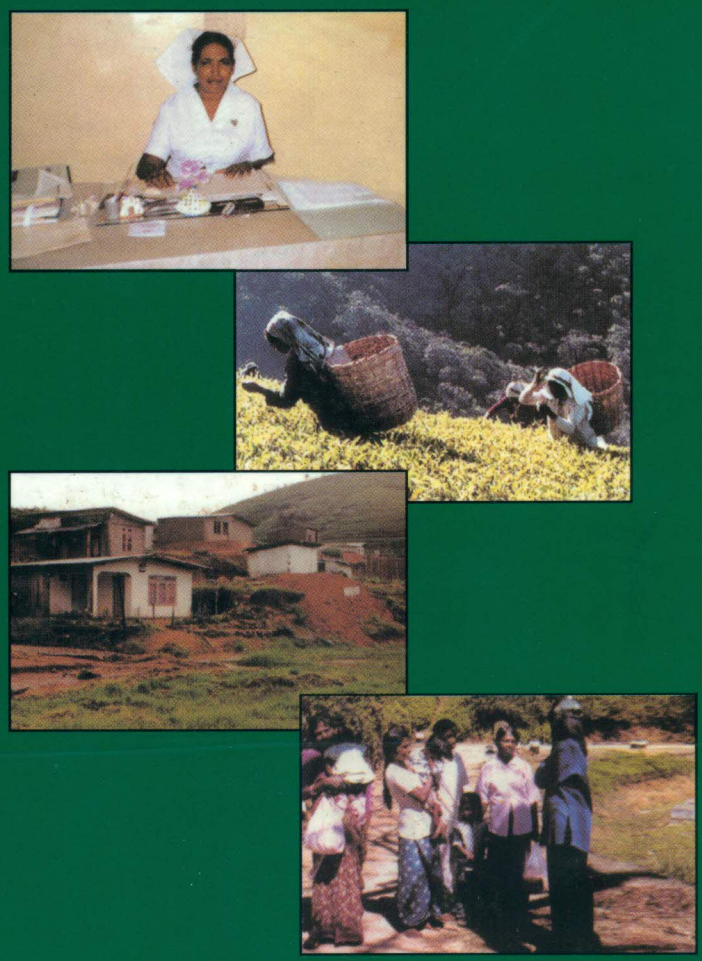
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Effectiveness of Welfare Programmes in Improving Estate Performance in Sri Lanka



PSG

PROGRAMME SUPPORT GROUP

IPS

INSTITUTE OF POLICY STUDIES

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Colombo 3
Sri Lanka

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Preface

This research study is, perhaps, the first of its kind in the plantation sector. Although investment in social welfare is known to have a profound influence on worker health and improved human relations, the impact that such measures have on worker performance has so far not been assessed through rigorous economic analysis. This document marks the first step in that direction.

It was against this background that the Programme Support Group had commissioned the Institute of Policy Studies (IPS) to undertake this much-needed study. The enclosed report is the outcome of their exercise spanning a one-year period. Using multivariate analysis, it quantifies the impact of five welfare inputs -- crèche attendance, better housing, individual latrines, maternal care services and availability of qualified medical personnel -- on worker outturn and labour productivity. We believe that the findings will be of direct relevance and interest to two of PSG's main groups of partners, namely, the Plantation Housing & Social Welfare Trust and the plantation management companies.

I would like to place on record our appreciation to the IPS and, in particular, Dr Nisha Arunatilake, for undertaking this task with the utmost professional competence. As with most of our studies, the data has been furnished by the companies and the PHSWT. We wish to thank them for this assistance and also closely interacting with the researchers in the course of their study.

I express the sincere hope that this study will contribute to further systematic heed to the issue of modern labour management practices.

Eric Kamphuis
Team Leader
Programme Support Group

Abstract

The plantation management has to overcome many hurdles in their effort to remain competitive in the world market. Among these, issues pertaining to labour costs and availability are fast coming to the forefront. Considerable changes have taken place both in the estate sector and the macro environment of the country that have influenced the labour supply and demand situation of the estates. If the present trends continue, a labour shortage situation is imminent. To reap the dividends from productive investments in the sector, the estates must have access to a ready and reliable work force. Hence, it is vital that the management take timely action to improve labour supply problems.

Since plantation crops are essentially export oriented, individual producers have -- in the absence of marketing initiatives-- little influence over the prices. As a result, estate profitability is mainly determined by the efficiency of the management in minimizing costs. Labour costs -- given the labour intensive nature of plantation crop production -- account for a significant portion of total costs. Since the late eighties, labour costs have been rising in the estate sector. If these wage increases are to be accommodated without eroding the competitiveness of the sector, labour productivity has to increase.

Traditionally labour has been considered as a cost, not as a resource to be developed. Labour welfare improvement programmes were launched mainly for humanitarian reasons. Partly due to availability of a cheap, submissive, captive and abundant labour force, there was little incentive to look at expenditure on social welfare as investments that contribute to the long-term productivity of the estates. There is increasing qualitative evidence of links between worker welfare and estate productivity. However, no study to date has rigorously assessed the direction and magnitude of these linkages.

This study hopes to fill this gap in the literature. Using a multivariate analysis, it examines the inter linkages between social welfare programmes and labour performance indicators while controlling for all other contributory factors. In particular, the study analyses the effects of: 1) crèche attendance, 2) better housing, 3) individual latrines, 4)

maternal care services, and 5) availability of qualified medical personnel on labour outturn and labour productivity.

The results for the most part are consistent with the findings of earlier qualitative studies and conventional wisdom. They show that most welfare programmes affect labour outturn and productivity positively, and that management can expect to improve profits through investments in welfare programmes. One exception was the impacts of new or improved housing on labour outturn. The study cautions that this unexpected result could be possibly due to the nature of the housing programme and its recent inception. It argues that the impact from new or upgraded housing on labour performance may also be positive as the housing programme matures.

Acknowledgement

This study was carried out in collaboration and with funding from the Programme Support Group (PSG). The author would like to thank Harshitha Gunaratna and Sampath Jayasinghe for competent research assistance, Eric Kamphuis, B. Sivaram and Indira Hettiarachchi for valuable comments on earlier drafts of the paper, and David Dunham for help with formulating the research proposal. Finally, the author would like to thank the Regional Plantation Companies who participated in the survey and the Plantation Housing and Social Welfare Trust for providing data and other information. The IPS editor, D.D.M. Waidyasekera edited the manuscript and Asuntha Paul professionally designed and formatted it for publication. The author remains responsible for views expressed and for any errors and omissions.

1. Introduction

The estate sector has undergone several structural changes in the last decade. In 1992, recognising the need to revitalise and modernise the sector, the government grouped some 449 state-owned plantations into 23 Regional Plantation Companies (RPCs) and transferred their management to private agents on five-year renewable contracts. Starting in 1995, in a second phase of privatisation, these were extended to 50 - year leases with the hope of infusing fresh capital. By the end of 1997, 20 companies comprising all commercially viable tea and rubber estates were fully privatised. This privatised regime is faced with many challenges. On the one hand, external factors such as world market prices, technological advances, developments in competitor countries and more generally the government strategies in restructuring the sector have a direct impact on the competitiveness of the sector in the world market. On the other, the sector is faced with a plethora of internal problems relating to production costs, resource availability, resource allocation and management. Among these, the future cost and availability of labour is fast gaining importance.

Considerable changes have taken place both in the estate sector and the macro environment of the country that have influenced the labour supply and demand situation of the estates. Under state management (from 1975-92), plantations stagnated due to a multitude of factors including, most importantly, problems with ownership and management, lack of research and development, outdated regulations, political interference, insufficient investments and lack of attention to human resource development (Manikam, 1995; Shanmugaratnam, 1997; Gooneratne and Wesumperuma, 1984). Faced with a longer time horizon, after the second phase of privatisation, the newly privatised RPCs are striving to overcome the inherent weaknesses in the sector. The public sector also has launched several projects to facilitate and improve direct productive investments and social welfare with the hope of improving the sector's competitiveness in the world market. Currently, there are four on going public sector projects[1] funded by donor agencies, the government and the plantation companies,[2] and implemented in collaboration with

[1] The Plantation Development Support Programme, The Plantation Reform Project, The Estate Housing Development Programme, and the Plantation School Development Programme.

