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Impact of Technological Change on the Incidence of Child Labour in the Indian Match Industry*

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Abstract

The Indian match industry in the southern state of Tamil Nadu has been characterized by child labour and a stagnant technology for over half a century. We investigate the technological changes and industrial restructuring, catalysed by the changing duty structure that has moved the match industry towards greater mechanization. Our examination indicates that increased mechanization in the production processes has implied greater demand for skilled labour and a decline in child labour.

JEL-classification: J20, N35, O17

Key words: Child Labour, Match Industry, India

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1. Introduction

The impact of technological change on the demand for child labour has not received much attention in the development discourse in India.¹ This study proposes to fill this gap by investigating the match industry in southern Indian state of Tamil Nadu.

The use of child labour in manufacturing industry is usually associated with archaic technologies that, paradoxically, are being perpetuated in today's globalised world. Until recently many industries have responded to economic liberalization and global competition by intensifying the use of human labour, not least child labour. However with increased mechanisation and higher productivity factories tend to employ fewer but more skilled workers, who are paid higher wages. Ultimately this will make child labour superfluous.²

Whether this is likely to happen also depend on the supply side factors. Families providing child labour will benefit from the decrease in the demand for child labour if their economic situation improves, and more of their children are sent to school. Overall growth, increased demand for labour from competing industries, decreased fertility, and greater exposure to the outside world, effects of legislation, and increase in primary schooling may all affect the supply of child labour.

There are a number of reasons as to why adult labour is not easily substituted for child labour (Chandrasekhar, S.C. 1997: pp 146-48). These may be technological. One argument is that there are certain activities, like carpet weaving or diamond polishing that cannot be as easily accomplished by adults as they can by children, so that the demand for child labour in such activities is aimed specifically for child labour (Burra, N. 1995, p. 199). Another argument is economic and rests on an assessment of the impossibility of running an enterprise in certain industries at wages higher than that paid to child workers, especially when they are exposed to global competition (MIDS, 1985: pp 63-65). A third argument is focused on the industrial culture, especially in areas where the subsistence wage is based not on the income

¹ One exception is Helen R. Sekar's *Impact of Technological Change on the Demand for Child Labour in the Brassware Industry of Moradabad*, National Labour Institute, 2007.

² The development of machine-driven technology has been regarded as an important factor in the decline in the use of child labour in 19th century Europe and elsewhere. The improved machinery, so it has been argued, placed ever greater demands on the workers and thus impelled the management of modern manufacturing industry to refrain from employing children (Nardinelli, C. pp. 103-157).

of a single wage earner, but by the contribution of each individual worker (including children) to the family income (Vidyasagar & Hilding 2008). All these arguments have been advanced to explain the prolonged technological stagnation and heavy reliance on child labour in the match industry. We will look further into the strength of each one of them in the following account.

The match industry of India has been technologically stagnant for more than half a century (Hilding, 2002: 410-11). In order to create employment and regional development the Indian government had given tax relief (excise rebates) to match producing units that used non-mechanised labour intensive production processes.³

The Indian match belt in Tamil Nadu accounts for 85 per cent of India's match production, an increasing proportion of which is now exported (Vidyasagar and Kumarababu 2002). The industry is presently undergoing vast changes in terms of mechanization, marketing, exports and the demand for skilled labour. In the recent decade, a few important and related changes have taken place. Firstly, there has been a policy change in the excise duty structure of the match industry and the ceiling on the investment limit has also been lifted. Secondly, the industry is now facing a growing scarcity of labor due mainly to competition from spinning mills and the garments and the knit-ware factories. Thirdly, there has been a consolidation or merging of smaller units into larger ones, with impact on technical changes within processes and production. We specifically investigate the impact of the policy change in the excise duty structure imposed on the match industry and its effect on the industrial restructuring resulting in possible decline in child labour.

Our choice of focus is based on the fact that the excise duty constituted a heavy cost for the match companies (30-60 per cent of the sales price of a box of matches) while also providing a substantial income for the Government. Besides being a source of revenue it was also an economic regulator of the match industry, as will be explained below. It is a truly under

³ In order to support small scale industry proposals were made in the five year plans, that a certain amount of production should be reserved to the small scale sector. For the same reason a production limit was imposed on large scale industry where it was in competition with small scale producers. This was to apply especially to consumer goods. See the Industrial Policy Resolutions of 1948 and 1956, *The Gazetteer of India vol III* (1975). A review of India's experience of promoting small-scale industry is provided by Sandesara in *Economic and Political Weekly* (March 26 1988).

researched area in relation to child labour considering the preference of the Government for indirect rather than direct taxes in a great number of consumer goods industries, such as matches, tobacco, sugar, cotton fabrics etc.

The data and information on the excise duties, ad valorem tax and production has been collected from the Central Excise Office in Chennai and the Customs and Central Excise at Madurai and Tirunelveli. In addition, interviews were conducted with the officials of Wimco, President of the All India Chamber of Match Industries and National Labour Institute. To obtain information on the use of labour with respect to different processes of production, for instance, box-filling, frame-filling etc we also randomly surveyed households involved in match production and conferred with non-governmental organisations in the area. In a small random survey owners and workers in cottage, semi-mechanised and fully mechanised match units, were also visited on site. Interviews were also conducted with the regional area officers of International Labour Organisation, the Government of India and USAID led INDUS project and the Government of India's Sarv Siksha Abhiyan program.

