S.S.E.V Sri Lanka's Agricultural Industry

Subsidies.Schools.Extension.Videos

Policy brief to Sri Lanka's Minister of Agriculture, Duminda Dissanayake

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Executive Summary

Sri Lanka's recovery from first, the 26-year-long civil war and more recently the Easter Sunday terrorist attacks have been characterized by an emphasis on tourism, manufacturing, and innovation, however, the founding sector of the island's economy, agriculture, is what seemingly requires the most attention. The agriculture industry is particularly vulnerable because it employs a significant proportion of Sri Lankans but is contributing less and less to economic growth hence worsening poverty, increasing suicide rates among farmers, and causing the island and its people to depend on less sustainable means of development. The root cause of this slump is declining productivity as a result of a lack of mechanization and use of new, more efficient farming techniques. The best approach to confront these issues is to combine agricultural extension, the advent of participatory video and mediated instruction, with farmer-centric education, and diverting subsidies to agricultural machinery. This is consistent with the vision of President Rajapaksa, businesses and foreign investors, as well as in the long-term interest of existing and potential farmers.

Overview of the Problem

Sri Lanka's agriculture industry contributes to 7% of its annual GDP, this is relatively low compared to 26.4% of Sri Lankans employed in the agricultural sector and the 31.8% engaged in agricultural activities. There is a divergence between the productivity of the industry and the dependency of people on it. The percentage of value-added to the country's GDP by agriculture, forestry, and fishing, is sharply declining as it was about 28% in the early 1980s, 20% in 2000 and was 7% in 2018. Agriculture's proportional contribution to Sri Lanka's GDP is one of the lowest in South Asia and even in rural households, the average income derived from farm-income activities is 23% compared to the 56% derived from non-farming activities. Though a generational vocation, farmers have difficulty sustaining a living for their families due to social, economic, and environmental change. Increasing debt and declining returns result in desperate choices being made such as selling their land below the market rate and often taking their own lives. 150,000 people in Sri Lanka die by suicide from pesticide self-poisoning a year and are mostly farmers living in extreme poverty.

The cause for such drastic declines in productivity is multi-faceted. Primarily, there has been low adoption of mechanization in farming. In Sri Lanka, mechanization in farming exists on a spectrum wherein paddy cultivation, most of the operations are mechanized with the exception of bund cleaning and plastering, plant establishment and weed management, small scale seed paddy processing, and drying and storage. The technology is available to mechanize these segments of cultivation to increase productivity beyond the average expectation but there is a lag in implementation. Similarly, there is scope to mechanize maize cultivation as the second major crop, and grain legume cultivation- vegetable and fruit production sector- is not mechanized at all. However, the tea industry which contributes to 2% of Sri Lanka's GDP is a sector where the labor intensity should be preserved, for example, hand plucking tea is more selective and can't yet be replicated by any machinery so quality is better maintained without mechanical intervention. Still, the industry has benefitted from sprayers for the projection of water, weed killers, crop performance materials, etc.

The problem with most machinery is that farmers aren't adequately informed on how to effectively use their equipment to lower costs for themselves. Additionally, machinery is often imported but supply is not regulated and charges are considered unreasonable. However, there is evidence that if machinery is used right farming outcomes could be improved significantly in Sri Lanka. For example, if land leveling is done with the use of a laser-guided land leveler both in lowland and highland about 20-30% water can be saved and crop growth is likely to be more uniform. Yet, overall there is a weak functioning of agricultural research and development programs. Most research programs are confined to laboratories and do not adequately reach the farmlands. Similarly, the Farm Mechanization Research Centre and Insitute of Post Harvest Technology are responsible for research and development where testing and evaluation is also conducted. However, testing is not mandatory at these institutes, reducing the credibility of their findings.

Furthermore, Sri Lanka lacks a responsible agricultural extension program. Education rarely depicts agriculture as a path to be followed, despite the nation's historic dependency on the industry and if it is taught students only learn how crops have always been produced as opposed

to how much to produce and what cost, how to improve productivity, what happens if average costs aren't brought down to market level, etc.

Overall, it is evident that the problems associated with the agricultural industry in Sri Lanka are complex and multi-dimensional. Fundamentally, low productivity stems from a reluctance to mechanize and implement new and more efficient farming techniques. This is characterized by the high cost associated with mechanization, inadequate information on how to mechanize and implement new strategies effectively and the low guarantee of positive outcomes due to weak research, extension, and educational facilities. The key issue appears to be a sense of inertia developed by farmers due to the inadequate guidance and non-monetary support they have received over the years that has resulted in a fear of change. However, it is pertinent that the problem is addressed now, avoiding a generational cycle of poverty and lack of faith in the agricultural industry that has taken far too many livelihoods and lives already.

