

## ECONOMICS OF REPLANTING

01. Previous studies on the replanting of tea in Sri Lanka have concluded that the financial return to the producer is negative and should, therefore, not be a priority development option. This paper seeks to re-examine this issue and, taking into consideration the external factors involved, to suggest certain measures which will make the operation viable.

02. In so far as primary commodities are concerned, the main problem throughout the producing world has been that of price instability. Tea, in particular, has been subjected to this phenomenon more markedly than most other products. For instance, according to UNCTAD, the "price instability index" (the index measures the percentage deviation from the exponential price trend over a given period) for tea at 18.3 during the period 1983-92 is about the highest among the 11 core commodities investigated, the range varying between 6 and 27.7. The issue which, therefore, requires to be addressed is whether long-term development in tea, of which replanting constitutes a key element, can be left to the erratic fortunes of the industry or manipulated to ensure that development takes place in spite

of the uncertainties engulfing the tea market. This analysis, which proceeds on the latter premise, takes the view that policies involving tea should foster an uniform and continuous upgradation in the field assets in a situation, known only too well, where prices will and continue to fluctuate within the overall framework of global production and trade.

03. Among the developmental options in tea, replanting stands out prominently. When prices are depressed, invariably as they are, replanting is hardly contemplated owing to the absence of internal generation. Even during the brief periods of boom, the same treatment is accorded not only to prevent any crop loss but also on the ground that considerable losses have been accumulated over the years which must be initially wiped out before embarking on the more-costly and long-gestation activity which replanting involves. Either way, replanting is given a back seat.

04. Table 1 indicates the pace of replanting that has taken place both in the estate and small holder sectors since 1980.

As will be seen, there has been a reduction in the absolute replanted area over time but, more importantly, the current annual rate of 0.7 per cent is far below the nationally desirable level of 1.5 to 2 per cent. How do we overcome this situation by giving replanting the boost it requires?

TABLE 1- *Extent (ha) replanted since 1980*

Year	Estates	Small Holdings	Total
1980	1600	556	2156
1981	2114	563	2677
1982	1497	507	2004
1983	988	379	1367
1984	806	339	1145
1985	1258	414	1672
1986	1155	463	1618
1987	1155	348	1503
1988	1315	277	1592
1989	1227	324	1551
1990	1224	362	1586
1991	1461	312	1773
1992	898	519	1417
1993	NA	NA	1311

05. To begin with, it is necessary to proceed on the basis that, as with machinery, vehicles, etc, the prime field asset, namely, the tea bush, also depreciates over time and has to be eventually replaced. However, rather than adopting the strict accounting practice followed in plant and machinery, the depreciation element in respect of the tea bush is more appropriately amortised on the basis of its productive capacity. This could be done on the basis of the data used in this paper as follows:

Replanting cost (excluding overheads)	- Rs 320,000 per ha
Economic life of replanted field	- 25 years
Average Annual Yield	- 2250 kg/ha

In this situation, which happens to be representative of the industry, the

amortised cost of the replanted field will be Rs 12,800 per annum (320,000/25) and, furthermore, the effective rate of depreciation on tea bushes works out to Rs 5.70 per kg (12,800/2250). Such a practice has been accepted and a funding provided for in the farm accounts in respect of the apple and orange orchards in Australia and California as also in the rubber plantations in South India. Had such a provision existed for tea in Sri Lanka, each estate would have had a **Replanting Fund** at or around this rate per kg of made tea, from which withdrawals could be made to facilitate replanting being undertaken on a regular and continuous basis. For a private enterprise, it is pertinent to note that since depreciation serves as a "tax reducer", a provision of this nature stands to benefit profit-making units. For those in the red, however, such a funding will no doubt add to the COP and losses but ensure that development efforts are not deferred or set aside. In the Sri Lankan tea industry which requires all-round upgradation, it is possible for this concept to be widened to cover other developmental options as well. To that extent, it could be an extended **Tea Rehabilitation Fund** or **Tea Development Fund**, the proceeds of which are set aside not only for replanting but also for specified land-related fixtures such as labour housing, welfare facilities etc besides undertaking new planting.