Our investigation confirms that changing duty structure has catalysed a move towards integration of handmade and cottage units into semi-mechanised and mechanised units in India's match industry. Increased mechanisation in the production processes means a greater demand for skilled labour, thereby implying a decline in the demand for child labour.

The structure of our paper is as follows. India's match industry is described in Section 2. The presence of child labour that has characterised the match industry is discussed under Section 3. Section 4 explains that manufacturing processes and technology that are used in the match industry. The following section discusses the Government's excise duties and ad valorem tax policies. The concluding section argues that the recent changes in the excise duties influenced the pace of technological change in the match industry with a possible negative impact on the demand for child labour in the match industry.

2. India's Match Belt

The Rs. 3,000 million⁴ safety match industry is spread over the municipalities of Kovilpatti, Sattur and Sivakasi, in the South Indian state of Tamil Nadu. In 2007 it had more than 2000 units providing employment to over 160,000 people in this drought-prone area (All India Chamber of Match Industries in Sivakasi 2007). The handmade sector of the match industry of Sivakasi accounts for 85 per cent of India's match production. According to the Factory Inspectorate, by 2002 there were nearly 6,000 cottage-sector units that employed less than 20 workers each and were thus considered home-based units. There were 400 small scale units employing more than 20 workers each that were registered under the Factories Act. Semi-mechanized units producing wax matches accounted for a negligible proportion of the total production (Vidyasagar and Kumarababu, 2002).

Most match factories are situated in Virudunagar district, but the match belt also extends into the districts of Tuticorin and Tirunelveli (see Figure 1). The neighbouring municipal areas of Thiruthangal and Sattur in Ramanathapuram district in Tamil Nadu also produce fireworks and printed matter, such as posters, show-cards, calendars etc. A number of other articles are also produced in the area such as crackers, hand grenades, metal powder as well as tin and stainless steel products, all of which are marketed throughout India. (Hilding & Vidyasagar 2008).

As recently as in 1993 the child labour force in Sivakasi and the surrounding area was estimated at around 66,000 contributing more than 30 per cent of the workers to the match factories (Vidyasagar and Kumarababu 2002: 48). The vast majority of the child labourers in the match industry were girls. They were forced to work in order to earn their livelihood and to save for their dowry (Sekar 1992: 35). Boys were also employed in the match industry, but most of them worked in the fireworks and printing industries as helpers, carriers and so on.

⁴ Ravi Menon, 12 March 2008, Business Standard (<http://www.business-standard.com/india/news/a-match-not-made-in-heaven/316532/>), as accessed on 18 May 2010)

Figure 1. Tamil Nadu - District Map



The workers were transported by bus to Sivakasi every day from villages as far as fifty kilometres away. As most of these children did not receive primary education they grow up without acquiring any specific skills and ended up in low paid jobs. After having married they were forced to send their own children to work. They were thus caught in a vicious intergenerational circle. The entire household economy revolved around the three industries and there seemed to be no escape.

The origins of the match industry in Tamil Nadu can be attributed to the initiative of two enterprising cousins, Mr. P. Aiya Nadar and Mr. A. Shanmuga Nadar, from a family that for many years had been engaged in the trading of spices overseas. Because of the decline of this trade they cast around for a new business that could offer profit and considered match manufacturing worth trying. In 1922, they went to Calcutta in order to learn match manufacturing methods and spent over six months with a Japanese firm in an on-the-job learning operation. Using imported machinery from Germany, they built their first factory in Sivakasi, which by that time was a centre for the cotton and tobacco trade in Tamil Nadu. Mechanised production was however costly, since only certain quality woods could be used,

but labour was plentiful and cheap because of the economically depressed conditions in the region. Influenced by Gandhi's plea for cottage industries they decided after a year and a half to switch to manual production of a type similar to the one the Japanese had introduced into India at the beginning of the century (Hardgrave 1969: 150-51).

Soon other Nadar families moved into this business and in the late 1920s a cluster of about a dozen family units had been established in Sivakasi. Capital accumulation was rapid and an increasing number of units were formed by the Nadar families and by new entrepreneurs moving into the business. Indeed the course of development of the match industry and associated activities – the production of labels, certain chemicals and fireworks– illustrates how a nascent industrialisation takes shape in a society where proven pre-capitalist elements were present (Moulik and Purushotham 1982: 43-44).

In order to secure the Indian market against Japanese competition, Swedish Match determined to establish a subsidiary in India following the introduction in 1921 of a tariff duty on matches (Modig 1979: 41-58). The Western India Match Company (Wimco) was formed in 1923. Within a few years the company had established five match factories, their geographic location covering the most important markets in India. Wimco was the only match company with sufficient resources to create a modern industrial environment around its factories, a prerequisite for large-scale, highly mechanized production in early twentieth century India. It was small firms, often family-owned enterprises, which managed to survive (Ray 1979: 160-61). After Independence, as part of its policy of providing employment and regional development, the government of India introduced a number of restrictions on the match market in order to limit Wimco's activities and to support small domestic producers. Consequently Wimco's output stagnated while small and medium sized producers thrived at an ever growing pace (Hilding 1992: 123-26).