[2] A large portion of the funding for these projects comes from the Dutch and Norwegian governments. In addition to funding, the government, the community and the plantation companies also provide some non-financial contributions mainly in terms of land and labour inputs.

the Plantation Housing and Social Welfare Trust (PHSWT).[3] This new wave of investments has the potential to increase labour demand in the sector. At the same time, the labour supply to the estates has been deteriorating. Several studies report increasing trends of labour out-migration and low outturn in the sector resulting from rising worker aspirations and opportunities for outside work (Manikam, 1995; Shanmugaratnam, 1997; Dunham et al., 1997).

1.1 Recent trends in labour supply and productivity

Labour supply of the estates is dependent on two main factors: the availability of workers who are willing to work in the estates in the vicinity and, the frequency with which they report to work in the estates when work is offered (Dunham et al., 1997). In addition to these two factors, the productivity of the labour -- the efficiency with which the allocated tasks are carried out -- is also an important labour performance indicator.

For the large part, the plantations depend on the resident work force (about 84 per cent of the worker population resides in the estates). The geographical isolation of some estates (especially in the up-country), socio-cultural differences (majority of the resident workers are Tamils of Indian origin), and problems with citizenship rights for some and ethnic conflict related security considerations were -- until recently -- influential in keeping the estate population intact. But there are clear indications that the availability of this labour force cannot be taken for granted. Increased access to information, citizenship rights and increased mobility have opened doors to the plantation community to participate in economic activities outside plantations. Given the stigma attached to work in the estates, traditional management practices [4] and the harsh working conditions due to the nature of the work, the estate inhabitants -- the more educated and politicised youth in particular -- do not give preference to estate employment (Dunham et al., 1997; NIPM, 1998).

[3] The PHSWT was created in 1992 under the Companies Act as a non-profit organization. It is a tripartite organization comprising the government, the unions and the companies, and acts as a coordinating body between them and assists them in planning, implementation and monitoring of development programmes. At present, a large number of state organizations -- mainly coming under the Ministry of Plantation Industries and the Ministry of Livestock Development and Estate Infrastructure -- are involved in providing welfare facilities to the estate sector. At times, lack of coordination and differences in approaches to social development by these various organizations have resulted in impeding development activities in the sector.

[4] Although recently the management has sought to improve worker relations, the management practices in the estates inclined to be highly hierarchical and authoritarian in the past.

To aggravate the problem, even the workers who remain in the estates do not report to work regularly when work is offered. Past literature on the subject draw attention to several contributory factors. Majority of the work in the estates is carried out in the open where there is little protection, making work difficult under adverse weather conditions. The outturn rates are especially low for estates which are near villages and during paddy harvesting seasons -- as estate workers are lured to work in neighbouring smallholders, paddy fields, vegetable plots and gem mines. Absenteeism is also reported due to illnesses of the workers and their families, which are aggravated by the harsh weather conditions -- especially in the up-country estates -- poor nutrition, and inadequate protection due to poor housing facilities and clothing. Moreover, there is increasing trends in low outturn due to family and social problems caused by alcoholism. In addition, a significant number of workdays are lost due to strikes.[5] (Dunham et al., 1997; Manikam, 1995; NIPM, 1998; Sinnathamby and Wickramasekara, 1984; Sivaram, 2000b).

Low labour productivity has often been a worry for the estate managers. Productivity per worker at 15 kg. of green leaf per plucker per day is low compared to other regions such as North India (23), South India (25) (1998 data provided by Sivaram). Although many studies have analysed the severity of this problem in Sri Lanka, little research has been done on methods of improving this situation. Conventional solutions for improving labour productivity concentrated on giving wage incentives to motivate the workers to work harder. But these alone are unlikely to address the root causes of low labour productivity, relating to health, worker attitudes and training (NIPM, 1998).

1.2 Study Objectives

Traditionally, labour has been considered as a cost, not as a resource to be developed. Labour welfare improvement programmes were launched mainly for humanitarian reasons. Partly due to the availability of a cheap, submissive, captive, and abundant labour force, there was little incentive to look at expenditure on social welfare as investments that contributed to the long-term

[5] According to the Employers' Federation of Ceylon, a total of 462 strikes took place on estates during 1998 and 1999 involving 2,273 estate days (Sivaram, 2000b).

productivity of the estates.[6] But as can be seen in the earlier discussion, majority of the reasons for labour out-migration, low outturn and low productivity are related to health, housing and other social factors such as societal attitudes, family problems related to poverty, worker relations and community pressures. There is increasing evidence of links between worker welfare and estate productivity (through improvements in labour productivity and reductions in worker absenteeism and worker availability). However, little has been done to make use of this knowledge.

Until recently, welfare programmes were launched with the objective of improving social infrastructure, health and education in the estates and not with the objective of improving productivity. The Plantation Development Support Programme -- started in 1998 -- recognizing the need to look at the productivity aspects of social welfare, identified raising productivity and retaining labour supply in the estates as one of the final objectives achieved through developing the estate communities. In spite of that, achievements in welfare programmes are still solely measured by developments in social indicators and not by improvements in productivity indicators. For example, several studies[7] have assessed the impact of the welfare programmes in improving child and health care facilities, water supply, sanitation, health indicators (i.e., mortality and morbidity trends), and housing facilities in the estate sector. However, no study to-date has quantitatively assessed their effects on the productivity and profitability of plantations.

Part of the problem in assessing the productivity aspects of social welfare development lies in availability of data. To date, information on social development such as social infrastructure

[6] The estate population consists of workers brought from South India in the 1880s by British planters who realised the need for a cheap and readily available work force. Besides employment, the estate management provided the workers with basic social amenities such as housing, medicine dispensaries, maternity wards and crèches. Although an extensive legislative framework developed over time to ensure provision of basic welfare facilities and to prevent worst incidents of exploitation of the estate communities, the effectiveness of these laws were low, as there were no proficient institutions to monitor and enforce them. The estate inhabitants were totally dependent for all their needs on the estate management and were too weak and unorganised to make demands. The responsibility of providing these facilities rested solely on the plantation management, who had little incentives to engage in large-scale projects to improve social infrastructure facilities in the estates. Historically, plantations in Sri Lanka have been managed as special enclaves, and as a result the social infrastructure development programmes in the rest of the country had little impact on the estate population. As a consequence of these factors for nearly a century since the establishment of estate settlements, the social infrastructure remained rudimentary in the estate sector. Although the welfare measures undertaken under the sponsorship of donor agencies during the period of state ownership were visibly successful in improving the living standards of the workers, due to long years of neglect human development indicators in the estate sector still lagged behind at the time of privatisation.

[7] See for example, Plantation Housing and Social Welfare Trust Health Bulletins.

development and health indicators were gathered, computerised and evaluated mainly by the PHSWT, while data on productivity and labour performance were collected and evaluated by the plantation companies. Due to differences in interests, no study until now has combined these two sources of data to evaluate possible links between social welfare and productivity. This study aims -- by bringing together available data on social welfare and estate productivity -- to provide a robust empirical evaluation of these inter-linkages. To simplify the data needs and methodology, the analysis focuses on the tea industry. However, given the common history and management structure of all plantation industries in the country, and similarities in factors affecting labour performance, there is reason to believe that the main findings of the study on the effects of welfare programmes on the tea industry will also hold for other plantation crops -- especially rubber -- as well.

Estate profitability is a function of many variables. In the short-term, it is determined, largely, by prices fetched by the plantation produce and the cost of its production; and in the long-term on the investments in land, labour and capital. Since plantation crops in Sri Lanka are essentially export oriented, their prices to a large extent are determined by external forces relating to weather, technological developments, labour situation in the competitor countries, and political and economic environment in the importing countries. The factors relating to cost of production and investment, however, are under the control of the management and can be influenced. Given the high labour intensive nature of production of these crops, the labour costs account for a significant portion of total costs of production. These costs have increased significantly since 1988, and they are bound to continue to increase over time (Sivaram, 2000a: 353). If wage costs are to be accommodated without eroding the competitiveness of the sector, labour productivity will need to increase. At the same time, to reap the dividends from investments intended at improving agricultural productivity, the estates must have access to a ready and reliable work force. Although labour requirements may fall with improvements in labour productivity and mechanization, it is likely to remain high.

