens – the last two on the same day, February 17 – published, independently of

*Presidential Address int he 38th Annual Conference of Bangiya Arthoniti Parishad at Bijoy Krishna Girls' College, on February 17, 2018

one another, five remarkable Essays (or Pamphlets)[2] opposing the Committee's proposed policy. The matter was coming up for discussion in the Parliament in March 1815; hence the rush to bring to attention the drawbacks of the move.

This was not simple protest literature. Taking forward the received wisdom from Adam Smith with new concepts like territorial division of labour, law of diminishing returns and theory of rent, a fresh look at the inter-relationship between wages and profit, they analysed why the policy of a high import duty on corn would be detrimental to the British economy and why universal, unilateral free trade should be the policy to ensure economic growth.[3] The pamphlets were a milestone in the evolution of classical political economy.

In the event these scholarly essays did not cause any ripple and a restrictive Corn Law was passed on March 10, 1815. Despite continued pressure from liberal intellectuals, it was not repealed till 1846. But with T. R. Malthus, David Ricardo and Robert Torrens leading the charge as participants, contributors and theoreticians, the pamphlets marked the inception of a series of theoretical works and searching questions on political economy that travelled through smooth and rocky terrain in pages of books, newspapers, memoranda, petitions and, most of all, at the dinners of the Political Economy Club, a remarkable institution that was started in 1821 and continues till today.

At first read what seems unusual is that four thinkers had been concerned about the same problem at the same time; not only that, they had independently discovered the same analytical tools to arrive at similar answers. It is possibly one of the earliest, if not *the* earliest example in economics, of what is today well known as 'multiples'. While that is not today's subject, tied up with multiples is the issue of priority, which had been a matter of debate among the authors of the Corn Law Pamphlets – a debate that continued well into the twentieth century.

Other than Malthus, the authors were not professional economists: Ricardo was a successful stockbroker; West, a successful barrister; and Torrens, a gallant officer in the Royal Marines, a decorated hero of the Napoleonic Wars. They were all unusual participants in the field of political economy but Robert Torrens' lifelong dedication to economics, against the backdrop of a military career, I found most striking. Completely self-taught in political economy, he devoted fifty years of his life writing intensely on different issues of the subject, whether value and distribution, monetary policy, commercial policy or the economic advantages of a policy of emigration to Southern Australia. I also found it enigmatic that Lionel Robbins repeatedly referred to him as a minor figure in classical political economy, yet wrote a book, *Robert Torrens and the Evolution of Classical Economics*, a book of 347 pages, where page after page he discussed and praised Torrens' priority, clarity, language and influence. As expected from a scholar of Robbins'eminence, Ricardian though he was, it is an extremely fair book. In what follows I will quote extensively from Robbins' book, and from Torrens himself; their original language has nuances that paraphrase cannot capture.

Son of a clergyman and born in Dublin, Ireland, in 1780, Robert Torrens joined the Royal Marines in 1796 at the age of sixteen years. He was on active combat duty during England's war with France and showed exemplary bravery in the particularly difficult battle at Anholt, receiving a 100-guinea memorial sword as an honoured award and eventually becoming Colonel Torrens. Always interested in reading, Torrens pursued his intellectual interests even in the distant shores of military duty. Professor George Pryme (possibly a friend) recalled, "He told me the origin of his introduction to the science, that being appointed to the command of some lonely place, he took with him the Wealth of Nations, and a few other books on political economy and there mastered the subject."[4] Whatever else he might have read, it was Adam Smith's *Wealth of Nations* that changed the focus of Torrens' life, just as the same book, picked up on a casual visit to London, turned David Ricardo from a successful stockbroker to a legend of classical political economy.

No private papers of Robert Torrens have come to light as yet. We have no way of knowing if any factor other than the influence of the *Wealth of Nations* prompted him to become a political economist. Nor is there any way of knowing how he met the leading British intellectuals of the time and became such an integral part of their circle.

Torrens' first book, *The Economists Refuted*, was published in 1808 and *An Essay on Money and Paper Currency* in 1812, both while he was on active military duty.[5] How arduous it was to write during army duty is described by the author in the Preface of the second book: "assuming the command of the Marine Battalion garrisoning Anholt, he [the author] found that the requisite attention to the detail of military duty was peculiarly hostile to those habits of patient investigation, which, on less active service, he had delighted to indulge. The execution of his work was, therefore, necessarily suspended, until the winter setting in with severity, threw round the shores of Anholt an impregnable barrier of ice. … It was written with great rapidity, and under the influence of unusual ardour and emotion. It was meditated during midnight walks, and distant journeys, indited at inns, and on shipboard, and completed in the Irish Channel on board the Dorset Yacht".[6]

Later in that year of 1812 Torrens retired from active combat duty, though not from the Royal Marines, and moved to London, immersing himself in matters of political economy. It was only in 1834 that he fully retired from the Marines. "Quit of the obligations of active service, he seems to have thrown himself into the activities of Radical and Whig intellectual life in London"[7] and soon became an integral part of the core group of liberal thinkers there who were deeply involved in issues pertaining to economic policy, specially in setting that policy on a firm footing of economic theory.

By 1815 Torrens had "established his position as a leading thinker on questions of political economy."[8] His stature was such that at the first meeting of the Political Economy Club on

April 30, 1821, Robert Torrens was asked to take the Chair.[9] Members present at that meeting included T. R. Malthus, James Mill, David Ricardo, Thomas Tooke, among others. All free traders, it is interesting that not many members of the Club were professional economists; but then in those days economists came from a wider circle of thinkers, not necessarily with a specialisation in economics.[10] At the exclusive Club even acceptance of a question was considered a matter of prestige. The three questions accepted for discussion at that first meeting were from T. R. Malthus, S. C. Holland, and from Colonel Torrens.

On December 17, 1818, Torrens was made a Fellow of the Royal Society (FRS), a unique honour for an economist.[11] In 1826, and again in 1831, he was elected to the House of Commons and was very active in the debates on

Parliamentary Reform, Bank Reform, Commercial Policy and other economic issues.[12]

Torrens was a prolific writer. Lionel Robbins lists 83 items: books, mainly on political economy, almost all of over 300 pages, as well as two on the 'Catholic Question' and two not particularly memorable novels; a large number of petitions; letters (not personal); important newspaper articles, some of which came out in book form later; and speeches made in Parliament during the periods he was a member of the House of Commons. The list includes multiple editions of the same book, because they were not repeats; with a good deal of new material and fresh thinking and extension of earlier ideas, later editions often read like new books.

For someone so prolific it is not possible to summarise all Torrens' thoughts; I will confine myself to his main contributions, specially where he has 'priority' or at least 'subjective originality', to use Schumpeter's term. This is especially important in the case of Torrens. There was an overarching shadow of Ricardo in the intellectual air of the times which prevented Torrens' originality from being recognised throughout the 19th century. It was only E.R.A. Seligman's article in 1903[13] that revived Torrens from oblivion. Later, with Jacob Viner[14] and then Lionel Robbins' extensive research, Torrens' contribution and priority have been assessed in a fair way.

Torrens's interests and contribution during his long intellectual life of about half a century can be divided into two parts. In the first part, say between 1808 and 1830 or so, his interest lies in what we generally consider as basics in classical political economy, i.e., theories of production and distribution. This is where the priority question is mainly centred.

For the second period his interest shifts from pure abstruse theory to money and banking, where he along with a few others propagated the Currency Principle, which led to the Bank Act of 1844. In 1847, and again in 1858 when there was a possibility of the repeal of this Bank Charter, he wrote extensively defending the Charter. His successive analyses towards keeping the Bank Act "in the end became the largest and in some ways his most impressive

treatise,"[15] writes Lionel Robbins. From the 1830s onwards Torrens also became "an active exponent of the so-called system of self-supporting Colonisation"[16] and over the years became deeply involved with plans for emigration to Southern Australia. As always, he created theoretical models to support this move. While these later contributions are major, I will leave them here.

Torrens's first book, *The Economists Refuted*, is a clear, rather charming tract that was a reaction to William Spence's book, *Britain Independent of Commerce*. The maiden work was well received. The Critical Review said, "This is the production of a candid, penetrating and reflecting mind. The reasoning is close, perspicuous, and acute. We heartily recommend the present admirable production of Mr. Torrens."[17] A critic for the Annual Review wrote, "In the difficult science of Political Economy he is further advanced by a considerable progress than many who hold their heads extremely high."[18] Spence had put forth the Physiocratic thesis that since a country's wealth came only from agriculture, Napoleon's Continental System of closing all European ports to British trade would make no difference to the growth of British economy. Torrens was a committed soldier and the idea of economic independence pleased him but the economist in him could not accept this optimistic outlook.

The extended name of this book, *The Economists Refuted, or, an Inquiry into the Nature and Extent of the Advantages Derived from Trade*, is revealing. With various examples Torrens first shows that agriculture is not an absolute necessity for production of wealth, and goes on to emphasise the importance of international trade, whatever kind of economy there may be. Commercial arrangements lead to superior technical efficiency. "The *act* of exchanging", he says, "does not, indeed, bring wealth into existence," but "the *expectation* of exchanging gives rise to divisions of labour, which multiply, to an immense extent, the articles that supply our wants and gratify our desires. Prohibit trade and the divisions of labour cease: restore it, and the divisions of labour, with all their benefits, return. Hence, whatever may be the benefits resulting from the divisions of labour, these benefits are to be referred to trade, as to their original and proper source."[19]

Extending to the international scenario the basic Smithian tenet of division of labour being limited by the market, Torrens develops the idea of 'territorial division of labour':

"Different soils and climates are adapted to the growth of different productions. One district abounds with luxuriant pasture, another is calculated for tillage; in one country the sheep have the finest fleeces, in another country, where these animals have but a coarse and scanty covering, the earth supplies abundant quantities of cotton."[20]

Each territory will then specialise in whatever commodity its land is suited to and exchange with other territories, which means there will be territorial division of labour and the "productiveness of human industry will be greatly augmented."[21] Since the combination of

international division of labour and the existence of international markets lead to greater productivity, Spence's dismissal of international trade could easily be dismantled. This is the start of what eventually became the full-fledged Theory of Comparative Cost.

"If there is territorial division of labour and exchange, how exactly should one conceive the advantage of either party? In investigating this question [Torrens] was led to conclusions which, later on, were to underlie one of the most famous propositions of the classical system,"[22] the Theory of Comparative Cost. The theme of this question recurs in the *Essay on the External Corn Trade* (1815), with further refinement:

"If England should have acquired such a degree of skill in manufactures, that, with any given portion of her capital, she could prepare a quantity of cloth, for which the Polish cultivator would give a greater quantity of corn, than she could, with the same portion of capital, raise from her own soil, then, tracts of her own territory, though they should be equal, nay, even though they should be superior, to the lands in Poland, will be neglected, and a part of her supply of corn will be imported from that country."[23]

Lionel Robbins writes, "This is quite clearly the leading practical application of the theory of Comparative Costs as conceived in the Classical tradition: and as we shall see is certainly a sufficient ground for the claim that Torrens was first in the field."[24]

But then Torrens did not stop there. There is a further logical extension in the fourth edition (1827) of the *Essay on the External Corn Trade*:

"A difference in the cost of production between two countries, affecting commodities in each, not universally but partially, gives immediate occasion to an interchange of commodities. If, in Poland, the cost of producing cloth and iron, &c. &c. continued to be twice as great as in England, while the cost of raising corn fell to an equality with the cost of raising it in England, then Polish corn would be exchanged for English cloth and iron. Under these circumstances, a quarter of corn, in Poland, would be worth only half a bale of cloth, or half a ton of iron; while, in England, it would be worth a whole bale, or a whole ton."[25]

Robbins, the loyal Ricardian, the pure scholar/researcher, writes, "It is difficult to think of any passage in the whole literature of the subject before Taussig in which the essence of the doctrine [the Theory of Comparative Cost] is more forcibly presented."[26] Torrens' priority in ideas on Gain from Trade and the Theory of Comparative Costs is finally confirmed. It is worth noting that Robbins' student A. K. Dasgupta, another loyal Ricardian, referred to the theory as the "Torrens-Ricardo Theory of Comparative Cost".

For any researcher, whether in pure science or social science, priority is the reward; but it is an elusive reward. Torrens did not get it in his lifetime. The 1815 book *An Essay on the External Corn Trade*, a comprehensive work on the corn trade, was an important book, one

in which Robbins found several 'firsts in the field'; and it was very well received. About it Ricardo wrote to Malthus, "At the Geological Club his [Torrens'] book was spoken of the other day with great approbation. Mr. Blake and Mr. Greenough think that he has exhausted the subject and his arguments cannot be controverted. I should think that he is very generally read."[27]

Ricardo's own reaction was not favourable. Torrens was disappointed at not finding any mention of his work[28] in Ricardo's *Principles of Political Economy and Taxation* (1817), and wrote to the author about it. In a letter to a common friend, Ricardo wrote that Torrens claimed "some merit as the original discoverer of some of the principles which I endeavoured to establish … [But] none of his doctrines appeared to me strikingly new…. There were some things in his book … [that] were wrong."[29] He continued,

"Our altercation was carried on without the least acrimony, and ended by a complete restoration of cordiality, though accompanied with rather more reserve than before. He has dined with me twice since ... and stoutly defended my doctrines, to which he is quite a convert, against Mr. Malthus' opposition to them."[30]

Torrens responded to the 'hurt' of not being acknowledged in Ricardo's original *Principles* with a strong review of the book in Edinburgh Magazine,[31] specially criticising the Ricardian concept of value. In the light of that review, Ricardo made changes in the second edition of *Principles* to Chapter 1, "On Value".[32] He also mentioned Torrens twice by name in that edition, praising his arguments as "unanswered and unanswerable"[33]; but at the same time he wrote to James Mill, "I have mentioned Torrens twice with approbation, but on looking over his book I find so much that is wrong in it that I cannot bestow general praise on him, I commend him only for an able illustration of a particular principle."[34] Cordiality, yes, but the shadow never lifted.

Whatever might have been Ricardo's reaction and Torrens' response, twentieth century historians of economic thought have given Torrens priority on the Theory of Comparative Costs and on a more comprehensive Theory of Rent. We now come to the latter.

The Law of Diminishing Returns, we are well aware, is the basis of the Theory of Rent, and thereby the model of growth in classical political economy. We are all much too familiar with the subject for me to elaborate on it, and as mentioned earlier, Ricardo, Malthus, West and Torrens all four had almost similar analyses on the Law and the Theory of Rent. In his first foray into the topic Torrens had actually missed out on the effect of 'intensive cultivation', but once priority is left behind and history moves forward, we can assert that the best articulated discussion of the Law is found in his 1821 book, *Production and Wealth*.

While Torrens' thoughts on the Law are not particularly different from the others' – except for his elaborate treatment, with ifs and buts and repeated warning of "secular stagnation"[35]

if the Law operated unbridled in agriculture – with the Theory of Rent, it is different. There is refreshing, new input. While the Ricardian System could accommodate a 'no-rent' land, it implied that if there were *no* inferior land, or no reduction in yield with superior land, there could be no rent. Torrens had a different approach:

"Neither the gradations of soil, nor the successive applications of capital to land, with decreasing returns, are in any way essential either to the appearance or the rise of rents. If all soils were of one uniform quality, and if land, after having been adequately stocked, could yield no additional produce on additional capital being laid out upon it, still the rise in the value of raw produce … would cause a portion of the surplus produce of the soil to assume the form of rent."[36]

Existence of inferior land is not the cause of rent; on the contrary, "resorting to inferior soils, and applying additional capital to land with a decreasing return, instead of being the causes which create and elevate rents, are the limiting circumstances which prevent rent from rising so high as it otherwise would rise."[37] Some historians have found this a better way of framing the effect of the Law; clearer than Ricardo's, which could be interpreted as saying that diminishing returns were the cause of rent.

Torrens's further refinement is important; more than the phenomenon of a rise of rent eating into profits, consequent to a rise in the price of food, he considered the effect on rents of economic progress. In this, the analysis "went considerably beyond Ricardo, [who believed that] the interests of the land owners were in sharp opposition to the interests of capitalists and wage-earner."[38]

Torrens' view was different. Even though agricultural protection would raise rent in the 'very short run', he did not think this would go on for long. If a rise in food prices were to significantly curtail profits, capital would leave; this would reduce local manufacture and impinge on the growth of capital and economic progress, which in turn would hurt the interest of landowners. If prices were artificially inflated, he declared in his maiden speech to Parliament on 24 November 1826, "Capital would emigrate to more happy climes, and leave the agriculturist to lament over the desolation which he had brought upon himself."[39] Ricardo did not envisage such a situation.

The other new idea Torrens put forth was of a growing demand for 'agricultural luxuries'. "A rise in the value of *agricultural luxuries*, as compared with *agricultural necessaries*, extends cultivation, and raises rents,"[40] he wrote. This is a departure from Ricardo; land has multiple uses, it does not just produce necessities placed under the collective arch of 'corn'.

With each edition of the 1815 *Essay* (four editions and the last new edition of 1829), there was refinement of his various ideas, with an emphasis on improving conditions for labour.

This is a theme he gets back to repeatedly, as is clear from his ideas on Wages.