Total consumption of matches in India grew exponentially. In the 1950's an annual growth rate of 3.6 per cent was recorded. In the 1960's the equivalent figure was 4.1 per cent and in the 1970's, 5.9 per cent. The result of this level of expansion was a quadrupling of the market in the thirty years following independence. In the 1980's, however, growth rate started to decline and by the end of the decade it was again below 4 per cent.

3. Child Labour: the Corner Stone of Sivakasi's Match Industry

Child Labour has been the corner stone of handmade match industry ever since its establishment in the 1920s. In 1945, Deshpande reported that there was a huge unskilled labour force consisting mainly of women and children (mostly below 12 years) working for more than 12 hours a day under exploitative conditions in the match industry in Sivakasi and Sattur region (Deshpande 1945: 19). Low excise duty rates by the state for the handmade match industry, had been introduced to encourage employment. This led to a tremendous expansion of the match industry⁵ and the use of child labour.

The poor agricultural conditions like low soil quality, and lack of irrigation⁶ in this area also added to the problem. It resulted in production of only one crop per year (Kothari 1983: 1194). A large part of the population was unable to derive a living from working on the land which meant that there was a labour surplus available for industrial work. In addition, the widespread extent of child labour also kept the wages very low. Families were also engaged in part-time match making in the home.

In 1976 a committee under the chairmanship of Mr. Harbans Singh, the then member of the revenue board, was appointed to suggest measures for the eradication of the unfair labour practice of employing children and to explore the possibilities of their working from home with a facility to attend school at least in one shift. The committee observed that “the stoppage of child labour is likely to create more problems than it will solve,” threatening the existence of the industry and creating extreme hardship to the people. Thus the committee suggested certain ameliorative steps to enhance the wages for children with reduced working hours and part time schooling (Singh 1976).

With half hearted efforts to implement the above recommendations the issue of child labour continued to persist and in 1981, a survey conducted by the Area Development Programme (UNICEF) found that there were 45,000 children working full time in the match

⁵ Between 1920 and 1970 the rate of growth of demand rose sharply so that match consumption in India doubled first in 40 years, then in 20 years and then again in 8 years. During the 1970s growth averaged 8 percent compound per annum, but subsequently came down to 4 percent during the 1980s. At the turn of the 1980s the average Indian consumed five matches a day with three-quarters of the demand attributable to smokers (ITCOT, 1992, p15).

⁶ Only seven per cent of the cultivated area is irrigated.

industry alone. Owing to public pressure and the intervention of the Supreme Court of India another committee under the chairmanship of Mr. Hari Bhasker, the then Commissioner of Land Reforms, was appointed during 1985 to study the implementation of the recommendations of Harbans Singh Committee.

Despite these committees and intervention by the highest court of the country and the enactment of Child Labour Prohibition and Regulation Act of 1986 (specifically prohibiting employment of children in the match and fireworks industry) the problem continued and, in fact, has been increasing keeping in pace with the increase in match production (at the rate of 4% per annum).⁷

Again in April 1992, the issue of child labour in match industry was in focus with the formation of a Special Inter-Departmental Committee by the government of Tamil Nadu, under the Chairmanship of the Secretary for Labour and Employment, to develop a strategic plan for total elimination of child labour, in the match belt. A sub-committee formed under it, submitted its report in March 1993 and found that child labour in the match industry was prevalent in the "D" cottage sector⁸, and considerably widespread in the "C" factory sector⁹. They also found some of the 'C' sector to be falsely classified with a number of trading companies controlling 'D' sector units. A major share of the surplus generated by these units was siphoned off by the trading companies. They also found vestiges of child labour in the fireworks industry, especially in the interior areas of Virudunagar district with seasonal variation in demands.

⁷ According to the National Child Labour Policy formulated by the Government of India in 1987, ten hazardous industries were selected for priority action, among them the match industry in Sivakasi. The other industries were diamond polishing in Surat, gem cutting and polishing industry in Jaipur, glass industry of Ferozabad, brassware industry of Moradabad, handmade carpet industry in Mirzapur, lock-making industry in Aligarh, handmade carpet industry in Jammu & Kashmir, slate industry in Mandsaur, slate industry in Markapur.

⁸ D sector units are not classified as factories and do not provide any long-term benefits. They consider themselves exempted from all labour laws and official visitations, even though they would come under the Minimum Wages Act. Unlike the C sector where specified timings are observed, in the D sector units in villages, workers choose their own working time and place of work. It is usual to find in many villages where women work from 3 am to 6 am, go home to cook, then come back at 8.30 am and continue to work till 3 pm, after which, they go home to attend to housework.

⁹ Expansion of labour supply has been made possible by increased use of child labour, bussing in of labour over long distances, inward migration of families, spread of the D sector to villages and some outward spread of C units. All C sector units would employ more than 20 persons, and consequently according to the Factories Act, most of them were registered as factories. In the C sector, it is not uncommon that only 30 percent of the labour employed are shown on the books.