Proposed Solution

A multi-layered problem deserves an equally nuanced solution. The solution isn't to give up on the primary sector, industrialize, and force people into manufacturing and services. This is both environmentally unsustainable and economically inefficient considering the vast array of natural resources Sri Lanka can continue to sustainably cultivate, produce, consume, and trade to improve their economy and the livelihood of existing communities. The solution has historically lain in addressing the gap in poor knowledge in two ways. Television and radio broadcast programs to disseminate agricultural information across large geographies and agricultural extension where trained extension agents attempt to impart farming practices and techniques to farmers through individual interaction. Both these projects have often been criticized for being too general and therefore ineffective. Therefore, my proposal is a combination of the two in a far more specific manner to adopt what Robert Evenson calls the awareness-knowledge-adoption-productivity (AKAP) sequence, guiding a farmer through this progression to inculcate a particular technique using primarily basic video services.

Similar to Digital Green, a research project piloted in India in 2009, the solution aims to disseminate targeted agricultural information to small and marginal farmers using digital video. It has 4 important pillars. Firstly, it includes a participatory process for content production where

local university students, scientists, NGO experts, field staff, progressive farmers, and other volunteers from the community partake in creating instructional videos pertaining to the implementation of more efficient equipment or methods of farming increasing the verifiability of the videos. The clips will include demonstrations, instructions, benefits, address common questions and concerns. Secondly, a locally generated digital video database will be created where the videos are digitized on a PC and edited, using simple non-linear editing software. The videos are then either mailed as DVDs or directly uploaded, if adequate bandwidth is available, on to a searchable Internet database that makes the content available for public use under a Creative Commons license. Thirdly, the project will follow a Human-mediated instruction model for dissemination and training. Mediators will be trained residents, carry out a minimum of 3 screenings a week, and be supported by a full-time extension system that provides mechanisms for feedback and audit for a cluster of villages. The mediators will be given a performance-based honorarium of up to Rs. 1,500 (US$30) per month, which is calculated from a mutually agreed set of target metrics that take into account the local population of farmers and the agro-ecological conditions of the season. Fourthly, the project will follow regimented sequencing to initiate new communities as opposed to direct imposition that often overwhelms and antagonizes communities.

This structure doesn't expect information or communication technology alone to deliver useful knowledge to marginal farmers, instead, it combines technology and existing people-based extension systems and aims to amplify the effectiveness of conventional extensional programs. This is due to multiple reasons. Firstly, local social networks are tapped to connect farmers with experts and the thrill of appearing "on TV" motivates farmers. In India, some farmers competed to be included in the content so that they could be seen by their peers "on TV." In other cases, farmers who refused to even participate in screenings would later become die-hard DG farmers when they themselves were featured in a video. Peer content often initiated curiosity and established itself as a medium for transference through community participation. Furthermore, the project uses cost-realistic technologies, like TVs and DVD players that are shared in each village and one digital camcorder and PC shared across the project area. Additionally, the video-based content improves the diffusion of better farming practices and reduces the expert

support required for each farmer. During the pilot study, farmers demanded videos that included concrete demonstrations, testimonials, entertainment, etc. as well as videos that featured multiple farmers adopting the same practice, possibly to see proof of a broader base of acceptance.

The nature of videos is also a large reason for DG's success. Videos are localized to a region and feature the participation of familiar farmers as opposed to experts in idealized conditions. In India, farmers sought videos featuring people similar to themselves, who spoke in their dialect and accent, and who had low-to-medium-levels of formal agricultural expertise (Rogers' diffusion theory). Here, homophily (the tendency for people to have (non-negative) ties with people who are similar to themselves in socially significant ways) is exploited to minimize the distance between teacher and learner. This is particularly important because these farmers, like the ones in Sri Lanka, will have, had encountered many experts in the past, but that expert advice was confounding; farmers expressed apathy toward expert lectures, preferring the persuasion of familiar neighbors. The videos will also be adapted appropriately for the season and particular village (the study in India found that farmers were not receptive if it wasn't of immediate value). Moreover, village-level mediators facilitate the showing of these videos to ensure that farmers personally connect with the content on a regular, accessible basis and the study found that presence of mediator even with slight mediation more prolonged interest. Location is also important: public places were well attended whereas semi-private places were less accessible such as a school at the edge of a village, house of a partisan politician, etc. Finally, farmers were more eager to participate if tools or ingredients were provided during the screenings even if it were for a fee.

