Promoting tea business in the tea smallholding sector in developing countries through efficient technology transfer system: Special reference to Sri Lanka

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Tea production in smallholding sector, the dominant sector in Sri Lankan economy, is below its targeted level recently. Therefore, this paper attempts to study the effectiveness of the technology transferring system in tea smallholding sector in order to uplift its productivity. The study was carried out in Pasgoda DS division in Matara district, Southern, Sri Lanka. Seventy tea smallholders were interviewed in the study by using a pre-tested questionnaire. The results revealed that the existing technical knowledge of smallholders was very poor and it varied dramatically with different cultural practices. Based on Kruskal-Wallis ranking method, the study showed that the most efficient source of technology transfer was tea processing factories while the weakest source was mass-media. Further, the most effective mode was individual methods. The study showed very poor extension service in the study area. Based on the survey, the study recommends strengthening the extension services in order to disseminate technical knowledge among tea smallholders and improving the contribution of mass media in order to make the tea sector more efficient, effective and sustainable.

Key words: Tea smallholding sector, technology transfer, tea small holding development authority, tea shakthi.

INTRODUCTION

Tea sector in Sri Lanka

Sri Lanka’s tea sector consists of main two sectors, state sector and the smallholding sector. Total extent of tea land in Sri Lanka is about 210,621 ha (Central Bank, 2011). Tea smallholding sector and estate sector account 91,667 ha (43.5%) and 118,954 ha (56.5%) respectively. Tea smallholding sector produces 74% of the total tea production in Sri Lanka (Tea Small Holding Development Authority, TSHDA, 2008; Ministry of Plantation Industries, 2007). Therefore, tea smallholding sector plays a leading role in country’s tea production. Smallholders’ yield in Sri Lanka, is far higher than in estates, to some extent, is due to the fact that the share of high-yielding vegetative propagated clone tea in smallholder fields. It is reportedly 70%, compared to a much lower order of about 43% in estates (Ministry of plantation industries, 2007). The macro-level position of smallholdings is somewhat distorted by wide-ranging regional differences. This will be evident from the three sub sectors into which they can be classified. The first is the highly productive; mostly clone tea with yields exceeding 2,000 kg/ha/yr (Sivapalan et al., 2006). For this category, tea is invariably the sole or predominant crop and the use of hired labor is high.

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These units are mostly found in the southern districts of Galle and Matara, where the area under tea has gone up by more than 10,000 ha over the last 12 years. In Matara district there are 63,273 smallholders and the annual average production is 40 million Kg in 2008 (TSHDA, 2008). The average yield of tea per hectare in year 2010 was 1,493 kg and it is projected that it will be 1622 kg in year 2011. Accordingly, taking into account of the main tea producing methodologies within the first 07 months from January to July 2011, (Orthodox) black tea contributed about 91.8% of the total tea production (179.82mn kg.) during the aforesaid period. CTC (Crush, Tear, Curl or Cut, Tear, Curl; machinery processed tea) and Green tea products contributed 7.1% (13.96 mn kg.) and 1.1% (1.89 mn kg.) respectively and the total tea production in the aforesaid period amounted to 195.67 mn kg. 68.7% of the total tea production that is, 134.5mn kg was produced by the tea smallholders. Their contribution in the period from January to July 2010 was 68% that is, 133.74 million Kg (Sri Lanka Tea Board, 2011).

Tea production and export in Sri Lanka

Tea, the prominent crop of the plantation sector in Sri Lanka, grows in many parts of the wet zone, and in particular in the central hill country. Sri Lanka is famous for its high quality black tea, and is one of the largest suppliers in the world. In 1999, 269.3 million kilograms of tea (95% of total tea production) was exported, earning US$621 million in foreign exchange. Tea accounts for 15% of the GDP, generating roughly $700 million annually. The United Kingdom, Russia, and the Middle East are the major export markets (Central Bank, 2010).

