

# WHY IS YOUNG GENERATION IN AGRICULTURE COLONIZATION SCHEMES LESS INTERESTED IN CONTINUING WITH FARMING? EMPIRICAL EVIDENCE FROM THE HURULUWEWA AGRICULTURE COLONIZATION SCHEME IN SRI LANKA

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## 1. BACKGROUND AND RESEARCH SUBJECT

Modern agricultural colonization schemes (MACSs) were introduced in the Dry Zone in Sri Lanka to achieve the country's food self-sufficiency, particularly in rice farming, which is the main crop and staple food, expanding the cultivated land and addressing the problem of unemployment by settling people. Today, more than 110 agricultural colonization schemes have over one million settled people (Chandrasiri, 2010). Undoubtedly, the country managed to attain its primary goal of introducing the MACSs, i.e., achieving self-sufficiency in rice.

However, various issues remain in the MACSs, which cause unsustainability in farming. Many studies have cited the less profitability of rice farming, stagnated nature of productivity of rice farming, marketing problems, lack of an agriculture-based value-added system, issues in the agricultural extension network, matters related to land rights, outmigration, and less interest of youth in the settlements in continuing with farming (World Bank, 2003; Prasanna, 2006; Rupasena & Vijayakumar, 2006; Kikuchi et al., 2002; Rupasena & Naik, 2009; Thiruchelvum, 2005; Thivanka, 2017). Among the emerging issues in the MACSs, the generational issue – less interest of youth in continuing with agriculture - has

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been recognized as vital due to its negative consequences to sustain the schemes that largely contribute to the country's food production. The unavailability of sufficient alternative off-farm employment opportunities to the young in the schemes leads to social and economic unrest among the youth in the systems. It increases the retirement age of the aged farmers.

The literature works in the field find various push and pull factors that affect the less interest of young to engage in farming activities. Among them, issues related to land ownership, land tenure structure, and farm size (Susilowati, 2015; Singh and Panda, 2016), youth recognition of farming as dirty, lacking opportunities for personal achievements (Charles, 2014; Thivanka, 2017), lack of innovations in agriculture (Patil et al., 2014), and fewer practices of best techniques in farming have been identified as influential factors which push the young out of farming. Moreover, the studies which examined the pull factors noted that off-farm opportunities with more income, high investment, and the presence of new technologies in other sectors interest the young to engage in unsustainable and often illegal income-generating activities due to less effort and high earnings within a shorter period than farming activities (Susilowati, 2015; Rukuni and Zvavanyange, 2013; Kokanova, 2014). However, minimal studies have explicitly focused on MACSs in Sri Lanka on this subject. Thus, it is essential to identify the influential factors that affect the young generation to move away from farming in the MACSs in Sri Lanka to sustain the schemes and ensure the country's food security and address the unemployment issue in the farming areas.

The main thrust of this study is to analyze the constraining factors influencing the youths' decision to continue farming in MACSs in Sri Lanka. The specific objectives are, 1) to examine the socio-economic profile of the young who are not interested in continuing with farming, 2) to identify the push and pull factors influencing young farmers' decision in moving out of full-time farming, and 3) to learn the lessons from progressive young farmers to motivate young who are not interested in continuing with farming and unemployed in the MACSs.

## **2. LITERATURE REVIEW**

This section of the paper reviews previous studies to identify the push and pull factors influencing youths' decision to move out of farming.

### **2.1 Push factors**

Using field survey data, Susilowati (2015) examines the factors that push young in Indonesia out of farming. The results revealed land ownership of farms, land tenure structure, constraints to accessing land, and farm size as the

demotivating factors for the young to engage in farming activities. Similar results have been obtained by Sibanda (2011) in Africa, Charles (2014) in Ghana, Agwu et al. (2012) in Nigeria, and Singh and Panda (2016) in India. These studies also noted that the number of young farmers decreases while the elderly farmers are not retiring and not passing their farms to the younger generation. Rukini and Zvavanyange (2013) and Charles (2014), in their studies in Africa and Ghana, respectively, found that youth do not consider farming as an attractive career. However, the sector remains with a higher potential of providing jobs for the youth. These studies revealed that youth perceive farming as dirty and lacking opportunities for personal achievements. Consisting of the findings of these studies, Umeh and Odom (2011) explained that youth find farming as a non-recognized job.