The study in India had extremely promising outcomes. DG maximized the impact of agricultural extension workers, increased the adoption of certain agriculture practices seven-fold over a classic Training and Visit-Based (T&V) extension approach. In addition, regarding the cost-per-adoption basis, DG was shown to be 10 times more effective per dollar spent than a classical extension system. Moreover, although DG did not explicitly seek to do anything but propagate good farming practices because of its participatory content production and emphasis on bringing small groups together, there were instances where DG reunited estranged family members, whether they were feuding brothers or neglected widows—this effect was most

frequent when the person alienated was featured in a DG video. Overall, Figure 1 summarizes a cost-benefit analysis of the adoption of new farming techniques through different extension systems.

Figure 1			
Extension System	Cost (US$)/Village/Year	Adoption (%)/Village/Year	Cost/Adoption (US$)
T&V (control)	$840	11%	$38.18
Digital Green	$630	85%	$3.70

However, the DG model still has some limitations. The scale of impact was confounded by logistical and resource challenges that include the sheer number of households assigned to a single extension officer. Furthermore, individual officers faced difficulty in establishing a rapport with their potential clients so extension officers tended to restrict their contacts to the richer, larger-scale farmers in each village, as they are typically the most willing to experiment with new inputs. They used these farmers as models, but the field staff was rarely able to showcase the progression of these farmers to wider audiences due to social and resource limitations. Finally, the evidence of the study is non-conclusive due to the small size and geographic focus of the experiment.

Given the geographic, cultural, and economic similarities between India and Sri Lanka's agricultural industries, the costs and benefits are likely to be more or less identical, adjusted for respective exchange rates and inflation. However, unlike in India, this proposal has two more components, in addition to the Digital Green model: participatory video and mediated instruction for agricultural extension, the proposal suggests Farmer Field Schools (FFS) and subsidized machinery to complement DG's model. The DG model primarily concerns itself with existing farmers and therefore encounters the limitations concerned with educational apathy and inertia. However, Farmer Field Schools targeted at potential farmers which function as an informal trade school that students could enroll in upon completion of high school to learn the basics of farming in perhaps 6-12 months as opposed to relying on hearsay and tradition sets a positive precedent for an academic foundation to farming. Alternatively, it could enable farmers to improve their

decision-making capacities through weekly "informal schools" in which a small group of farmers or potential farmers observes and evaluates possible agricultural interventions on one individual's farm. It has spread the adoption of integrated pest management practices in Asia by graduating more than 4 million farmers in 50 developing countries. This could also make them more receptive to Digital Green in the long-term. Additionally, to counter the problem associated with expensive machinery, the government could regulate the trade of sustainable agricultural equipment by (partially) substituting the fertilizer subsidy with a subsidy for agricultural machinery to make it more affordable for farmers to invest in improving productivity.

Overall, the three-fold solution of the Digital Green model: participatory video and mediated instruction for agricultural extension, Farmer Field Schools, and subsidized machinery are likely to significantly improve Sri Lanka's agricultural industry. The concerns with the pilot study can be addressed through a lessons-learned approach where more locally or regionally extension agents are assigned to each village to avoid the problem of scarcity and difficulty in relationship building. Also, despite the relatively small scale of the pilot study 1,470 households in 16 villages over 13 months is a significant amount for a solution of such specificity and if concerns with success still persist Sri Lanka can conduct its own pilot prior to implementation, however, time is of the essence.

Political Rationale & Discussion/Refutation of Alternatives

Building a greener, more inclusive and more efficient agricultural industry is beneficial to Sri Lanka's economy and people, but is also the most feasible option for the future. The government is likely to support this initiative for two reasons: it is more cost-efficient than existing mechanisms and is directly in line with the newly elected President's vision for the agricultural industry.

The current fertilizer subsidy program constitutes 2.24% of total government expenditures and has become a massive burden on the Treasury. It is widely accepted that the fertilizer subsidy has led to increased land productivity and encouraged farmers to expand the land under paddy cultivation (Central Bank of Sri Lanka, various years). It has, however, resulted in certain policy failures too such as illegal use on lands without legal titles and to crops

other the paddy and inefficiencies associated with the distribution of fertilizer. Certain environmentalists, based on their preliminary findings, have initiated discussions in the public media of the pollution of waterways by heavy metals, such as cadmium, caused by the application of inorganic fertilizer. They also argue that the accumulation of cadmium in water bodies as well as in plant and animal tissues has led to an increased prevalence of chronic renal failures. Therefore, the subsidy is fiscally and environmentally unsustainable and economically inefficient and better off being replaced by a subsidy for machinery, the Digital Green program which has a mostly negligible cost and could be crowd-sourced by the private sector or NGOs like in India and encouraging Farmer Field Schools which could also be successfully run privately.