Therefore, tea production in Sri Lanka is of high importance to the Sri Lankan economy and the world market. Tea industry is one of the country’s main sources of foreign exchange and a significant source of income for laborers. Being the second largest exporter, Sri Lanka has produced 19% of the total world export in 2008 (Figure 1). The industry was introduced to the country in 1867 by James Taylor, the British planter who arrived in 1852. In 1965, Sri Lanka led the world in producing tea, but now it has fallen behind India and is the third biggest tea-producing country globally (Figure 1) (Sri Lanka Tea Board, 2008). The Ministry of Plantation Industries is taking quick measures to increase tea production to meet the tea shortage in the world market as a result of the drought in India and Kenya. The global shortage is around 900,000 tons of tea as the production has decreased by 15% due to dry weather conditions in the globe at present (Central Bank, 2011). Tea, Sri Lanka’s highest foreign exchange earning crop, is set for a challenging year with export targets estimated to drop by 5 million kilogrammes and fewer buyers from its top markets in the troubled Middle East. Sri Lanka's state-run Tea Board has announced in their latest forecast that the 330 million kilograms expected to be plucked in 2012 has now been revised to 325 million kilograms mostly due to prevailing drought conditions and there is also a danger that export earnings could drop as Iran sanctions, which came into effect last month, take their toll (Sri Lanka Tea Board, 2012). Continued turmoil in the Middle East is also causing concern over prices and over 60% of Sri Lanka’s tea exporters are to the Middle East with the biggest buyer being Iran.

Problems in tea smallholding sector in Sri Lanka

The Tea Board initially expected overall production to be slightly higher than last year’s 328.37 kilograms that earned US$1.5billion. However, in the first four months of 2012, tea exports fell by 11.7% to US$$ 421.1 million (Central Bank, 2012). Even smallholders are dominant and most important sector in country’s tea production, the small holding sector does not reach to its targeted level yet in Sri Lanka. The average productivity is 300 to 400
Table 1. Top five tea producers in the world.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Production in 2011 (MT)</th>
<th>% of world total</th>
<th>% change from 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>1,640,310</td>
<td>35.13</td>
<td>+11.77</td>
</tr>
<tr>
<td>2</td>
<td>India</td>
<td>966,733</td>
<td>20.70</td>
<td>-2.46</td>
</tr>
<tr>
<td>3</td>
<td>Kenya</td>
<td>377,912</td>
<td>8.09</td>
<td>-5.28</td>
</tr>
<tr>
<td>4</td>
<td>Sri Lanka</td>
<td>327,500</td>
<td>7.01</td>
<td>-1.17</td>
</tr>
<tr>
<td>5</td>
<td>Turkey</td>
<td>2,21,600</td>
<td>4.74</td>
<td>-5.70</td>
</tr>
</tbody>
</table>

Source: FAOSTAT data, 2011.

kg per ha/yr and the targeted level is at least 700 kg/ha/yr. Moreover, re-plantation ratio is 0.2%; even it should be 2% annually (Plantation sector statistical pocket book, 2008; 2011). This may mainly due to inefficient technical knowledge transferring system. Tanui et al. (2012) showed the main way of improving agricultural productivity among smallholder tea farmers is through the introduction of improved agricultural technologies to farmers. Even though this is very important issue, very few researches have been carried out on this regard so far. Further, efficient technology transfer system is vital to compete with the highly competitive world tea production; the research investigations related to this issue are very scant all over the world. Therefore, this study attempted to capture the existing technical knowledge level of tea smallholders with the aim of increasing productivity, while evaluating the effectiveness of different modes used by different sources to disseminate knowledge and suggesting recommendations to improve technology transferring system in the tea smallholding sector in Sri Lanka.