The study aims to first examine and provide as complete an overview as possible of the factors that affect labour performance indicators. Specifically, these will cover: 1) labour outturn (the proportion of workers who report to work when it is offered); 2) labour retention (the ability of

the estates to control labour out-migration);[8] and 3) labour productivity (the efficiency with which individuals carry out allocated tasks). Second, using these findings, it aims to quantitatively assess whether social welfare programmes play any notable role in improving estate profitability -- through their effects on labour performance indicators -- while controlling for other factors.

The organisation of the paper is as follows. Section 2 discusses the data used for the study. Section 3 gives a summary of the findings on the determinants of labour availability and productivity. Taking into account these findings, Section 4 discusses the indicators used for the empirical analysis, and provides descriptive statistics of some important variables. Section 5 details the findings of the study, and Section 6 concludes.

2. Data

Assessing the linkages between welfare programmes and worker performance is made difficult due to several factors. Since both worker welfare and labour performance are multidimensional intangible notions, their measurement is not straightforward. As a multitude of other factors also contributes towards these notions, one must understand and control for these factors to isolate the effect of welfare on labour performance. Recognising differences between individuals, unequal distribution of endowments and the effect these may have on the labour performance, health and nutrition of individuals, ideally one must use individual level data to identify relationships between welfare and labour availability and productivity[9] Since such individual level data are not available for estate populations, and since the scope and time limitations of this study did not permit the collection of individual level data, only estate level data is used for the analysis.

[8] The ability of the estates to control labour out-migration is more difficult to measure due to several reasons. First, worker out-migration is greatly dependent on definitions of labour supply. Labour supply, as Dunham et al. (1997: 25) summarises, has had several definitions over the years and is largely dependent on the available working age population in the area surrounding the estate and labour outturn. In this study, issues pertaining to labour outturn are treated separately. Since the study is primarily interested in the impact of welfare programmes on labour retention, and as welfare programmes are extended primarily to registered workers, labour retention is measured by the changes in the size of the immediate available workforce. The immediate available workforce, following Dunham et al. (1997), is defined to be the number of registered (resident and non-resident) and casual workers.

[9] For example, a study done on an Indian tea estate with 500 workers using individual level data and covering a 3-year period indicates that inherently individual characteristics such as income of other family members, cinema habits, alcoholism, land ownership, and the number of children and their ages may influence absenteeism and productivity (NIPM, 1998).

The research study is based on data obtained from several sources. Information was gathered in two stages. In the first, the study gathered qualitative information on factors affecting labour outturn, labour retention and labour productivity (hereafter referred to as labour performance indicators), changes in management practices, and the effectiveness of welfare programmes in improving labour productivity in order to develop a study methodology. This was done through interviews based on a structured qualitative questionnaire with senior managers of plantation companies, interviews with workers and estate superintendents. Besides, officials affiliated to Programme Support Group and the PHSWT were consulted to gather information on the various welfare programmes in the estates.

At the end of the first stage, a study methodology was developed and based on that quantitative data were gathered for the empirical analysis. Data on welfare programmes and estate population were mainly obtained from the Annual Health Return data from the PHSWT. In addition, based on a questionnaire, the study collected monthly data on estate productivity and labour performance from companies. Since the qualitative analysis done in the first stage showed that local area characteristics -- such as proximity to cities, and availability of other employment opportunities -- are influential in determining estate labour performance, a telephone interview was also conducted to obtain information on these characteristics.

3. Determinants of Labour Performance indicators

As a multitude of factors affects labour availability, labour outturn and labour productivity, gleaning out the effects of welfare programmes on labour performance will first require understanding and controlling for all other factors that may also affect labour performance. Past studies throw some light on the factors affecting labour performance indicators in tea plantations. In order to validate the relevance of these factors in the current context, and to investigate the existence of any new contributory factors, the study also gathered information through a series of interviews with the company and estate managers, and estate visits. Following is a summary of these findings.

3.1 Factors affecting labour performance

3.1.1 Factors affecting agricultural productivity

Agricultural productivity of the estates is noted to have a direct positive relationship on labour performance. Hence, the company managers were first asked to identify factors that affect

agricultural productivity. Two sets of factors were identified. Exogenous factors -- that is, factors that are outside the control of the company -- and endogenous factors -- that is, actions taken by the company to improve agricultural productivity. Elevation, plant stock (Vegetatively Propagated (VP) or Seedling tea)[10] weather (amount and number of rainy days, blowing during rainy season, inadequate rain during dry season), and terrain were commonly identified to be the external factors influencing agricultural productivity of the estates. Proper fertiliser usage, pest control, factors affecting bush density and bush age (replanting, infilling), the management of shade trees, pruning and soil conservation practices, on the other hand, were identified to be measures commonly taken by the companies to improve agricultural productivity.

3.1.2 Factors affecting labour productivity

The most noted factor mentioned in the interviews with the company managers and estate superintendents on labour productivity was management practices of the estate. In particular, the following managing practices -- roughly in order of given importance -- were mentioned: a) techniques used to improve plucking time (e.g., providing transport, allocating fields closer to cottages, more frequent weighing stations, mid-day meals at the field when distant fields are plucked); b) training programmes to enhance knowledge on harvesting; c) providing more achievable incentives (attainable plucking-norms) and rewards for plucking performance; d) facilitating plucker comfort through maintaining the height of tea bush through regular pruning, and introducing low weight of baskets; e) use of new plucking technology (e.g., shears). The managers also gave priority to factors relating to health and nutrition of the workers such as health care facilities and sanitation. Especially, health conditions such as skin diseases, lung diseases, digestive disorders, paediatric disorders -- which indirectly affect the outturn and productivity of mothers -- were mentioned. In addition to these some exogenous factors that were identified to affect agricultural productivity, such as terrain, rain, heat and blowing were seen to affect labour productivity independently from their effect on agricultural productivity. Lack of motivation was also suggested as a factor affecting productivity.

Besides these, earlier studies have highlighted several other determinants of labour productivity. A study on a medium sized tea plantation in India states that household responsibilities for female

[10] The more agriculturally productive VP teas were discovered only in the 1930s. Since Sri Lankan tea plantations started in the middle of the 19th century, they were planted with seeds introduced primarily from Assam, India. These tea plants are usually referred to as seedling tea. Since VP teas are more productive, there has been an attempt to change the plant stock from seedling to VP tea. But due to the costs involved in replanting, these changes take place rather gradually. Most of the companies inherited the plant stock with the estates. Although strictly speaking the plant stock of an estate can be changed, it cannot be done in the short-term. Hence in this study, existing plant stock is considered as an exogenous variable here.

workers with young children are likely to adversely affect productivity. The same study also highlighted the importance of experience and worker attitudes in determining worker productivity (NIPM, 1998).

3.1.3 Factors affecting labour outturn

Although the factors mentioned by managers to affect labour outturn were largely similar to the factors affecting labour productivity, the order of given importance to these factors was different. Among the factors mentioned, health of the workers and their families (fatigue, sickness, alcoholism) and family problems -- childcare, family disputes (sometimes relating to alcoholism)-- were given more importance. Many managers brought attention to alternative employment opportunities as a main factor affecting labour outturn. It was noted that the effect of alternative work opportunities on labour outturn varied across estates depending on the nature and proximity of side employment, productivity of the estate, work opportunities in the estate, and worker manager relationships. Depending on the location, alternative employment opportunities digressed from work in garment factories and shops -- when situated near towns – to smallholder tea estates, paddy cultivation and work in vegetable plots. Seasonal labour problems during paddy and vegetable cultivation seasons were also mentioned. Social events -- such as festivals, weddings and funerals in the community -- were noted to affect outturn. (Some managers have experienced instances where entire divisions took time off during community functions). Weather -- sustained rain, cold temperatures and strong blowing in particular -- and means of protecting against severe weather conditions were also mentioned as contributory factors. Moreover, some managers brought up labour management, worker attitudes, and worker manager relationships as factors affecting outturn.