06. In the light of the above features, the cost and returns from replanting may be re-examined. For this purpose, the data involved are:

- cost of uprooting and value of old bushes (also, perhaps, the loss of yield from uprooting)
- initial capital expenditure on replanting
- expenditure on maintenance and upkeep till maturity
- life of replanted field, and expected yield and revenue from replanted tea.

As against the labour cost of uprooting estimated to be about Rs 23,000 per hectare, research studies are indicative of an average fuelwood yield of about 140 cubic metres from the uprooted bushes. Although much of it is removed by workers for their domestic requirements, it nevertheless is marketable, the value of which would in effect have to be deducted in arriving at the net cost of replanting. For the purpose of the analysis, the impact of the crop loss is also not provided for since replanting will be undertaken on heavy loss-making fields which are almost being abandoned so much so that the operation will only prevent further losses being incurred.

For the first 6 years, the representative cost of replanting and maintenance for the estate sector has been worked out separately for labour and materials, totalling Rs 316,851 per hectare, as per details vide Annexure. The year-wise break-up is as follows:

Year	Cost (Rs/ha)
1	86,618
2	11,820
3	116,789
4	41,212
5	29,318
6	31,095
Total	316,851

In keeping with the concept of Partial Analysis, this incorporates only the actual cost of replanting, not the element pertaining to general charges which has to be incurred irrespective of whether replanting does or does not take place. Two significant points emerge from the Annexure. Firstly, labour accounts for 71 per cent of the total cost, which raises the issue that in estates where excess labour or under employment exists, some of the workers could be diverted to a gainful capital activity like replanting without adversely affecting day-to-day operations. The other feature is that 31 per cent of the expenditure is incurred during the two-year rehabilitation period before the tea is replanted; this suggests the possibilities of saving within these years coupled with the technical feasibility of cutting out or cutting down the period of rehabilitation, in which case, the cost of the operation could be substantially brought down. This is an aspect on which more research would appear to be necessary.

Although the economic life of the tea bush - particularly, that of the replanted VP plant - is yet to be conclusively estimated, the present analysis for determining the financial returns is limited to 25 years. In any event, calculations beyond that will

not significantly alter the conclusion as the discounted value will be too small. During the first 3 years of immaturity, there will be no yield and hence no revenue from the replanted field. The yield during the fourth year is estimated at 1300 kg/ha and during the fifth year at 1600 kg/ha. Thereafter and subject to appropriate cultivation and pruning practices, the average annual yield is estimated to be 2250 kg/ha. These figures could no doubt marginally be varied based on the actual field and elevational factors but given the proper land and plant selection, it would only be reasonable to expect managements to generate productivity at least to this extent.

To the capital cost has to be added the cost of mature tea upkeep after the period of immaturity. This has been worked out to be Rs 19,067 per hectare as detailed in Table 2.

It is to be noted that the above does not cover the cost of plucking and manufacturing which, being of a variable nature, is linked to production and is accounted for separately in Table 3.

At constant levels, the NSA from the replanted field is taken to be Rs 70 per kg, particularly in the context of the relatively improved quality and hence price potential which VP plants entail.

**TABLE 2- Annual Average Cost of Mature Tea Upkeep (Rs/ha 1994)**

Operation	Labour Cost		Material Cost				Total Cost	Per Can Tot. cos
	Man days	Cost	Unit	Cost	Quantity	Cost		
Tools			Set	1000	1	1000	1000	3
Roads & Bridges	3	249					249	1
Desilting and Trace Drains	11	913					913	5
Terracing	4	332					332	2
Weeding-Hand	25	2075					2075	11
Weeding-Chemical								
Labour	10	830					830	4
Gramoxone			litre	207	4	828	828	4
Couch Grass Eradication								
Labour	2	166					166	1
Round up			litre	1700	0.5	850	850	4
Ravines & Boundaries	2	166					166	1
Pruning	12	996					996	5
Shade Management	10	830					830	4
Bush Sanitation	5	415					415	2
Artificial Manure								
Dolomite	6	498	kg	0.8	200	160	658	3
U /39 (Mature Tea Mixture)	16	1328	kg	6.7	922	6177	7505	39
Blister Blight Control	10	830	kg	212	2	424	1254	7
<b>Total</b>	<b>116</b>	<b>9628</b>				<b>9439</b>	<b>19067</b>	<b>100</b>