About 90 per cent of the total work force was found to be female and were used in the most labour-intensive production process of frame and box filling. Thus, the problem of child labour in the match industry was also a manifestation of the problem of the girl child. The average age of child labourers is between 10-14 years and the piece rate system of payment meant that the women and children worked for long hours to be able to earn more.

The sub-committee further found that more than 50 percent of the households children were contributing one third to one half of the family income and it was estimated that half of the families with working children would fall below the poverty line without the income from children working full time. The enrolment of children in school was lower among girls than boys in both the age groups of 6-11 and 12-14, and the drop out rates were much higher among girls than boys. Low enrolment and high prevalence of child labour was noticeable for 50 percent of the villages in the match blocks (where match industry is concentrated) and 65 percent of the villages in the feeder blocks (from where children are transported everyday to the match blocks).

Both the match and fireworks industries pay on a piece-rate basis and the normal working day is 10-12 hours. The subsistence wage in the area is based, not by taking into account the entire family, but the individual worker's subsistence level. Each worker has therefore to earn his/hers subsistence. Because of the industrial culture that is created child labour is seen as a natural phenomenon. (Vidyasagar & Hilding 2008).

A door to door survey conducted by R.Vidyasagar during 1994 covering 200,000 households in 12 development blocks and 4 municipalities in the match belt reported that there were about 66,000 children below the age of 14 working in the match industry. They accounted for about one third of the workforce in the industry (Vidyasagar 1994). The extent of child labour and the exploitative conditions of working children attracted the attention of public discourse and policy makers. Solutions were sought in the form of vigorous law enforcement and other social interventions for addressing the issue of child labour in the match industry. Notwithstanding all these efforts intensive use of child labour continued in this industry till recently (Vidyasagar & Kumarababu 2002).

An important reason for the use of child labour in the match industry is that the industry is concentrated in a narrow area. This has resulted not merely in utilising the available surplus labour in the area - including children - but also inward migration of families and bussing in

of children. The phenomenon of 'nimble fingers' is considered significant and hence increased productivity is attributed to children. This is supposed to result in more productive use of the floor space occupied by a worker and reduced supervision cost. It is true that children in the 11-14 age group are generally more productive than adults, but smaller children are less productive. On average, child productivity, if anything, will be equal to or marginally lower than adult productivity. There is hardly any direct labour cost advantage in using child labour, since the child and the adult are paid the same wages for a given quantity of production.¹⁰ The somewhat higher productivity of children above the age of 10 or 11 would be balanced out by the lower productivity of children below that age. Based on the above considerations, it is unlikely that the labour cost would substantially increase if child labour is withdrawn. Even the modest increase in labour cost that could result, will not in any way affect the competitiveness of the handmade match sector (Sub-committee report of the government of Tamil Nadu, 1993).

4. The Manufacturing Process

In order to gauge the impact on the technology and the demand for child labour we need to understand the manufacturing process in the match factory. Exactly where in this process the individual worker is placed depends on his or her sex, age and experience. The more qualified, time-rated occupations are reserved for adult men while women and children carry out the less qualified piece-rated work. There is a complete absence of women in positions of authority and grown men are seldom found engaged in piece work.

Factories are of two main types: *splint and veneer factories*, which manufacture intermediate products, and *dipping factories*, which assemble the finished item. The latter are so called because an important part of the process consists of dipping the splints in the

¹⁰ However, use of a substantial number of child labourers result in indirect labour cost saving by depressing the general wage level in the area and by making a large part of the labour pliant and docile. On this account, it can be said that withdrawal of children from the labour force would make labour more scarce and costlier. However, there are limits to the extent it can go up given that the cost of labour has a general tendency to level with other predominant occupations in the area. The adult wage level in the match belt is likely to increase compared to neighbouring areas in the event of the withdrawal of children from the work force. However, this differential cannot be large, as the feasibility of a radial spread to low wage and drought stricken areas makes the cost of relocation affordable for this industry.

chemical composition. Splints and veneers are transported from factories in Kerala, Karnataka and the Andaman Islands (Hilding 1992: 112-14).

Irrespective of whether the dipping factories operate on a large or small scale they almost always lack mechanical equipment.¹¹ The combination of an abundant supply of cheap labour, on the one hand, and government excise rules, on the other, entail an almost total absence of incentives to replace human resources with machinery. For this reason the production process is almost identical in all factories, the most important stages being as follows:

- 1 Frame filling
- 2 Paraffining
- 3 Preparation of the tip and friction compositions
- 4 Dipping the splints
- 5 Manufacturing the inner and outer boxes
- 6 Box filling
- 7 Friction painting
- 8 Labelling and banderolling
- 9 Packing and bundling

Of these stages of production (1) frame filling is sometimes and (5) box making often performed on a contract basis in workers' homes. The workers are provided with materials by a middleman or labour broker, who also collects the finished product. The work approaches handicraft and is done, for the most part, by women, children and elderly relatives eking out the family income.

Frame filling is carried out by hand using very simple tools: a frame consisting of 50 lathes with 50 grooves in each to hold the splints and sometimes a splint guide for sorting the splints in the grooves of the lathe. When the splints have been arranged in the frames and fastened tightly they are brought to the factory for paraffining and dipping.

Other parts of the process are carried out on the factory premises. Paraffining and dipping are each done by men working in pairs. They are day labourers specialised in these tasks.