3.1.4 Factors affecting labour retention[11]

The most significant factors governing labour retention were partly outside the control of the managers. These related to circumstances affecting the monotony, uncertainty and stigma

[11] Earlier studies on labour availability were concerned more with issues pertaining to labour supply such as birth rates of the resident workers, and large-scale movements of workers due to repatriation to India and to other Tamil-populated areas and more secure areas within plantations during communal disturbances (Sinnathamby and Wickramasekara, 1984). They also mention that these workers found it difficult to move individually due to differences in ethnic background and citizenship rights. More recent studies, however, give less emphasis to demographic factors and large-scale worker movements but draw attention to the importance of worker aspirations and availability of outside work as determinants of labour supply (Dunham et al., 1997, NIPM, 1998). Hence this study concentrates on factors affecting labour retention, rather than factors affecting labour supply.

attached to work in the estates relative to the excitement, freedom and better pay of work opportunities outside the estates. Regularity of labour-days, availability of adequate avenues for regular incomes, regular work opportunities for family members were also noted as contributory factors. Many managers noted the importance of availability of health and childcare facilities, and proper housing in retaining workers.

Although an attempt was made to examine the determinants of labour out-migration, the results were largely inconclusive. This could be for several reasons. Given estate level data, it was difficult to capture individual characteristics that are most significant in influencing worker out-migration. For example, Dunham et al. (1997:34) notes that "attitudes and aspirations can be affected in practice as much by hearsay, peer group values and community perceptions of 'status' as by any reasoned individual assessment of the alternatives available." Since economic liberalisation in the late seventies, the opportunities for outside work in towns, garment factories, and abroad have increased. With the acceleration in issuing identity cards in the late eighties and better education for the estate youth, the ability of the estate population to take advantage of these work opportunities have also improved. However, these changes have taken place over a long period. The earliest estate population data we could obtain were for 1992, and the latest for 1997. Five years is possibly not a long enough period to examine labour out-migration using estate level data. Further, the data needed to fully examine the issue of labour-retention includes macro level changes that have taken place in the country over the past couple of decades -- such as government policies towards improving employment opportunities in the rural sector, and the security situation in urban centres. Such an examination is beyond the scope of this study. Given these reasons, the rest of the paper concentrates only on the analysis of labour outturn and labour productivity of the estates.

4. Indicators Used for the Empirical Analysis

4.1 Study Sample

The study collected monthly estate data from eight companies. In most cases, research interns were allowed to go to company offices and peruse company documents to collect necessary data. In some instances, companies agreed to fill-out the estate survey using their own staff but were able to give information for only a selected number of estates under their management. In order to obtain unbiased results in such instances, a sample of estates from the relevant companies were randomly selected by the researchers for the study.

Data was collected for 43 estates. However, surveys obtained from one company -- for 6 estates -- were incomplete and could not be used for the study. Although the survey asked for monthly data for the year 1998, two companies provided data for 1999. This data was used as estimates for 1998 values in the study. The final sample consisted of 37 estates or 444 (i.e., 37 * 12) estate-months.

4.2 Labour performance indicators

4.2.1 Labour outturn

Data on labour outturn is obtained directly from estate surveys. Earlier studies have highlighted that the labour outturn patterns varied between resident and non-resident workers, between male and female workers, across regions and over the year (M. Sinnathamby and P. Wickramasekara, 1984; Dunham et. al. 1997). This current study controls for the regional and seasonal variations in labour outturn. Although important, due to incompleteness of available data on resident workers, it is not possible to analyse resident worker outturn separately. For the same reason, differences in outturn levels for males and females are not considered separately. The analysis is therefore restricted to outturn of all workers (hereafter referred to as overall outturn). As seen in Table 1, overall average labour outturn for most of the estate-months falls between 70 to 90 per cent. For comparison purposes, outturn of resident workers are also given for a smaller sample for which data is available. The average resident worker labour outturn is slightly better (78.24) than the overall (76.46).[12] This shows that, when work is offered, workers who reside in the estate are more likely to report to work than workers who are from outside the estate. This result is expected and consistent with the findings of Dunham et al. (1997:31).

4.2.2 Labour productivity

Labour productivity is defined to be the efficiency with which individuals carry out allocated tasks. Estate workers can be broadly categorised into factory workers, sundry workers (labour allocated for pruning, bush management, soil management, replanting and infilling) and pluckers. The proportion of workers allocated to factory work is relatively small.[13] Measuring productivity of sundry workers is difficult due to the multitude of different tasks that come under sundry work. Hence, this study concentrates on plucking which accounts for 70 per cent of the workforce.

[12] These calculations are simple averages of labour outturn data provided by the companies for the estate-months in the sample.

[13] The proportion of factory workers for Mid- and Up- country estates is about 6 per cent and for Low country estates it is about 11 per cent of the total workforce (Sivaram, 2000a).

Table 1: Labour outturn patterns in the sample

Outturn (%)	Number of estate-months (% of total)	
	Overall	Resident workers
Below	20 (4.5)	5 (1.6)
50+ to	16 (3.6)	12 (3.9)
60+ to	76 (17.1)	53 (17.0)
70+ to	142 (32.0)	94 (30.1)
80+ to	159 (35.8)	119 (38.1)
90+	31 (7.0)	29 (9.3)
Total	**444 (100)**	**(100)**

A commonly used index (see Sivaram 2000a:362) to measure real labour productivity[14] by the companies is:

$$\text{Revenue labour output} = \frac{\text{Estate Production}}{\text{Total mandays}}$$

where, total mandays is defined as the number of actual full working days[15] worked by all workers summed over a specific time period (usually a month). "Revenue labour output" (RLO) measures the labour output of made tea production. However, the present study analyses the labour productivity of green-leaf-tea production. Therefore, this study uses a slightly modified version of RLO where estate production in RLO is changed to estate green leaf production, and total mandays is changed to total plucker mandays. The resulting labour productivity index -- called the plucker productivity -- is given below.

$$\text{Plucker productivity} = \frac{\text{Estate production of greenleaf tea}}{\text{Total plucker mandays}}$$

Data on estate production of green-leaf-tea and total plucker mandays were directly obtained from the estate monthly progress reports (EMPR). EMPRs provide three different measures of green leaf production: field-weight, check-roll-weight and factory-weight green-leaf. This study uses the check-roll-weight as a measure of green leaf production -- pluckers are paid according to

[14] The term "labour productivity" has a slightly different meaning in Sivaram (2000a). In Sivaram (2000a), "labour productivity" -- which is arrived at by multiplying real labour productivity by the net sales average -- has a monetary value. This study concentrates only on the real labour productivity.

[15] A half days work is regarded as 0.5 workdays. A normal working day consists of 9 hours, including one hour for meals.

the check-roll-weight green-leaf-tea production. Table 2 shows how estate-months in the sample are distributed over various classes of the labour productivity measure described above. According to this measure, the average labour productivity for the sample is 16.6 kg. per plucker manday.[16]

Table 2: Labour productivity patterns in the sample

Average green leaf kg. per manday	Number of estate-months (% of total)
Below 10	52 (11.7)
10+ to 12	60 (13.5)
12+ to 14	49 (11.0)
14+ to 16	66 (14.9)
16+ to 18	55 (12.4)
18+ to 20	67 (15.1)
20+ to 25	54 (12.2)
25+ to 30	25 (5.6)
30+	16 (3.6)
Total	**(100)**

4.2.3 Welfare indicators

Measuring welfare is complicated due to its multidimensional and intangible nature. In the interviews with estate managers, it was evident that a variety of programmes are undertaken by the management to improve welfare in the estates. Among these, various measures to improve health care, water and sanitation, childcare and housing improvements were mostly noted. There has also been a more recent trend in establishing savings schemes, and community co-operative shops, educational programmes and organising and providing recreational facilities for the youth. A study done by the Sri Lanka Business Development Centre (SLBDC), through a literature survey and personal interviews with company and estate staff and focus group discussions with workers, identifies several indicators to assess the impact of welfare programmes on the estate population (PHSWT, 1999b: 39).