**Assumptions**

1. Fertiliser application as per TRI recommendation for corresponding yield slab
2. Blister control by Perenox application at recommended rates
3. Pruning cost calculated for average cycle

07. In keeping with the established practice for appraising capital investment, the analysis adopts a discounting technique to evaluate the returns from replanting. The principle here is that the value of tomorrow's money is not equal to that of today, but something less. How much less is decided by the discount rate, that is, the interest rate used. The aim, therefore, is to ascertain the future value of the rupee as of today. Since the investment is being undertaken now, the benefit which will accrue in the future should also be converted or discounted to today's terms for comparison. In discounting the costs and benefits to the first year of investment, the present value arrived at for each year is totalled for its whole life respectively for net cash outflows and net cash inflows. These two figures are then compared to determine the viability of the investment, the principle being that if the present cash inflows are more than the outflows, the decision is considered to be feasible as it generates a surplus. In other words, the Net Present Value (NPV) has to be positive. It must be added that for evaluating the investment, the choice of the discounted rate depends on the source of capital, such as own or borrowed and the rate of interest, which in respect of replanting tea has been taken to be 15 per cent, being the rate at which Plantation Management Companies have been assisted by the Government for undertaking capital expenditure.

08. Accordingly, the position that emerges for replanting one hectare of tea is summarised in Table 3:

**TABLE 3-Returns from Replanting tea (Rs/ha)**

Activity	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 25
Capital Cost	86618	11820	116789	41212	29318	31095				
Mature Tea Upkeep							19067	19067	19067	19067
Yield (Kg M.T)							1300	1600	2250	2250
Pluck:+Manufac:Cost							51706	60806	78718	78718
Total Cost	86618	11820	116789	41212	29318	31095	70827	79873	97785	97785
Total Revenue							91000	112000	157500	157500
Net Returns	-86618	-11820	-116789	-41212	-29318	-31095	20173	32127	59715	59715
NPV (at 15% DA)	-30167									

**Assumptions**

1. Plucking cost calculated using TRI Agricultural Economics Unit's study on Labour Planning on Tea Estates
2. Variable manufacturing cost taken at Rs 13 per kg M.T
3. Cost and returns assumed to remain constant from year 9 onwards

As will be seen, the NPV is negative at Rs 30167, indicating that, on strict financial considerations, replanting is not viable.

09. In order to see as to how the operation can be made viable, Table 3 can be modified to arrive at the minimum capital cost for replanting to break even. In doing so, we have obliterated the expenditure relevant to the first year of rehabilitation and the position that emerges is vastly encouraging in that a positive NPV accrues on this account alone. In fact, all that is required is to reduce the capital cost during that year by about 50 per cent - ie, to about Rs 43,000 per hectare. As such a saving will not only give the much-needed momentum to replanting but also serve the social objective of soil conservation, it is suggested that a state subsidy of this order would be desirable and necessary in the wider national interest.

10. In translating this model to small holdings, the following changes are made:

- a lower daily wage rate of Rs 71.48 (inclusive of EPF/ETF) STATUTORILY applicable to private estate owners; otherwise, the labour and material components, with marginal adjustments, appear to be as relevant to small holdings as to estates,

- the cost of green leaf production of Rs 7.75 per kg and a corresponding price of Rs 9.85 per kg: the former is in keeping with the findings from a recent Ministry of Plantation Industries study while the latter represents the converted green leaf price relative to the NSA at the national level.

- a replanting subsidy of Rs 67,000 and Rs 57,000 per hectare provided to small holdings in the up/mid and low country respectively and disbursed in five instalments as follows:

	Up/Mid (Rs/ha)	Low
Uprooting	5,000	4,000
Soil Conservation	11,000	8,000
Soil Rehabilitation	9,000	6,000
Planting	30,000	29,000
Maintenance	12,000	10,000

On this basis, the costs and benefits for replanting one hectare of tea in the small holder sector are worked out in Table 4.

