Research article

Aspects of the Aging Farming Population and Food Security in Agriculture for Thailand and Japan

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Abstract This paper highlights the aging farmer population and food security in agriculture, an issue for both Thailand and Japan. The increase of elderly population in both countries is particularly marked in the agricultural labor force as the number of agriculture labor force has continually decreased due to the exodus of young farmers from agriculture. This has significantly impacted food security. The 152 Thai and 10 Japanese respondents, consisting of farmers aged over 55 years were sampled using a purposive sampling technique that was based on the interviewing survey carried out on August-December 2011. For techniques of data analysis, the descriptive statistics and cohort method were used. The results present an increasing trend of aged farming population and aging farmers mainly engaged in farming aging 65 and over in both countries. In case of the increase in Japan, it can be explained by the number of post-retirement farmers. It is interesting to note that the aging trend increases in number partly due to a slower rate of exiting from farming. The disadvantage is that older farmers would be much less efficient in agriculture, especially rice cultivation. However, the role of maintaining a farm land can be entrusted to the aging famers. From the survey, it was found that food insecurity is a risk due to a reduction of the farm labor force and the aging society. Yet, most farmers in both countries believed that a shortage of farm labor force has probably not given rise to a problem of food insecurity because in modern agriculture less labour is needed and the use of machinery is increasing. Thus, the government should improve access to modern technology and machinery to increase efficiency for coping with the above situations.

Keywords older farmer**,** post-retirement farmer, population mainly engaged in farming, cohort method, part-time farmer, full-time farmer

INTRODUCTION

In most countries, population aging tends to be greater in rural areas than in cities (Gerardo, 2005). This is because rural-to-urban migration is usually highly age-selective, involving mostly young adults who migrate to cities to seek urban employment (Gustavo, 2008). As a result, the population left behind in the countryside typically have higher proportions of older people (Gerardo, 2005). According to National Statistical Office (2011), in Thailand the agricultural population, over 65 year old occupied nearly 10% of the population. For Japan, over the 50-year period, from 1960 to 2010, an annual rate of decrease of roughly 1.16% for farm household has brought the agricultural population down to 6.50 million in 2010 (Ministry of Agriculture, Forestry and Fisheries(MAFF), 2011). As the younger population has moved out of agriculture, the aging farming population has become more prominent. Consequently, the agriculture sector will increase the reliance on the elderly population for labour. The aging of producers in the low capital-intensive agricultural sectors of many developing countries could imply lowering of the productivity of labor (Philippe,

2011). Probably labour productivity is one of the greatest stress areas that the rural exodus exercises on the food stability of these countries.

To date, there has been little research into the aging farm labor force in Thailand and Japan. This issue is a major problem for rural development, so there is a need for more research to quantify the current situation. Thus, this study has focused on the change in population demographics as its impact on food security in both Thailand and Japan and the prospective role of the aging population as a farm labor force for agricultural development.

METHODOLOGY

The research used secondary data to analyze the expected rural population and numbers predicted to be engaged in farming for the next 25 years in both Thailand and Japan. It also used primary data from a survey carried out in Khon Kaen, Thailand in 4 villages; Nonkaow village, Wangto village, Nontoon village and Tarae village; and in Tottori prefecture, Japan. A total of 162 respondents made up of farmers aged over 55 years in Thailand and Japan were sampled using a purposive sampling technique. 10 respondents from Japan also were members of Inaba Japan Agricultural Cooperative (JA). This research was based on an interviewing survey that was carried out during August-December 2011. For techniques of data analysis, the descriptive statistics and cohort method were used. With a differentiation of data collection period, Japan began in 2005 (Uchida, 1998) but Thailand since 2003 (National Statistical Office, 2011). For prediction, in Japan it can be calculated at provincial level as Tottori prefecture; but in Thailand, it must be forecasted on a national level due to a lack of data at provincial level. In case of the total number of agricultural population, less than 14 years has been estimated according to Uchida's method and the group aged over 75 years was compared with the general population aged over 75 years in Tottori province for Japan and in national level for Thailand (Uchida, 1998). This study also collected data from a discussion with Japanese scholars and professors in Tottori University.