Given availability of data, six variables were chosen as welfare indicators. These mainly capture programmes targeted at improving psychological, physical and sociological factors relating to

[16] Interestingly, 21.4 per cent of the estate-months on average reported more than 20 kg. of green leaf per manday. Although it is beyond the scope of this study, it would be useful to study the reasons for the high level of productivity in these estate months in a future study.

housing, health, sanitation, child-care and worker relations. Welfare measures on reducing indebtedness, providing recreational facilities, and building community level organisations and support groups are a recent phenomenon. As such, these are not included in the analysis as most of them were started after the time interval considered by this study. Table 3 gives a list of the welfare variables used in the study with some descriptive statistics. The mean values show the average performance in the sample for each indicator, and the minimum and maximum values show the range within which the indicators vary. For example, on average in the sample, 46.1 per cent of the children under 5 attended a crèche. In the estate with the lowest attendance, this per cent is only 20.7, and in the estate with the best attendance, almost all children under five (100 per cent) attended the crèche.

Table 3: Welfare indicators

Variable	Mean	Minimum	Maximum
Continuous variables			
Percentage of children under age 5 attending crèche[17]	46.1	20.70	100
Percentage of families benefiting from new or improved houses from 1994 to 1997	2.09	0.00	8.73
Individual latrines in the estate as a per cent of total number of families.	38.19	0.00	92.17
Live births as a per cent of total births in the estates.	97.08	88.89	100
Dichotomous variables			
Presence of a qualified medical officer in the estate.[18]	0.27	0.00	1.00
Presence of paramedical personnel in the estate.[19]	0.32	0.00	1.00

According to the PHSWT (1997:1), "A basic need of the working mother is the confidence that her children are in a safe and caring environment during her absence. The ideal crèche will seek

[17] This could be more than 100 per cent in some cases, where children of non-residents attend the crèche.

[18] This indicator is one when the most qualified medical official in the estate is either a regional medical officer or an assistant medical officer.

[19] This indicator is one when the most qualified medical officer in the estate is an estate medical assistant, a pharmacist or an apprentice-pharmacist.

to fulfil this need. Secure in the knowledge that her children are safe, the worker will be able to direct all her energies to the job at hand. This will increase efficiency and, in turn, contribute to the productivity and profitability of the estate". This statement implies a positive association between quality childcare and worker productivity. The attendance of children less than 5 years of age should improve with the quality of childcare provided by the crèche. Estate management, with technical and financial assistance from donor agencies and the government, has traditionally taken many actions to improve childcare facilities in the estates. These include most notably, training of crèche attendants and provision of appropriate buildings and equipment and their maintenance. A crèche, which is well equipped and staffed by a trained attendant, is more likely to attract children. Taking this into account this study uses "the crèche attendance of children under five years of age" as a measure of quality of childcare provided in the estates.

The psychological and physical health of individuals is highly influenced by the housing and sanitary conditions they live in. Overcrowding, leaking roofs, lack of light and ventilation, weakened structures, inadequate sanitary facilities and kitchens without proper chimneys to let the smoke out are some of the identified pressing housing needs in the estate sector (PHSWT, 1999b). There have been several programmes in the sector to upgrade existing housing units, facilitate the construction of new houses, and improve sanitary facilities. This study uses two variables to capture these improvements made in the estates: 1) Percentage of families benefiting from new or improved houses from 1994 to 1997; 2) Individual latrines in the estate as a per cent of total number of families.

Peri-natal mortality (i.e., still births and early neo-natal deaths) is highly affected by the easiness of access to quality health care services, and the awareness of health risks among the community.[20] As such they are commonly used as indicators of specifically maternal and child health and more generally the health status of a community (PHSWT, 1999a). Perinatal mortality is influenced primarily by maternal care, method of delivery and perinatal care of the infant. A well-organised health service system exists in the estate sector to provide care to pregnant mothers and infants in order to minimise the incidents of still births and maternal deaths.[21] In this regard the midwives play a critical role in educating and advising pregnant and feeding mothers on proper nutrition and health care. The maternal care services encourage the pregnant mothers to register with the health staff in order to monitor their health and to identify and correct possible

[20] Due to data availability this study takes into account only still births.

[21] According to the Estate Health Bulletin 1995/1997 (1999:23), "an appreciable portion of deliveries (5-7 per cent) that have been conducted by untrained persons results in still births…"

abnormalities. They also encourage pregnant mothers to deliver in health institutions under the supervision of trained medical personnel. The quality and accessibility of available maternal care services in the estates are reflected in the number of successful births in the estates. As such, live births as a per cent of total births are used in this study as a composite indicator, which captures the adequacy of these services.

The presence of a qualified medical officer in the estate reflects the quality of medical care available for general health needs -- that is, health needs that are not only specific to pregnant mothers and children -- in the estates. A qualified medical officer can contribute to improve the health status of the community by properly identifying medical conditions and by providing timely treatment. This not only reduces the illness period of an individual, but also limits the spread of diseases.

There are three categories of health personnel in the estates: general medical providers, maternal medical care providers and child care providers (PHSWT, 1999a). Since the quality of care provided by maternal and child care providers are already indirectly captured by the two variables on crèche attendance and live births, only general medical care providers were categorised for the purpose of measuring quality of available health care providers. Depending on their qualifications, there are several grades of general medical care providers in estates. In descending order of qualification, these comprise Registered Medical Officers (RMOs), Assistant Medical Officers (AMOs), Estate Medical Assistants (EMAs), Pharmacists and Apprentice Pharmacists. For the purposes of this study, RMOs and AMOs were classified as qualified medical officers, and EMAs, Pharmacists and Apprentice Pharmacists were qualified as paramedical personnel. This study uses two variables on the presence of estate medical staff as indicators to capture the quality of health care personnel available in the estate.[22]

4.3 Control Variables

The main objective of the study is to examine the correlation between the above mentioned welfare indicators and labour performance indicators. As discussed earlier, a plethora of factors

[22] An attempt was also made to use healthcare facility infrastructure as a measure of quality of health care. But the study was able to only obtain information on the existence of outpatient and inpatient care facilities in the estates. Most estates in the sample (97 per cent) had an outpatient care facility. The existence of in-patient care facilities varied depending on the size of the estate population and its proximity to government hospitals. As a result, the mere existence of an in-patient health care facility did not indicate the quality of available health care. Given these reasons, availability and type of estate health staff was used as a measure for quality of health care.

affect worker welfare and labour performance. In order to glean out the direct effects of welfare indicators on labour performance indicators, it was necessary to control for other factors that also affect labour performance. These variables used as controls for estate heterogeneity can broadly be categorised into several sets: 1) factors affecting agricultural productivity; 2) managing practices of the estate; 3) local area characteristics; 4) demographic characteristics of the workers such as experience. Appendix 1 gives a list of variables used as controls with some descriptive statistics of the data.

4.3.1 Factors affecting agricultural productivity

The agricultural productivity of the estates is influenced by a variety of external factors -- relating to weather, soil type, terrain and elevation. Due to data limitations, it was not possible to control for all these factors separately. The Planter's Association, mainly on the basis of elevation and rainfall, uses five different agro-climatic regions in their publications (PA, 2000). This categorisation of estates is used as agro-ecological regions in this study. These are namely, Western-Up, Western-Mid, Uva-Up, Uva-Mid and Low Grown. In the study sample, the distribution of the estates across these agro-ecological regions is 16, 6, 6, 4 and 5 respectively. In addition, monthly rainfall, month dummies,[23] and per cent of extent in VP tea were used as controls for agricultural productivity of the estates. Tables A2.1 and A2.2 in Appendix 2 show how labour performance indicators vary across agro-ecological regions and over different months of the year.