On Wages Torrens not only differs from his fellow economists on a definitional level but gives a theory of 'natural rate of wages' which became the reference point for classical political economy. For Torrens the 'natural price of labour', i.e., the static equilibrium wage, cannot be the same everywhere for "the minimum below which the real wages of labour cannot permanently fall consists of that quantity of the necessaries of life which climate and custom render necessary to support … a [labourer's] family sufficient to preserve the supply of labour even with the demand."[41] He explains, "A labourer in Hindostan, may continue to work with perfect vigour though receiving as his natural wages, only such supply of This is a far finer way of phrasing the sentiment than Ricardo's from the same period, on 'perpetuating the race without increase or diminution.' See Ricardo, *Works: Volume I*, ed. Sraffa (1951), p. 93. covering, as would be insufficient to preserve a labourer in Russia from perishing."[42]

This crucial definition has historically been attributed to Ricardo, again denying priority to Torrens. The irony is that Ricardo himself had written, "The whole of this subject is most ably illustrated by Colonel Torrens."[43]

Torrens' definition of 'natural rate of wages' prescribed the minimum wage. Higher wages, or a kind of maximum, are far more difficult to theorise. Torrens thought that in a closed community, not depending on foreign markets, this could be achieved through 'combination', i.e., solidarity, of labour, provided the supply of labour does not increase – a revolutionary idea for the time. In an open economy with international trade, it is a different story. "In countries possessing superiority in manufacturing for the foreign market," he writes in his 1834 book *On Wages and Combination*, "wages may be raised within the limits of such superiority."[44] The application of the Theory of Comparative Cost, Torrens' 1815 discovery, will operate to ensure the advantage, or otherwise, of lifting wages.

One major difference Torrens had with his fellow theorists is over the effect of the introduction of machinery on wages. The general opinion was that machinery would adversely affect the labourer. But in his 1834 book, Torrens was p. 73. Quoted in Seligman, "Neglected Economists" (1903): p. 344. firm that "all inventions for abridging labour, and diminishing the cost of production have the effect [ultimately] of increasing both maximum and actual wages."[45] There is a refreshing air of hope, of 'happy climes', to use Torrens' own expression, in the way he visualises the future. Not sharing the accepted belief of an inverse relationship between profits and wages, with higher wages impinging on growth, his future is anything but a dismal 'stationary state'.

There would be periods of hardship, though, for labourers displaced by new machinery and therefore he proposed, in another first, the idea of a national insurance fund. I quote:

"It also appears that the general good which results from the employment of new and improved machinery is accompanied by partial evil. While the public acquires additional wealth, the individuals who are supplanted in their accustomed occupations are reduced to poverty. Humanity and justice require that those who thus suffer for the public good should be relieved at the public expense. Whenever a new application of mechanical power throws a particular class of operatives out of employment, a national fund should be provided to aid them in betaking themselves to other occupations. It is a disgrace to the Legislature and to the country, that the numerous body of hand-loom weavers should have been left so long in misery and destitution, and toiling to the death in hopeless competition with the power loom. A comprehensive plan for their relief should be one of the earliest measures of the reformed Parliament."[46]

In 2018, can we not say the same about the handloom weavers of Bishnupur or Benaras?

Let me turn now to Torrens' view on Value, for this is where he had the largest disagreement and confrontation with his fellow economists. It is also the one field of exchange where I felt in a way that I understood the complexity of the relationship between Torrens and Ricardo, and I would rather not leave it totally untold.

Classical economists accepted the Labour Theory of Value, where for goods freely reproducible, "the long run equilibrium ratio of exchange, the natural values, were principally determined by the relative quantities of labour expended in their production".[47] Torrens did not accept this measure. He agreed that it was adequate if labour was the only scarce factor, but not otherwise. Getting into the reality of production, Torrens looked for a theory that would accommodate aggregate investment in an enterprise – not a Labour, but a Capital Theory of Value.

Torrens was willing to treat capital as 'accumulated labour' and base his theory on that, but not a simple labour theory of value. In his 1818 *Edinburgh Magazine* critique of Ricardo's *Principles,* he asserted that when rates of profit are constant, goods obtained by equal investments of capital have equal value.[48] Citing Ricardo's caveat in *Principles* "that when equal capitals are of different

degrees of durability, the products of equal quantities of labour will not be of equal value", he argued that since "equal capitals seldom possess equal degrees of durability," Ricardo's statement in fact disproved his own Labour Theory of Value.[49] Torrens' main point is that

"the relative worth of all things is determined not by quantities of labour required to procure them, but by the universally operating law of competition, which equalises the profits of stock, and consequently, renders the results obtained from employment of equal capitals of equal value in exchange."[50]

What constitutes Value is not the only thing – there is also the Measure of Value. Ricardo took quantity of labour as the measure of value, and Malthus the value of labour. Neither satisfied Colonel Torrens. To him Value was a mutual relationship among goods, not an absolute property of any one good; he stated clearly that "exchangeable value being always relative, and an increase or diminution in the power of purchasing possessed by one set of commodities, necessarily implying a corresponding diminution of the same power in some other quarter, we cannot, without involving ourselves in contradiction and absurdity, conceive the possibility of an abstract or ideal standard."[51]

Even the value of labour is relative:

"the exchangeable value of the labour expended on production is so far from being invariable, that it fluctuates with every change of time and place … as labour purchases a greater or less quantity of commodities in general, its exchangeable value is increased or diminished, and it becomes incapable of serving as a standard for measuring the value of other things."[52]

He concludes, "All we can do is to ascertain the circumstances which cause a given quantity of one thing to be offered and received for a given quantity of another.[53]

Ricardo was a bit bewildered by this. In the paper that he was writing when he died (in 1823) he wrote, "Colonel Torrens means that if two equal capitals be employed for the same time the commodities produced will be of equal value. No one can doubt the truth of this proposition, but I may ask Colonel Torrens what he means by equal capitals?"[54] He ends with, "Col. Torrens' rule fails me."[55]

In the end, says Lionel Robbins, "what divided the two [Ricardo and Torrens] turns out to be the question of the measure; and the difference proves to depend on the fact … that one was seeking for the philosopher's stone and the other was not."[56]

As I read through Torrens, Ricardo, a bit of Malthus and Mill, I got the feeling that they thrived on personal interaction and exchange of ideas. Communication was not simple; the options were either printing articles or writing letters, but these were hardly immediate. The thinkers had to meet somewhere to argue and discuss. The need for an exclusive Club therefore assumed great significance.

After initial meetings and discussions, James Mill, Torrens, Tooke, S. C. Holland and a few others formally established, on 18 April 1821, the Political Economy Club in London, "a Society for promoting the knowledge of Political Economy."[57] The intellectual fervor of the times was nowhere better reflected than at its dinners.

The membership of the Club was a rather motley group, the only common thread being their total commitment to free trade and active campaigning to get the Corn Law repealed.[58]

There was little else to unify them in their outlook on political economy or policy.

The rules of the Club were strict. Questions were noted in the minutes but records of discussions were not kept, so that members could speak without hesitation.[59] Without hesitation they spoke, indeed; they were so forceful and forthright in their arguments, each holding to his own opinion, that it was said one could not "find two members of it that agree on any one point."[60]

Not having records of discussions is disappointing, but notes, letters and various diaries — specially that of J. L. Mallet, a friend and follower of Ricardo – give us a fairly clear picture of the atmosphere of eager intellectuals arguing away, never budging from their own viewpoint. One can almost visualise the Freemason's Tavern in London, the oval table or may be the smoking room, with the best of intellects expressing their ideas gently or vehemently or getting irritated by some member or the other.

The questions naturally cover a wide territory. At a distance of almost two hundred years, sometimes one has to pause and wonder, *why* such questions?

At the first session, on 30 April 1821, Malthus asked, "Can there be a General Glut of commodities?"[61] He was obviously not at ease with Say's Law. Three years later, 5 April 1824, T. Tooke and a colleague jointly asked, "Might not the term Demand be excluded with advantage from the Science of Political Economy?"[62] To us, brought up on Alfred Marshall's *Principles*, this sounds strange, but if you believed in Say's Law, the question would be natural. Then there was Ricardo's sole question in the two years that he belonged to the Club: "Whether machinery has a tendency to diminish the demand for labour?"[63] The issue had been a contentious one among his peer group, possibly within his own self.

My interest is naturally in Torrens' questions. He attended the dinners regularly and in the thirty years that he was a member (he resigned in 1851 for reasons not known), eighteen of his questions were discussed. They ranged from fundamental questions on definitions of basic terminology to taxes and tythes, Poor Laws, conditions of Labour, monetary policy, etc., often framed in a rather combative way. I will give below some of his questions and descriptions of his participation in the discussion.

1. On 6 February 1835:

A discussion on Malthus' *Essay on Population*, described in Mallet's Diary:

"McCulloch, who is always bitter against Malthus, the workings of an envious and mean disposition, he held that there was in human nature a principle of improvement and exertion that was at all times sufficient to counteract and overcome the principle of population, and therefore that Malthus' theory was altogether erroneous … Torrens likewise attacked the

principle of the *Essay* [Malthus'], and said that if it were correct, no savage nations could have escaped from their barbarous state."[64]

Mallet added his own comment: "There is no instance of any purely savage and insulated tribe or nation becoming civilised."[65]

2. On 8 May 1835:

"The first question discussed was a question of Torrens, which was unanimously voted to turn upon an impossible case. He claimed the right to discuss any abstract proposition with a view to establishing a principle, but it was overruled in the present case which did not go to *establish* but to *disturb* a principle, that of Free Trade upon grounds altogether hypothetical."[66]

3. On 6 April 1832:

The Club debated the Ricardian theory of Value, almost a decade after Ricardo had died:

"The discussion at last ran into a question of value, what constituted *value in exchange*—and on this rock it split, and left us all at sea. McCulloch boldly standing by Ricardo's doctrine, that equal quantities of labour are equal in value all over the world—and Torrens and Malthus treating it as a ridiculous notion. McCulloch at last challenged Torrens to put this point in the form of a question, and pledged himself not to leave him an inch of ground to stand upon; and the question was accordingly framed, but afterwards dropped by general consent as only likely to lead to interminable disputes."[67]

4. On 13 January 1831:

Torrens comes out with the most unexpected and unusual question, like a bombshell:

"What improvements have been effected in the science of Political Economy since the publication of Mr. Ricardo's great work; and are any of the principles first advanced in that work now acknowledged to be correct?"[68]

Fortunately, there is a good account of the ensuing discussion in Mallet's Diaries.

"Torrens held that all the great principles of Ricardo's work had been successively abandoned, and that his theories of Value, Rent and Profits were now generally acknowledged to have been erroneous. As to value the dissertation on the Measure of Value published in 1825 by Mr. Baillie of Leeds has settled that question. As Thompson had shown that Rent was not the effect of differences in the relative productiveness of soils, but the effect of demand and price, and as to profits, it is clear that the part that goes to replacing the capital employed, which Mr. Ricardo had omitted to take into the account, was decisive of the unsoundness of his views. Tooke and McCulloch admitted the truth of the last observation, and Tooke also thought that Ricardo was wrong in his Theory of Value."[69]

Mallett continues:

"The whole discussion of the day turned on the merits of Ricardo; and to me was very abstract and tedious. It was generally admitted that Ricardo is a bad and obscure writer, using the same terms in different senses; but that his principles are in the main right. Neither his Theories of value, nor his Theories of Rent and profits are correct, according to the very terms of his propositions; but they are right in principle…. One of the errors of Ricardo seems to have been to have followed up Malthus' Principles of population to unwarrantable conclusions."[70]

The questions at 700 dinners in 100 years could go on, but I will put a stop here.

In 1835, Torrens suddenly abandoned the ship of free trade and committed the 'heresy' of proposing the need for 'reciprocal tariff', using a somewhat Ricardian doctrine![71] That was Robert Torrens: temperamental, unpredictable, straightforward, always faithful to his logical instincts, a "controversialist". I can best illustrate his nature with a quotation from Lionel Robbins. A particular article of Senior's criticising Torrens had

"enough irrelevancies and misunderstandings to make it easy game for so skilled a controversialist as Torrens. One can almost hear the old Colonel of Marines snort with pleasure as he perused its contents, perceived its weaknesses, reached for that formidable pen, and began *Letter X* of *The Budget*, the famous *Letter to Nassau Senior*. The result is a debating triumph of the first order."[72]

This appreciation by Lionel Robbins is a century after Torrens' working life. By 1857 Torrens was disappointed, disgruntled, possibly disgusted at not getting the credit for priority that he deserved. He might have been influential in policy, but his pride was in theory. In 1857 he reprinted his first book, *The Economists Refuted*, and tried to vindicate his claim of having explained

"for the first time, the nature and extent of the advantages derived from trade

… [that] Mr. Ricardo subsequently adopted … [so that it came to be] generally believed that it was reserved for Mr. Ricardo … to show that the benefit resulting from foreign trade consists of the increased production created by international divisions of employment."[73]

Only J.S. Mill took note of this and put a footnote in the 1862 edition of his *Principles* accepting the joint claim by Torrens with Ricardo.[74]

With all his idiosyncrasies, Robert Torrens was a good man, with a sharp pen and a sharp mind. A brave man from the Royal Marines, Ricardo called him "a very gentlemanly man".[75] Mallet wrote, "Torrens is subtle, often obscure, and not unfrequently wrong, but fluent enough

and generally able to explain the principle on which his opinions are founded: he is always courteous in discussion, which is not a very common quality among these great men."[76]

Ricardo had passed away a long time ago, in 1823. Malthus too passed away in 1834. Torrens, the only one left of the original trio of theoreticians, led an active and, in fact, a very influential life for another thirty years. He died in 1864 and then went into oblivion.

At his death "the River Torrens in South Australia, which was named after him, did not suddenly plunge into the bowels of the earth and disappear. But so far as the rest of his fame was concerned, it was as though something of this sort had happened."[77] So wrote Lionel Robbins. In assessing his contribution Robbins has not only given Torrens priority or originality in various theoretical matters that we have discussed, but he has given equal praise for the second phase of his work on banking, commercial policy, etc. I quote: "There is a further development of the general theory of money in which the contribution by Torrens is original—the nature of the bank credit.... much credit remains due to him as one of the first writers explicitly to deal with this most fundamental aspect of the theory of banking."[78] On Colonisation, Robbins adds, "where colonisation is concerned what must be regarded as the eventual Classical tradition was largely due to Torrens himself."[79]

The praise goes on.

Still, why was Torrens a minor figure? Why was this man with a brilliant analytical mind forgotten? How posterity treats a person is not predictable and I would not hazard a guess. All I can say is that it was partly his personality – his interest in possibly too many fields in economics. He changed his view to wherever his logic took him, and there is no denying that he wasa "controversialist". Peace and calm one associates with Ricardo and Malthus but not Torrens. It is not just brilliance; one possibly needs 'order' with that brilliance. Torrens did not leave a name; Ricardo became a legend. Torrens left no followers, Ricardo did – generations of them. Torrens' priority was rarely recognised, Ricardo's need not be repeated. I make no comparison but the names Ricardo and Torrens somehow go together. They were friends, but the shadow from 1817 never lifted. Torrens' mind, as I have already noted, shifted among various fields and built solid building blocks wherever it went, but he did not create a holistic system. Ricardo collected the building blocks built by himself, others, and even by Torrens, and built an edifice that has lasted now two hundred years.

Lionel Robbins ends thus:

"Torrens [had] more originality and deeper analytical insight, less capacity for concise exposition, more for the moment of vision and the communication of élan. This he was and thus he played his part, and although, in the picture of the varied and spacious society in

which he lived, he is not one of the figures in the foreground, at least he deserves a position in the middle distance."[80]

Sixty years later in 2018, the approach has changed: we also look for the social philosophy. I would therefore like to end with Torrens' own approach to political economy:

"The study of Political Economy, if it did not teach the way in which labour may obtain an adequate reward, might serve to gratify a merely speculative curiosity, but could scarcely conduce to any purposes of practical utility. It claims the peculiar attention of the benevolent and the good, mainly because it explains the causes, which depress and elevate wages, and thereby points out the means by which we may mitigate the distress, and improve the condition, of the great majority of mankind. Political Economy is not, as has been erroneously stated, the appropriate science of the statesman and the legislator: it is peculiarly and emphatically, *the science of the people*."[81]

A man with this philosophy, to me, should be in the front row, in the foreground.

Acknowledgement

The definitive work on Robert Torrens is Lionel Robbins' book, *Robert Torrens and the Evolution of Classical Economics*. It has been my primary reference for this article. One great pleasure in my life is handling old crumbling paper. My father Professor A. K. Dasgupta's old notebooks, pages all brown and stiff, have guided me in all my efforts at understanding classical political economy. This time was no different. I am always grateful to him for leaving me the great legacy of his books and notes. I thank Mohanbhai Patel, A. A. Shaikh, Rehana Patel, Kiran Pandya, Gaurang Rami, Sanjay Mukherjee and M.N. Sane for taking the trouble of finding reference material for this article. Ferreting out two hundred year old material is not an easy task. Rehana Patel has an acute sense of locating points where logic has failed me. But for her detailed, patient editorial help and encouragement none of my work would have been completed. For her, always my affection.

Notes

1 Lionel Robbins, *Robert Torrens and the Evolution of Classical Economics* (London: Macmillan & Co. Ltd., 1958), p. 146.

2 Two by Malthus and one each by the others.

3 Malthus espoused this policy somewhat tentatively since after Napoleon's 'Continental Policy' of closing all European ports to British goods, he had favoured restriction on corn imports.

4 Saeed Ahmed Meenai, "Robert Torrens – 1780-1864," *Economica* New Series 53, no. 89 (1956): p. 49.

[5] The author's full title is given as R. Torrens, Esq., Major Commandant of the Royal Marine Battalion at Anholt. The army meant much to him; its discipline, routine, camaraderie and risk had shaped him.

[6] Robert Torrens, *An Essay on Money and Paper Currency* (London: J. Johnson & Co., 1812). Quoted in Robbins,

Robert Torrens (1958), p. 265.

[7] Robbins, *Robert Torrens* (1958), p. 3.