¹¹ Some of the factories use machinery in the blending of chemicals and a few of the larger employ machinery in making the boxes.

Paraffining is done by dipping the tips of splints in a pan containing the molten substance. The function of paraffin is to improve the burning quality of the splints. The preparation of the chemical composition is considered a skilled task and is carried out by male workers.

Other stages of production, i.e. filling the boxes, friction painting, labelling, banderolling, bundling and packing are carried out on a piecework basis, usually by women and children. Together these two groups comprise between 70 and 80 per cent of the total labour force in a dipping factory. Filling the boxes is an especially labour intensive stage of production, performed entirely by hand, most often by young girls sitting cross-legged in long rows on the factory floor (Hilding 1992: 137-40).

Up until the turn of the century there was no mechanised production in Sivakasi and the surrounding areas. All processes in the manufacture of matches were made by hand. From the year 2000 and especially after 2003 massive technical changes and a restructuring of the whole industry process was on its way in Sivakasi. Mechanisation has taken place in frame filling, dipping, box-making, and sometimes other processes as well, substantially increasing the demand for labour in manual processes such as box-filling.¹² Methods of production are extraordinarily flexible combining machine power with manual labour in various ways. There is also great variability in the final product although cardboard is now almost substituted for veneer in making the boxes.

In 2001 *The Imperial Tobacco Co. of India* (ITC) entered the match market in a big way as a marketer of matches and producer of the paperboard for the boxes. ITC's strength is its large distribution network and strong hold on distributors who are heavily dependent on cigarette sales. While Wimco reaches retailers indirectly through wholesalers ITC has direct relationships with retailers. Possibly the ITC saw match marketing as a field of business where they could reap quick profits without having to make heavy investments, possessing as they did a nationwide distribution network (Das Gupta 2003). On July 1, 2005 ITC acquired 74 per cent of Wimco's share capital, i.e. its entire match division. By then Wimco's market

¹² At present most of the units in the region have not fully mechanized their operations. In these units, frame filling and dipping is done mechanically. When the production was carried out manually, it required 200 to 250 labourers in frame filling and dipping for manufacturing 1200 bundles. Now a single machine has displaced this labour. However, the increased volume of production has absorbed labour in box filling and other manual operations (Hilding & Vidyasagar 2008).

share had dropped to 15 per cent while its match division had experienced losses during the few preceding years (*Times of India*, 2 July 2005, Hindu Business Line 2 July 2005).¹³

During the last few years match production has slowed down as a result of excess capacity and shrinking profitability. Consumer prices have remained virtually stagnant since 1995 while inputs such as chemicals and paper have become more expensive. Margins in the industry have fallen from around 3 per cent to a mere 1.5 per cent during the last few years. There is cut-throat competition and excess capacity which is likely to force many producers out of the market in the years to come. Many small producers that cannot afford their own distribution network sell only through wholesalers and use their excess capacity to supply ITC, which is now well on its way to dominate marketing of matches in India (Hilding & Vidyasagar 2008).

5. Government's excise duties and ad valorem tax for the Match Industry

After Indian Independence in 1947, the small scale industry, with its labour intensive character was expected to absorb large numbers of unemployed and underemployed in rural areas. With the intent of providing employment and regional development, the government of India introduced a number of restrictions on the match market in order to limit Wimco's activities and to support the small domestic producers.

The principal policy instrument was the differential excise. Between 30 and 60 per cent of the sales price of a box of matches was charged as excise duty. Discounts in the amount of duty payable were especially intended to favour small producers. The units in the match industry were broadly classified into four categories, viz. A, B, C and D sectors by the excise department.¹⁴

¹³ Today (D-sector units) are facing stiff competition. Though they need not have to pay any excise duty on finished products, they have to pay duty for all inputs (mechanized sector has CENVAT facilities by which the duty paid on inputs is deducted from the excise duty levied on the final production). Price of match boxes being same for last several years cottage sector cannot compete with the mechanized sector, according to Thangappan.

¹⁴ Any unit using power for the match manufacturing process is defined as part of the mechanised 'A' sector. Until recently Wimco was the only producer classified under this. If any one of the complementary processes is produced with the use of power, and if the total value of the capital invested in the unit does not exceed Rs. 2 million, the unit is treated as part of the semi-mechanised 'B' sector. 'C' sector units are defined as units not using power in any of the production processes. These units generally employ more than 20 workers each and are to be registered as factories by the Factories Act. If the unit does not use power and the production is within the ceiling limit of 120 million matches per year, they are defined as 'D' sector units. Given the ceiling on production limits these units cannot employ more than 20 workers. These units are not required to be registered under the Factories Act (Vidyasagar 2002: 36).

An additional tax category was introduced in 1949 with the objective to lend support to the medium sized factories which had been obliged to pay full excise duty and therefore experienced hardship in coping with competition from the mechanised factories (i.e class A-factories). Another tax category was introduced to stimulate the smallest units of production to promote employment creation in the rural areas. Subsequent changes were introduced in 1960 and later in 1967, however it was possible in principle to conduct mechanised manufacture on a small scale basis and still receive a rebate on excise duty.