Many studies denoted that the young have particular issues in accessing the formal credit markets and obtaining new technologies, agro-inputs, agricultural extension services, and agribusiness management practices. Singh and Panda (2016) revealed that existing infrastructure facilities and willingness of government to develop infrastructure facilities in agriculture, measures taken to safeguard the national and rural markets from Multinational Corporations (MNCs), marketing facilities, finance, and marketing information are more influential factors which attract youth towards agriculture in India. The lack of innovations in agriculture is also a deterrent factor of restraining young from farming (Patil et al., 2014).

Studies reporting the relationship between educational level and youth involvement in farming states that less educated people tend to continue agriculture; thus, best agriculture practices are less used (Butt et al., 2011). Their studies further revealed that lack of rewarding the farmers, poor agricultural extension services, less attention of scientific and moral values of agriculture in agriculture education curricular, and less research in agriculture are the factors that affect the declining trend of young in farming. Research studies in Nigeria by Agwu et al. (2012) and in India by Bhat et al. (2014) reveal that parents' educational level and occupation negatively affect young people's involvement in farming activities.

## **2.2 Pull factors**

As per the study of Susilowati (2015) in Indonesia, the earning prospects of farming and more income security positively impact young farmers to continue farming. If there are off-farm income opportunities than agriculture, most young tend to replace farming with another occupation. According to Rukuni and Zvavanyange (2013), attractive job opportunities in the off-farm sector cause the young to migrate to the urban areas in Africa. Study conducted by Ogunremi et

al. (2012) in Nigeria further proved these findings. The influence of social media, television, cinema, and the internet is decisive in this connection.

In an investigation in Africa, Kokanova (2014) reports that high investment and new technologies in other sectors pull the young from farming. Creating employment opportunities in security forces due to internal civil conflicts also pulls young from farming due to stable income, particularly for less-educated youth. The study further revealed that some young are more interested in engaging in unsustainable and often illegal income-generating activities due to less effort and high earnings within a shorter period than agriculture activities.

### **2.3 Studies in the context of Sri Lanka**

By studying the factors affecting less engagement of youth in farming, Thivanka (2017) reveals that deficient level of social protection, less social recognition, higher earnings and overall sustainability in other sectors (industry and service sectors), higher migration to more urbanized and cosmopolitan areas, lack of technology and innovation in agriculture, and lack of financial and non-financial sources for farming have influenced the less attention or declining trend of youth participation in agriculture. According to Sudarshanie (2015), education level, gender, marital status, monthly income, agricultural experience, availability of paddy lands, agrarian machinery, agricultural inputs, financial facilities, labor, water/irrigation facilities, agricultural extension services, and training & market facilities are the influential factors for youth participation in agriculture in Sri Lanka.

## **3. MATERIALS AND METHODS**

From January to February 2018, data were primarily drawn from a field survey conducted in the *Huruluwewa Modern Colonization Scheme (HMCS)* in the North Central Province (NCP) of Sri Lanka. The HMCS was selected as a case study because it is one of the significant colonization schemes established in the late 1950s. Currently, the second and third generations of the settled families in the scheme are practicing farming. Thus, this scheme is a unique case to understand the origin of root causes that influence the young generation to move out of farming. The field sites were chosen by considering both right- and left-banks of the HMCS due to the difference among settled people in the area—traditionally lived, and outside people. Thirteen typical *Grama Niladari (GN)* divisions from the left-bank and the right-bank were selected from both banks for the farmer household survey.

The study defined young farmers as farmers who are below 40 years. This age limit was specified for the study because the retirement age of elderly

farmers is high compared to the retirement age of government and private-sector workers. The study selected 155 farm households by applying random sampling techniques. In this connection, the survey used the farmer list in each farmer channel chosen. The total sample consists of 120 young farmers and 35 parents. Out of 120 young farmers, 111 young farmers reported that they are not interested in farming, while nine young farmers have the vision to stay with farming activities. Sampled farmers were interviewed by administering a pre-tested semi-structured survey questionnaire. In-depth interviews were also conducted with the leaders of farmer organizations in each selected channel of the scheme. Descriptive and inferential analytical methods were used to analyze the collected data due to the nature of the phenomenon to be studied.

#### **4. RESULTS & DISCUSSION**

##### **4.1 Socio-economic profile of the surveyed young farmers**

Table 1 presents the profile of the young farmers who are not interested in continuing with farming in the study area. It revealed that 87.4% are males, the majority of the gender category. When considering their education level, the majority (89.2%) have less than GCE A/L qualifications, and of them, 54.9% of farmers have not even sat for the GCE O/L examination. These findings indicate that the young remain, but less interested in continuing with farming, are less educated. Butt et al. (2011) revealed that the remained less-educated young in farming lead to minor adaptation of modern technology and innovations in agriculture. Thus, it is necessary to upgrade agriculture-based knowledge to improve the adaptation of new technologies and innovations in agriculture.