[8] Ibid.

[9] Ibid., p. 4.

[10] Cambridge University did not introduce a Tripos in Economics till 1903 and Oxford University instituted a Chair in Economics only in 1825. Scholarship among thinkers of the time was broad: "W.F. Lloyd was "mathematical lecturer at Christ Church College, Oxford 1816-1824, and Reader in Greek in 1823; in 1832, he was appointed Drummond Professor of Economics." See Roy Harrod, "An Early Exposition of 'Final Utility', W.F. Lloyd's Lecture on 'The Notion of Value' (1833) Reprinted," *Economic History* (Supplement to *Economic Journal* Supplement) 1 (May 1937).

[11] The Fellowship is given for exceptional contribution to science, or for a particular book, or both.

[12] It is interesting that in a letter to his friend Francis Place (one of the few personal letters that have survived) Torrens says that for a change, he will be generally quiet in the House; but within no time he becomes his normal self and manages to displease King William lV with a speech. His proposed Parliamentary reform implied dissolution of the House of Lords! See Meenai, "Robert Torrens" (1956): p. 54 and Robbins, *Robert Torrens* (1958), p. 4.

[13] Edwin R. A. Seligman, "On Some Neglected British Economists," *Economic Journal* 13, no. 51 (1903): pp. 335-63.

[14] Jacob Viner, *Studies in the Theory of International Trade* (New York: Harper Brothers Publishers, 1937).

[15] Robbins, *Robert Torrens* (1958), p. 6.

[16] Lionel Robbins, introduction to Robert Torrens, *Letters on Commercial Policy by R. Torrens; With an Introduction by Lionel Robbins*, L.S.E. Reprints of Scarce Works no. 14 (London: London School of Economics and Political Science, 1958).

[17] Meenai, "Robert Torrens" (1956): p. 49.

[18] Ibid. One wonders to whom the critic is referring. Mill and Malthus were the only two of the group who had written books on similar topics before Torrens.

[19] Robert Torrens, *The Economists Refuted* (London: S.A. & H. Oddy, 1808), p. 17.

[20] Torrens, *Economists Refuted* (1808), pp. 14-15. Quoted in Robbins, *Robert Torrens* (1958), p. 20.

[21] Ibid. Quoted in Robbins, *Robert Torrens* (1958), p. 21.

[22] Robbins, *Robert Torrens* (1958), p. 21.

[23] Robert Torrens, *An Essay on the External Corn Trade* (London: J. Hatchard, 1815), pp. 263-4. Quoted in Robbins, *Robert Torrens* (1958), p. 23.

[24] Robbins, *Robert Torrens* (1958), p. 23.

[25] Robert Torrens, *An Essay on the External Corn Trade: 4th Edition* (London: Longman, Rees, Orme, Brown & Green, 1827), pp. 402-3. Quoted in Robbins, *Robert Torrens* (1958), p. 24.

[26] Robbins, *Robert Torrens* (1958), p. 24.

[27] David Ricardo, Letter to Malthus, 27 March 1815. Quoted in Meenai, "Robert Torrens" (1956), p. 50.

[28] The Theory of Comparative Cost, even if it was in an initial stage, and the Theory of Rent, which Torrens had arrived at independently of Ricardo. Incidentally, Malthus and West *were* acknowledged in Ricardo's *Principles*. [29] David Ricardo, Letter to Trower, 23 August 1817. Quoted in Robbins, *Robert Torrens* (1958), p. 10.

[30] Ibid. Quoted in Robbins, *Robert Torrens* (1958), p. 11.

[31] Robert Torrens, "Strictures on Mr. Ricardo's Doctrine Respecting Exchangeable Value," *Edinburgh Magazine and Literary Miscellany* 3 (October 1818): pp. 335-8.

[32] David Ricardo, *Works and Correspondence of David Ricardo: Volume I*, ed. Piero Sraffa (Cambridge: Cambridge University Press, 1951), p. 31 note 2 and pp. 60-61 note 1.

[33] Ibid., pp. 96-7 and p. 271.

[34] David Ricardo, Letter to James Mill, 23 November 1818. Quoted in Robbins, *Robert Torrens*, (1958), p. 11.

[35] Robbins, *Robert Torrens* (1958), p. 41.

[36] Robert Torrens, *An Essay on the External Corn Trade: 3rd Edition* (London: Longman, Rees, Orme, Brown & Green, 1826), p. 138. Quoted in Robbins, *Robert Torrens* (1958), p. 42. There is an echo, and elaboration, of Ricardo's famous dictum "Corn is not high because a rent is paid, but a rent is paid because corn is high." See Ricardo, *Works: Volume I*, ed. Sraffa (1951), p. 74.

[37] Ibid., pp. 138-9. Quoted in Robbins, *Robert Torrens* (1958), p. 43.

[38] Robbins, *Robert Torrens* (1958), p. 46.

[39] Meenai, "Robert Torrens" (1956): p. 55

[40] Robert Torrens, *Colonisation of South Australia* (London: Longman, Rees, Orme, Brown, Green & Longman, 1835), p. 279. Quoted in Robbins, *Robert Torrens* (1958), p. 47.

[41] Robert Torrens, *An Essay on the External Corn Trade: 2nd Edition* (London: J. Hatchard & Son, 1820), p. 374.

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[45] Ibid., p. 44. Quoted in Seligman, "Neglected Economists" (1903): p. 343.

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[44] Robert Torrens, *On Wages and Combination* (London: Longman, Rees, Orme, Brown, Green & Longman 1834),

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[48] Torrens, "Strictures on Mr. Ricardo's Doctrine" *Edinburgh Magazine* (October 1818): pp. 335-6.

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[51] Robert Torrens, *An Essay on the Production of Wealth* (London: Longman, Hurst, Rees, Orme & Brown, 1821), pp. 64-5. Quoted in Robbins, *Robert Torrens* (1958), p. 68.

[52] Ibid., pp. 58-60. Quoted in Robbins, *Robert Torrens* (1958), pp. 68-9.

[53] Ibid., p. 65. Quoted in Robbins, *Robert Torrens* (1958), p. 69.

[54] Ricardo, *Works: Volume IV*, ed. Sraffa (1951), pp. 393-4. Quoted in Robbins, *Robert Torrens* (1958), p. 69.

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[56] Robbins, *Robert Torrens* (1958), p. 70.

[57] *Political Economy Club founded in London 1821. Centenary Volume* (London: Macmillan & Co., 1921), p. 1.

[58] Henry Higgs, introduction to *Political Economy Club* (1921), p. viii. Many members of the Club had taken part in writing the Merchants' Petition for repeal of the Corn Law in 1820. Torrens had helped draft the petition, and was also a signatory.

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[60] Maria Edgeworth, Letter to Mrs. Ruxton, 9 March 1822. In Maria Edgeworth, *A Memoir of Maria Edgeworth: Volume II*, ed. by her children (London: privately published, 1867), p. 180. Quoted in Higgs, introduction to *Political Economy Club* (1921), p. xii.

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[62] Ibid., p. 21.

[63] Ibid., pp. 7-11. The question was posed on June 25 1821 and discussed on 4 February 1822.

[64] J. L. Mallet, "From Mr. J. L. Mallet's Diaries," in *Political Economy Club* (1921), pp. 265-6.

[67] Ibid., p. 234.

[68] *Political Economy Club* (1921), pp. 35-6.

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ASPECTS OF TRADE AND ENVIRONMENT: THEORY AND EMPIRICS*

Kausik Gupta#

Abstract: *The paper attempts to provide not only a theme-based survey of the literature on trade and environment but also seeks to raise some issues related to trade and environment which have some policy relevance from the point of view of a developing economy. We start from the model of Copeland and Taylor (2004) that focus on both demand for and supply of pollution in a small open economy under well defined property rights. Treating this paper as the benchmark model we have analyzed various papers in the context of small open economies that have considered various policy issues related to environmental pollution. Next we have focused our attention on the North-South models of trade and environment and the analysis has been based on the work of Chichilinsky (1994). It shows how lack of property rights reduces the gains from trade in the South. From the empirical point of view the literature on Environmental Kuznets Curve (EKC) has been linked in this paper with the empirical literature on trade and environment. Issues related to 'Impossible Trinity in the context of Global Environmental Regulations' has been analyzed. Finally, institutional aspects are linked with that of the carbon credit market in the paper and it has been mentioned that the carbon credit market is yet to achieve its full potential to fight against global warming.*

JEL Classification: F18, Q53, Q54, Q56

Keywords: Property rights, North-South Trade, Impossible Trinity, Pollution Haven, Carbon Credit.

I.Introduction

Since the early 1990s economists are concerned with various issues related to trade and global environment. The issue has been analyzed both from theoretical and empirical angles by the economists. In fact most of the theoretical models related to trade and environment originated in the early 1990s. From the empirical point of view as well we find most of the writings on global environmental pollution, including the summits or meetings to combat green house gas emissions, started in the 1990s. So the topic 'trade and environment' is

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considered as an important area of research in the context of contemporary research areas of economics.

The relationship between international trade and environment may be considered from two different angles. First, international trade implies an expansion of economic activity and hence causes generation of huge level of wastes and pollution in the economy. Second, lower environmental standard and loose environmental regulations in developing countries often attract foreign multinational enterprises to invest in developing countries and also to shift dirty product and production processes to developing countries.

The developed countries are in favour of maintaining uniform global standard so far as environmental pollution is concerned due to which they are sceptical about entry of imported products due to trade from developing countries. The developing countries are against this stand of the developed countries as they argue that the developed countries use environmental protection measures as a non-tariff barrier to protect their own market from foreign competition.

Though the present paper is a survey of various issues on trade and environment it is not a typical survey of research studies in true sense of the term. In this paper we have started from the seminal work of Copeland and Taylor (2004) and have considered this model as the Benchmark Model. The model has been presented in detail just to illustrate the concepts of demand for pollution and supply of pollution and to analyze how the other trade theoretic models differ from the Benchmark Model.

There are various ways by which trade and environment have been captured in terms of North-South models. Out of all the models we have considered the Chichilinsky (1994) model for detailed analysis. The reason is that the model considers a very interesting analysis of North-South trade in the presence of lack of assignment of property rights in the South. This issue is very much relevant and something unique in the context of environmental policy analysis.

Theoretical issues on trade and environment have been analyzed in the literature both on the basis of general equilibrium models and partial equilibrium models. In the present paper we have confined ourselves only on the general equilibrium models as it will help to throw light on the sectoral linkages as a result of impact of international trade on environment and vice versa. Such an analysis is helpful for the policy makers as the impact of various environmental policies on trade related issues or impact of trade policies on environmental issues can be captured in terms of changes in different sectors of the economy when we have a general equilibrium model.

There are various approaches to the empirical analysis of trade and environment. Here we have considered only some selected issues associated with empirical analysis of trade and environment. Any empirical analysis on trade and environment remains incomplete unless we focus on the Environmental Kuznets Curve (EKC). The inverted U-shaped nature of EKC has been explained in terms of various factors and out of them quite a large number of factors are related to international trade. The present paper has tried to analyze these factors. Apart from this in this paper under the empirical analysis we have tried to point out the *systematic fears* associated with the relationship between trade and environment and have examined the existence of '*Impossible Trinity'* in the context of global environmental regulations. Finally, the institutional aspects of global environment in terms of climate change and emission of Green House Gases (GHGs) have been discussed with special emphasis on the carbon credit market since the Kyoto Protocol. Such a discussion helps us to understand the issues associated with global environmental pollution and the role of developed and the developing countries to combat emission of GHGs.

The paper is broadly organized in the following manner. ' Section 2 deals with a survey of the theoretical models on trade and environment. This section is again divided into various subsections under various themes. Section 3 deals with the empirical works related to trade and environment and again it is classified into various subsections on the basis of various themes. Finally the concluding remarks are made in section 4.

II. Trade and Environment : Theoretical Models

II.1 Issues on Trade and Environment in Small Open Economies

Trade and environment in terms of theoretical models can be analyzed from various angles. Models on this issue in terms of small open economy can be analyzed in various phases. To make matters simple we consider two such phases. Phase I deals with demand for pollution and supply of pollution under well defined property rights in a small open economy so as to achieve market equilibrium. With the help of these types of models scale, composition and technique effects associated with trade, growth and environment can be analyzed. This has been done in terms of Copeland and Taylor (2004) model which we treat as our benchmark model. Phase II considers small open economy type models to take into account the issues related to pollution tax and pollution standard and also to consider the effects of these policies on domestic welfare when the economy is engaged in trade with the rest of the world.

II.1.1 Phase I: The Benchmark Model - Copeland and Taylor (2004)

The structure of the benchmark model is basically a replica of Copeland and Taylor (2004), though the roots of this model are based on the works of Copeland and Taylor (1994, 1995, 1997 and 2000) .The purpose is to illustrate the literature in terms of this model. We consider

a small open economy with two sectors x andy producing respectively goods Xand Y. We consider Y as the numeraire commodity and express the price of commodity in terms of commodity. Thus xp is the domestic price of the commodity which is equal to the given international price *xp as there is no tariff. The two primary factors that are required to produce each of the two-commodities are labour and capital (denoted by Land Krespectively). Production function in each sector exhibits constant returns to scale (CRS) and we have all the usual features of standard Heckscher-Ohlin-Samuelson (HOS) type of trade model (alaJones (1965)).It is assumed that only x- sector pollutes. We thus have

$$p_x = a_{Kx}(w/r)r + a_{Lx}(w/r)w \qquad (1)$$

$$1 = a_{Ky}(w/r)r + a_{Ly}(w/r)w \qquad (2)$$

In equations (1) and (2) a_{ij} s are the input-output coefficients and w and r are the returns to the primary factors labour and capital respectively.

Capital and labour are assumed to be perfectly mobile between the two sectors. We thus have

$$a_{Kx}(w/r)X + a_{Ky}(w/r)Y = K \qquad (3)$$

$$a_{Lx}(w/r)X + a_{Ly}(w/r)Y = L \qquad (4)$$

Let X be the level of potential output and Z be the level of pollution generated from the product of sector 'x' . If abatement does occur then for < = we can write

$$\tilde{X} = Z^{\alpha}\,[F(K_x, L_x)]^{1-\alpha} \qquad (5)$$

where is the level of *effective* output for the product of sector, given .[1]

Though pollution is treated as an output in terms of our analysis equation (5) can be treated as a Cobb-Douglas representation of the production function where pollution is treated as an input.[2]

Let be the emission coefficient i.e. emissions per unit of effective output of sector. Thus when property rights are well defined the amount of pollution generated by the product of sector is given by

$$Z = e(p_x/\tau)\,.\,\tilde{X} \qquad (6)$$

where price per unit of emissions released by sector (can be treated as an emission tax or a payment for tradable emission permit).

The share of emission charges on the value of output can be written as and hence we have

$$e = \frac{Z}{\tilde{X}} = \frac{\alpha p_x}{\tau} \leq 1 \qquad (7)$$

Equation (7) shows that emission intensity falls as pollution taxes rise. National income of the economy in domestic prices, denoted by G, can be written as

$$G = p_x \tilde{X} + Y = G(p_x, K, L, Z) \qquad (8)$$

From equation (8) we get the result that price of a unit of emissions is equal to the marginal abatement cost i.e.

$$\tau = \frac{\partial G}{\partial Z} (= G_Z) \qquad (9)$$

Copeland and Taylor (2004) have assumed that there are identical consumers in the economy. In such an economy they have assumed that each consumer maximizes utility and the preferences for consumer goods are homothetic. They have also assumed that utility function is strongly separable with respect to consumption goods and environmental quality and have stated the indirect utility for a representative consumer in the following manner

$$V(p_x, I, Z) = \upsilon(I/\beta(p_x)) - h(Z) \qquad (10)$$

In equation (10) h is increasing and convex whereas uis increasing and concave. Pollution is thus treated as a public bad. In equation (10) I is per capita income i.e. = G/N, and bis a price index.

Copeland and Taylor (2004) have tried to determine optimum pollution in an otherwise small open economy model in terms of market forces when property rights are defined. They have thus focused on both the demand and the supply sides of pollution and have derived both the demand curve for and the supply curve of pollution. The demand curve for pollution rests on equation (10) in the sense that it can be interpreted as the inverse demand function for pollution. As τ falls the marginal product of emissions or the marginal abatement cost falls and it is possible when there is an increase in the level of pollution. More intuitively we can rewrite equation (6) as

$$Z = e(p_x/\tau) \cdot \tilde{X}(p_x, \tau, K, L) \qquad (6.1)$$

As tfalls the firms pollute more due to two reasons. The first is that the emission intensity rises due to lower tax on pollution and the second, one lower tax on pollution makes production of dirty good more attractive so that X~ expands. As a product of these two we find that the demand for pollution or Zincreases implying that we have a negatively sloped demand curve for pollution.

Copeland and Taylor (2004) have also shown that supply of pollution can be determined in general on the basis of the behaviour of the government. The government's problem is

$$\text{Max } V(p_x, I, Z) \text{ subject to } I = G(p_x, K, L, Z)/ \tag{11}$$

As we have considered a small open economy prices are given so that $\frac{dp_x}{dZ} = 0$. Incorporating the constraint in the objective function the first order condition implies

$$V_{p_x}\frac{dp_x}{dZ} + V_I\frac{dI}{dZ} + V_Z\frac{dZ}{dZ} = 0$$

Using the fact that $\frac{dp_x}{dZ} = 0$ and $\frac{dI}{dZ} = \frac{d(G/N)}{dZ} = \frac{G_Z}{N}$ we can rewrite the above first order condition as

$$\frac{V_I G_Z}{N} + V_Z = 0 \tag{12}$$

From (9) we know that $\tau = G_Z$ and using it we get from equation (12)

$$\tau = N[\text{“}\frac{V_Z}{V_I}] =. N.MD(p_x, R, Z) \tag{13}$$

where $MD(p_x, R, Z)$ is the representative consumer's marginal damage from pollution (the marginal rate of substitution between pollution and income) and $R = \frac{I}{\beta(p_x)}$ is the real income of the representative consumer. Equation (13) thus implies the pollution tax is the sum of the marginal damages across individuals.[1] Equation (13) can be interpreted as the supply of pollution in the sense that an increase in pollution increases marginal damage for each individual and hence increases the total marginal damage from pollution.[2] It raises the optimal tax on

pollution. Thus the supply curve of pollution is positively sloped. The point of intersection of demand for and supply curve of pollution gives us the optimal level of pollution.[3] This is shown in figure 1.