Furthermore, newly elected President Gotabaya Rajapaksa consistently emphasized during his campaign the necessity for economic policy centered around rural society. He refers to protecting farmers using the latest technology such as drip irrigation, vertical agriculture, and organic food production. Moreover, he referred to the feedback program " Pilisandarak program" carried out over the last 4 years in the agricultural industry. The results of this can be mobilized to localize and implement the proposed solution. Mr. Rajapaksa also urged the need to turn farmers into agricultural entrepreneurs and encourage them to enter global markets to find niche markets where they can thrive which is promoted by the proposed solution. Additionally, businesses and foreign investors are likely to see the possibility of further value additions in the Sri Lankan supply chain due to technological improvements and are likely to invest in the industry.

The main opposition is likely to be, ironically, from the rural poor and the farmers themselves who could subsequently present a significant threat to the elected officials who support the initiative. This is likely especially if the fertilizer subsidy is released and they encounter the immediate implications of higher costs. Subsidies are also an easier, quicker fix that they prefer and would see mechanization as a threat, associating it with both westernization and also capital-to-labor substitution and therefore unemployment. The involvement of NGOs is also likely to make them skeptical as there are low levels of trust due to corruption and mismanagement of funds in the past. However, these concerns can be mitigated if the

government is transparent about what the subsidy is being released for and convey the long-term benefits of this alternative solution. Similarly, using India as a case study to iterate that technology will assist farmers to improve their livelihood and increase their profit margins as opposed to replace them. Transparency and communication regarding affiliated NGOs will also mitigate the backlash resulting from short-term negative consequences.

Subsidies are the main alternative that has already proven to be less efficient, however, other weaker alternatives exist as well. For example, kiosk-based web portals that would provide real-time weather forecasts and customized information to help farmers better manage crops such as ITC's e-Choupal initiative, Hindustan Lever's iShakti, IIIT Hyderabad's e-Sagu, and IIT Bombay's aAQUA, have faced difficulties in enabling farmers to recognize value from the information that cannot directly be incorporated into their existing operations. The latter also depends on a farmer's ability to compose an appropriate query that can be sent via SMS on a mobile phone or via a PC kiosk with internet access and require available experts to provide advice on an individual basis. Other forms of using videos in agricultural extension such as The Developing Countries Farm Radio Network (DCFRM) are often produced by experts of different socioeconomic statuses in simulated conditions so only the most progressive farmers tend to connect these programs with improving their personal farming operations. Kiosk-based interventions to connect farmers with expert information using PCs continue to be impractical for the rural conditions of the developing world due to illiteracy and underdeveloped infrastructure. Farmers prefer interpersonal methods of receiving information on new or innovative farming practices over mass media methods. Similarly, other tutored video instruction methods haven't been as effective as DG as The Digital StudyHall, for example, lacked mediation by locals, demonstrating DG as a strategy that combines all the positives of these initiatives and mitigating their drawbacks.

Conclusion

Sri Lanka must invest in this three-fold solution that includes the Digital Green model: participatory video and mediated instruction for agricultural extension, Farmer Field Schools, and subsidized machinery to address the gap between the reliance on the agricultural industry

and its inefficiencies. On the precipice of widespread industrialization and irreparable environmental damage this is the most pragmatic, desirable, and nuanced solution at this crucial juncture where suicide rates are increasing amongst farmers and value addition to GDP is at a critical low. The policy proposed addresses low productivity in the agricultural industry due to the fears associated with mechanization and new farming techniques, both by fulfilling the needs of existing farmers and potential farmers. The proposed solution is inclusive and localized, sustainable and doesn't require long-term 3rd-party presence, cost-effective and segmented. It uses lessons learned from the pilot study in India to mitigate mistakes and improve based on feedback and continues to allow this sort of feedback loop. It is already widely proven that new techniques and machinery has a positive correlation with increased productivity, implementing these solutions is the most common obstacle in Sri Lanka and this solution effectively tackle that while accounting for all stakeholders and mobilizing the positive political climate.