Most young farmers (87.4%) are married. In terms of average farm size, 35.1% of farmers own less than one acre, and only 26.1% of farmers own more than two acres, while the rest of the farmers own between 1 - 2 acres. Children of the initial settlers in the scheme informally engage in farming of their parents' lands. The young farmers revealed the issue of land ownership specific to the colonization schemes. According to the Land Development Ordinance Act 1935 (as amended), some restrictions have been imposed on ownership transferring and subdividing the land into less than 1.5 acres in terms of lowlands, respectively.

**Table 1: Socio-economic characteristics of young farmers who are not interested in continuing with farming**

Factor		No. of farmers (N=111)	Percentages (%)
Gender	Male	97	87.4
	Female	14	12.6
Education Level	No School Education	10	9.0
	From Grade 1 to 5	9	8.1
	From Grade 6 to 10	42	37.8
	Ordinary Level	37	33.3
	Advanced Level	10	9.0
	Diploma	2	1.8
	Higher Education	1	0.9
Marital Status	Unmarried	12	10.8
	Married	97	87.4
	Divorced	2	1.8
Average farm size (acres)	Less than 1 acre	39	35.1
	1 to 1.5 acres	18	16.2
	1.5 to 2 acres	25	22.5
	More than 2 acres	29	26.1

Source: Field survey, 2018

#### **4.2 Factors affecting the less interest of young farmers in continuing with farming**

##### **4.2.1 Economic factors**

The analysis of economic-based push factors revealed that income instability or less predictability of farming income is influential on the decision of young to move out of farming in the scheme. According to key informant interviews and parents' views, drought is a significant issue in the system, which harms the income stability of the farmers in the scheme. According to farmers' experience, drought has weakened farming earnings during *Yala* and *Maha* seasons in 2017. The recent study of Prasanna (2017) in the NCP in Sri Lanka on 'Economic Cost of Drought and Farmers' Adaptation Strategies' revealed that paddy productivity has reduced from 1,470.8 kg per acre to 991.6 kg per acre due to drought. The study further noted that the unit price of paddy has increased from Rs. 28.9 to Rs. 35.5 due to supply shock and acreage estimated income loss of paddy farming, calculated by considering both productivity change and price change—been reported as Rs. 30,710.9 per season. This study was based on farmers' experience in the 2013/14 drought in the NCP.

The HMCS is primarily based on a paddy-based monoculture system. The interviewed farmers reported that institutions that deal with water management in the scheme have insufficient capacity to manage the crop systems following the rainy calendar in the region and water availability in the tank. Thus, the impacts of water shortage on farming communities in the scheme are becoming severe.

Less income from farming is the second decisive factor influencing the young generation's decisions to move out. This mainly associates with the third and fourth factors—the higher cost of production and farmer issues in the agricultural marketing system. Table 2 presents the cost and income analysis of rice farming, which is the main crop in the scheme. It indicates that the farmer earns a net income of Rs. 12,989 per acre, Rs. 23,380.2 for the average farm size in the scheme (1.8 acres), by spending Rs. 42,575 per acre. In a research study conducted in the same scheme, Prasanna and Abeyrathne (2018) reported that paddy farmers do not derive adequate net income from paddy farming, and most farmers sell their harvest in the harvesting period at the lowest price. This does not support them to cover the cost of production adequately.

Prasanna and Abeyrathne (2018) further revealed the oligopsony market structure in paddy marketing in the area. The lower financial capability of the farmers to cover variable costs of paddy farming pressurized financial needs for subsequent cultivation. Also, the pre-modern economic characteristics of paddy marketing channels have created the opportunity for large-scale traders to grab the farmers' production at a minimum price during the harvesting period.

The availability of formal credit facilities is also reported as an influential factor in young farmers' decision to stay with farming in the system. According to farmers' views, the weakened financial situation of the farmers, particularly in the harvesting time of the main crop—rice—, has resulted in farmers' dependence on local money lenders at a relatively higher interest rate, which is not visible directly. These local money lenders are the traders in the agricultural commodity marketing chain in the region. Hence the farmers have to keep their harvest as a guarantee and sell them at relatively low prices at the harvesting time, weakening farmers' bargaining power during marketing.

Among the pull factors, job opportunities at the private and government infrastructure development projects are influential. It revealed that the government initiated mega-development projects such as road development projects, tank renovation, and building constructions that have created short-term working opportunities for the young in the area.