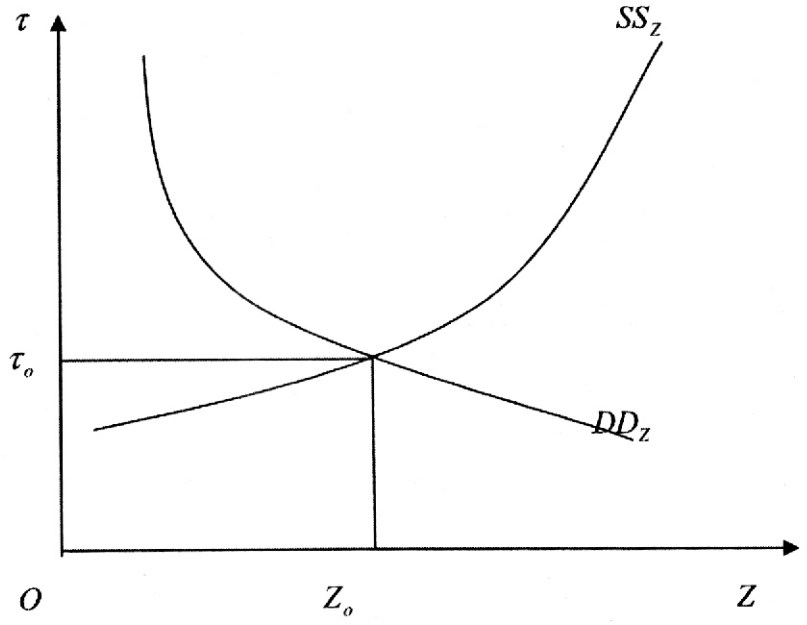

Figure 1: Optimal Pollution and Pollution Tax

In figure 1 the equilibrium tax rate is τ_0 and equilibrium level of pollution is Z_0. The demand curve for pollution, in figure1, is given by DD_Z and supply of pollution curve is given by SS_Z in the same figure. We now consider two special cases. First, if there is an exogenous pollution tax rate given by, then supply becomes horizontal at and it is the demand for pollution that determines the optimal level of pollution. Second, if there is a fixed overall pollution quota as we find in case of tradable emission permit system then supply becomes vertical and the price of emissions is determined fully by the demand for pollution.

We can add a few remarks on this Copeland-Taylor (2004) model. If we assume that sector 'x' is the import-competing sector and is protected by an ad-valorem tariff (the rate of tariff is 't') so that $p_x = p_x^*(1+t)$ and this sector is more capital intensive than sector 'y' (the exportable sector), then we can say that the Rybczynski theorem is valid just like that of Jones (1965) model. We can assume that domestic capital and foreign capital as perfect substitutes so that

$K = K_D + K_F$ and national income at domestic prices in the presence of full repatriation of foreign capital income can be expressed as

$$G = p_x\tilde{X} + Y'' \; rK_F$$

$$= wL + rK_D + \tau Z + tp_x^*M \qquad (8.1)$$

where $M = D_x(p_x, G) - \tilde{X}$ is the volume of imports of the product of sector 'x' (D_x is the level of demand for the product of sector) and is the tariff revenue of the government which is distributed in a lump sum manner among workers and capitalists. It can be shown easily that an increase in foreign capital inflow with full repatriation of foreign capital income reduces the level of national income at domestic prices when the rate of tariff is positive.[1] The fall in the level of causes a fall in the level of and hence a fall in the level of . This sifts the supply curve of pollution in the leftward direction. Again, as a result of foreign capital inflow the capital-intensive sector expands. For a given level of, it implies from equation (6.1) that an increase in causes an increase in and hence a rightward shift of the demand curve for pollution. Hence we can conclude that in Copeland Taylor (2004) model foreign direct investment (FDI), with full repatriation of foreign capital income, raises the tax on pollution. The impact on the level of pollution as a result of FDI remains ambiguous. This is one important issue which has been widely discussed in the literature on trade and environment. In fact one can extend this model in various directions, say by introducing the informal sector, and can examine the impact of FDI in terms of this model. There is actually wide scope of research on trade and environment in this line.

We now focus on the scale, composition and technique effects, which is well discussed in the context of the literature on trade, growth and environment, and we try to link these three effects with that of our benchmark model. Grossman and Krueger (1993) have first discussed these three concepts in the context of analyzing Environmental Kuznets Curve (EKC) empirically. Copeland and Taylor (2004) have defined scale as

$$S = p_x^{*0}\tilde{X} + p_y^{*0}Y \qquad (14)$$

where p_x^{*0} and p_y^{*0} denote the base period levels of world prices

Denoting φ_x as the value share of dirty good $\tilde{X}$ in total output evaluated at base-period prices we get $\varphi_x = \frac{p_x^{*0}\tilde{X}}{S} = \frac{\tilde{X}}{S}$ if we fix the base world price as unity (i.e. =1). Thus from equation (6) we get

$$Z = e\tilde{X} = e\varphi_x S \tag{15}$$

Denoting $\hat{Z} = \frac{dZ}{Z}$ we get from equation (15)

$$\hat{Z} = \hat{S} + \hat{\varphi}_x + \hat{e} \tag{16}$$

The first term on the RHS of equation (16) is the scale effect, the second term is the composition effect and the last term is the technique effect. The applications of these effects are discussed in the context of the analysis related to EKC in subsection III.1.

II.1.2 Phase II: Pollution Tax, Pollution Standard and FDI in Small Open Economy Models

We next focus on phase II of the trade and environment models in a small open economy. There are quite a large number of papers that have linked pollution with nutritional efficiency, tax and standard in the context of small open economies where the goods are traded. We start with the works of Chaudhuri and Gupta (2003), Chaudhuri(2006), Chaudhuri and Mukhopadhyay (2006), Gupta(2012), Chaudhuri and Mukhopadhyay (2013), Chatterjee, Gupta and Chatterjee (2017) etc. These models are more related to changes in domestic policies or FDI in the context of small open economy with trade. In other words, we can categorize this part of our analysis in terms of trade and environment, FDI and domestic policies in the context of a small open economy.

The models of Chaudhuri and Gupta (2003), Chaudhuri(2006), Chaudhuri and Mukhopadhyay (2006) and Chaudhuri and Mukhopadhyay (2013) are almost similar. All these models have considered a small open economy multi-sectoral general equilibrium structure with an informal sector as the source of pollution. Chaudhuri and Gupta (2003) have considered a three-sector model where the formal manufacturing sector uses the product of the informal sector as an intermediate input and pollutes the environment on one hand and bears the cost of abatement of pollution above the maximum allowable pollution of the economy on the other hand. There is no such restriction in case of the informal intermediate good providing sector. The cost of abatement of pollution is internalized by the formal sector and is treated endogenously in the model. Moreover, they have assumed that foreign capital is specific to the manufacturing sector so that FDI, which is specific to this sector, leads to transfer of environmentally sound technology(EST). They have shown that under reasonable conditions an inflow of foreign capital raises total domestic pollution and national income.

The model of Chaudhuri (2006) is close to the model of Chaudhuri and Gupta (2003) with the difference that efficiency of a representative worker has been inversely linked with the

level of pollution in the economy. In Chaudhuri (2006) model an emission tax function has been used which is nothing but a replica of the abatement cost function in Chaudhuri and Gupta (2003). However, unlike Chaudhuri and Gupta (2003), Chaudhuri (2006) has considered pollution emission in the economy only by the non-traded intermediate goods producing informal sector. Interestingly the models of Chaudhuri (2006) and Chaudhuri and Mukhopadhyay (2006) are almost identical. The difference between the two lies in the analysis of the comparative static results. Chaudhuri and Mukhopadhyay (2006) have shown that a reduction in the permissible level of pollution in the presence of a polluting informal sector leads to an increase in pollution while an inflow of foreign capital lowers the pollution level in the economy. Chaudhuri (2006) in his model, in addition to the same pollution effects, has shown that a reduction in the permissible level of pollution increases welfare and a foreign capital inflow reduces welfare under some reasonable conditions. Thus his model shows that there exists a trade-off between pollution and welfare in a small open economy.

The model of Chaudhuri and Mukhopadhyay (2013) is again similar to the model of Chaudhuri and Gupta (2003) though unlike Chaudhuri and Gupta (2003) the work of Chaudhuri and Mukhopadhyay (2013) has considered four sectors with two informal sectors and two formal sectors. They have assumed that one of the informal sectors and one of the formal sectors produce the same intermediate good and that is used by the other formal sector. There are also two types of capital one type is confined purely for the formal sector and the other type of capital is used by both the two informal sectors and the intermediate goods producing formal sector. A penalty or tax for the formal sector has been considered for excessive pollution and the tax rate depends on the level of intermediate input that generates pollution. In such a framework Chaudhuri and Mukhopadhyay(2013) have considered the concept of FDI and transfer of EST in a manner similar to the one that have been shown in the work of Chaudhuri and Gupta (2003). In such a framework the authors have shown that FDI in the formal sector may accentuate pollution even if it involves transfer of EST.

Chaudhuri (2015) has considered the usefulness of the Pigouvian tax policy in dealing with negative production externalities in the presence of labour market distortion using a two-sector full-employment model for a small open developing economy. He has shown that the socially optimal Pigouvian tax rate may not be necessarily positive and that it crucially hinges both on the degree of labour market imperfection and the magnitude of negative externalities that production of the dirty commodity generates. Finally, he has suggested that the tax policy should be accompanied by labour market reform for increasing efficiency.

If we compare all these models with the structure of Copeland and Taylor (2004) we find that none of these models have focused on the supply side of pollution, rather what they have considered falls under the demand side of pollution. In this context Gupta (2012) has considered a model which deserves some attention. In the partial equilibrium literature on

pollution the debate between tax and standard is well known, but in the context of general equilibrium this issue has not been dealt with adequately. Gupta (2012) in his model has considered this issue in the context of general equilibrium. Moreover, he has introduced the concept of green capital in the context of a trade model for a small open economy. He has shown that though an increase in the rate of emission tax is successful in reducing the level of pollution a reduction in maximum allowable pollution may fail to do so under some reasonable conditions. Thus a trade-off exists between tax and standard not only at the partial equilibrium level but also at the general equilibrium level. Gupta (2012), following Copeland and Taylor's (2004) utility function for a representative individual, has also considered a welfare function where pollution emission has been treated as a negative externality. He has shown that from the welfare point of view in a small open economy when all the goods are traded pollution control in the form of reduction in maximum allowable pollution improves welfare whereas pollution control in the form of increase in emission tax rate reduces welfare under reasonable conditions.

II.2. Trade and Environment in the context of North-South Trade Models

In the last section we have considered a survey of trade and environment issues in the context of small open economy models. We now shift our attention to focus on North-South trade models. The most important work in this regard is the paper by Chichilinsky (1994). Copeland and Taylor (1994, 1995 and 1997) have also considered the issue of trade and environment in terms of North-South models in their works. For our purpose we shall mainly confine to the work of Chichilinsky (1994).

Chichilinsky (1994) has studied the pattern of North-South trade in a world economy where in North the property rights are relatively well defined compared to the South. Chichilinsky(1994) has provided a micro-foundation to show that this divergence in property rights between North and South can be explained in terms of the divergence between private property rights and common property rights so that the private property supply lies above the common property supply. It implies that at the same price we have more of the common property supply than the private property supply.

The model has been explained in terms of two goods, two inputs and two countries with Heckscher-Ohlin flavour except that the supply of resources are price dependent. For example, in the model environmental resource is considered as one of the two inputs and its price is assumed to be function of price of the resource. We do not want to present here neither a summary nor a detailed representation of Chichilinsky (1994) model, rather our attempt is to provide a graphical representation of the model on the basis of the ideas of Chichilinsky (1994) so that the readers can easily understand the essence of the model.

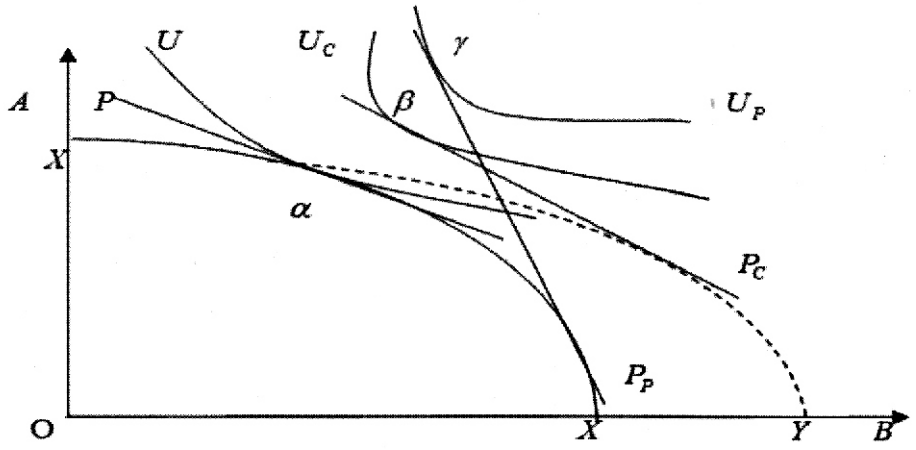

Figure 2: Free Trade Equilibrium under Common Property

In figure 2 we consider free trade equilibrium in the South where property rights are not well defined. The production possibility locus under private property is given by XX whereas the production possibility locus under common property is stretched as XY. The autarkic equilibrium is at point α. The free trade price line under private property is given by P_P and the level of welfare corresponding to consumption at point γ is given by U_P. In case of common property consumption takes place at point β and the level of welfare is given by U_C. The South has comparative advantage in the production of environmentally intensive goods and as a result of common property it produce abundant amount of the environmentally intensive good B. This excessive production of good B reduces its price and hence causes a fall in the terms of trade. From the consumption point it follows that as < the level of welfare under common property is less than the level of welfare under private property. In other words common property reduces the gains from trade in the South.

II. Trade and Environment : Empirical Issues

Under the empirical issues on trade and environment we start from the issues related to the Environmental Kuznets Curve (EKC) and then we switch over the common explanations related to the linkages between trade and environment in terms of 'systematic fear' and 'the impossible trinity of global environmental regulation'. Finally we pass on to the issue of climate change and greenhouse gas emissions.

a. Issues related to the Environmental Kuznets Curve (EKC)

The inverted-U shape of EKC has been explained in the literature in terms of a number of factors out of which a large number of factors are related to various aspects of trade and

environment.[1] The EKC shows a parabolic relationship between per capita GDP and the level of pollutant in a country (may be in the form of carbon dioxide (CO_2) emission or sulphur dioxide (SO_2) emission). Here per capita GDP is considered as a proxy of the level of economic activity of the economy. The relation thus stands as:

$$y_{it} = \beta_0 + \beta_1 x_{it} + \beta_2 x_{it}^2 + \varepsilon_{it} \qquad (17)$$

In equation (17) the level of pollutant is given by y_{it} where i stands for country or region and t stands for time. Per capita GDP is given by x_{it} and ε_{it} denotes the stochastic error term. The intercept coefficient is given by β_0 and the impact coefficients are given by β_1 and β_2. Here for inverted-U shaped we can fix '*apriori*' the signs of and as > 0 and < 0.

The common factors that explain the shape of EKC are income elasticity of environmental quality demand; scale, technological and composition effects; international trade; displacement (industrial flight) and pollution haven hypothesis etc. Out of all these except for the first factor all other factors are related to trade theoretic explanations of inverted U-shaped EKC.[1] It is to be noted in this connection that in a developing country the rising part of EKC is much more stretched compared to the developed countries and the turning point is reached at a much higher level of per capita GDP for a developing country compared to that of a developed country. The major reason behind this is that in the developing countries due to large scale emission of pollutants from the informal sector we find that as economic activities expand, in terms of expansion of the formal sector, due to the complementarities of formal sector with that of the informal sector the latter sector also expands and pollutes the environment. It is very difficult to regulate the pollution generated by the informal sector as, by definition, this sector is beyond the enforcement of pollution regulation on the part of the Pollution Control Board. In fact in developing countries, particularly in India, the formal sector subcontracts the informal sector for supplying intermediate goods and to undertake the burden of emitting hazardous wastes in the context of supplying intermediate goods.[2]

In order to link trade and environment with that of EKC we focus on the scale, technological and composition effect first.[1] As a result of economic expansion more wastes are generated in the economy and it leads to more pollution. This follows from the scale effect which operates in the initial phases of development. However, with further development we find that the share of dirty goods in total GDP of the economy falls. This is the positive impact (in terms of less pollution) of composition effect. Apart from this we find that with economic development the technological effect comes into the picture and it leads to adoption of environmentally sound technology which reduces the emission intensity of products. The scale effect dominates initially but as the economy develops the composition and the

technological effects combined together dominates over the scale effect. It explains the inverted-U nature of EKC.

