VII. CONCLUSIONS, POLICY IMPLICATIONS AND AREAS FOR FURTHER RESEARCH

7.1. Conclusions

This study being an application of a policy analysis matrix under two competing systems (i.e. smallholder rubber agroforestry and smallholder rubber monoculture) in Jambi, DRC and PCR indicators were found to be less than 1 under the baseline scenario which shows that rubber is efficiently produced in both systems but more efficiently produced under monoculture than its counterpart. Interestingly enough, these results are consistent with the government policies of achieving smallholder’s production and subsidization of inputs (e.g. fertiliser).

Since PAM is a static model, which cannot capture the potential changes in prices, costs and productivity, the rankings were subject to changes in the market condition. In order to overcome the limitation, a set of sensitivity analyses were carried out by changing farm gate prices and real interest rate (i.e. price of rubber and real interest rate both at private and social prices). The general conclusion from this analysis is that, even with 10% increase in the price of rubber and 5% increase in social and private interest rates, smallholder rubber agroforestry system did not out-compete its counterpart efficiently and profitably thus making monoculture the best option if farmers are looking for the best profitable system.
3. Based on farm budget calculation, the study reveals that smallholder rubber monoculture system in managing the plantation during rubber establishment has higher returns, employs more labor and also more profitable than smallholder rubber agroforestry traditional systems. An effort to prolong the plantation stage brings in significant changes in the farmers' economy and the neighborhood as it creates more employment opportunity in the villages.

Price distortions reduce the production of rubber under smallholder rubber agroforestry system. With a 20% decrease in prices of rubber reduces the systems efficiency (i.e. from 0.37 DRC under baseline scenario to 0.42 under scenario B for smallholder rubber agroforestry system) and (0.31 DRC under baseline scenario to 0.39 DRC under scenario B for smallholder rubber monoculture system) thus making rubber more less desirable under scenario B for smallholder rubber agroforestry system. When the price of rubber falls, smallholders under rubber agroforestry system reallocate factors of production (i.e. capital and labor) to other crops thus leaving rubber unattended to in order to meet their daily expenses. Therefore smallholders resume tapping when there is an increase in rubber prices again. Therefore price fluctuations affect the production of rubber under agroforestry system whereas; Smallholders under monoculture system maintain their tapping and rubber maintenance schedule for future benefits.

While more intensive monoculture rubber offers better rubber productivity (yield and profitability), it also requires much higher capital and input that is
beyond reach for smallholders under rubber agroforestry especially during the establishment stage.

6. Finally, although rubber agroforestry system has the capacity to provide smallholder farmers with diversified income and a range of non-timber forest products than monoculture although for economic benefits, monoculture stands out to be a better option.

7. **Policy Implications**

   Given the relatively low yields of rubber from smallholder farmers under agroforestry system and the disincentive effect of the overvalued exchange rate, a special credit scheme is necessary for farmers if rubber production is to be more efficient and attractive under smallholder agroforestry system.

   The increasing profitability and efficiency of rubber with higher price relative to other crops may have a negative effect on food production and vice versa under smallholder rubber agroforestry system. If the profit gap is deemed unacceptable by the government, it should be off-set by increasing the official price of both food crops relative to that of rubber in order to maintain the production of other crops under agroforestry system.

   If smallholder rubber agroforestry system is to be efficient compared to its counterpart, better policies and high yielding varieties have to be put in place.

   One way out to keep some check on further growth of subsidy without adverse impact on rubber production efficiency is to increase fertiliser prices at a rate lower than rubber price received by farmers. This would ensure that real price of fertiliser is declining whereas nominal price is increasing. In this kind of
situation when rubber price is rising there is a scope to raise prices of fertiliser. Therefore, the best option to keep a check on growth of fertiliser subsidy without causing adverse effect on rubber production is; to increase prices of fertiliser by suitable fraction of increase in rubber price. This will make the real prices of fertiliser to decline, and, it will be the real price of fertiliser to determine fertiliser use.

Since fertiliser imports are turning costlier than domestic production. It is thus important to expand domestic production and improve pricing environment for fertiliser to attract investments in fertiliser production.

Although Price fluctuations are normal for any commodity, rubber is a volatile commodity. Major rubber producing provinces in Indonesia like Jambi need sophisticated financial instruments e.g. providing price fluctuation insurance to farmers. This requires complicated rural banking arrangements and well-organized markets which Indonesia government must put in place.

7.3. Areas for Further Research

This study has led some useful findings and conclusions about improving economic efficiency and distortions affecting smallholder rubber farmers. However, there are critical areas that need further research and these are;

1. Switch from one crop to another exists (i.e. from rubber to other crops like Palm oil);
2. Credit intended for agricultural production activities, is diverted to non rubber farming activities like weddings other than rubber production. Hence, a decline in crop yields and loss of income, causing households to default loan repayment.