**Table 2: Economic factors influencing youth to move out of farming**

Rank	Push Factors		Pull Factors	
	Factor	Average Value	Factor	Average Value
1	Less income security	4.43	Availability of job opportunities in the private sector	3.52
2	Less income from farming	4.32	Created job opportunities at the government-initiated infrastructure development projects	3.52
3	The higher cost of production	4.29	Self-employment opportunities	3.45
4	Issues in the agriculture marketing system	4.15	Job opportunities with higher income security	3.11
5	Fewer credit facilities for farming	4.01		

Source: Field survey, November 2017

Note: 1-Strongly does not agree, 2-Not agree, 3-Moderate, 4-Agree, 5-Strongly agree

**Table 3: Average cost and income of rice cultivation in the survey area (per acre and kg): 2017 Maha Season**

Variable	Mean value	Min.	Max.	Sta. Dev.
Cost				
Labor cost (family labor + hired labor)	15,742	10,564	50,700	8373.1
Machinery cost	13,446	0	44,000	7,722
Input costs (costs for seeds, fertilizer, pesticides, and herbicides)	11,379	903.4	37,268	7,657.1
Packaging cost	991.9	0	3,500	782.4
Transportation cost	1,016.3	0	5,000	994.0
Production cost per acre	42,575	11,414	100,760	22,151
Total cost per acre	(a)			
Gross income per acre	1,429.6	293	3,690	704.0
Price per kg of rice (Rs.)	39.35	23	55	7.7
Total gross income per acre (Rs.)	55,564	8,800	166,050	28,276.9
<b>Net Income per acre (Rs.) (including the fertilizer subsidy)</b>				<b>12,989</b>

Source: Authors' calculations based on field survey data

#### 4.2.2 Social Factors

As presented in Table 4, young farmers in the scheme concern about the low social recognition in agriculture. According to the views of young farmers and their parents, the root causes of this problem are the issues related to the land title, land fragmentation issues, fewer earning opportunities, and high-income instability. This has resulted in the stagnated nature of farm household economies in the scheme for many decades, as showed by the data of the Central Bank of Sri Lanka. For instance, the GDP share of the paddy sector has declined from 28% to 0.6% from 1982-85 to 2017 (Central Bank of Sri Lanka, 2017). It implies that returns of factors of production in paddy farming have not increased relative to other sectors over the years, thereby widening the economic gap between paddy-based agriculture population and population in other sectors. By a political economy perspective analysis, Gunaruwan and Yasoda (2018) further revealed that the real income of paddy farmers (except the period between 1971 and 1977) has deteriorated even if the cost of production has not increased in real terms. This deterioration of the economic condition of farming over the decades has resulted in a declined social recognition of the farming population. The following statement of an interviewed farmer reflects the severity of this issue of the young in farming communities:

“... being a farmer, we could not find a girl for marriage from rich or educated families ...”

Field note, 2018

The family members, particularly the educated and who have already migrated from the scheme, and parents, encourage the young members to find income opportunities alternative to farming, mainly due to high-income vulnerability and long-term experience in the deteriorating real income of farming.

The third critical factor is the less attention of the government to address the issues prevailing in agriculture, specifically in the colonization schemes, and the country at large, for many decades. The young farmers and their parents realize that there is no future for farming due to less realization by the government of issues prevailing in the colonization schemes. They have a negative perception of this regard, stating, ‘*Kudammage Salakili* (less attention or neglect).’

The fourth factor was identified as less attention paid to agriculture in the formal educational system. There is no adequate space for agriculture in curricular at the school and university levels other than in the agriculture stream.

However, for centuries, Sri Lanka has been recognized as an agricultural country. Young farmers believe that available jobs in different sectors are socially recognizable. Also, they observe the illegal earning opportunities available in the government infrastructure development projects, such as selling fuels, soils, and machinery parts. These short-term but illegal opportunities have also dragged the young away from farming.