RESULTS

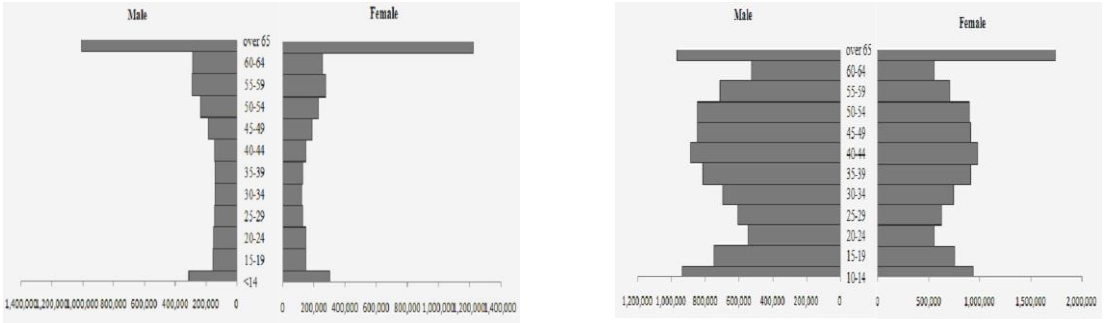
Current Situation and Tendency of Aging Population in Agriculture

According to the 2010 Census of Agriculture and Forestry (MAFF, 2011), in Japan, the number of farmers has fallen by half since the 1980s. The number of Japanese working in agriculture and forestry declined to 2.6 million in 2010, down from 5.43 million in 1985. The average age of Japanese working in agriculture and forestry was 65.8 in 2010 (Figure 1-a). The rate of aging population aged over 65 years increased by 34.3 % in 2010 compared to 8.2 % in 1960.

Thus, the total number of farm household members will have steeply fallen, as the number of aging farmer household members will be rising. In Thailand, on the other hand, the aging farmers have shown an increasing number of agricultural workforces from 4.5 % in 1980 to 16.7% in 2008 while agricultural workforce aged 15-39 represented the fallen proportion to 37.2 % in 2008. In contrast to this group, the agricultural workforce aged 40-59 increase by 36.1 % in 2008 compared to 27.4% in 1985 (Fig. 1-b). From this analysis, it can be concluded that the reduction in the young farming labor force has had effects of rapidly aging of the agricultural workforce. Table 1 showed that the rising portion of older farmers is due to an absolute increase in their numbers as well as a steady decrease in the number of farmers aged under 65 in both Japan and Thailand.

For Tottori prefecture, Japan, in the next 25 years the agricultural population aged over 65 is expected to be reduced from 34,656 persons in 2005 to 33,743 persons in 2030; and from 74,468 persons in 2005 to 12,725 persons in 2030 for the population aged under 65. In contrast, for Thailand, the total number of farming population aging under 65 is expected to decline from 18.07 million in 2003 to 16.64 million in 2028 or around 19% in 2003-2028. But the total agricultural population and population mainly engaged in farming aging 65 and over has a greater number than other age groups similar to Japan (Table 1). From this viewpoint, the aging trend is partly due to a slower rate of quitting from farming. Regarding Japan, the number of farmers aging 65 and over

shows an increasing figure. This increase may indicate the number of post-retirement farmers[1]. The post-retirement farmers can be classified into 3 categories based on pension income as follows: First, post-retirement farmer at early retirement age who are aged 50-54 years; Second, post-retirement farmer at first period retirement age who are aged 55-59 years and Third, post-retirement farmer at second period retirement age who are aged 60-69 years (Sawada, 2003; Supaporn and Tsuneo, 2005). The number of post-retirement farmers began rising from the 1990s; especially, in 2005-2010 period. This increase was due to the number of those who were born at the peak period of births; the post war "baby boom" of 1945-1949.



a) Japan, 2010 **b) Thailand, 2008**

Fig. 1 Farming population by age group

Table 1 Prediction of the number of farming population and population mainly engaged in farming for the next 25 years for Tottori province of Japan and for national level of Thailand