In spite of inefficiencies in the shape of excise evasion and diminished economies of scale, the differential excise would fundamentally alter the operational framework for the match industry's future development.¹⁵ Wimco's output stagnated while small and medium sized producers thrived at an ever growing pace (Hilding 1992: 123-126). Consumers, however, have been obliged to pay the price for the increased employment resulting from this policy, in the form of higher prices for the finished product. Matches have often been regarded as a product with a low elasticity of demand and consequently a suitable item for taxation (*Report of the Taxation Enquiry Commission, Vol II, 1963: 305-307*).

About 17 years back, as a part of the government's policy to encourage employment creation, a variable duty structure of about Rs 0.75 - Rs 0.50 per unit was charged. This duty was paid through colour-coded banderolls for cottage, semi-mechanised and mechanized units. So, there was a built in incentive to avail this advantage by running 10-15 cottage units rather than one integrated semi-mechanised or mechanized unit. However, for the government the cost of printing was more than the duty collected resulting in a dead loss. The withdrawal of the banderoll and the move towards the direct duty regime, removed the advantage of production through multiple small cottage units.¹⁶

In 1998 (Notification No: 5/1998-CE), the semi-mechanized units were levied with an excise duty of Rs. 0.90, Rs. 1.10 and Rs 6.60 per hundred boxes for 40, 50 and 300 matches packed in each box respectively. The excise duty was relatively lower at Rs. 0.70, Rs. 0.85

¹⁵ Inevitably a differentiated rate of excise duty which is intended especially to favour small producers creates disincentives to expansion as the excise rate differentials are not based on economies of scale. There is also an incentive for large producers to cut their excise bills by distributing manufacture amongst a number of small and fragmented units.

¹⁶ Interview conducted with Superintendent (technical) in Central Excise Office, Chennai, India on 9th January 2008.

and Rs. 5.10 per hundred boxes, for the sector in which frame-filling; dipping of splints in the composition; pasting of labels etc. were not carried on with the aid of power. The hand-made sector enjoyed the lowest duties at Rs. 0.20, Rs. 0.25 and Rs. 1.50; while the mechanized sector paid the highest duties at Rs 1.92, Rs 2.40 and Rs 14.40 respectively. The duty structure was further re-structured in 1999 and 2002 (Notification 5/1999-CE and 6/2002-CE).

Till recently there was a ceiling on production of Wimco to protect the handmade sector. But now there is no ceiling on production of any type of units and ceiling on investment limit is also lifted since 2001.

Furthermore, since 2003 the handmade sector is completely relieved of excise duty whereas a Central VAT of 8% was levied on mechanized and semi-mechanized sectors (Notification 6/2003-CE). With Notification No. 4/2006-Central Excise, however, an ad valorem rate of 12% was levied on matches made by the use of power (other than Bengal lights).

6. Resulting technological changes and decline in child labour.

With the removal of the excise duty concession between the small and medium non-mechanised factories two developments are now on its way; small units are either being merged into larger ones or they are driven out of the market. According to the Superintendent of the Central Excise Department in Madurai (Hilding & Vidyasagar 2008) the small non-mechanised units are likely to disappear in the long run. According to the Central Excise Commissionerate, Madurai, Matches Production and Revenue Reports in 1996-97, about 97 percent of the production in the match industry in the Sivakasi region was by handmade and cottage units. According to information from Mr Sriram Ashok, President, All India Chamber of Match Industries, cottage factories constituted 40.3%, small scale 52.2%, semi-mechanised 5.4% and mechanized 2.1% of match production in the Madurai division in 1999-2000 (Hilding 2009). There was a major re-structuring of the match industry, post 2003 that coincided with the change in the excise duty structure.¹⁷ From available data for Madurai and Tirunellveli it is evident, however, that the number of semi-mechanised and mechanised units increased rapidly after 2003. By 2006-2007 more than 100 mechanised units and close to 1000 semi-mechanised units in the area were accounting for the bulk (90 percent) of the match market in India (All India Chamber of Match Industries in Sivakasi, 2007).

¹⁷ This of course does not prove causality, as there may be other simultaneous changes.

According to Thangappan¹⁸, Cottage production seems to be negatively affected even though they need not have to pay any excise duty, they have to pay excise duty for all inputs (mechanized sector has CENTVAT facilities by which the duty paid on inputs is deducted in the excise duty levied on the final production). Since the price of match boxes have been the same for several years cottage sector cannot compete with the mechanized sector. Similarly most part of the match boxes are cardboard boxes now and veneers have been replaced. The changes in the structure of match production and mechanization are very rapid after 2000 and Thangappan reported that the mechanization has been especially rapid after 2003.

Firms in the different sectors of the match industry operate in different factor markets and consequently their comparative advantages are in different areas. Of the two major factors of production, raw material and labour, it is the latter that varies most in price. Factories carrying out manual production have an absolute comparative advantage in their exclusive access to cheap labour (e.g. child labour). If that advantage is neutralized through a policy that does no longer favour manual production there will automatically be incentives to mechanise. (Hilding 1992: 177-184).