**Table 4: Social factors influencing youth to move out of farming**

Rank	Push Factors		Pull Factors	
	Factor	Average Value	Factor	Average Value
1	Less social recognition of agriculture	4.62	Socially recognized job opportunities in other sectors	3.68
2	Influence of the family members	4.55	Availability of higher-income opportunities in the urban area	3.59
3	Inadequate government support	3.51	Illegal earning opportunities at the government infrastructure development project	3.10
4	Less agriculture-based education	3.25		

Source: Field survey, November 2017

Note: 1-Strongly does not agree, 2-Not agree, 3-Moderate, 4-Agree, 5-Strongly agree

#### 4.2.3 Environmental factors

Among the environmental factors, water and agricultural land-related issues are detrimental (see Table 5). Specifically, farmers are experiencing a continuing reduction of water availability for farming in the scheme due to drought and the inadequacy of the irrigation network maintenance process. As discussed in the literature (Prasanna, 2017), the economic cost of drought is very high compared to other natural calamities. Drought has also created problems in water management in the scheme, particularly in the latter part of both the left and right banks of the scheme. Interviews with leaders of farmer organizations revealed that water scarcity due to drought raises conflicts among farmers over water distribution, particularly at the end period of paddy farming. Thus, youth generally experience these water-related problems and disputes.

The existing legal environment related to the transfer of land ownership has affected the younger generation's interest in continuing with farming. Land

Development Ordinance Act 1935 (as amended), which is the primary legislation of all state land, has made restrictions in transferring and sub-dividing the land belong to parents. The oldest male obtains preference over everybody else (Law and Society Trust, 2010a). Section 72 of the LDO (as amended) in the absence of the nomination of a successor to a settlement in these areas stipulates inheritance to devolve in the male line according to the concept of primogeniture (Law and Society Trust, 2010a; Law and Society Trust, 2010b). Males are given priority in the list provided in subsection (b) of the third schedule. The view of the interviewed young in the scheme revealed that less assurance on land ownership negatively affects their decision on investment in land improvements and new crop systems deviating from the traditional farming structure in the scheme, particularly from rice farming.

Another issue is land fragmentation. According to farmer views, lack of availability of land and pressurized demand for land by the second and third generation of the scheme due to fewer off-farm income opportunities in the area are the closest reasons for the land fragmentation issue. Young persons who participated in the survey reported that existing small plots for farming, particularly rice farming, are not economically viable. However, there are few success stories of alternative farming or crops to rice farming using small land plots in the scheme. Still, most young people intend to have sufficient land for farming to create adequate income to sustain their future lives.

Fear of pesticide and herbicide use is another critical factor. This is because of publicity on recently revealed research findings of chronic kidney disease (CKD), indicating the association of agrochemicals with CKD. Specifically, the interviewed young revealed the prevalence of non-communal diseases such as asthma, diabetics, and heart problems other than the CKD in the scheme. The interviewed farmers also reported Farmers' experience in soil fertility reduction.

**Table 5: Environmental factors influencing youth to move out of farming**

Rank	Push Factors		Pull Factors	
	Factor	Average Value	Factor	Average Value
1	Scarcity of water due to the drought effect	4.69	Availability of jobs with a healthier working environment	3.31
2	Less availability of own lands	4.52	Availability of jobs without having climate change effect	3.23
3	The problem of land fragmentation	4.43		
4	Water management issues	3.72		
5	Fear of pesticide and herbicide use	3.40		
6	Reduction of soil fertility	3.10		

Source: Field survey, November 2017

Note: 1-Strongly does not agree, 2-Not agree, 3-Moderate, 4-Agree, 5-Strongly agree

#### 4.2.4 Technological factors

As presented in Table 6, the non-availability of modern equipment to use pesticides and other chemicals is a critical factor. Farmers in the scheme still apply pesticides and other agrochemicals in an unsafe method. Secondly, farmers do not have adequate training opportunities for agricultural technology usage. Thus, the farming system in the scheme is transforming very slowly to modern technology-based agriculture.

Issues in the marketing system have been recognized as the third factor. Specifically, the farmers still lack opportunities to access market information adequately, and thus, their predictions on market trends are primarily incorrect. They also reported issues related to storage and transportation. Moreover, less accessibility to new technology and less capability to purchase new agricultural machinery have influenced young farmers' dissatisfaction with farming schemes.

In terms of pull factors, the more technology-based industrial sector has pulled young from the schemes or outmigration of labor. According to factors reported, the presence of advanced technology, easy accessibility of technology, better knowledge, easy accessibility of raw materials and equipment, availability of innovation and research, and the availability of better infrastructure facilities in other fields are the technological-related pull factors.