Tottori Province, Japan (person)												
Age group	farming population						population mainly engaged in farming					
	2005	2010	2015	2020	2025	2030	2005	2010	2015	2020	2025	2030
Under 30	29735	17454	11469	7836	5714	4246	2551	1044	619	438	332	251
30-54	30481	20378	13624	9584	7107	5064	4439	2681	1794	1360	1166	979
55-64	14252	16309	14169	9400	5259	3415	7050	6743	5281	3088	1833	1283
Over 65	34656	32528	35023	38312	37266	33743	27031	22965	22081	22451	21253	19955
Total	**109124**	**86669**	**74285**	**65132**	**55346**	**46468**	**40171**	**33433**	**29775**	**27337**	**24584**	**22468**
Thailand (1000 persons)												
	2003	2008	2013	2018	2023	2028	2003	2008	2013	2018	2023	2028
Under 30	7482	5711	6496	5940	6144	5992	1077	616	1057	679	1081	1029
30-54	8697	8538	10482	8037	11053	8663	2947	2653	3412	2442	3780	2193
55-64	1894	2496	1936	2154	2082	1986	574	609	548	550	573	502
Over 65	1560	2050	2775	3587	3867	4454	320	255	291	349	393	449
Total	**19633**	**18795**	**21689**	**19718**	**23146**	**21095**	**4918**	**4133**	**5308**	**4020**	**5827**	**4173**

Source: author's calculation

Older farmers in agriculture of Japan

From the survey applied to 10 respondents, the majority of the farmers were averagely 66.7 years old. Seven were high school graduates and only three farmers were college graduates. The average number of family members who reside together was 2 but most households involved in farming are elderly couples that can receive some assistance from the children who live in the cities and return home on holidays like Golden Week. The type of farming work for households can be divided into

[1] The post-retirement farmer is defined as farm household members who mainly engage in a non-farming job and change to only a farming job after retiring from a non-farming job.

2 categories as follows: (1) part time farmers; that is, farmers who regularly do non-farm jobs but help farming on weekends (Saturday and Sunday). They do farming part time before retiring from their regular jobs; and then, after retiring they work as full time farmers. These farmers generate income from not only their pension but also their farming job. The share of pension amounts to more than 50% of total income. (2) Full time farmers; that is, farmers who work in farming job before and after 60 years as full time farmers. Of the 10 farmers, most have changed from part time farmers to full time farmers. They are post-retirement farmers at second period retirement age who have been working as farmers for around 6-7 years after retirement and will expect to do farming activities for around 10 years more. Only 3 farmers have always been full time farmers, and have farming experience of 45 years. They intend to continue farming for next 10-15 years. The motivation of this farmer type is to protect their land because they have no successor to continue farming. Moreover, most landholdings are small in size of 2.53 ha for rice paddies and of 2 ha for upland fields (Table 2). There are four types of agricultural cultivation; that is, rice-vegetable, rice-vegetable-flower, vegetable-flowers and vegetable that are operated by four, one, two and one farmers respectively. The fruits grown are persimmon, plum and lemon and the vegetables grown are tomato, Japanese radish, kidney bean and goya etc. Only two farmers grow flowers for sale such as pansy and lily. They grew rice once a year due to a very cold winter, and they worked 6.5 hours/day in planting period and 8 hours/day in harvesting period. They also cultivate crops in urban areas around houses, making vegetable plots and then bringing their small amount of products to sell through Japan Agricultural Cooperative (JA). As above mentioned, the farm size of rice paddy is small leading to be much less efficiency in agriculture. However, the older farmers have been conservative on rice cultivation leading to slow down in the number of farm households growing rice. They expand the area of their farm land through the use of rental lands.

Table 2 Farm size of landholding and cultivated area in Japan

Farm size (ha)	Landholding (No, %)		Cultivated Area (ha, %)			
	Paddy field	Upland field	Rice	Vegetable	Flower	Fruit
0.1-0.3	-	-	-	2 (20)	-	-
0.4-0.6	-	1(10)	-	1 (10)	-	-
0.6-0.9	-	2 (20)	1 (10)	2 (20)	1 (10)	1 (10)
1.0-3.0	4 (40)	4 (40)	4 (40)	3 (30)	1 (10)	1 (10)
3.0-6.0	3 (30)	3 (30)	2 (20)	-	2 (20)	1 (10)