An interrelated issue in this context is to link international trade with that of scale, composition and technological effects. It is argued that increasing trade volume (especially export) raises the size of the economy and causes pollution in terms of the scale effect by generating more wastes. Again trade improves environmental quality (and reduces pollution) by shifting specialization from pollution intensive product to non-pollution intensive product and thus reducing the share of dirty products in total GDP. This is the linkage of international trade with composition effect. Apart from this international trade promotes transmission of environmentally sound technology from developed to developing countries and hence reduces emission intensity. This is the linkage of technological effect with international trade. Hence international trade raises environmental pollution in terms of scale effect and reduces pollution in terms of composition and technological effects.

The common notion is that the poor countries are specialized in environmentally 'dirty' products whereas richer countries are specialized in environmentally 'clean' products. This is the essence of the *'displacement-hypothesis'* (DH). It is argued that the dirty (or pollution-intensive) industries of developed countries (with stronger environmental regulations) migrate to developing countries (with weaker environmental regulations) and this phenomenon is referred to as the *'industrial flight hypothesis'*. The reason behind this is the pollution haven hypothesis (PHH) in terms of which the developing countries, due to its weaker environmental regulations, are regarded as pollution haven for attracting pollution-intensive products. In the empirical literature there is still a debate regarding migration of dirty industries from developed to developing countries. However, inspite of the existence of such a debate, one should consider the combination of DH and PHH as an important factor to explain the shape of inverted-U EKC.

It is frequently argued that FDI causes technology transfer and pollution intensive techniques enter into the developing countries through such technology transfer. Hence FDI raises the level of environmental pollution. Again there is the opposite view which states that FDI leads to transfer of environmentally sound technology (EST) and hence reduces the level of environmental pollution. In the first case we have an upward shift of EKC due to FDI whereas in the second case we have a downward shift of FDI. Empirical evidences take into account both these issues[2] though the debate is still unsolved.

a. General Empirical Issues on Trade and Environment: Systematic Fear and the Impossible Trinity of Global Environmental Regulation

In general it has been observed by Frankel (2009) that SO_2 concentration tends to fall with openness whereas CO_2 concentration tends to increase with openness in developing countries.

In this context we should focus on the '*systematic fear'* associated with trade and environment. There are two issues associated with this systematic fear. First, traders fear that too much emphasis on environmental protection, especially by developed countries, can be an excuse for imposing non-tariff barriers in the form of environmental regulations and may hamper free trade. Second, environmentalists fear that emphasis on free trade can be an excuse to give inadequate weight to environmental goals and excessive weight to maximization of GDP.

If we consider the beneficial and the harmful environmental effects of trade we find that both can be analyzed under two alternative scenarios like (i) growth in income as a result of trade and (ii) a constant level of income inspite of trade. From the point of view of harmful effects we find that trade leads to growth in income implies an expansion in the scale of economic activity and hence it generates more wastes. This results in environmental degradation. For a given level of income, we have the *'race to bottom'* argument which creates harmful environmental effects of trade. In the '*race to bottom'* scenario we find that high environmental standard in developed countries results in high cost for the polluters. This causes a relocation of polluting industries from developed to developing countries along with capital outflow from the former to the latter. As a result of this the developed countries are forced to relax their environmental standard which ultimately raises the global pollution level. Regarding the beneficial effects we find that when trade leads to growth in income of the economy it implies a shift towards cleaner production techniques and hence the share of dirty production of the economy in its GDP falls. The beneficial effects as a result of trade, for a given level of income, can also be explained not only in terms of gains from trade but also due to improvement in environmental standard of the product.

We now focus on the '*impossible trinity'* of global environmental regulation. The impossible trinity is depicted in terms of figure 3. The Impossible Trinity arises in terms of a trilemma of regulations with three attributes like (i) globalization (which is desirable for its economic benefits), (ii) environmental regulation (which is desirable when we have negative environmental externality) and (iii) national sovereignty (which is desirable not only because different countries have different needs and preferences but also that each country has some pride associated with political independence and enjoying sovereignty). Impossible Trinity implies that it is possible to design a system where any two of the above-mentioned three attributes hold.

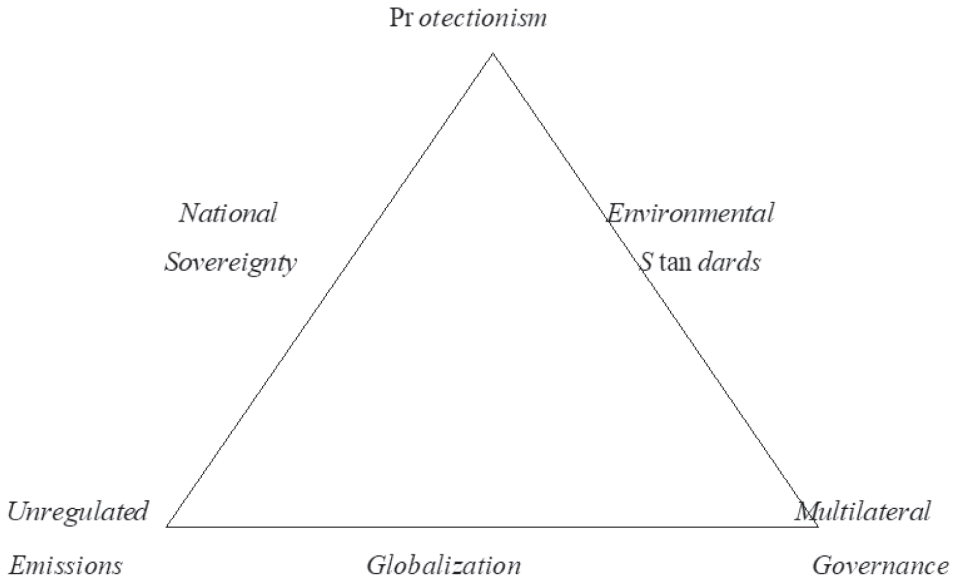

Figure 3: The Impossible Trinity

The three attributes are shown on three sides of the triangles in figure 3. The angles are represented by unregulated emissions (the lower left side corner), multilateral governance (the lower right side corner) and protectionism (the top of the triangle).[1] Unregulated emissions imply a situation of *laissez faire* and protectionism implies isolation. So naturally when these two are in operation national sovereignty is maintained. Only if the countries can cut off from international interactions, they can preserve national sovereignty along with maintaining any type of environmental regulation that they want. Hence national sovereignty and environmental regulation (environmental standard) are inconsistent with globalization. The process of international economic integration causes the economy to move to the bottom of the triangle implying the era of globalization. When we have laissez *faire* along with multilateral governance (implying multilateral environmental regulation) we have a situation of globalization. Globalization is thus causing a conflict between environmental regulations (by mixing unregulated emissions in the form of *laissez faire* with that of multilateral governance) and national sovereignty. We may either have globalization and national sovereignty without giving attention to global environmental regulations (in the form of environmental treaties) or we may have to focus on globalization along with global environmental treaties without focusing on national sovereignty. The impossible trinity arises because of the fact that environmental protectionism requires international cooperation as a part of globalization .International cooperation again in turn affects national sovereignty. So in case of maintaining

sovereignty along with environmental regulations domestically, the question of protectionism arises.

a. Climate Change and Green House Gas Emissions

The issue of climate change is based on various global conventions and treaties. The United Nations Framework Convention on Climate Change (UNFCCC) is one among the series of agreements and treaties that have been adopted at the 1992 Earth Summit. The main goal of UNFCCC is to restrict Green House Gas emissions in the atmosphere so that dangerous anthropogenic human induced interference in the climate system can be prevented. The UNFCCC parties are classified into three categories: Annex I parties, Annex II parties and Non Annex I parties. Annex I parties include all developed countries which are members of the Organization for Economic Cooperation and Development (OECD) along with the economies of transition with binding emission targets like Western and Eastern European countries, Canada, Japan, New Zealand, Russia etc. Annex II parties consist of OECD member countries which are mainly developed countries but not with binding emission targets. These countries are expected to provide financial assistance to developing countries to combat pollution and also to help them in providing environmentally sound technology. The Non Annex I parties include developing countries with voluntary participation like China, India, Brazil, Philippines etc.

Among the various other conventions, protocols and treaties The Kyoto Protocol deserve special attention. It took place in December 1997 in Kyoto, Japan, and entered into force in February 2005. In November, 2009, 185 parties of the UNFCCC signed and ratified the Protocol. The major feature of the Protocol is that it has assigned specific targets for 37 industrialized nations and the European Community to reduce their emission of the specified Green House Gases (GHGs). The process through which the Kyoto Protocol used to operate is known as 'The Kyoto Mechanism'. The major three components of this mechanism are (i) International Emissions Trading (IET) in the carbon market, (ii) Clean Development Mechanism (CDM) and (iii) Joint Implementation (JI) programme. These mechanisms are adopted to fight against global warming through reduction in GHGs in the form of decrease in carbon emissions. [2]

In order to understand the operation of IET, CDM and JI we need to introduce the concept of '*Carbon Credit'*. Carbon Credit is like a permit that allows an entity to emit a specified amount of GHGs which causes global warming. One credit is achieved when 1 tonne of CO_2 (or CO_2 equivalent) is reduced. The carbon credit is represented in terms of emission reduction unit (ERU) so that 1 ERU is equivalent to reduction of 1 tonne of CO_2 (or CO_2 equivalent). Credits can be exchanged between businesses or brought and sold in the international markets at the prevailing market price. Under IET countries can trade in the international carbon

credit market. Countries with surplus credit can sell credits to countries with quantified emission limitation and reduction commitments under the Kyoto Protocol. Under CDM a developed country can take up a greenhouse gas reduction project activity in a developing country where the costs of GHG reduction project activities are much lower. In this case the developed country would be given credits for meeting its emission reduction targets while the developing country would receive capital and environmentally sound technology to implement the project. Under JI scheme any Annex I country can invest in an emission reduction in any other Annex I country as an alternative to reduce domestic emissions. JI allows a country with an emission reduction commitment (i.e. Annex B Parties) to generate emission reduction units (ERUs) from domestic projects and sell them to another Annex I country, which then uses them to meet its Kyoto target.

The carbon credit market is yet to achieve its full potential as a global agenda. In India we find that has been some increase in achievement of certified emission reduction in the context of carbon credit market but it is still far behind China. Still almost every year we find Conferences/Meetings/Summits are organized with sole global agenda like reduction in emission of GHGs. The issue of global warming is still a matter of concern in the present world and it calls from interdisciplinary and multidisciplinary research to fight against it.

III. Concluding Remarks

In this paper we have considered a theme-based survey of various works related to trade and environment covering both the theoretical and empirical aspects. Starting from the Benchmark Model of Copeland and Taylor (2004) we have focused various theoretical works on trade and environment both in the context of small open economy models and North-South models under general equilibrium set up. In the context of North-South model we have elaborately analyzed the model of Chichilinsky (2004). In the context of empirical works we have analyzed the various factors related to trade and environment to explain the inverted–U shaped EKC. In this context we can mention that we have used the concept of scale, composition and technological effects as explained in terms of Copeland-Taylor (2004) model to explain the inverted-U shape of EKC. The Impossible Trinity in the context of global environmental regulations has been explained and it has been shown that it implies the inconsistency associated with simultaneous occurrence of three attributes like globalization, national sovereignty and environmental regulations. Finally the carbon credit market has been analyzed in terms of IET and CDM as we find from Kyoto mechanism under the Kyoto Protocol. We have expressed the concern that carbon credit market is yet to achieve its full potential to fight against global warming.

From this literature survey it appears that the research gap in the context of the literature on trade and environment lies in the existence of a sound theoretical structure of the carbon

credit market. For example, in the Copeland –Taylor (2004) model one can incorporate the effects of FDI on the optimal pollution in the economy along with the impact on the tax rate on pollution. If such FDI reduces the optimal pollution it can be interpreted in terms of CDM initiated by the developed country in the developing country as an outcome of FDI. Researchers should explore this aspect for further research on issues in trade and environment. Research in this line will help the academicians and policy makers to deal with the disputes related to transboundary pollution and will help to combat emission of GHGs for enhancement of global welfare.

Notes :

[1] For easy understanding we have retained the notations used by Copeland and Taylor (2004) though at a later stage we have discussed some implications of Copeland and Taylor (2004) which are not shown in the original paper.

[2] One can explicitly introduce abatement cost in the competitive equilibrium condition. However, to simplify matters we have not introduced it here.

[3] See Copeland and Taylor (2004) for details. For easy understanding we have used the same notations as used by Copeland and Taylor (2004).

[4] It follows from the standard Samuelson rule regarding optimal taxation

[5] Here environmental quality is treated as a normal good. It is to be noted that higher pollution reduces environmental quality and hence reduce utility. Thus $V_Z < 0$.

[6] It is to be noted that as Z affects G positively (it is interpreted as an input in the model just like primary inputs), it also affects I positively and hence R positively. Copeland and Taylor (2004) have assumed that an increase in increases marginal damage. The fact that varies endogenously with is also taken into account in deriving the supply curve of pollution.

[7] A Brecher-Alejandro (1977) type of result.

[8] See Dinda (2004) for an excellent survey on EKC.

[9] As income increases, it implies higher standard of living as a result of which people are concerned for cleaner environment. So, given that income elasticity of environmental quality demand is high, an increase in income implies that people are more willing to pay for an ambient environment. In other words high income implies less pollution. See Beckerman (1992), Carson et al. (1997), Chaudhuri and Pfaff(1998) etc.

[10] One can cite the example of leather tanning process in the Bantala area of eastern Kolkata by the informal sector units in order to supply intermediate products to the big shoe companies. See the works of Chaudhuri and Gupta (2003) and Gupta and Basu (2004).

[11] See Grossman and Krueger (1991)

[12] See the works of Bommer (1999), Dean (2004),Letchumanan and Kodama (2000), Xing and Kolstad (1995) etc.

[13] See Frankel (2009) for details about the 'Impossible Trinity of Global Environmental Regulations'.

[14] In case of Kyoto Protocol we find that there is one more categorization of countries which is referred to as Annex B countries. It includes all Annex I countries except Turkey and Belarus.

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SUSTAINABILITY OF AGRICULTURE IN WEST BENGAL

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Abstract:

Modern agricultural practices are increasingly turning out to be knowledge-based and lack of professional expertise and exposure to contemporary farming techniques of the farmers of West Bengal is pushing the sector in a lagged-behind state. Agriculture in the state is small farmer centric (90% of the farmers being small and marginal) with average holding size 0.82ha limiting the scope for introduction of technology innovations and interventions. Predominance of rice based mono-cropping with jute in sequence and less preference for crop rotation and diversification are eroding the competitiveness of the agricultural sector. Imbalances in fertilizer application and indiscriminate use of pesticides have adverse impact on soil health and productivity. The farmers are not aware of the significance of soil testing nor are they knowledgeable about the usage of certified seeds.Unfortunately about 90% farmers of West Bengal use 10-15 years old crops as seeds consequently hampering the production.

Sustainability of agricultural sector is contingent upon its commercial viability and commercialisation is not possible without agricultural education. When the job market is shrinking in both private and public sectorseducatedyouths who are disinclined to the sector can be trained as technology transfer agents and encouraged to take courses in agricultural education as a career option. Knowledgeable, well-informed young minds will rejuvenate the conventional agricultural practices inspiring application of information technology, biotechnology, ecology, management etc. in raising theproductivity of agricultural sector in a sustainable manner. Improving cropping intensity with better exploitation and management of surface and ground water resources, crop diversification with less water intensive and remunerative crops having strong markets, soil health management through comprehensive survey and application of organic fertilizers, promotion of seed villages for production of certified seeds are vigorous footsteps towards sustainability. Agriculture Development Officer at block level, KrishiPrajuktaSahayak (KPS) at Gram Panchayat level, KrishiBandhu, Farmers' Interest Groups, Farmers' Club are initiatives in this direction.

Keywords: Sustainable agriculture, technology innovation, soil health, certified seed, commercial viability, agricultural education

JEL Classification Codes:

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I.INTRODUCTION

"Sustainability of agriculture relates to the capacity of an agro ecosystem to predictably maintain production through time. Therefore sustainability implies stability in a given set of environmental and economic circumstances" (Scot H Hutchins, Global Director Crop Protection R&D). Utilising proven modern farming technology and science-based solutions farmers can increase productivity, efficiency, profitability in an environmentally non-degradable manner as well as reduce malnutrition and enhance food security.Shifting agricultural activity from subsistence tocommercial one is a pre-condition for sustainability. The paper intents to corroborate that application of modern technology makes agriculture sustainable.

West Bengal has 3% of India's landmass and 8% of the population .About65% of labour force in the state is engaged in agricultural sector though the sector contributes only 18.7% of SGDP in 2014-15 and grew at a rate less than 4% during the same period. Small and fragmented ownership of land caused by the land reform in West Bengal hinder introduction of innovations and interventions. There is a broad correspondence between infrastructure and technological developments of regions and the level of credit flow. (Rao, 1994)Failure of previous Government to implement the revised Agricultural Policy of 2002; reinvigorate agricultural education, research and extension system cause lack of professional expertise and reluctance to be knowledgeable about modern farming techniques among the farmers. It is evident from the study that mechanised farming practices, crop diversification (specially producing those crops having high income elasticities of demand) in some districts of West Bengal have brought commercial successes.

II. AGRICULTURAL PROFILE OF WEST BENGAL

Majority of the population in West Bengal live in the rural areas and agriculture is their main occupation. About 64% of geographical area is engaged under cultivation and 91.74% of cultivable area is net sown area. 88% of total land holdings belong to marginal and small farmers with average holding size 0.82 ha,deterring the application of modern farm techniques. The main obstacle to agricultural growth is fragmented ownership of land. Very few agriculturists in the state have 30-40 acres of stretch of land, limiting the scope for adoption of intensive crop production technologies including mechanised cultivation and cooperative farming.