**Table 6: Technological factors influencing youth to move out of farming**

Rank	Push Factors		Pull Factors	
	Factor	Average Value	Factor	Average Value
1	Less availability of safe ways to use pesticide and other chemicals	4.39	Presence of advanced technology in another field	4.47
2	Inadequate agro-training program	3.90	Easy accessibility of other sectors' technology	4.37
3	Lack of market-related technologies	3.70	Presence of better knowledge of different fields	3.35
4	Inadequate infrastructure facilities	3.54	Easy accessibility of raw materials & equipment	3.20
5	Less accessibility of new technology	3.06	Availability of innovation & researchers in other fields	3.26
			Availability of better infrastructure facilities of other fields	3.31

Source: Field survey, November 2017

Note: 1-Strongly does not agree, 2-Not agree, 3-Moderate, 4-Agree, 5-Strongly agree

#### **4.3 Lessons learned from the progressive farmers – analysis and discussion on selected cases**

This section of the paper analyzes the results of four cases of progressive young farmers in the scheme by considering their risk-minimizing behavior in yield and output price. These four case studies were selected based on their resource endowment and interest in continuing with farming. Table 7 presents the profile of the farmers chosen as cases. It reveals that these farmers are middle-aged and educated, with sufficient farming experience. Compared to other young in the scheme, they are rich in land size and assets owned.

**Table 7: Basic features of selected progressive farmers**

Item	Farmer			
	A	B	C	D
Age	38	34	38	32
Educational level	GCE O/L	GCE A/L	GCE O/L	GCE O/L
Experience in farming	24	17	22	16
Land size	Papaya – 7 acres Mango – 3 acres Coconut – 4 acres Minor crops (intercropping with papaya)	Papaya – 4 acres Banana – 1 acre Minor crops – 1 acre	Papaya – 1 acre Chili – 0.5 acres Pumpkin – 1 acre	Banana – 2 acres Chili – 0.5 acres Cassava – 1 acre Papaya – 2 acres (mixed way with banana)
Assets	Lorry (small), two four-wheel tractors, canter, van	Lorry (small); four-wheel tractor, two-wheel tractor, canter	Two-wheel tractor	Four-wheel tractor, small lorry
Vision	To establish an agro-based industry	To expand the extent of the alternative crop system	To become an entrepreneur	To continue with farming

Source: Field survey, 2017

#### 4.3.1 Alternative crop systems

These farmers have used different approaches to minimize the farming risks regarding yield and price of output. They have experienced yield fluctuations due to changing weather patterns (drought and floods), the spread of diseases and pests, and a higher level of price volatility of agricultural commodities due to change in supply and demand patterns.

#### 4.3.2 Risk minimizing behavior in terms of yield and output price

These farmers have used different approaches to mitigate the risk in farming related to yield and price of output. They experienced yield fluctuations due to changing weather patterns (drought and floods), the spread of diseases and pests, and a higher level of price volatility of agricultural commodities due to change in supply and demand patterns.

Farmer A uses papaya seed marketing information to determine the extent of land he plans for papaya cultivation in a particular season. Before deciding the land extent for cultivation, he collects information on papaya seed marketing from traders in the main papaya growing regions of the country, such as *Embilipitiya* and *Puttalam*. Then he compares those details with the previous season to predict whether the concerned season's papaya cultivation is high or low.

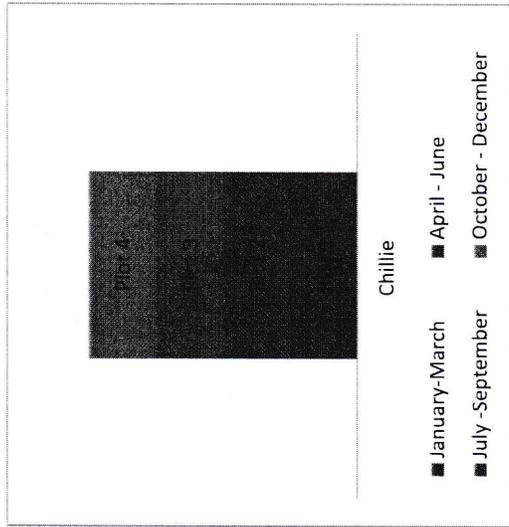
Suppose he confirmed that the quantity of seeds sold is less compared with that of the previous season. In that case, he increases the extent of land for papaya cultivation, assuming less harvest at the aggregate level in the harvesting period. The reason is that less extent of papaya cultivation leads to less yield and thereby generates a higher price.

Further, farmer A applies different crop plans—vertical and horizontal approaches—to address price volatility, thereby minimizing income vulnerability. He knows that the price of agricultural commodities fluctuates differently based on weather patterns (drought and floods), festival seasons, harvesting periods, and government policies on imports of agricultural commodities. Thus, he applies a horizontal approach (see Figure 1) for a particular marketable crop, in this case, chili. In this connection, two acres of land suitable for chili cultivation are divided into four plots and start cultivating each plot at different periods of the year without considering the weather patterns (rainy and dry periods) but contemplating the demand patterns. Farmer A's experiences have proved that this horizontal approach for a particular crop is a successful case because of his predicted price fluctuation for the year 2016 (see Figure 2).