With mechanisation and consolidation of smaller units to larger ones increasing unemployment should be the likely outcome in the region. Paradoxically, however, our field survey shows that the trend is just the opposite. Unemployment, according to official statistics is on the decrease. The reason put forward is increased competition for labour. The great provider of employment is the rapidly growing textile industry in the area; in particular the knit-ware industry in Tiruppur situated around 300 km north of Sivakasi. The latter is a highly globalised venture producing almost wholly for exports and is now facing a shortage of labour. In order to attract girls from the match and fireworks industries Tiruppur exporters have launched a special scheme under which the girls are provided board and lodging in addition to salary and get after three years a bonus of Rs. 36 000 to cover their marriage expenses (Sivaramakrishnan 2007: 11-12).¹⁹

¹⁸ Interview with Mr Thangappan, Superintendent of Central Excise Department, Madurai, on 24th March 2008.

¹⁹ This sum is in fact only about half the statutory minimum wage. The girls sign contract for three years, but before the period expires they are fired and receive nothing. This according to Joseph Ray, director of the Trust for Education and Social Transformation (Interview conducted 13th March 2009, Hilding 2009).

Preliminary information from our field visit to different factories revealed, however, that for mechanisation to pay off, large volumes of production is required, which may not be within the reach of all producers, making it more profitable for some of them to continue with manual methods of production (Hilding & Vidyasagar 2008). Due to saturation of market a number of factories do not find it worthwhile to mechanise. Their profit margins are too slender to warrant investments in the stagnating market (Interview with Mr. Sriram Ashok, president of the All India Chamber of Match Industries 12th March 2009, Hilding 2009).

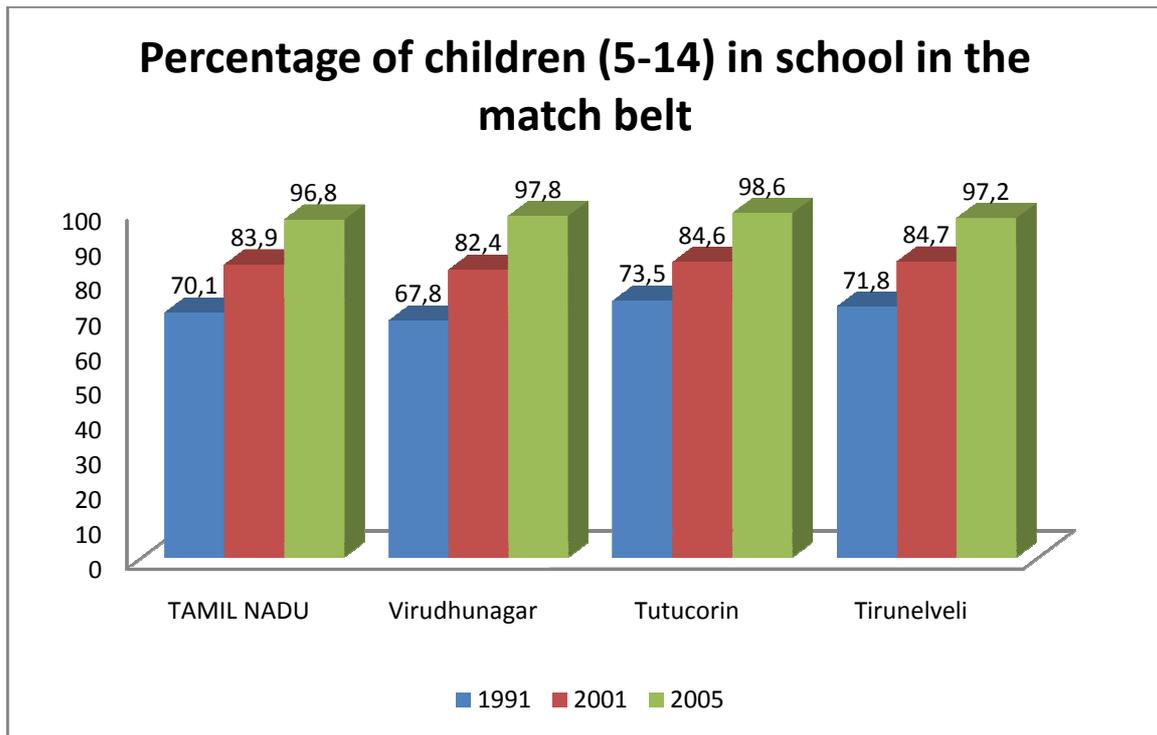
Increased competition for labour is likely to have a beneficial impact on child labour. If there is increase in wages manufacturers will substitute capital for labour. Mechanisation will increase and the factories employ fewer but more skilled workers who are paid higher wages. This is likely to create incentives for education. The representatives of voluntary organizations we talked to all confirmed that child labour was on the decrease. A technological change in the industry is only one possible cause. The overall growth in the area, increased awareness, greater exposure to the outside world, effects of legislation and increase in primary schooling may all have contributed to the decrease.

Before drawing any broad conclusions of what factors may have caused the decrease in child labour it could be useful to look at the Census data for 1991 and 2001 and the SSA data for 2005 respectively regarding enrolment of children in schools and trends in the incidence of child labour in the match belt (Virudhunagar, Tuticorin and Tirunelveli districts).