West Bengal is the largest producer of rice in India accounting for nearly 15% of national total. Out of total area of 6.24 mn.ha under foodgrains cultivation , 5.39mn.ha is occupied by rice in 2014-15, 92.27% of total cultivable area is in 8 fertile districts of West Bengal and the state is endowed with favourable agro climate prompting diversified agricultural production. As income increases, people diversify the diet with food containing more proteins and vitamins and thus the farmers should be made aware of the changing pattern of market

demandand encouraged to produce cereals having high income elasticities of demand. Crops like maize, oilseeds, and pulses have stronger markets. Only 2.15% and 2.75% of national total of maize production in 2013-14 and 2014-15 respectively, came from West Bengal. For oilseeds the figures were 2.78% and 3.49% in 2013-14 and 2014-15 respectively and 0.65% and 1.02% in case of pulses for the same period. Whereas, the largest producing states namely Andhra Pradesh contributed 17.89% of total maize and Madhya Pradesh 27.36% and 28.96% respectively of total, oilseeds and pulses production in 2014-15.The following tables provide the comparative study of principal crops with the top producing states.

Table 1: Production of major crops in West Bengal vis a vis Highest Producer State (For the Year 2014-15)

Name of Crop	Highest Producer statevis.a.vis WB	Area (Million,Lakh Hectare)	Production (Million,Lakh Tons)	% to All India	Yield (Kg/Hectare)
Rice	West Bengal	5.39	14.71	14.04	2731
	Uttar Pradesh	5.87	12.22	11.66	2082
Maize	Andhra Pradesh	1.04	4.97	20.42	4079
	West Bengal	0.15	0.65	2.75	4347
Pulses (All Varieties)	Madhya Pradesh	5.36	4.70	27.36	877
	West Bengal	0.25	0.18	1.02	711
Pulses (Arhar)	Andhra Pradesh	4.33	2.26	7.54	521
	West Bengal	0.02	0.02	0.08	1458
Pulses (Moong)	Andhra Pradesh	2.66	1.77	12.43	666
	West Bengal	0.21	0.18	1.25	839
Pulses (Gram)	Karnataka	9.53	7.03	8.36	738
	West Bengal	0.26	0.30	0.36	1154
Pulses (Lentil)	Madhya Pradesh	5.50	3.36	39.59	610
	West Bengal	0.65	0.62	5.68	960
Oilseeds (All Varieties)	Madhya Pradesh	7.09	7.72	28.96	1090
	West Bengal	0.77	0.93	3.49	1161
Oilseeds (Groundnut)	Gujarat	1.40	2.22	33.90	1586
	West Bengal	0.79	2.02		2557
Oilseeds (Rapeseed & Mustard)	Rajasthan	2.47	2.90	45.89	1170
	West Bengal	0.45	0.49	7.77	1084
Oilseeds (Sesame)	Gujarat	2.38	1.26	24.00	525
	West Bengal	2.24	2.15	22.50	960
Oilseeds (Linseed)	Madhya Pradesh	1.12	0.57	39	503
	West Bengal	0.10	0.02	2	200

(Sources: Annual Report 2016-17, Dept. of Agriculture, Cooperation and Farmer's WelfareState of Indian Agriculture 2015-16, Ministry of Agriculture and Farmer's Welfare, GOI Agricultural statistics at a Glance 2015, GOI, Ministry of Agriculture & Farmer's Welfare)

The data for pulses clearly reveals that productivities of varieties of pulses like Gram, Arhar,Moong and Lentil in West Bengal surpass the productivities of the respective crops in the highest producing states. Also the yields of the different varieties of oilseeds like groundnut, rapeseed, mustard and sesame outperforms the yields of those crops in the top producing states .Favourable agro climate and abundance of natural resources are conducive for diversified agricultural production. Moderately developed irrigation infrastructure (consisting of mainly conventional irrigation system) has the potential for further improvement with better exploitation and management of soil health and surface and ground water resources. Modernirrigation coverage of the state vis a vis other major states are presented in table 3. Micro- irrigation (increases efficiency and ensures better control of water use) coverage of West Bengal is not up to the markcomprising only 0.3% of net sown area.

Table 2: Coverage of micro-irrigation in West Bengal vis a vis other major states in 2014-15 (in hectares)

States	Drip	Sprinkler	Total	% of net sown area undermicro irrigation
West Bengal	604	50,576	51,180	0.3
Maharashtra	8,96,343	3,74,783	12,71,126	8.3
Madhya Pradesh	1,66,358	1,85,759	3,52,117	17.21

(Source: Agricultural Statistics at a Glance 2015, Ministry of Agriculture)

The rich bio-diversity and varied agro-climatic conditions boosted growth of horticulture production. As a result horticulture has emerged as a major driver of sustainable agricultural development. The state has strong production base for horticulture crops especially fruits and vegetables with scope for further development in processing and value addition. West Bengal produces 24.51MT of vegetables, about 14.1% of national production from an area of 1.38 mn.ha with a productivity of 16.70 tons/ha and 3.29 MT of fruits, which is 3.3% of national total from an area of 0.22 mn.ha in 2014-15.West Bengal is the leader in the production of pineapple, brinjal, cabbage, cauliflower and second largest producer of potato and litchi after UP and Bihar respectively.Following table provides the horticultural profile (in terms of fruits and vegetables) of West Bengal vis. a vis. highest producing states.

Table3: Horticulture Profile of West Bengal vis. a vis. largest producer states for 2014-15.

Name of vegetables	Highest Producer state vis.a.vis WB	Area (Million Hectare)	Production (Million Tons)	% to All India	Yield (Ton/Hectare)
Brinjal	West Bengal	0.16	2.98	23.00	18.40
	Orissa	0.13	2.20	22.00	16.60
Potato	Uttar Pradesh	0.56	13.58	31.00	24.40
	West Bengal	0.41	9.03	22.00	33.00
Cabbage	West Bengal	0.08	2.20	24.00	28.00
	Orissa	0.04	1.15	14.00	28.00
Cauliflower	West Bengal	0.07	1.88	22.00	25.54
	Bihar	0.06	1.00	2.29	15.27
Tomato	West Bengal	0.06	1.14	6.11	20.20
	Madhya Pradesh	0.07	2.17	9.37	31.00
Pineapple	West Bengal	0.01	0.31	18.20	30.60
	Assam	0.01	0.22	15.60	15.80
Papaya	Andhra Pradesh	0.02	1.14	27.10	80.00
	West Bengal	0.01	0.34	5.90	29.40
Banana	Tamil Nadu	0.13	8.25	28.70	65.80
	West Bengal	0.04	1.10	3.70	24.00
Mango	Uttar Pradesh	0.27	3.60	23.00	13.60
	West Bengal	0.09	0.43	2.30	10.10
Guava	Uttar Pradesh	0.05	0.94	12.60	19.21
	West Bengal	0.01	0.19	5.10	13.00
Litchi	Bihar	0.03	0.23	45.60	7.30
	West Bengal	0.009	0.09	16.10	13.00

(Source: Horticulture statistics at a Glance 2015 &<<State-wise Horticulture Status Ministry of Agriculture and Food Processing Industries, Govt. of India-2014)

West Bengal is the second largest producer of potato after UP but the yield is higher than UP, clearly indicating that there is scope for further improvement. Inadequacies in availability of quality seeds, plant materials lead to low level of replacement, total dependence

on other states like Punjab for potato seed, absence of cold storage facilities affecting seed quality are major barriers in the growth of potato production in the state. The farmers mostly produce the commonly consumed varieties like Chandramukhi, Jyotiandpukhraj instead of commercial ones like Atlanta, Peru etc.meant for making potato chips.

Though the state is a major producer of fruits like pineapple, mango, litchi, guava and vegetables viz. brinjal, cabbage, cauliflower, potato inadequate post-harvest management, lack of storage facilities for perishable produce are resulting in seasonal glut and distress sale beside huge losses. Also potential for commercial ventures in horticulture is not fully exploited.

III.FUTURE CROPPING PATERN FOR AGRICULTURAL SUSTAINABILITY

The agricultural land devoted to different crops in a region or state or a country at a particular point of time is increasingly getting influenced by economic factors rather than non-economic ones (V. Kalaiselvi). Expansion of modern irrigation system, infrastructure development, penetration of rural markets, development and dissemination of modern crop technologies encouraging production in environmentally non-degradable manner are economic factors contributing towards crop choices of farmers. Liberalisation and globalisation policies further strengthened the role of price related economic incentives in determining cropping pattern. Crop diversification or a shift from traditional less remunerative crops to more remunerative ones is also the result of government policies and thrust on some crops over the others. Crop diversification reflecting the shift of agricultural activity from subsistence to commercial one and economic profitability preserving the quality of natural resource base is the underlying force of crop diversification.

Government (both Central and State) initiatives are important in motivating the farmers to diversify to more sustainable and higher value cropping pattern. Prevalence of rice-based mono-croppingadversely impacts the soil health. So farmers have to diversify cropping pattern from water guzzling paddy to oilseeds, pulses, maize for sustainability of production.

The demand for high income elastic vegetable oil (an important source of energy, essential amino and fatty acids) increases considerably in the post reform period due to the opening up of agricultural sector and changes in food habits. Consequently the demand for groundnut, sesame, soyabean and sunflower are increasing rapidly. Share of West Bengal in total oilseeds production of the country is less than 3%. Except rapeseed, mustard and sesame, contribution of West Bengal to the production of other oilseeds is negligible.

Groundnut is a Kharif crop with high oil content making its production commercially valuable. A variety of value added products are prepared from groundnuts. Among oilseeds, it has highest share in export. Groundnut is cultivated in sandy soils of Digha and Kanthiin East Midnapore. Though the yield (as shown in Table I) surpasses the top groundnut producing

state Andhra Pradesh, poorer total production is due to lower acreage devoted to its production. In the southernmost areas of West Bengal in the districts of South 24 Parganas, South Howrah and East Midnapurthere exists about 8.4 lakh hectares of low lying parts of the deltas having shallow underground water with high salt content. Salts are raised to the surface during dry seasons making it unfit for cultivation. The region is mono-cropped with 4.2 lakh hectares being cultivated in wet season and rest 6-7 months during dry seasons remain fallow. Possibility exists for successful groundnut cultivation in the sequence Rice-Groundnut, Groundnut-Rice applying saline water irrigation andorganic fertilizers. Sprinkler irrigation is ideal for the crop grown under sandy soil, while drip irrigation improves seed quality and saves 40-50% irrigation water. Seed replacement rate is highest for groundnut in West Bengal. Rapeseed-mustard is a group of crops comprising rapeseed, Indian mustard and black mustard.Mustard oilis nutritious having high market value. De-oiled mustard has good export value.Mustard is cultivated in the districts of Murshidabad, Nadia, Malda, North 24 Parganas, Burdwan, Birbhum, etc. Table-II indicates that in spite of satisfactory yield total production of mustard is in lagged behind state in West Bengal due to lesser area of cultivation. In the western belt of the state there is vast tract of relatively arid and lateritic lands representing about 1/3rd of the cultivated area in the districts of Purulia, Bankura, parts of EastMidnapur, Burdwan and Birbhum. Nutritional status of soil is poor due to leaching losses on account of high porosity. Productivity of the soil in the region could be improved substantially through interventions like soil management, water harvesting and soil conservation technology and the crop can be grown as an inter/mix crop with gram, lentil and potato in this region. Rice fallow land can be more profitably utilised for cultivation of rapeseed and mustard with low cost of seeds and other inputs and zero-tillage cultivation. Lower yield compared to top producers is due to the use of old varieties of seeds (B-9, Pusa Bold, etc.) released during 1980s.

Sesame is grown as a Kharif crop in arid and semi-arid regions and Rabi/Summer crop in the cooler areas at a temperature of 25^0 C. It can be grown on a wide range of soils but should be well-drained. In West Bengal, it is grown as a summer crop both in rain fed andirrigated land. Sesame oil is considered one of the healthiest due to rich sources of unsaturated fatty acids and has industrial and pharmaceutical uses. Nadia, Hooghly, West Midnapore, Murshidabad, Bankura and Burdwan are sesame producing districts in West Bengal.West Bengal is a major producer of sesame in India. Can be grown as kharif crop in the lateritic soil of Purulia, Birbhum and eastMidnapur using organic fertilizers and quality seeds. Sunflower oil is one of the healthiest oil with an ideal source of unsaturated fatty acid and its seeds have high export value. The crop can be grown in all the seasons and as a contingent crop when the season for planting regular crop is delayed or regular crop has failed. Can be grown as a summer crop after rice in the low lying Gangetic deltas of South 24 Parganas, East Midnapur and South Howrah and as winter crop in the fertile alluvial soil of Nadia, Hoogly, Burdwan

and Murshidabad. Greenhouse farming of the crop is a viable option providing controlled cultivation under less area throughout the year compared to open land. Both the quality and yield are much higher (4to 8 times) than open field cultivation.

Linseed is a plant grown as winter crop. Linseed oil has quick drying property is largely used in paint and varnish industries. The seeds have high medicinal value in control of cardiovascular, cancerous, diabetic, rheumatic arthritis diseases. Murshidabad, North 24 Parganas are linseed producing districts. Productivity of linseed has declined from 500 to 200 kg/ha during 2013-14 .Maize- Linseed and Paddy-Linseed sequences may be practiced in the southern belt and inter-cropped with cereals, pulses, oilseeds of rabi season in new alluvium regions of Murshidabad, Hoogly, Nadia, Burdwan and North 24 Parganas. Farmers of West Bengal are not much familiar with linseed cultivation nor are they aware of the commercial value of the crop. Limited choice of high yielding varieties, use of farm saved seeds and low input applications are the factors attributing to low yield in the state.

Soil recharging pulse occupies less than 4% of total area under rice cultivation in2014-15. Pulses like Gram (Greenand Brown),Pigeonpea (Arhar) and Lentil(Musoor) are excellent sources of proteins and vitamins having strong market values. Arhar is both winter and summer crop and supplies a major share of protein requirement of vegetarian population in north India. In West Bengal it is cultivated as rabi crop in flood prone areas but cropping intensity increases if sown in summer along with moong.It can be cultivated as summer crop in new alluvium soil of Nadia, Hoogly, North 24 Parganas and flood prone, old alluvium soil of Dinajpur (North and South) and Malda. Gram sown in rotation with cereal crops help in controlling soil- borne diseases. Green gram(Moong) excellent source of high quality protein, is both summer and winter crop. The state grows rabi green gram and there is a great scope of increasing the area in rice fallows in Jalpaiguri, Coochbehar. Can be cultivated in rotation with rice as summer crop in the southern most districts like South 24 Parganas, East Midnapur etc. Lentil is a nutritious food having high demand for export. It is a winter crop that can be grown successfully in low lying paddy soils of poorer type. Generally , it is grown after the harvest of kharif crops. Though Murshidabad is top lentil producing district, North 24 Parganas, Nadia, Hoogly, Burdwan have the potential to grow the crop in commercial scale.

Horticulture has become one of the major agricultural activities providing higher productivity per unit as compared to other crops resulting in higher income and employment generation in rural areas. Rich bio-diversity and varied agro-climatic conditions in the state are perfect for growing a large variety of horticultural crops beyond the traditional ones.

In spite of large number of farmers relying on potato cultivation the prices depend on production from other states and weather conditions. In 2011 even lower productions could

not prevent farmers from distress sale due to inadequate storage facilities, arrival of crop from Punjab and prices crashed to Rs 100-120/50 kg bag. About 260 odd farmers in Bamanpur village of Burdwan district in collaboration with food and beverage firm PepsiCo produced 15,000 kg /acre of Atlanta variety of potato in a collective land of 140 acre in 2011. PepsiCo provided the farming technology and became the guarantor of the loan they took for buying inputs. The company gave a price of Rs.305/50 kg bag with assuredprofits. PepsiCo's collaborative farming programme in West Bengal around 2012 were operating in 6 districts-Burdwan, Hooghly, Bankura, Birbhum, Howrah and NorthMidnapore, it increased to 9 in 2017 supplying 72,500 MT of potatoes.

Productions of crops like moosambi, hybrid mangoes and grapes profitably using modern amenities in the districts of Murshidabad, Purulia and Bankura are path breaking. Productivities of such valuable fruit crops could be improved through the adoption of soil management, water harvesting and soil conservation technologies in the lateritic lands of Purulia, Bankura, Birbhum parts of EastMidnapur and Burdwan.Mouth-watering Himsagar varieties of mangoes have satiated British taste buds and have the potential for a strong international market. The old mango orchards of Malda and Murshidabad have outlived their economic life and need rejuvenation. Uninterrupted power, water supply, warehousing facilities and forward integration with processing industries are immediately required to make mango cultivation competitive.

Greenhouse farming of high value exotic vegetables like Broccoli, Red Cabbage, Cherry Tomatoes and Bell Paper is picking up in many parts of India. Demand- driven exotic vegetables production is suitable for the farmers as they have assured markets through contracts with buyers. These vegetables have demand in Five Star Hotels, clubs, restaurants, supermarkets etc. Exotic vegetable market is growing at the rate of 15-20% per annum and is increasing further since India is importing 85% exotic vegetables. Greenhouse or polyhouse is beneficial as the returns are good, allowing the farmers to grow crops throughout the year irrespective of season. Cropping duration of these vegetables are 4-10 months and more than 90% of total yield are obtained during off seasons fetching higher market prices (2-4 times more than normal season prices). Polyhouse farming of exotic vegetables can be employment generating in the hilly districts of Darjeeling, fertile plains of North 24 Parganas, Hoogly, Nadia, Burdwan, Murshidabad Dinajpur(North and South) and Malda.