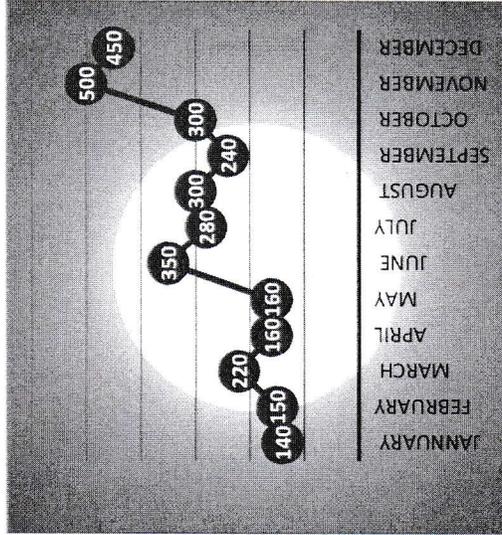
Farmer B applied the horizontal approach for a crop in papaya cultivation, dividing the land into two plots. His purpose is not to address possible price

fluctuations at the market (since he has an agreement with an export company) but to minimize the harvest loss due to potential threats of adverse weather patterns on crop systems.

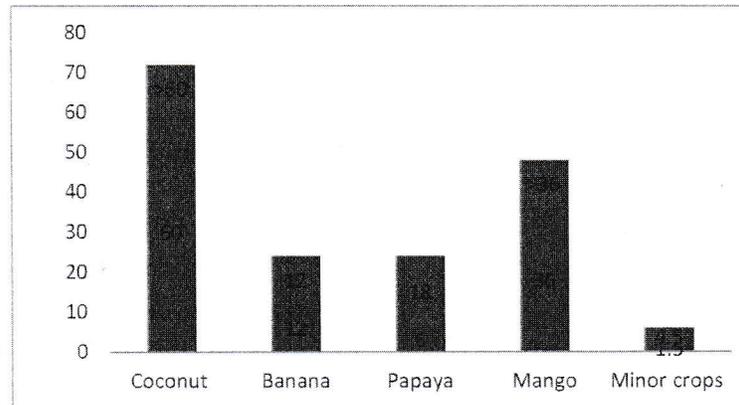
All interviewed progressive farmers apply crop diversification methods in a mixed approach—horizontal and vertical approaches. This denotes farmers grow short-term, mid-term, and long-term crops such as coconut, mango, papaya, banana, and minor crops, via an integrated approach. By applying this method, farmers aim to stabilize agricultural income, generate income throughout the year, and minimize the possible risk of the price down of certain crops on farm income. Figure 3, depicted using case study data, signifies the period of starting the harvest. It indicates that a mixed approach has allowed the farmers to have income at different months of the year. This is an exciting point found by the study as rice farming derives income only two times per year. It proves that the mixed approach helps to stabilize farm income and farm income generation throughout the year.



**Figure 1: Annual cultivation plan of Chile**  
 – horizontal approach  
 Source: Field survey, 2017 (case of farmer A)



**Figure 2: Farmer prediction on price movements**  
 – Case of Chile  
 Source: Field survey, 2017 (case of farmer A)



**Figure 3: Cultivation plan –Vertical approach**

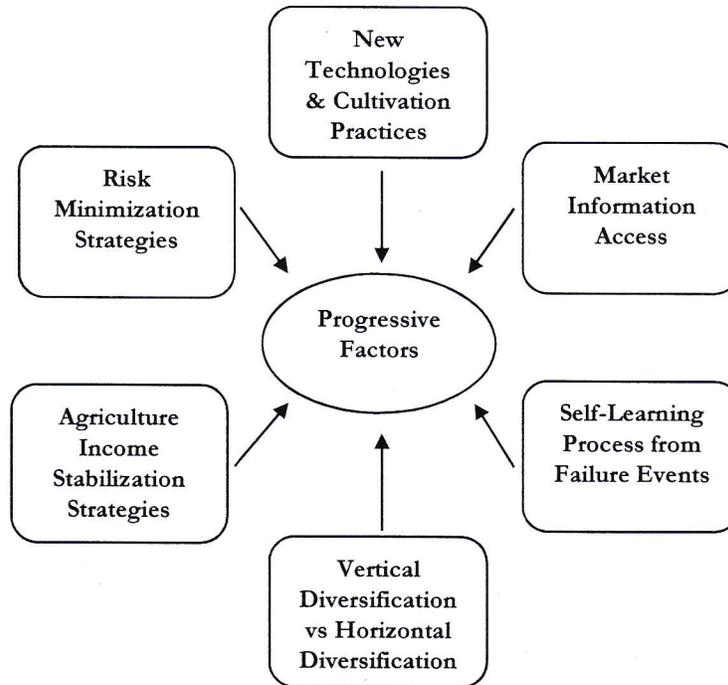
Likewise, these farmers apply different cultivation techniques and crop management systems to minimize the yield and price risk.