Older farmers in agriculture in Thailand

For over 90% of farm households, farming is the main occupation. The remainders have non-farm jobs as main jobs. The average age of farmers is 63.5 years. 5.3% (8 households), four farmers previously worked in non-farm jobs as government workers and after retirement entered into farming. These farmers moved from part time farmers to full time farmers. Three farmers worked in factories and after reaching the age of 55 and over, changed to farming. Formerly, they helped farming activities such as rice harvesting. Just one farmer has had a small private business while doing a farming job until now. The motivation of continuing farming activities is being successors (42.8%), generating income (3.2%), occupying a farm land (38.2%), and no successor (15.8%). Regarding the size of landholding, most farmers have 1.0-2.99 ha and only five households have a bigger size of land. Just two households do not own land. Most farmers grow rice with less than 1.0 ha, while a small number grows either cassava or sugarcane in areas less than 1.0 ha and 1.0-2.99 ha respectively (Table 3). Although they do farming with small size lands, they can protect farm lands from other sectors same as Japan and also support farm activities especially rice cultivation, leading to be conservative rice cultivation farmers like Japan. With most of the farmers growing rice in a single crop, this research has focused on the number of working days and hours as shown in Table 4. It was found that they mostly used working days and hours in transplanting, applying fertilizer and harvesting. The main farm labor force is the farming couple but their children help transplanting and harvesting. Also, some households have hired labor and used machinery in transplanting and harvesting.

Table 3 Farm size of landholding and cultivated area in Thailand

Farm size (ha)	Landholding (No, %)	Cultivated Area (No, %)		
		Rice	Cassava	Sugarcane
<1.0	34 (22.4)	72 (47.3)	9 (5.9)	10 (6.6)
1.0-2.99	84 (55.3)	68 (44.7)	5 (3.3)	12 (7.9)
3.0-5.99	27 (17.8)	6 (3.9)	2 (1.3)	5 (3.3)
6.0-9.0	5 (3.3)	-	-	-

Table 4 Average number of working days and working hours for a single crop

Activities	Number (day)	Number (hour/day)
Soil preparation	3.89	1.61
Transplanting	5.31	5.56
Applying fertilizer	5.45	2.06
Weed control	3.93	1.83
Harvesting	6.43	5.61

Older farmers and food security for Japan and Thailand

The opinion of aging farmers in both countries regarding the food security issue was that food security is an issue caused by the reduction of farm labor force and the aging society. However, most believed that the shortage of farm labor has not actually given rise to a problem of food security as modern agriculture needs smaller labor force and the shortage of labor can be covered by the use of modern machinery. In addition, the impact of high oil prices has partly led to food insecurity because food prices are increasingly corresponding to the price of oil. This is also because of a rise in production costs, such as fertilizers. Another factor is the increasing demand due to the increase of population and income (Table 5). In the same table it was found that no significant difference in opinion of food security in agriculture could be detected between Japan and Thailand. As above mentioned, Thai farmers have recommended that the production pattern should be diversified by growing crops other than main crops such as perennials while Japanese farmers thought that they should change commercial production to sustainable production; that is, increasing crop diversification to increase self-reliance leading to be a source of food support for consumers.

Table 5 Opinion of food security in agriculture for Japan and Thailand

Items	Japan		Thailand		Test of Difference*
	Frequency	Percentage (%)	Frequency	Percentage (%)	
Increasing aging farmer	3	40	49	32.24	
Impact of high oil prices	1	10	27	17.76	2.047^{ns}
Shortage of farm labor	5	30	68	44.74	
Increasing demand	1	10	8	5.26	
Total	**10**	**100**	**152**	**100**	

**Difference was compared using chi-square test; ns = non-significant*

DISCUSSION

With an increasing trend of aging farming population, agriculture and rural development will be increasingly encouraged by older persons (Gustavo, 2008). Older farmers have expansive knowledge and experience of agricultural production that are conservative traditional agricultural practices and they can transfer their experience to young farmers in spite of that older farmers are less incentive for investment and innovation in agriculture (Stloukal, 2000) and are slower to adapt to the change in agriculture (Siamwalla, 2004). In other words, the aging of producers in the low capital-intensive agricultural sectors could imply a lowering of the productivity of labor (Philippe,

2011). However, the role of maintaining farm land can be entrusted to the aging famers with support from outside and use of mechanization. Thus, governments should improve the technological and crop seed development as well as machinery availability to increase production efficiency to offset production decreasing.

CONCLUSION

Population aging 65 and over has an upward trend in both counties. Older farmers in both countries have played a key role of farm land maintenance involving rice cultivation. In order to maintain food security both Thai and Japanese farmers should increase crop diversification other than main crops.

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