Presently mushroom is a very popular food item having high nutritional values. The cost of production is considerably low, easy to grow and does not require dedicated cultivating land, rather it can be grown even in the house area.

IV.MODERN AGRICULTURAL MACHINERIES

"Farming methods took a great leap forward with the coming of Industrial Revolution and the development of more complicated machines. One of the primary constraints to increased productivity and profitability stems from the limited use of modern farming techniques, equipments and inputs" (William E. Todd, US Ambassador to Cambodia).

With the invention of steam power, agricultural steam engines replaced heavy pulling work of oxen that could power stationery machines including combined harvester that cut, thresh and separate the grains while moving continuously in the field. Transplanters with plastic mulch help in transplanting seedlings efficiently. Technology is changing the way that humans operate the machine as computer monitoring systems, GPS locators allow the most advanced tractor implements to be more precise and less wasteful in the use of fuel, seeds and fertilisers (History of Agricultural Machinery- E. Todd). "Precision farming" a new technique that boosts crop yields and reduces waste by using satellite maps and computers to match seed, fertiliser and crop protection applications to local soil conditions. So 21st century farming is essentially technology-based and can be accessed by farmers belonging to a cooperative system.

Immense progress has been made in the production of quality seeds by the application of biotechnology or genetic engineering. Through biotechnology different traits like insect and drought resistant, toxin producing,nitrogen use efficient crops which not only saves on water, pesticides, fuel and labour but restore/enhance soil fertility.Mobile technology plays a big role in monitoring and controlling crop irrigation systems. Farmers can control his irrigation systems from phone or computer. Moisture sensors allow precise control of water while crop sensors tailor the application of fertilizer in an effective manner. Integration of information to create management knowledge as a means to influence soil health, pest control, post-harvest activities like conserving, packaging, marketing of the products are also considered as modern farming techniques.

V. STRATEGIC ENDEAVOUR

Inevitably agricultural sector in the state needs technology infusion to push the yield frontier further, utilise inputs more efficiently and diversify to more sustainable and higher value cropping patterns. But new technologies are all knowledge intensive requiring both a strong research and extension system and skilled farmers with emphasis on technology transfer tools. A reoriented agricultural education (with emphasis on agricultural science) is desperately needed. When the job markets are shrinking due to the stagnant manufacturing sector and IT sector substituting skilled labours by Intelligent Machines, agriculture has vast potential in generating higher income and employment. Undergraduates may be encouraged to take courses offering agricultural education in ICAR (Indian Council of Agriculture Research)

recognised universities assuch degrees are now treated at par with medical and engineering ones(according to a recent notification by the Ministry of Agriculture and Farmer's Welfare). Introduction of specialised courses in agricultural education are vital to upgrade teaching skills. The State Agricultural Plan 2009-12 (SAP) under the aegis of RashtriyaKrishiVikasYojana aimed at creating entrepreneurship and employment among the rural masses and enhancement of productivity in agricultural sector in sustainable manner. Its objective was to draw specific guidelines offering flexibility for the choice of techniques enabling farmers for the adoption of location specific and low cost technology. Overall production of crops like rice,pulses,oilseeds and potatoes exhibited upward trend and net income of farmers increased following new cropping sequences (as shown in the table 3) in the post SAP period. Better farming practices and more acreage under cultivation of respective crops made it possible, but rural employment generation was not stimulated. Unfortunately road map for employment generation was absent in the SAP. Exposing young generation to modern agricultural science, especially agriculture engineering, biotechnology, food and nutrition, ecology and management willserve the dual purposes of solving the unemployment problem and the much needed revamping of the sector . The agriculture education should equip the new graduates with subject competency, agri-business skills, knowledge of computer and information technology and communication skills. The curricula should inculcate analytical skills, impart knowledge about post-harvest technology, international marketing and value-addition to maximise benefits from exports. The paradigm shift in agricultural education should be accounted for in our three State Agricultural Universities. Educated, progressive youths can serve as technology transfer agents like KrishiBandhuthrough Farmers' Club, Farmers' Interest Group, Agriculture/Horticulture Development OfficerandKrishiPrajuktaSahayak(KPS) at Block and Gram Panchyat levels.

Table 4 :Comparative Analysis of Pre and Post SAP income at farmer level

Cropping sequence	Present Net income (pre-SAP)	Income after SAP interventions	Incremental income after SAP implementation	% increase in net income
Rice+Potato	12450	15576	3126	25%
Rice+Potato+Sesamum	13972	21021	7049	50%
Rice+Ptato+groundnut	13372	18092	4720	35%
Rice+Ptato+Jute	14898	21055	6157	41%
Rice+vegetables	14760	17655	2895	20%
Rice+Rice+vegetables	20418	29783	9365	46%
Rice+Wheat+Jute	11659	17121	5462	47%
Rice+Potato+vegetables	20700	26301	5601	27%

Source: State Agricultural Plan,2009-11

VI. CONCLUSION

Sustainability is indeed an issue of survival, but is far broader than the concept of resource destruction like soil erosion, ground water depletion, deforestation, etc. Sustainability includes the goal of food production (ensuring food security), welfare of the food producers and preservation of non-renewable resources. Technology will be the enabling man-made component that will link these two overriding objectives. Indeed, history confirms that technology has been essentialwarranting agricultural productivity and stability. Current breakthroughs in technology confirm that discovery and development of new technologies are sustainable endeavours and common sense directs us to the conclusion that technology will enable sustainability of agriculture.

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WORK STATUS OF FEMALE MIGRANTS/INFILTRATORS FROM BANGLADESH IN WEST BENGAL AND ORISSA

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Abstract

The Partition of India in 1947 saw an onslaught of refugees from Pakistan (from eastern and western parts) into India. This has continued unchecked especially in the Eastern part of the Country, even after East Pakistan became an independent country, namely, Bangladesh in 1971. Though migrants from Bangladesh to India were primarily Hindus, Muslims also formed a part of the flow, mainly for economic reasons.

The migrants from Bangladesh are primarily settled in West Bengal and neighbouring states, one of which is Orissa. A study was conducted among 400 women in two districts of West Bengal, and one of Orissa, where there are large settlements of migrants from Bangladesh.

The study tried to take a look at the work status of the female migrants. A huge disparity was found among the female migrants in the survey areas of West Bengal and Orissa.Almost all of them are engaged in economic activities in Orissa, but in the study areas of West Bengal, the percentages vary between 7 to 25% only. Even among Muslim women low percentages are engaged in economic activity.

Generally the economic condition of a family regardless of its religious followings is a strong determinant of employment of its women folk. A look at the economic situation of the migrant families from survey data, for both working females and the non working, reveals a mostly modest economic situation of both the groups. Yet a very low percentage of the women in the survey areas of West Bengal are gainfully employed, leading one to wonder whether the strong conservative societal mindset continues playing a dominant role here.

On the other hand, in the survey area of Orissa which incidentally has 100% Hindu migrant population, 99% of the females are engaged in outside labour. What is helping to overcome the traditional conservative mindset of confining women at home?

Many of the women among the migrant population in Orissa felt this was largely due to education and other migration induced factors that brought about a change in their beliefs and attitudes to life. Financial independence of these women, had less to do with their families' economic situation and more to their education and /or change in perception.

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Keywords: Women Migrants from Bangladesh, Work Status, Education, Migration related change in Perception.

JEL Codes: **F**5, **F**6, **I**3, **J**1, **J**6.

I. Introduction

The Partition of India in 1947 saw an onslaught of refugees from Pakistan (from eastern and western parts) into India. Displaced migrants started pouring into India in the wake of communal disturbances preceding and following Independence (Dey and Chakraborty1994). This has continued unchecked especially in the Eastern part of the Country, even after East Pakistan became an independent country, namely, Bangladesh in 1971. Though migrants from Bangladesh to India were primarily Hindus, Muslims also formed a part of the flow, mainly for economic reasons.

The migrants from Bangladesh are primarily settled in West Bengal and neighbouring states, one of which is Orissa. A study was conducted among 400 women in Nadia and Murshidabad districts of West Bengal, and Kendrapara of Orissa, where there are large settlements of migrants from Bangladesh. The study tried to take a look at the work status of the female migrants.

Over the years, the percentage of females among the migrants from Bangladesh to India has been on the rise (from 46.21% in 1971 to 52.79% in 2001 in accordance with Census of India 1971-2001). Participation in economic activity of the female migrants in the survey areas has been examined and reasons behind different levels of participation have been analysed in this paper.

In the study areas of West Bengal and Orissa, four blocks were chosen from the two districts of West Bengal (**Murshidabad** and **Nadia**) in consultation with local people, officials and Panchayat members. In Murshidabad, the four blocks selected were Murshidabad –Jiaganj of Lalbagh subdivision, Raninagar II, Jalangi and Domkal blocks from Domkal subdivision. In Nadia, Chakdaha block from Kalyani subdivision and three blocks namely Karimpur-1, Karimpur-2 and Tehatta-1 from Tehatta subdivision were chosen.

In Orissa's **Kendrapara** district where the study was concentrated, one block, namely Mahakalapada block was chosen after consultation with the local people, officials and the Panchayat members regarding area-wise concentration of migrants. The women in the survey areas have been divided into groups of five year period. The age distribution is seen to vary amongst the different survey areas (Table 1).

Table 1: Age distribution of the female migrants (Percentage)

Age Group	Lalbagh	Domkal	Kalyani	Tehatta	Kendrapara
0-14	0.00	0.00	0.00	-	-
15-19	0.00	1.31	1.42	2.77	-
20-24	5.00	3.96	0.00	9.72	6.00
25-29	5.00	10.52	12.85	15.27	14.00
30-34	11.25	15.78	12.85	12.50	19.00
35-39	6.25	15.78	28.57	27.77	20.00
40-44	8.75	18.42	12.85	13.88	16.00
45-49	5.00	13.15	11.42	13.88	14.00
50-54	16.25	13.15	8.57	2.77	3.00
55-59	3.75	5.26	2.85	-1.38	3.00
60-64	20.00	1.31	5.71	--	2.00
65+	18.75	1.31	2.85	-	3.00
Mean Age	49 years	40 years	39 years	35 years	37 years

Source: Survey data

The main concentration in Lalbagh is in the 30-54 years category, but there is a substantial percentage (38.75%) in the 60 years plus age group. In Domkal and Kalyani the women under the survey belong to the 25-54 years age category mainly, though in Tehatta, the women were from a lower age cluster (20-49 years). In Kendrapara, the respondents primarily belonged to 25-49 years.

Quite a few women in Lalbagh belong to the 60 years and above category, but this is for Lalbagh only. In the other areas, very low percentages of the women migrants belong to this age category. Also, in Lalbagh, Domkal, Kalyani, Tehatta and Kendrapara, none of the women migrants were from the 0-14 year's age group. The average age of the women varies from 35 years in Tehatta, 37 years in Kendrapara, 39 years in Kalyani, 40 years in Domkal to 49 years in Lalbagh.

All the females chosen for the study in Lalbagh and Kalyani in West Bengal and Kendrapara, Orissa were Hindus, the areas being predominated by Hindus, but in Domkal and Tehatta of West Bengal the females were broadly divided between Hindus and Muslims.

Table 2: Religious composition of the female migrants (Percentage)

Religion	Lalbagh	Domkal	Kalyani	Tehatta	Kendrapara
Hindu	100.00	57.89	100.00	54.16	100.00
Muslim	-	42.10	-	45.83	-
Christian	-	-	-	-	-
Buddhist	-	-	-	-	-
Others	-	-	-	-	-
No Reply	-	-	-	-	-

Source**:** Survey Data

II.Work Status

An examination of the data on work participation of the women reveals a huge disparity among the female migrants in the survey areas of West Bengal and Orissa.Almost all of them are engaged in economic activities in Orissa, but in the study areas of West Bengal, only 25% in Lalbagh, 15.78% in Domkal, 7.14% in Kalyani and 12.50% in Tehatta are engaged in outside work.

Amongst the women workers in Lalbagh, 5.26% work as agricultural labourers. But the women are mainly engaged in the biri making (52.63%) and 42.10% work as maids or cooks in other households.

Table 3: Sector wise distribution of the working women migrants (Percentage)

	Lalbagh	Domkal	Kalyani	Tehatta	Kendrapara
Cultivator	0.00	0.00	0.00	0.00	1.01
Agricultural labourer	5.26	0.00	0.00	0.00	96.96
Household industries	52.63	66.66	75.00	0.00	1.01
Others	42.10	33.33	25.00	100.00	20.20

Source: Survey data

(**N.B1**: Women engaged in biri making have been shown under 'household industries' and those working as maids have been classified under 'others'.

N.B.2: In Kendrapara, the total is not 100% because some women are engaged in more than one occupation)

The paltry 15.78% women, who are engaged in regular employment work in Domkal, also work in the biri industry or as maids (Table 3). This is again observed in the case of Kalyani where the very low percentage who are engaged regular employment, work in either the biri industry or as domestics in other households. In Tehatta, only 12.5% are employed, primarily in livestock tending.

So overall in the survey areas of West Bengal, where work participation rate is low, the women are mostly working as biri maker, as domestics or as livestock tenders.

However, in Orissa, the distribution picture of the women migrants engaged in various sectors is very different compared to that of West Bengal. 99% of the women in Kendrapara work outside, mainly as agricultural labourers (96.96%) and a few are engaged in livestock tending and construction-there are overlappings, as the women are engaged in more than one occupation.

The migrant women, mainly Hindus primarily fled from Bangladesh due to a wide range of socio-political and religious factors that made it difficult for them to live in their motherland. Muslims also came into India for different reasons and purposes, but mainly due to economic reasons. In Domkal (Murshidabad) and Tehatta (Nadia) of the study areas of West Bengal, Muslims form a substantial portion of the migrant population. A very low percentage of females in these two areas however, are engaged in economic activity. Among the low percentage of women migrants who are engaged in outside work in these areas, 56% in Domkal and 57.14% in Tehatta belong to Muslim families. Thus, what we observe overall is that in the study areas of West Bengal, Hindu or Muslim, a very low percentage of the women migrants are engaged in economic activity. Why is this so?

Generally the economic condition of a family regardless of its religious followings is a strong determinant of employment of its women folk. A look at the economic situation of the migrant families from survey data, for both working females and non working, reveals a mostly modest economic situation of both the groups. Yet a very low percentage of the women in the survey areas of West Bengal are gainfully employed. Table 4 presents a picture of the economic situation of the families' of the employed female migrants .

Table 4: Economic background of the employed female migrants (Percentage)

Income bracket in rupees	Lalbagh	Domkal	Kalyani	Tehatta	Kendrapara
0-3000	88.33	80.00	100.00	28.57	94.35
3000-6000	5.88	20.00	0.00	42.85	5.65
6000-9000	5.78	0.00	0.00	14.28	0.00
9000-12000	0.00	0.00	0.00	0.00	0.00
12000-15000	0.00	0.00	0.00	0.00	0.00
15000 plus	0.00	0.00	0.00	14.28	0.00
N R	0.00	0.00	0.00	0.00	0.00

Source: Survey Data

In Lalbagh the women belong mainly to low income families of monthly earnings less than Rs 3000. In Domkal also ,the women come primarily from low income families,with only 20% belonging to the second income bracket of Rs 3000-6000 .

In Kalyani(where only 7.4% of the migrant females who work outside), all are from low income families .Only Tehatta displays a better income distribution picture with the main concentration in the Rs 3000-6000 category and 15% belonging to the highest income bracket of Rs 15000 plus.

Table 5**: Economic background of non working females in the survey areas of West Bengal (Percentage)**

	Lalbagh	Domkal	Kalyani	Tehatta
Rs 0-3000	77.77	47.72	75.00	28.57
3000-6000	11.11	13.63	9.61	42.00
6000-9000	7.93	13.63	9.61	4.11
9000=12000	1.58	9.09	5.76	10.00
12000-15000	-	4.54	-	1.00
15000 plus	1.58	11.36	-	14.28

Source: Survey data

Table 5 shows that the economic scenario of housewives in the survey areas of West Bengal is not much different from those of the women who work outside. In Lalbagh, in both the cases, working and non working, the women belong mainly to the lowest income group. In

Domkal, the non workers are spread out over all the income groups, though highest concentration is in the first group.

In Kalyani , all the working women are from the first income group and for non working females also, maximum concentration is in this category ,with smatterings in the other groups.For the migrant women in Tehatta the pictures for non workers and those in regular employment are almost mirror images of each other.

Economic situation of the migrant families in general is thus observed to be largely modest. In it universally acknowledged that poverty is generally the main reason why women leave the confines of their homes, to seek work. Chaudhury (1978) and Hossain(1998) writing on working married women in Bangladesh observe that poverty is the main reason behind women going out to work,which overrides the strong patriarchal traditions to confine women at home .But in the survey areas of West Bengal economic factors are not apparently prompting the women in the survey areas to go out for work in large numbers.

In a country like India, the conservative societal mindset in several parts of the country regarding the role of women in the world of work, tries to protect women in the private confines of home (Jejeebhoy 2000) and even in dire need, women are often not allowed to work beyond the family farm or business.

Krishnaji (1995) argues that, female work participation is determined by economic status of the family, often overriding patriarchal tradition of keeping girls at home. In poor families , women very often, enter the job market at a very tender age-there being more often than not, siblings or children to feed. Seeing the economic plight of the family, girls often seek employment to supplement the family's income. But since the women in the survey areas of West Bengal are not going out to work in droves one is led to wonder whether the conservative societal mindset is playing a dominant role among the migrants settled in West Bengal.