REVIEW OF LITERATURE

Momentary look to the tea production in Sri Lanka and the world

By the independence of Sri Lanka in 1948, tea along with rubber and coconut contributed more than 92% of total export earnings of the country (Athukorala and Huynh, 1987). The tea sector still continues to occupy an important place in the economy, even though the relative contribution has declined in recent years. Sri Lanka was the second largest producer having 20 percent share of the world tea production in 1961 (ADB, 1990). The total production of Sri Lanka has increased until 1965 and thereafter tea production has not changed until late 1980s while India, China and Kenya have increased output by many times. Currently, Sri Lanka dropped to the fourth among the top five tea producers in the world (Table 1). However, total production in Sri Lanka has gradually increased after mid 80s with average 2% annual growth rate reaching 280 kg million in 1998 (Central Bank, 2007). The production increase mainly came from the low grown areas where smallholders are prominent. Production from low elevation has increased rapidly reaching 150 kg million level in 1998. High grown area has shown little improvement while mid grown area has decreased the level of production in the same period. As the global tea industry is very competitive, the slow market growth means each producer faces the challenge of maintaining their position (Ali et al., 1997). Moreover, the tea industry of Sri Lanka has not performed well in the competitive global tea market. The country is conceding its market share to emerging producers like Kenya and other African producers (Ganewatta and Edwards, 2000). Tanui et al. (2012) showed that tea farming technology packages tailored to improve productivity in the tea sector and these packages can double the current smallholder tea production of 1,800 Kg made tea per hectare.

Technological adaptation and smallholder tea production

Most of the literature on technological adaptation concentrates on single practices such as fertilizer application (Green and Ng’ong’ola, 1993). Other studies in other domains suggest that the importance of the enhancement of the adaptation of technologies (Nkonya et al., 1997). However, it showed that the immediate and uniform adoption of innovations in agriculture is quite rare (Feder et al., 1985). Related to the smallholder tea production in Kenya, being the top third tea producer in the world, next to India, the selection of the most important technological factors was based on the recommendations of the Tea Research Foundation (Mwaura and Muku, 2008).

METHODOLOGY

Matara district was selected for the study as it follows in the highly productive area which consists of the highest number of tea smallholders. Pasgoda DS division (district Secretariat division) in Matara District was selected purposively due to the third largest green leaves producing DS division in Matara district. There is considerable number of tea smallholders (60% of the total in Matara...
Table 2. Measuring criteria of the existing technical knowledge.

<table>
<thead>
<tr>
<th>Marks range</th>
<th>Knowledge level</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>Poor</td>
</tr>
<tr>
<td>50-74</td>
<td>Moderate</td>
</tr>
<tr>
<td>&gt;70</td>
<td>Good</td>
</tr>
</tbody>
</table>

Figure 2. Existing technical knowledge of tea smallholders.

district) cultivating tea in this DS division. Five GN (Grama Niladhari) divisions with selected number of smallholders in brackets can be listed as, Panakaduwa East (15), Puwakgahahena (15), Pasgoda (15), Mologgamuwa South (15) and Dampahala (10) which consisted of 70 smallholders. Respondents were selected from above GN divisions by using simple random sampling technique. A pre-tested questionnaire was employed to collect field level data from these respondents. Kruskal Wallis ranking method was used to capture the most efficient source and mode of technical knowledge transfer. Knowledge of the respondents was categorized as poor, moderate and good, based on marking criteria according to the marks obtained in order to evaluate the existing technical knowledge (Table 2).

RESULTS AND DISCUSSION

Existing technical knowledge of tea smallholders

The study revealed that majority of the smallholders (47%) had poor knowledge about tea cultivation, where 33% had moderate knowledge. There were only 20% of the smallholders with good knowledge about tea cultivation (Figure 2). Moreover, their knowledge about different practices was varying and they had good knowledge about plucking and field planting while very low knowledge about pest (15%) and disease management (10%), which can be considered as main practices attentive for obtaining high productivity (Figure 3). These results were congruence with the technological adoptability study undertaken by Jayamanne et al. (2002), in tea smallholding sector in low country, Sri Lanka. Authors show that although the mean adoption level was 71% for eleven recommended technological packages, some packages such as pest and disease control, and weed control were marginally adopted by the tea smallholders. Further, these findings rigid the findings of Tanui et al. (2012), who stated regarding Kenya tea smallholders, that the existanc of an alarmingly low uptake of technologies by small holder tea farmers which points to significant gaps in the current tea sector policies and technology transfer worth exploring in the small holder tea sector. Moreover, authors showed that lack of knowledge on socio-economic factors that constrain the adoption of the technological packages by smallholder tea farmers could be the cause of the wide gap that exist on the rate of adoption within the estate and small holder tea sub sectors. In the present study special questions were asked about planting material selection and nursery practices, as this is the most important field practice to achieve high production. Majority of the respondents (53%) had moderate knowledge about these practices and only 30% of the respondents had good knowledge (Figure 4). These results are also in consistent with past literature (Jayamanne et al., 2002). Moreover, respondents had poor knowledge about fertilizer application (Figure 3).These results were slightly deviated from the results obtained by Jayamanne et al. (2002), as authors found that highest adopted packages included plucking, clone selection, field establishment, and fertilizer application (above 75% level). In addition, study showed that technical knowledge slightly differed with different age categories. It revealed that young generation (30 years) had highest knowledge, because they are the early adopters to the new technology. Elders (>60 years) also had higher average knowledge than other age categories may due to advance experience (Figure 5). Further, the study suggested that age of the respondents was not a considerable dependent factor to achieve technical knowledge as it did not show prominent fluctuations. Moreover, study revealed that memberships obtained from main sources, Tea Smallholding Development Authority (TSHDA) and Tea shakthi, played a key role in disseminating the technical knowledge. Majority (67%) of the smallholders received membership of TSHDA and 35.7% were the members of both sources (Figure 6). Members achieved comparatively higher knowledge than the non-members (Figure 7) may be due to the compulsory of its members to attending meetings and launch regular demonstrations and discussions for the members. These demonstrations, meetings, discussions etc. may help to achieve considerable knowledge on tea cultivation.