4.3.2 Managing practices of the estate

Many of the constraints faced by the Social Welfare Programme II (SWP II) were related to issues concerning company level participation, commitment, inadequate concern for cost and quality, and attitudinal problems of senior managers to welfare programmes (MPI, 1998: 15). Further, the company level differences in investments in new technology, new labour practices and management of capital and labour could also have an effect on labour performance indicators. Moreover, in the estate qualitative survey, several managers mentioned the importance of management practices in improving labour performance. Although an attempt was made to collect specific information on different management practices (such as use of shears in

[23] A "dummy variable" is a variable that takes the values of either one or zero, and it is used to indicate the presence or absence of qualitative characteristics. For example, the month dummy "January" takes the value one when the month is January and it takes the value zero otherwise.

estates), it was not possible to use this information in the study as the collected information was either incomplete or was not relevant to the study time period. Given the lack of distinctive detail data, company dummies[24] were used as a general control for all management related variables.

4.3.3 Local area characteristics

From the results of the qualitative survey and from earlier literature on the subject (see for example, M. Sinnathamby and P, Wickramasekara, 1984), it was apparent that local area characteristics such as distance to town and availability of other employment opportunities in the area affect labour performance indicators. Two variables were used to capture these characteristics of the estates. These are, distance from the estate to the nearest postal town and a variable to indicate the presence of other income earning opportunities -- such as work in smallholder estates and availability of work in villages.

4.3.4 Demographic characteristics of the workers

Several studies have highlighted the effect of demographic characteristics on labour performance. Most studies conclude that women are better workers – that is, they are more productive and report to work more regularly, and that worker productivity improves with experience and age (Sinnathamby and Wickramasekara, 1984; NIPM, 1998). Some estate managers interviewed mentioned that it is evident from check-roll data that workers are most productive from around mid-thirties to late-forties. This is when the workers are both experienced and physically strong to carry out the allocated tasks efficiently. Due to data limitations, this study is unable to control for gender or age distribution of the work force extensively. Given data availability, the analysis only includes a variable to indicate the proportion of workers over 25 in the labour force to control for worker performance differences due to demographic differences in the work force.

5. Results

5.1 Some notes on interpreting the results

As discussed before, a multitude of factors – such as agricultural productivity of the estate, weather, altitude, managerial efficiency, etc. – affect the labour performance of an estate.

[24] See footnote 22 for an explanation of a "dummy variable". A Company dummy is a dichotomous variable. For each company there is one variable, which is one when an estate belongs to that company and zero otherwise.

Multivariate regression analysis is a commonly used tool in economics to isolate and explain the effect of various factors (called independent or explanatory variables) on an outcome (called the dependent variable). Two types of explanatory variables were used in the analysis: 1) continuous variables (such as percentages); 2) yes/no (dichotomous) variables. The results for these two types of variables are interpreted somewhat differently:

5.1.1 Interpreting continuous variables

The results against continuous variables show the increase in the dependent variable for a unit change in the explanatory variable. To give an example, the results show that a 1 per cent increase in crèche attendance increases labour outturn by about 0.22 percentage points.

5.1.2 Interpreting yes/no variables

The results against a yes/no variable show the contrast between the yes and the no. For example, in the case of the presence or absence of a qualified medical officer in the estate, the results show that relative to estates without medical personnel, in estates with a qualified medical officer the labour outturn is about 6.38 per cent higher.

5.1.3 Statistical significance

Since the analysis was done using only a sample of estates, the results are estimated with some error. Hence after estimating the results, a test is done to examine whether the result (the association between the explanatory variable and the outcome) is significantly different from zero. If it is significantly different from zero, the result is said to be statistically significant at some confidence level (usually, results are reported for confidence levels of 99, 95 and 90 per cent).

5.2 Results on welfare indicators

The effect of welfare on labour indicators was analysed using 2 regressions, where labour indicators (labour outturn of all workers, and labour productivity) were regressed against the explanatory variables (i.e., welfare and control variables) outlined above. Following are the findings on welfare indicators from these regressions (Appendix 3 gives full regression results).

Table 4 gives a summary of these results. Statistical significance at 99, 95 and 90 per cent levels is indicated.[25]

5.2.1 Labour outturn

- The crèche attendance of children under five years had a significant effect on labour outturn. The results show that a 1 per cent increase in crèche attendance increases labour outturn by 0.22 percentage points.

- Labour outturn increased with the increase of individual latrines in the estate. When the percentage of individual latrines increased by 1 per cent, labour outturn improved by 0.07 percentage points.

- Surprisingly, the effect of new or improved housing on labour outturn was not positive. Results show that when the per cent of families benefiting by new or improved housing increased by 1 per cent, the labour outturn decreased by 1.62 percentage points. Some possible reasons for this unexpected result are discussed in Section 6.0.
- Relative to estates with no medical personnel, the presence of qualified medical or paramedical personnel on the estate had a strong positive and statistically significant (at 99 per cent level) effect on labour outturn. Results show that relative to estates without medical personnel, the labour outturn of estates with qualified medical officers and paramedical officers is 6.38 and 5.09 percentage points higher, respectively.

- Live births as a per cent of total births had a significant and positive effect on labour outturn, indicating that maternal care services contributed notably in improving labour productivity. A one per cent increase in the percentage of live births increased outturn by 0.66 percentage points.

5.2.2 Labour Productivity

- As in the regression for labour outturn, the crèche attendance of children under five years also had a positive and significant effect on labour productivity. A 1 per cent increase in crèche attendance increased labour productivity by 0.07 kg.

[25] See section 5.1.3 for an explanation on statistical significance.

- Labour productivity increased with the increase of individual latrines in the estate. When the percentage of individual latrines increased by 1 per cent, labour productivity improved by 0.09 kg.

- New or upgraded housing had a positive effect on labour productivity, but the result was statistically insignificant.

- As in the regression on labour outturn, presence of medical personnel (qualified or supporting) had a positive effect on labour productivity, but the result was not statistically significant.

- Live births as a per cent of total births had a significant and positive effect on labour productivity. As for the result on labour outturn this indicates that maternal health influences labour productivity positively. A one per cent increase in the percentage of live births increased productivity by 0.31 kg.

5.2.3 Other salient features of the regressions

Although the main objective of this exercise was to evaluate the effect of welfare programmes on labour performance indicators, the results revealed several other useful findings. Other results that affected labour performance significantly and could potentially aid decision making on labour and resource allocation and planning are listed below. The implications of these results are further discussed in the next section.

- The company dummies affected both resident labour outturn and labour productivity significantly. This indicates that management practices such as investments in technology and labour relations have a significant impact on labour performance.
- Month indicators also were significant, indicating – as expected-- that there are seasonal variations in labour outturn and labour productivity.

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Table 4: Results on welfare indicators

	Overall Labour outturn (%)	Labour productivity (Green Leaf kg. per plucker manday)
Results on Continuous variables[26]		
Percentage of children under age 5 attending crèche[27]	0.22***	0.07***
Percentage of families benefiting by new or improved houses from 1994 to 1997	-1.62***	0.05
Individual latrines in the estate as a per cent of total number of families.	0.07*	0.09***
Live births as a per cent of total births in the estates.	0.66***	0.31***
Results on Dichotomous variable		
Presence of a qualified medical officer in the estate.[28]	6.38***	0.22
Presence of paramedical personnel in the estate.[29]	5.09***	0.64

Note: ***, **, * indicates statistical significance at 99, 95 and 90 per cent confidence, respectively.

- The indicators on agro-climatic regions were also significant showing that there are regional variations in labour outturn and productivity. Relative to Western-Mid country estates and controlling for all other factors, labour productivity was highest (2.78 kg. higher) in the low country estates and lowest (3.47 kg. lower) in the Uva-Mid country estates. Relative to Western-Mid country estates and controlling for all other factors, labour outturn was highest (13.96 percentage points higher) in Uva-Up country estates.
- Of the two variables that were included to capture the effect of local area characteristics, the presence of other employment opportunities in the vicinity had a significant and negative

[26] As described in section 5.1 the interpretation of continuous and dichotomous variables is somewhat different. As such, these two types of results cannot be directly compared. In order to avoid misinterpretation, the results are reported separately.