Basu and Basu (1991) explain that this is however nothing surprising. Literature on women's employment is replete with such contradictory conclusions-unacceptably low levels of labour force participation among poor women, co-existing parallely with female employment primarily driven by poverty. Apprehensions regarding security, and conservative attitudes regarding fear of their harassment, violence and rape (also noted by the World Bank Development Report 2012), appear to be some of the over riding factors preventing females from seeking outside work irrespective of theie families' economic situation (Hamid 2011).

On the other hand in the survey area of Orissa (Table 3), with a 100% Hindu migrant population, 99% of the females are engaged in outside labour. They come from mainly low economic backgrounds, with families earning mainly below Rs 6000 a month. What is helping

so many females from modest economic backgrounds in Orissa to work outside overcoming traditional conservative mindset of confining women at home?

Many of the women among the migrant population in Orissa felt this was largely due to education and other migration induced factors that brought about a change in their beliefs and attitudes to life.

If we are to look at education first, Table 6 on the literacy levels of the female migrants reveals disparities in the literacy rates among the women in the survey areas of West Bengal and Orissa. Only 32.5% women in Lalbagh, Murshidabad are literate. Literacy rate is marginally higher at 42.10% in Domkal. In Tehatta in Nadia, a close 41.66% are literate. But in Kalyani, Nadia however, an impressive 61.42% women are literate, which is way above the other three survey areas of West Bengal.

Table 6 : **Literacy rates of the female migrants from Bangladesh**

Lalbagh	**Domkal**	**Kalyani**	**Tehatta**	**Kendrapara**
32.5	42.10	61.42	41.66	66.00

Source:Survey Data

Looking at Kendrapara,Orissa however, it may be noted that literacy rate is relatively high at 66.0% ,which is at a comparable rate with Kalyani in West Bengal .

Authors like Kishor and Gupta (2004) however feel that the benefits of education at the household and societal levels are likely to begin accruing with literacy, as it is one of the fundamental source of status, but the benefits are fully realised only with increasing educational attainment(Kishor and Gupta 2004) . Jeffery and Basu (1996) and Kishor and Gupta (2004) share the opinion that a minimum threshold level of 5-6 years of education is necessary for attainment of significant improvement in female status in a highly gender stratified country like India.

In order to examine the education levels of the literate women in the survey areas, the women have been divided according to education levels, namely, primary, secondary, higher secondary, graduate ,post graduate and Madrassah educated (Table 7).None of the surveyed women have proceeded however beyond higher secondary level.

Table 7**: Level of education of literate female migrants in the survey areas (Percentage)**

Level of education	Lalbagh	Domkal	Kalyani	Tehatta	Kendrapara
Primary Level	50.00	16.66	23.40	35.71	40.00
Secondary Level	41.66	70.00	72.34	64.28	27.69
Higher Secondary	8.33	13.33	4.25	-	32.30
Graduate	-	-	-	-	-
Post Graduate	-	-	-	-	-
Madrassah	-	-	-	-	-
NR	-	-	-		-

Source: Survey Data

The percentage of literate women, holding primary education is highest in Lalbagh. Literate women with primary (50%) and secondary education (41.66%) are comparable, but a very low percentage of women hold a higher secondary degree. In Domkal on the other hand, percentage of women who has completed secondary level is as high as 70%. Secondary education level is high in Kalyani also (72.34%), which is also the highest amongst the survey areas.

Women with secondary education level are high in percentage in Tehatta, Nadia (64.28%) and the figures for primary level though nearly half its size, is the second highest among all the study areas in West Bengal.

It is interesting to observe that in Kendrapara, Orissa all the three education levels are well represented, with 40% of the literate women migrants having primary education,27.69% secondary and nearly 33% higher secondary level of education .The percentage of women with higher secondary education in Kendrapara, Orissa ,is the highest among all the survey areas, and much higher in comparison to those of West Bengal. Quite a few women migrants in West Bengal have completed their education up to secondary level, but did not proceed beyond that.

The essential difference between the survey areas of West Bengal and Orissa lies in the literacy and education levels of the female migrants. Literacy level among those in the survey area of Orissa is far higher than the areas of West Bengal, barring Kalyani.However when we look at education levels, a substantial percentage of women in Orissa's study area have completed higher secondary level of education, while none in West Bengal proceeded to that level. For women migrants settled in West Bengal, supply factors deterring further education (distance, lack of infrastructure for girls in school, clothes, books, equipment, dearth of

trained teachers and poor teaching etc) did to some extent act as a brake, but demand factors like parental disinterest and also discouragement at home exerted a pressure that was far more powerful compared to the supply related factors. The ambivalence regarding the relative unimportance of women's education and the age old traditional view about the futility of female education is very much evident in the lives of the women migrants. The findings reiterate the observations of Rana et al.'s (2003), Bagchi and Guha (2005), Dasgupta and Bandopadhyay (2005) and Levine (2006) regarding family reluctance as a strong inhibitory factor for discontinuity of education in West Bengal. The report of The National Development Council Committee on Literacy in India (1992-93) also identifies conservatism of tradition bound families and looking upon girls as economic burden, and the overall low status of women as parts of the reasons for the educational deprivation of girls in India.

On the other hand in Orissa, migration, with its upheaval, was a major discouraging factor after secondary level for 87.50% of the women in Kendrapara, Orissa. Despite this however, 32.30% of the literate women in Kendrapara are higher secondary educated. After completing class 12, they did not study further, but neither did they get sucked into a never ending cycle of housework and drudgery at home. Almost all of them, along with those with primary/ secondary level of education, started working.

This is where female migrants in West Bengal, and those in Kendrapara, Orissa differ. In both the States, migration stopped education of many, but in Kendrapara, stopped education did not manage to suck them into household work. The women, in fact almost all of them, started working, whatever type of work they could find. Whether to be financially independent or support their families, all of them realised the importance of going out for work. They were better able to convince their family members also.

Now while slightly higher level of education compared to their counterparts in West Bengal might have helped, the migrant women in Kendrapara also spoke about a metamorphosis that came about their thoughts and beliefs during and after the tumultuous upheaval of forced migration from Bangladesh. Buijs (1993) and Zentgraf (2002) have in their works commented on the metamorphosis of migrant or refugee women, who do not always act as is expected of them. These women may try to retain their original lifestyle and culture at least to some extent , but very often, find exigencies of being migrants and refugees forcing them to examine the preconceptions, and adopt roles both social and economic, which they would have rejected at home. Acting very differently, from what is expected of them.

This is what happened to these migrant women in Orissa. They did not go along the beaten path that primarily expects them to stay at home. On the other hand, enlightened by education that strengthened the changes in their thoughts, beliefs and outlooks during the process of

migration, many started working once their education became discontinued. Others joined in, motivated.

In this context, Zentgraf (2002) challenges a unilinear, integrationist view that sees immigrant women's status and roles as changing along a traditional-modern continuum. Immigrant women's experiences and their perceptions of their experiences, are quite diverse and complex, and very often women report a sense of empowerment, new found freedom, and self confidence as they negotiate traditional gender roles in a new social and cultural context, very often acting very much unlike what would be expected of them.

When the women in Kendrapara wanted to work and be financially independent, it had less to do with their families'economic situation and more due to their education and /or change in perception.

Education has a very important role to play in the empowerment of women. Education has the potential of empowering women in several different ways. It enhances every aspect of a woman's autonomy. It increases women's economic independence by equipping them with skills necessary to avail of paid income employment opportunities, and thereby make their economic contribution more visible. It equips them with awareness and knowledge to make life's choices by increasing ability to access resources and services, enabling them to become informed consumers and citizens and challenge and make accountable those who hold positions of power and authority. Education inculcates a sense of self worth, commands greater family respect for opinion for women and more decisionmaking power (Kishor and Gupta 2004).

The empowering role of women's education is multi-pronged, affecting not only every aspect of women's lives but also the lives of their children and other dependents. Mother's education is a significant variable affecting children's education attainment and opportunities (Feinstein and Sabates 2006, Jerrim and Micklewright 2009). A mother with a few years of formal education is considerably more likely to send her children to school. Eduction of women thus having an intergenerational cascading effect, with far reaching consequences on a society's development and progress -a factor Ramalingaswami et. Al (1997) describe as the key of keys to women's status in developed and developing countries.

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INDIAN ECONOMY -THE PRESENT SCENARIO*

Subrata Gupta#

Economic reforms in India had its beginning about thirty seven years ago. We all know that the country has not yet been able to reap the full benefits of the reforms. China introduced reform measures in 1976, and twenty five years after that, China became a strong economic force in the global economy challenging USA, Japan and other developed countries. But India has not been able to achieve that position despite the fact that it could achieve eight percent rate of growth on average during the Eleventh Five Year Plan at 2004-05 prices, and could cope with the turmoil created by the global depression of 2008-09. Prior to that India achieved unprecedented growth of over 9 percent for three successive years between 2005-06 and 2007-08. But the situation took a different turn since the beginning of the Twelfth Five Year Plan.

The Economic Survey of 2017 has estimated the growth rate to be 6.75 percent for the current year and the forecast for the next year is between 7 percent and 7.5 percent. The question is, would this rate be achieved at all if the pace of industrial production in the manufacturing sector and the rate of agricultural production fail to be in compliance with the projections. If we look at consumer spending, decline of both public and private investments, the loss of low-end jobs consequent upon demonetisation and very low employment creation, the benefits of a 7 percent rate of growth would be invisible. The present Government came to power by promising to create 100 million new jobs by 2022. which is a myth and not a reality. There is no doubt that the pace of job creation has fallen short of target in each plan period over last forty years. Jobless growth has been a key problem of our economy and it has not yet been properly addressed and it has been a vital snag in achieving inclusive development. Another snag in achieving inclusive development has been to bring the larger section of the people under the cover of the complete social safety net. India's rank in the inclusive development index is now 62 among 74 countries as recorded by Oxfam, and India is below China, Nepal,Pakistan, Sri Lanka and Bangladesh, all neighbor countries. The Oxfam Report further states that the top one percent in India have cornered 73 percent of the wealth created in the past years. The bottom 50 percent have experienced a mere one percent increase in their wealth during the same period. For creating jobs, it is essential that production in both the industrial and the agricultural sectors should be raised which in turn would depend on consumers' demand. It needs an increase in the purchasing power of the consumers. But decline in both agricultural and industrial productivity and low income of the rural people,

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* Valedictory Address at the 38lh Conference of the Bangiya Arthaniti Parishad held at the Bijoy Krishna Girls' College, Howrah, on February 18, 2018.

Former Secretary, Bangiya Arthaniti Parishad.

and lack of employment-generating investments have stood in the way of more consumer spending. Share of agricultural investment in the total investment has fallen. On the other hand, low industrial productivity and lack of competitiveness in the industrial sector stand in the way of job creation. The problem is very serious in the informal sector particularly after demonetisation. In the Budget for 2018-19, the Union Finance Minister has projected that the income of the agriculturists would be doubled by 2022. Minimum support prices have been set to rise by one and half times of the present minimum. But there is still a gap between the present market price and the minimum support price. It is a major problem that the agriculturists do not get remunerative prices, and that is responsible for slowdown of demand in the rural sector.

It was expected that foreign investment would lead to expansion of employment opportunities in the industrial sector. But much of the foreign investment in recent time has been in the form of acquisition and takeover of existing ventures and purchasing distressed assets of the existing companies. There are no greenfield investments. Moreover, it has not come to the rescue of the unskilled labour in the informal sector.

Trade deficit widened a three year high of $ 14.88 billion in December, 2017, attributed to a spike in the impact of gold and precious stones as well as high import cost of crude oil which has increased by 21 percent in one year. Difficulties arising out of the implementation of the multiple rate GST have, no doubt, hurt business. It has imposed burden on small traders. After the introduction of the GST which covers almost all commodities except petroleum, diesel and beverage, the only source of revenue left in indirect taxation is the custom duty. The budget for 2018-19 has tapped this source, and prices of large number of consumer durables have been raised. Along with trade deficit, we face the problem of inflation. On paper, there has been a fall in the wholesale price index. But retail inflation rate is now 5.21 percent. Food prices have been soaring. Continuous rise in prices of petroleum and diesel has worsened the situation. The suffering of the poor and the low income-earners in both the rural and urban areas has been acute.

People of lndia had got a bold promise from the present Government before it came to power that the problem of black money, one major source of inflation, would be solved within 100 days of its coming to power. After insignificant progress in getting the information of black money kept in foreign accounts, there was a sudden launching of demonetisation on November 8, 2016. The announced objectives of demonetisation were (1) to unearth the corrupt cash hoarded by the rich, (2) to remove forged money and (3) to check terror funding. There is nothing to say against these objectives. It is well known that most of the black money is kept in the forms of real estate, gold and jewelleries or in foreign account and not in cash. Reserve Bank of India estimates show that about ninety nine percent of the old money has come back through the deposits to the commercial banks. Does it mean that black

money has been unearthed? Even after twenty days of demonetisation, i.e. on November 28, 2016, the Government issued a notification giving the black money holders an opportunity to make their hoarded money white, thus indirectly acknowledging that the first objective has not been realized. That issue of counterfeit money has not been checked is evident from large number of disclosures. That demonetisation has failed to prevent terror funding is well-known. The hardship demonetisation caused has not yet been properly assessed. We all remember the long queues in front of the ATMs and death of more than hundred people on that account. We also remember the irritation caused by day-to-day changes in regulations initiated by a bunch of arrogant persons at the helm of the affair. Workers in the informal sector were hard hit– small businesses were forced to shut down their business. Daily wage-earners faced loss of income. Thousands of workers lost their jobs. One would find no logic for abolishing thousand rupee note. Could it not be retained in a new form along with two thousand-rupee note? It has now been easier to carry suitcases of unauthorized money of greater denomination requiring smaller space. It was soon realized by the Government that the policy did not work well. So attention of the people was sought to be diverted to digital banking.

The inflationary pressure has been heavy in the retail sector. According to the estimates of the Reserve Bank of India, it would be 5.1% in March, 2018 and would reach 5.6% in the first half of 2018-19. Impact of food inflation has been alarming. The Union Government has announced a good package of health insurance in the Budget for 2018-19 which would require a big amount of money except in the first year of its introduction. Huge subsidies in crude oil, fertilizer food, distribution and cooking gas still continue. Thus, public expenditure is likely to increase still further. Already the revenue deficit in the Budget for 2018-19 has been estimated to be Rs. 5.95 lakh crores. Gross expenditure is expected to increase over revised estimates by 16.7%. The targeted fiscal deficit of 3.3% of GDP has not been achieved. Thus, it is likely that there may be an expenditure-induced inflation. The Government has claimed that there has been, however, a substantial increase in tax revenue in 2017-18. Increase in tax revenue is not the result of demonetisation. Consequent upon the implementation of the Seventh Pay Commission recommendation, many employees of the Central Government have now come under the tax net and many have now come under the net of higher slabs of tax rates. Pressure from banks to link bank accounts with the PAN Card and Aadhaar Cards and to some extent the GST have compelled the erstwhile tax evaders to come voluntarily under the tax net. This tax has contributed to some extent to some increase in tax revenue. Again, the fact that there has been an increase in the number of submission of tax returns does not mean that all the persons submitting returns have come under the tax net. The Government has announced that the income of the farmers would be double by 2022. Will it be possible in the absence of adequate investment in agriculture? It is surprising that the Budget for 2018-19 does not provide for additional financial allocation for the Mahatma

Gandhi Rural Employment Guarantee Programme for 100 days, and in the backdrop of rising prices the real incomes of the workers under the scheme are going to fall. The slogan 'Make in India' is yet to show success.One important field of employment generation is to increase labour intensity in the medium scale, small scale and micro enterprises. The Government should now give greater attention to these industries. Incentives to these sectors are given in the speeches of the Prime Minister and the Finance Minister; but the record of performance for reactivising these industries has been much short of our expectations. In the financial sector, the public sector banks are overburdened with non-performing assets, and the Government is now in search of money to recapitalize these banks. The present economic scenario shows that everywhere the possibility of achieving a healthy economy with inclusive development in near future is bleak.

But justice would not be done to the Government if we only criticize it without encouraging it to find out the ways and means for solution to these problems. It is good that the Government has now given more attention to agriculture and the health sector. Something more should be done for the health sector. More attention should be given to the education sector; at least 5 percent of GDP should be spent on education including skill formation. The Government should now widen its focus of attention to the generation of employment opportunities and to bring the lower middle class and middle class of both rural and urban areas under the social safety net. Unproductive expenditures should be curtailed. Tax evasion should be strictly dealt with. The banking sector should be rejuvenated and the Government should make all-out efforts to ensure the repayment of bank loans by a section of the industrialists. All attention should be given to raising, industrial productivity. Manufacturing sector should be given facilities for investment. The Central Government should undertake more responsibility for infrastructural development. To improve industrial environment, there should be a hub of innovation in critical industries such as defence, aerospace, information technology, electronics and capital goods which need to adopt advanced technologies.

Introduction of GST is a good thing although its multiplicity of rates and hasty implementation without proper home work could have been avoided. What is now important is to mobilise domestic savings properly so as to raise its investment in proper channels.

My views on the present economic scenario of India are related only to a limited number of issues. There are more issues which should be properly addressed. I hope, Bangiya Arthaniti Parishad, through its deliberations of a high order on a variety of issues will soon become a good forum to formulate policy prescriptions which would persuade the policy-makers of our country to give proper attention to these issues.

GUIDELINES FOR THE AUTHORS

1. All articles and notes submitted for publication must be in English, an abstract not more than 300 words should accompany all articles.
2. Articles published (or submitted for publication) elsewhere should not be sent. If the article has been presented in a Conference or Seminar, which should be indicated.
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