Before starting papaya cultivation, first, the farmer A and B search the degree of prevalence of diseases in papaya cultivation in the area. If they confirm the incidence of infections in papaya cultivation is high in the area even in the last season, they move to the new cultivation region – in this case, from the *Huruluwewa* area to the *Horowpathana* area. If low, they stay with cultivation in the area. These farmers apply this technique to avoid possible threats of diseases to papaya cultivation.

Second, all selected farmers cultivate against the rainy calendar in the region. Specifically, minor crops and mid-term crops such as bananas begin to grow during the period, where other farmers who solely depend on the rainy calendar and irrigated water fail. According to farmer A, the planting period may fall into a heavy rainy period not suitable for planting using this technique. However, to address this possible problem, they use different land preparation and water management techniques compared to other farmers. These farmers apply this technique to gain price advantages during the off-season or high-demand periods such as festival seasons or fewer supply periods such as off-seasons.

Third, all farmers control the diseases by following guidelines provided by the extension officers in the area. Techniques adopted in land preparation, planting, fertilizer application, disease control, and harvesting stages are primarily based on guidance given by the extension officers in the region. Farmer A and B follow the guidelines of buying companies to provide a quality product to the buying companies.

The analysis of these selected four cases proved that these are innovative farmers who think out-of-the-box (out of the traditional farming system in the scheme). They have entrepreneurial freedom to farm as structural rigidities in the scheme do not influence them because of their out-of-the-box thinking ability.



**Figure 4: Progressive factors influencing the young to earn higher income from farming**

## 5. CONCLUDING REMARKS

This study attempted to explore the reasons for the less interest in farming of younger generations in the agriculture colonization schemes in Sri Lanka via an empirical survey in the *Huruluwewa* Colonization Scheme in the NCP. First, the study identified the economic, social, environmental, and technological factors which influence the young to move out of farming. Second, the study attempted to identify specific features and strategies adopted by self-motivated young farmers interested in continuing with farming, in identifying appropriate lessons to enrich the interest of young in farming.

The analysis revealed that less predictability or high uncertainty of farming income due to risk involved in price and productivity and production is the critical reason for youths' decision to continue farming. The root causes of this issue are drought and marketing-related reasons. Lack of innovativeness in farming or less ability of farmers to think out-of-the-box is the key factor affecting the frustrated view on farming in the scheme.

The analysis of social factors indicated that less social recognition of farming is the main reason for young to decide on moving away from farming. This is mainly due to economic and social stagnation of the communities, or less or slow transformation of this sector for many decades relative to other industries. This has created multiple adverse effects on second and third generations of the scheme, e.g., in terms of societal, for instance, outmigration (both temporary and permanent), social issues in marriage, crimes, and drug addictions. Fear of adverse health effects due to pesticide and herbicide usage in farming was an emerging environment-related factor influencing youths' decisions.

Limitations over investment and technology adaptation due to land fragmentation and land rights associated explicitly with the Land Development Ordinance of 1935 are some deterrent factors influencing youths' decision to continue farming.

The case studies of progressive young farmers revealed the lessons required by the young to continue with farming. According to the lessons learned from progressive farmers, the conditions which required to think out-of-the-box by young farmers are to do experimental farming for higher yield, innovative ways of market risk diversifications for better market return, innovative ways of predicting future market trends, particularly the supply side, and thereby the prices, and innovative ways of practicing farming techniques.

The study findings indicate the need for innovative approaches to reduce risk in price and yield fluctuations in farming. In this connection, the establishment of the new supply management system and introducing novel crop systems to cater to the export market demand and high middle classes are essential. Second, the stagnated economic and social status of agrarian structures in the colonization schemes is mainly due to less attractiveness of capital by the farming sectors or agro-based industries relative to other sectors. Thus, it is essential to improve capital attractiveness in the farming and agro-based industries in keeping interest rates low relative to other sectors or establishing conditions for higher returns in farming or agro-based industries relative to other sectors.

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