Apart from the NPV being negative despite the lower wage and the subsidy element, the actual position is that, unlike in the estate sector, most small growers will be unable to suffer a loss of crop on the already tiny holdings, thereby rendering conventional replanting impracticable. This may also explain, to some extent, why small holders have shown a greater preference for availing of the subsidy for new planting albeit on marginal lands than the replanting subsidy. For this reason, it has been suggested that rather than advocating replanting *per se*, small holders should be encouraged to undertake infilling as an on-going activity and that, coinciding with the vacant patches coming into bearing, the old bushes could be culled and planted with grass and subsequently with the proven material, as the next and subsequent phases of infilling. Such a phased-out programme would appear to be an appropriate "replanting strategy" for small holdings.

**TABLE 4-Returns from Replanting tea for Small holders (Rs/ha)**

Activity	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 25
Capital Cost	75164	10438	107008	37640	26968	28238				
Yield (Green leaf kg)							5652	6957	9783	9783
C.O.P (Rs/ha)							10075	12400	17438	17438
Total Returns							55674	68522	96359	96359
Subsidy (High/Mid)	5000	20000	30000	12000						
Net Returns	-70164	9562	-77008	-25640	-26968	-28238	45599	56122	78921	78921
NPV (at 15% DR)	-1336									
Subsidy (Low)	4000	14000	29000	10000						
Net Returns	-71164	3562	-78008	-27640	-26968	-28238	45599	56122	78921	78921
NPV (at 15% DR)	-2206									

**Assumptions**

- 1.Capital cost based on Annexure by altering wage rate
- 2.Yield converted to green leaf at 23 % outturn and assumed to be on par with estate sector estimate
- 3.Cost and returns assumed to remain constant from year 9 onwards

11. The long-term consequences of not undertaking replanting should be obvious. Unlike living beings of even machinery which come to a grinding halt at some point of time, the situation that develops in a perennial crop like tea is gradual but continuous fall in production sets in. Sooner, if not later, many fields will become uneconomic and with falling plucking intake, the impact of the declining viability will spread to the remaining productive fields as well. Improved cultural practices and infilling will not respond to or sustain fields which are old and uneconomic and in such a situation, they have to be replanted with high yielding and high quality VP tea or diversified into more gainful avenues for which opportunities are limited. The factors necessitating replanting are many and varied. It improves field productivity, increases plucking intake, reduces harvesting cost and thereby puts a brake on the escalating cost of production. Additionally, the higher crop generated will help to optimise the labour use in the current socio-economic milieu which requires having to maintain the workforce at or near the existing levels. From the environmental angle, the process of replanting reduces soil erosion, the beneficial impact of which will be apparent to the land user as it is to the community at large. From the wider national considerations, therefore, replanting warrants a treatment that extends beyond the financial returns accruing to the estate.

12. Viewed from this perspective, the conclusions and recommendations that emerge are summarised below:

a) A provision could be made for establishing a separate **Tea Replanting (or Rehabilitation/Development) Fund** on the lines suggested in para 5; withdrawal from the fund should only be for replanting and such other developmental activities as specified.

b) As an alternative to a) above the reintroduction of the Replanting Subsidy for the estate sector is proposed. The quantum of subsidy could be limited to cover about half the expenditure incurred during the first year of rehabilitation. This works out at current costs to about Rs 43,000 per hectare. Being a national priority, it is suggested that funds for this purpose could be sought from an appropriate international funding agency. Further, the gap between the replanting cost and the subsidy element could be met by a Replanting Loan at an interest rate not exceeding 15 per cent.

c) Apart from periodically enhancing the rate of replanting subsidy for small holdings, as is being presently done, in keeping with inflation, its scope could be widened to provide for an **equivalent subsidy for replanting a prescribed minimum extent** of say, 500 square metres, or 0.05 hectares (ca 24 perches)