How extension service shapes existing technical knowledge

Extension officers can play a great role in technical
knowledge transfer. But the study showed that the extension officer’s role was very poor in Tea shakthi contrasts to TSHDA (Figures 8 and 9). Extension officers of TSHDA visited once a three month while that for Tea shakthi was only once in a six month implying the inefficient service of extension officer with respect to technical knowledge transfer. That may be the reason for having more members in TSHDA comparatively to Tea shakthi. Past literature based on extension in tea smallholding sector recognizes the poor extension service in the sector (Karunadasa and Garforth, 1997). Authors show that lack of knowledge was one of the major constraints in adopting technological innovations in the smallholding sector and showed the importance of the extension services in this regard. Further, past literature show that the inefficient extension service worldwide is one of the main barriers for achieving sustainable agricultural practices and there is a need to improve the extension workers’ role worldwide. Moreover, authors show that innovative farmers reject top-down extension and they need the extension involvement to serve primarily as facilitator (Kazan and Agunga, 1997).
One of the researches carried out in Kenya on tea smallholder sector also show the importance of the effective extension service in order to disseminate tea production technologies (Owuor et al., 2006). Moreover, Yaron et al. (1992) showed that the influence of extension can counter balance the negative effect of lack of years of formal education in the overall decision to adopt some technologies.

**Most effective source and most effective mode of disseminating technical knowledge in the tea smallholding sector**

In Sri Lanka’s tea sector there are different sources responsible for using different modes to disseminate technical knowledge (Table 3). TSHDA, Tea shakthi, Chemical Industries Colombo (CIC), Tea factory, Fellow farmers and Mass media are main sources and group meetings, individual methods, hand bills, method demonstrations and informal discussions are the main modes used by these sources in tea smallholding sector in the study area. Tea Smallholding Development Authority (TSHDA), Tea Shakthi, CIC, Tea factory use group meeting, individual methods and hand bills as major modes while Fellow farmers use method demonstrations and informal discussions as main modes to transfer the technology (Table 3). The modes used by different sources to transfer the technology were evaluated at the grass-root level. According to the Kruskal Wallis ranking method, the most efficient source was Tea processing factory followed by TSHDA while CIC, Tea shakthi
Visitation of extension officers of Tea Shakthi

Figure 9. Visit of Tea Shakthi extension officers.

Table 3. Different modes used by the different sources.

<table>
<thead>
<tr>
<th>Mode</th>
<th>TSHDA</th>
<th>Tea Shakthi</th>
<th>CIC</th>
<th>Tea processing factories</th>
<th>Fellow farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group meetings</td>
<td>√</td>
<td>√</td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Individual methods</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Hand bills</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Method demonstrations</td>
<td></td>
<td>√</td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Informal discussions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

Table 4. Efficiency of different sources- Kruskal Wallis ranking results.