Figures 2 and 3 indicate that the trend in child labour was on the decline, well in advance of the sweeping technical, excise duty and other developments we have now described. Since 2000, however, enrollment of children in school have accelerated while there is a steep decline in child labour.²⁰ The changes are most pronounced in Virudhunagar district where most of the industry is concentrated.

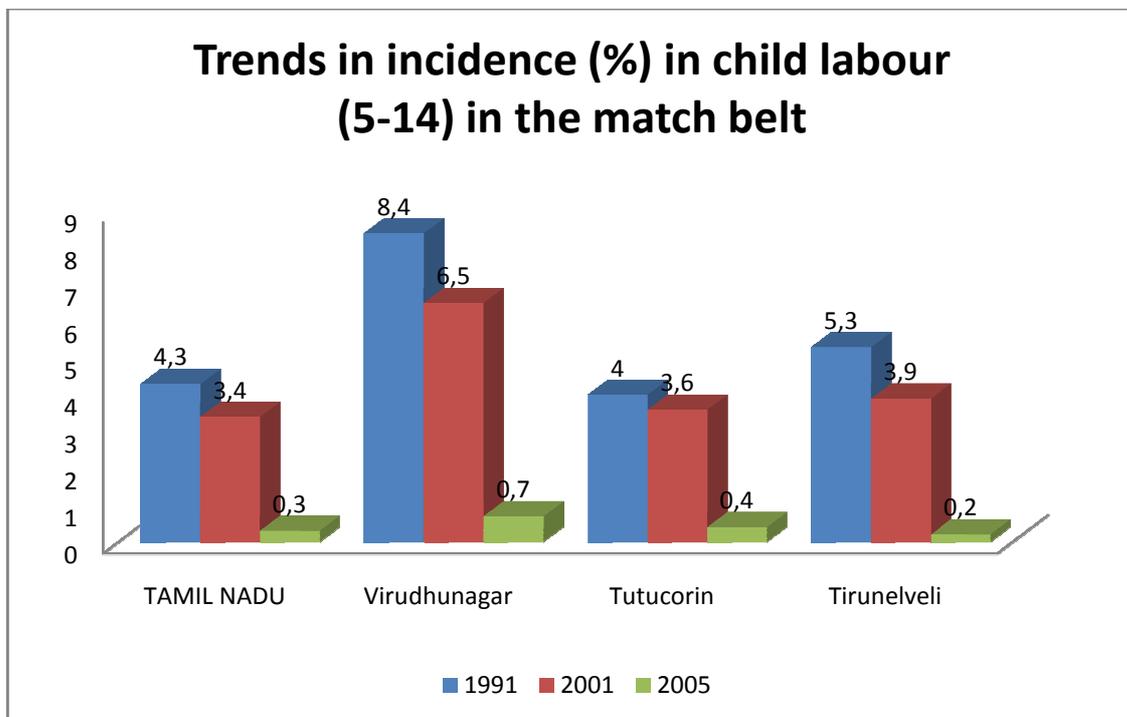
²⁰ The SSA data (Sarva Shiksha Abhiyan program) may not be fully comparable to the census data since it only registers child labour from among out-of school children. Working children who attend school are thus not included, nor home based labour.

Figure 2.



Source: Figures based on Census of India, 1991 and 2001; and SSA data for 2005.

Figure 3.



Source: Figures based on Census of India 1991 and 2001; and SSA data for 2005.

Discussions and interviews have confirmed that there has been a sharp decline in the use of children's labour in the match units (Hilding and Vidyasagar 2008). This fact is acknowledged by parents, NGOs, employers and government agencies. The SSA data also confirms this argument. The structure of the labour market and segmentation of market for children that remained static for over 80 years in the industry has undergone a tremendous change within a short span of time. While technology played a major role in the shift in the labour market, there are also other complimentary factors that could have contributed to the reduction in the use of child labour in the match belt. Tamil Nadu's remarkable achievement in primary education is probably one of the more important complementary factors ("Tamil Nadu India's most literate state", *Times of India*, May 14, 2003).

We have seen how the substitution of adult for presumably more efficient child labour did not impose a barrier to technological changes as suggested in much of the literature on child labour in India. Neither did the increase in wages needed to attract adult workers to the factories jeopardize their profitability except for the very smallest ones, who had difficulties in stepping up production to the volumes required for the technology to pay off. Nor did the industrial culture based on the employment of women and children that had characterized the match industry since it was first introduced into the area in the 1920's withstand the restructuring of the industry during the last decade. There may still be pockets of child labour in some remote areas providing putting-out work for the match factories, but they are likely to disappear in the near future.

In this article we have focused on the lifting of a few restrictions imposed by the government on the match industry, such as the removal of investment limits and changes in the excise duty differentials that earlier discriminated against mechanized production. As we have seen they set in motion a whole series of events that accorded with the socio-economic changes in today's Tamil Nadu and ultimately put an end to the use of child labour in the match industry.

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Impact of Technological Changes on the Incidence of Child Labour in the Indian Match Industry.

The Indian match industry in the southern state of Tamil Nadu has been characterized by child labour and a stagnant technology for over half a century. We investigate the technological changes and industrial restructuring, catalyzed by the changing duty structure that has moved the match industry towards greater mechanization. Our examination indicates that increased mechanization in the production processes has implied greater demand for skilled labour and a decline in child labour.



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