[27] This could be more than 100 per cent in some cases, where children of non-residents attend the crèche.

[28] This indicator is one when the most qualified medical official in the estate is either a regional medical officer or an assistant medical officer.

[29] This indicator is one when the most qualified medical officer in the estate is an estate medical assistant, a pharmacist or an apprentice-pharmacist.

effect on labour productivity. Labour productivity in the estates with alternate employment in the vicinity dropped by 1.92 green leaf kg. per plucker manday.

6. Conclusion and Discussion

The aim of this paper was to understand the factors affecting labour performance indicators -- measured by labour outturn, labour productivity and labour retention – and examine whether, while controlling for other factors, social welfare programmes play any noteworthy role in improving estate profitability through improving estate productivity. Largely due to lack of long-term time series data, the study was unable to come to any conclusive results on the effect of welfare programmes on labour retention. However, the results of the study show that welfare programmes do influence labour outturn and labour productivity significantly. The outcomes are largely consistent with the findings of the qualitative survey and conventional wisdom on the subject.

The results of percentage of families benefiting by new or upgraded houses from 1994 to 1997 were mixed. The effect of this on labour outturn was negative, and on labour productivity positive (but not significant). There are several possible explanations for this unexpected mixed result. First, beneficiaries of the housing programme have to take the majority of the responsibility for constructing and part responsibility for financing a house. They are also expected to take the initiative to start their own house. Given these governing factors, it is likely that the more enterprising and productive workers opt to participate in these schemes and as such further improvements in outturn or productivity due to housing improvements is only marginal.

Second, in the case of new houses, [30] the time and energy constraints of building a house while working could possibly be another factor contributing to this mixed result. Most new estate houses are built in stages. First a "core house" consisting of the minimum requirements for a house is built. The beneficiaries then work on making additions to the core house while residing in it. A core house is considered a complete house, although construction work may continue to make additions to it. It is possible that the time and energy spent on building the house could lessen work performance.

However, these constraints are present only while the house is in the process of being constructed. It is possible that this result may change as the housing programme matures. Also,

[30] Of the new or improved houses, roughly half were new houses.

the new settlement and housing development programme (a component of the Plantation Development Support Programme launched in 1998) considers water supply, sanitation and proper cooking facilities as integral parts of the housing evelopment programme. As such, the potential benefits from this programme would be greater than from programmes, which solely concentrates on improving houses. As more and more workers have completed houses, the improvements in physical and psychological health arising from improved living conditions could be reflected in labour performance.

A further point that should be noted regarding housing is the low coverage. From 1994 to 1997, in the study sample, only 2 per cent of estate households benefited from new or improved houses. Statistics indicate that the problem of housing in the estates is quite severe. MPI (1998: 7) states that, "of the total estate population 106,000 households live in overcrowded housing units which provide less than 50 square feet per capita space; 7 per cent has less than 25 square feet, half of the UN minimum norm. … Nearly half [of the houses] require new roofing sheets or roof construction because of frequent leaking. Cooking is done inside the house or in a temporary shed on a smoky stove without a chimney. Most housing units are cramped, humid, dark and full of smoke." It is apparent from these statistics that a significant proportion of households have severe housing problems (i.e., about 59 per cent of the households live in substandard housing units). There seem to be two sides to this problem. On the one hand, there is a need to provide families with spacious housing units with cheerful and healthy living environments. However, resource constraints, among other things, have resulted in limiting the progress of providing new and upgraded houses (under the Social Welfare Programme II only 5939 families benefited from re-roofing, roof plus, and self-help housing programmes). Given this situation, it is likely that most households will have to continue to live in existing housing units for some time to come. This demonstrates an immediate and pressing need to improve present housing conditions in the estates while working towards providing new and upgraded housing units in the long-term. Any programme intending to alleviate the housing problem should take into account both the short-term and the long-term aspects of the problem.

Of the welfare indicators considered, those relating to health such as presence of medical personnel, and percentage of live births on estates show positive impacts on outturn and productivity. Almost all the estates in the sample (97 per cent) had an outpatient health care facility. However, the availability of trained medical personnel varied across estates. Percent of live births is a commonly used indicator of health status of mothers in a community (PHSWT, 1999a). It is affected by factors relating to health care during pregnancy and at delivery and also

the general health of the mother. Results of the study indicate that investments in improving health status in the estates through improving the quality of health care contribute positively towards labour performance.

Box 1: How can these results aid investment decisions in estate welfare programmes?

An obvious question to ask, given the results of this analysis and the costs involved in investing in social welfare development programmes, is what the breakeven level of expenditure is for these welfare programmes. A simple simulation exercise was carried out to help answer this question. The following calculations were worked out for an average estate -- that is an estate with 900 workers, an average labour productivity of 16.5 kg. of green tea per plucker and a profit margin of Rs. 10 per made tea kg. -- for illustrative purposes. The actual breakeven levels of investments are sensitive to labour productivity and profit margins and would differ across regions, companies and estates. These calculations assume that the achievements of the welfare programmes have linear relationships with labour performance in the estates. Only the results of the calculations are shown below. The method of calculation using examples is given in Appendix 4.

<u>Breakeven levels of expenditure for different welfare programmes</u>

- Crèche programme - Rs. 180.00 per day per estate
- Latrines - Rs. 160.84 per day per estate or Rs. 107.23 per year per family
- Maternal-care services - Rs. 498.69 per day per estate
- Qualified medical officer - Rs. 2,037 per day per estate (relative to estates without medical officers)
- Paramedical officer - Rs. 1,625 per day per day per estate (relative to estates without medical officers)

Currently, the welfare services on estates are funded by a variety of sources. Most of the funding comes from various donor agencies. In addition, the government, the beneficiaries of the programmes and the companies also make monetary and non-monetary contributions. These calculations show the net benefits the estate management receives from the welfare services under consideration. They also show the breakeven contribution the management could make towards these programmes.

Estate Sector Health Bulletin 1995 - 1997 notes that communicable diseases, which result from low immunity and unsanitary conditions, such as diarrhoea are serious health problems on estates

(PHSWT, 1999a: 30). The positive effect of proportion of families with individual latrines on labour performance is most likely due to improvements in health resulting from improved sanitary facilities. The proportion of families with individual latrines in the sample is quite low (on average 38 per cent in the study sample). Estate Sector Health bulletin 1995 – 1997 also notes that since only 59 per cent of households have access to any type of latrine (individual or shared), the management should give priority to improving latrine facilities. The results of this study reasserts the importance of taking timely action in this regard from a productivity enhancing standpoint.

In addition to welfare programmes with potential effects on health outcomes, programmes targeted at improving child care such as crèches also had a statistically significant positive effect on labour outturn and productivity. The average crèches attendance for all the estates was 36 per cent in 1996 (PHSWT 1999a: 5). Management policy intended at improving crèche attendance is likely to affect labour performance positively.

The results also show that management plays a large role in improving estate labour performance. An earlier study by Dunham et al. (1997) also highlighted the leverage open to management in improving estate performance. The sector could benefit by sharing information on successful management practices and training managers to plan better and be more efficient in allocating and utilizing resources. Most company managers are already aware of the regional and seasonal differences in labour performance and take this into consideration when planning. The results on seasonal and regional variables re-emphasize the need to take account of these differences.

Appendix 1

A1.1 Other explanatory variables used in the empirical model

Controls on Agricultural productivity:

Percentage of VP tea extent. (Average: 46, minimum: 12; maximum: 100)

Monthly rainfall (mm). (Average: 236; minimum: 0; maximum: 1243)

Agro-ecological zones:

Western-Up
Western-Mid
Low Grown
Uva-Up
Uva-Mid

Seasonal controls:

Indicators for months as a control for seasonal variations

Management controls:

Company dummies as a control for changes in management practices of the estates (i.e., use of technology, labour management, capital investments, etc.)

Local Area Characteristics:

Distance to town - distance to the nearest postal town in km. (Average: 5.5 km; minimum: 0.8 km; maximum: 16.0 km).