<table>
<thead>
<tr>
<th>Source</th>
<th>Average Marks</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSHDA</td>
<td>366</td>
<td>2</td>
</tr>
<tr>
<td>Tea Shakthi</td>
<td>167</td>
<td>4</td>
</tr>
<tr>
<td>Tea processing factories</td>
<td>379</td>
<td>1</td>
</tr>
<tr>
<td>CIC</td>
<td>256</td>
<td>3</td>
</tr>
<tr>
<td>Fellow farmers</td>
<td>164</td>
<td>5</td>
</tr>
<tr>
<td>Mass- Media</td>
<td>50</td>
<td>6</td>
</tr>
</tbody>
</table>

Based on the respondents’ view, individual methods were the most effective mode followed by method demonstrations. Informal discussions were the least effective mode for transferring the technical knowledge (Table 5). That may be the reason for not popularizing fellow farmers as a source of knowledge transfer as it mainly uses the informal discussions for transferring the technical knowledge. Therefore, individual methods (field to field methods) should be improved further in the tea smallholding sector in Sri Lanka in order to achieve effective technology transfer in tea smallholding sector. It should not be promoted the informal discussions as the real information can be destroyed in this way. Some recent literatures on marketing also show the devastating effect of word of mouth (WOM) communication in various sectors (Bambauser-Sachse and Mangold, 2011; East et al., 2008). Method demonstrations also should be uplifted further for the sake of improving the efficient technical

ranked as 3rd and 4th respectively. That may be due to the fact that the better institutional arrangement in tea processing factories to disseminate the technical knowledge rather than other sources. It was evident from the study that Mass-media was the weakest source of technical knowledge transfer in the tea sector in the study area (Table 4). Respondents may not believe the information disseminated through Mass-media. Respondents may need to see the actual process in the tea-processing factories, in order to grasp the technical knowledge more efficiently, g
knowledge transfer.

Conclusion

The existing level of technical knowledge was very poor in tea smallholders especially in case of pest and disease management. Moreover, they had insufficient knowledge about planting material selection and nursery management that is vital for achieving high productivity in tea sector. Poor extension service was one of the main drawbacks in the tea smallholding sector in the study area. Young generation captured technical knowledge and adapted to the situation comparatively quicker than others. Moreover, membership played as one of the key factors of capturing sound technical knowledge among tea smallholders. Based on the grass-root level evaluation, study revealed, Tea processing factories and individual methods (field to field method) as the most efficient source and the most effective mode of technology transfer in tea smallholding sector respectively.

RECOMMENDATIONS

The study recommended following recommendations to uplift the tea industry in Sri Lanka with reviewing the present study.

1. The technical knowledge, specially the knowledge on planting material selection, nursery management, and pest and disease management should be disseminated mainly through the individual methods (Field to field method). Extension officers should play a prominent role in this regard.

2. The extension officers’ role must be carefully monitored to reap the benefits of the technical knowledge transfer.

3. Study emphasizes the great need of institutional arrangement in the tea smallholding sector in order to uplift the tea industry. Tea processing factories and TSHDA should explore their contribution as technical knowledge transferring sources.

4. Contribution of mass-media (Television, radio, Newspapers) should be improved in tea sector in order to disseminate the technical knowledge among tea smallholders efficiently.

Limitations and way forward

The current study has several limitations that can seed future investigations. Main limitation of this research relates the use of a single Asian country to draw conclusions which may limit the generalization of findings. Findings may vary related to other countries due to the variations of climate and socio-economic parameters. Moreover, current study considered the tea smallholding sector only. A comparative study, while combining with the state sector also may be a fruitful extension to capture the comparative efficiency of the technological transfer system in the tea sector globally. Though, these limitations limit the generalization and the precision of the results obtained, based on the scope of this study and due to various practical considerations, they were not taken in to account of the current study and these issues remain promising avenues for future research initiatives. Based on current findings, researchers can further conduct a SWOT (Strength, weaknesses, opportunities and treats) analysis in order to uplift the tea smallholding sector. Moreover, as the current research shows the need of the ramification of the extension service, more research investigations may be worthwhile to launch an effective and efficient feed-back mechanism in the tea smallholding sector in order to evaluate the actual benefits. In addition, more research investigations are required to evaluate the current findings. These phenomenons deserve further research attention in tea sector globally.

REFERENCES