Other income generating opportunities - indicates the availability of work such as work in smallholder estates, vegetable plots in the village

Age distribution of the workforce:

Percentage of individuals of 25 and above in the workforce

Percentage of individuals under 25 in the workforce

(Due to data availability, the study was compelled to use above age categories)

Appendix 2

Table A2.1:Labour performance indicators by agro-climatic zone

	Sample size	Average	Minimum	Maximum
Low Grown				
Outturn (%) - resident	24	64.2	44.0	98.0
-overall	60	68.5	17.0	84.5
Labour Productivity (Green Leaf kg. per plucker manday)	60	22.8	0.21	41.7
Uva-Up				
Outturn (%) - resident	36	69.6	56.6	80.0
-overall	72	70.0	41.0	92.7
Labour Productivity (Green Leaf kg. per plucker manday)	72	16.2	8.1	33.2
Uva-Mid				
Outturn (%) - resident	12	78.8	63.0	95.0
- overall	48	80.3	63.0	95.0
Labour Productivity (Green Leaf kg. per plucker manday)	48	14.8	7.2	26.2
Western-Up				
Outturn (%) - resident	192	82.8	53.0	98.0
- overall	192	82.3	52.0	98.9
Labour Productivity (Green Leaf kg. per plucker manday)	192	15.7	1.7	29.4
Western-Mid				
Outturn (%) - resident	48	73.4	35.8	90.0
- overall	72	71.5	35.8	90.0
Labour Productivity (Green Leaf kg. per plucker manday)	72	15.1	8.0	24.2

Table A2.2:Labour performance indicators by month

Month	Outturn - resident (%)	Outturn - overall (%)	Labour Productivity (Green Leaf kg. per plucker manday)
January	78.8	75.9	17.3
February	72.2	68.1	19.2
March	77.4	77.0	14.3
April	76.3	75.3	16.7
May	81.0	78.1	19.0
June	80.3	78.2	17.5
July	79.9	79.5	14.2
August	77.6	75.9	15.6
September	80.2	78.2	15.6
October	78.0	75.8	15.1
November	79.0	78.2	16.4
December	78.1	77.2	18.0
Sample	**26**	**37**	**37**

Appendix 3

Table A3.1: Regression results

	Labour outturn (%)	Labour Productivity (Green Leaf kg. per plucker manday)
Exogenous factors		
Rain fall this month	0.003	0.001
Per cent VP tea	0.019	-0.000
Agro-ecological zones[1]		
Low Grown	0.647	2.780*
Western - Up	2.889	2.557
Uva - Up	4.806**	0.703
Uva - Mid	13.958***	-3.466***
Welfare indicators		
Crèche attendance	0.219***	0.068***
Per cent of families with New/upgraded houses	-1.619***	0.047
Per cent of families with individual latrines	0.075*	0.091***
Presence of a qualified medical officer	6.378***	0.216
Presence of a paramedical officer	5.089***	0.641
Live births as a per cent of total births	0.663***	0.308***
Other Control variables		
Distant to town	0.163	0.133
Other employment	-0.386	-1.925***
Proportion of workers over 25	0.015	0.023

Source: Calculated.

Note:
1. Although not reported company dummies and month dummies were also included in the regression.
2. Significance levels at 90,95 and 99 levels are indicated by *, **, and *** respectively.
3. The omitted category is Western - Mid country. Results indicate, for example, that the plucker productivity is 2.78 green leaf kg. per manday higher in low country relative to plucker productivity in Western-Mid country, controlling for all other factors.

Appendix 4

A4.1 Calculating breakeven level of expenditure on welfare programmes

Example 1: Crèches

According to the results, a 1 per cent increase in crèche attendance in the estate increased the labour outturn by 0.22 percentage points and labour productivity by 0.07 kg. For an average estate with 900 pluckers, this means an increase of 1.98 workers. Given that the average worker productivity is 16.5 kilograms per plucker manday, this results in an increase of 32.81 (i.e., 1.98 * (16.5+0.07)) kilograms per day for the extra 1.98 workers. In addition, increase in productivity for all the other workers, calculated using average labour outturn of 76.46 for overall workers, results in an increase of 48.17 (i.e., 900 * 0.7646 * 0.07) kilograms per day. Together, the total increase of green leaf production is then 80.98 kilograms. On average, four and a half kilograms of green-leaf-tea is needed to produce a kilogram of made tea. Therefore, 80.98 kilograms of green-leaf-tea will produce about 18.00 kilograms of made tea. For an estate with a profit margin (net sales average minus cost of production) of Rs. 10 per kilogram of made tea, this results in a revenue increase of Rs. 180 (i.e., 10 * 18.00) per day. That is, for an estate with 900 workers and an average intake per worker of 16.5 kilograms and a profit margin of Rs. 10, the breakeven expenditure on crèche development amount to Rs. 180 per day.

Example 2: Latrines

The results show that increasing the proportion of families with individual latrines by 1 per cent increases the total average intake per plucker manday by 0.09 kilograms and outturn by 0.07 percentage points. The breakeven expenditure on latrine developments per day for an estate -- calculated using the same methods used in Example 1 -- amounts to Rs. 160.84. Assuming two workers per family and 300 working days per year this amounts to a breakeven expenditure on latrine development of about Rs. 107.23 (i.e., 160.84 * 2* 300/ 900) per year per family. It is important to note here that

latrine development will also result in other benefits such as reductions in medical care costs, which are not accounted for in this calculation.

Example 3: Quality of health staff

According to the regression results, presence of a qualified medical officer in the estate could improve labour outturn by a 6.38 percentage points. For an estate with 900 pluckers, this amounts to an increase of 57.42 pluckers per day. The mean labour productivity for estates without a trained medical care officer is 15.96 green leaf kg. per manday. On this basis, the increment in revenue due to having a qualified medical care officer in the estate relative to an estate without any medical personnel is Rs. 2,037 (i.e., 57.42 * 15.96 * 10/4.5) per day. The analogous increment for having a paramedical officer in the estate is Rs. 1,625 per day.

References

Dunham, D., N. Arunatilake and R. Perera (1997), *The Labour Situation on Sri Lankan Tea Estates – A view to 2005*, Colombo, Institute of Policy Studies of Sri Lanka.

Gooneratne W. and D. Wesumperuma (1984), *Plantation Agriculture in Sri Lanka*, International Labour Organisation, Bangkok.

Manikam, P.P. (1995), *Tea Plantations in Crisis*, Social Scientists' Association, Colombo.

MPI (1998), *Plantation Development Support Programme July 1998 - June 2005*, Ministry of Public Administration, Home Affairs and Plantation Industries, Colombo.

NIPM (1998), *Managing Social Change in Plantations*, National Institute of Plantation Management, Athurugiriya.

PA (2000), *Tea Industry Review*, The Planters' Association of Ceylon, Colombo.

PHSWT (1995), *Health Bulletin of the Estate Sector 1992-1994*, Plantation Housing and Social Welfare Trust, Colombo.

PHSWT (1997), Crèche Focus - A Manager's Guide, Plantation Housing and Social Welfare Trust, Colombo.

PHSWT (1999a), *Health Bulletin of the Estate Sector 1995-1997*, Plantation Housing and Social Welfare Trust, Colombo.

PHSWT (1999b), *Social Welfare Programme II 1993-1998, Completion Report*, Plantation Housing and Social Welfare Trust, Colombo.

Shanmugaratnam, N. (1997), *Privatisation of Tea Plantations*, Social Scientists' Association, Colombo.

Sinnathamby, M. and P. Wickramasekara (1984), "Labour Availability and Labour Demand in the Plantation Sector - Recent Trends", in W. Gooneratne & D. Wesumperuma (eds), *Plantation Agriculture in Sri Lanka: Issues in Employment and Development,* International Labour Organisation, Bangkok.

Sivaram, B. (2000a), "Labour Management and Planning ", in B. Sivaram (ed), *Plantation Management in the New Millennium*, National Institute of Plantation Management, Athurigiriya.

Sivaram, B. (2000b), *Economic and Social Impact of Privatisation of Plantations*,

Programme Support Group, Colombo.