CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

Understanding the factors such as demographic, socio-economic and institutional influencing the households' participation in small-scale irrigation is useful for future policy designs. This study attempted to analyse major demographical, socio-economic and institutional factors influence the participation of farmers in small-scale irrigation and income in Trincomalee district, Sri Lanka. On the basis of the information collected from 100 households and taking into account all the methodological drawbacks of studying the factors of smallholder rural farm households' participation in small-scale irrigation and income, descriptive statistical analysis was carried out and compared with two groups such as irrigation participants and irrigation non-participants with respect to important demographic, socio-economic and institutional variables. Likert-scale analysis also was applied to determine the level of significant of the factors affecting the small-scale irrigation participation with income of farmers' household.

This chapter completes the documentation of this study by presenting conclusions and recommendations. Therefore, the research objectives are reviewed and conclusions are presented. Recommendation for the future research are also identified. Moreover, this chapter presents the summery of achievement of objectives and conclusions in section 5.2, in section 5.3 limitation of the study, in section 5.4 recommendations are also described and finally section 5.5 offers suggestions for further research.

5.2 Achievement of Objectives and Conclusions

The aim of the research was to analyse the major demographical, socio-economic and institutional factors influence the farmers' participation in small-scale irrigation and income. Corresponding to this aim, three objectives have been formulated.

The first objective was to review the literature, on demographical, socio-economical and institutional factors affecting the farmer's participation in small-scale irrigation

in Trincomalee district Sri Lanka. It was found that, factors of demographic: Gender and Age, Socio-economic: Education, Labour force, Size of cultivated land, Access to market and Distance to water source, Institutional: Extension service and Access to credit facilities were identified as the influence factors of participation in small-scale irrigation.

The second objective was to identify the effects of demographic, socio-economic and institutional factors affecting farmers' participation in small-scale irrigation. It was found that, Labour force, Extension service and Distance to water source were found in chi-square test results that 0.001. This results imply that they have a strong significant relationship with irrigation participation. Age, Gender, Access to market, and Credit facilities were found as 0.041, 0.033, 0.002 and 0.028 respectively. Those factors have the moderately significant relationship with irrigation participation. Size of cultivated land, Education had failed to show the significant relationship with irrigation participation and their chi-square test results were 0.432 and 0.501 respectively. In addition, Labour shortage was one of the problem faced by respondents for weeding, harvesting, threshing, watering, livestock herding and ploughing. 64% of irrigation participants and 34% non-irrigation participants faced labour shortage problem. Because comparatively irrigation participants cultivate more land and they use irrigation, so they need more labours than non-participants. The respondents who didn't get the credit facilities, they reported because of high interest rate, not available on time and shortage of money for down payment were reasons.

The third objective was to determine the level of significant factors which effects in small-scale irrigation participation with income of household. It was found from income level verse Irrigation participants and non-participants analysis, 58% of the respondents who were participating in irrigation had the income of above Rs.20,000 monthly while only 34% of the respondents who were not participating in irrigation had the income of above Rs. 20,000 monthly. It disclosed that irrigation participants had the higher income level than non-participants. Further, preference factors of respondents and likert-scale analysis revealed that Extension service, Distance to water source, Labour force, Access to market, Gender, Credit facilities, Age, Education, and Size of cultivated land were found in descending order of level

significant factors which influence in small-scale irrigation participation with income.

5.3 Limitation of the study

This study is limited to small- scale irrigation participation of farmers. Small-scale irrigation is, usually on small land plots where farmers have the majority controlling influence, using a level of technology which they can operate and maintain the scheme effectively. According to the Sri Lankan situation, the cultivatable area of small-scale irrigation is less than 200 acres. This system comes under the purview of the Department of Agrarian Services. Other than the small- scale irrigation, large-scale irrigation also available and its cultivatable area is more than 200 acres. The cultivation lands comes under major and minor irrigation tanks are in this category. The central irrigation department and provincial irrigation department are the organizations responsible to manage this large-scale irrigation schemes.

5.4 Recommendations

Based on the findings what we have got in the analysis part the following policy recommendation remarks can be drawn for further consideration and improvement of irrigation development and income in the district Trincomalee, Sri Lanka.

The study revealed that participation in small-scale irrigation increases household income, there are no sufficient sources of water even for those who take part in irrigation. Therefore, the government has to incentivize farmers to undergo water conservation practices and in addition to surface water the water board, has to also dig underground water for small-scale irrigation is likely to be valuable for future irrigation development.

Extension service is a corner stone of agricultural practices in general particularly for irrigation development. Access to extension services was positively and very significantly related to both farm households' participation in small-scale irrigation and income. We recommend Agricultural faculties around Sri Lankan Universities and colleges to train quality development agents especially irrigation experts in adequate number to the rural areas would increase the contact and flow of information between the Agriculture Inspector and farm households to increase their

participation in small-scale irrigation, thereby enhance the production and productivity of the rural sector.

The gender difference of household heads in irrigation participation and income indicated female-headed households face shortage of labor and market information, made them rent or share out their land to the male headed household heads. As a result the likelihood of participation and income of female headed household heads are less than the male headed household heads. Therefore, the government has to find out ways to increase their probability of participation and enhance their income. For instance, ensuring property ownership (e.g. motor pump) to female-headed households and provide subsidized credits are some mechanism of increasing female-headed household's participation in small-scale irrigation and enhance their income level.

Furthermore earning from irrigation are affected by the marketing channel, in part because the main irrigated crops are harvested at similar times by farmers and are perishable. Since there is quality deterioration of their products due to lack of efficient storage and post-harvest processing mechanisms, farmers sell their products by cheap price during harvest period. Therefore, an effective marketing system will facilitate irrigation participation. Hence, the concerned bodies like governmental extension services, farmers' cooperatives and non-governmental market organizations should support the further development of the efficient marketing systems in the study area. This may include provision of marketing facilities and information provision. In addition to this the government should establish irrigation co-operative and integrate to market is crucial in order to the farmers get reasonable price for their produce.

5.5 Further Research

Following could be given as suggestions for future research.

a) This study can be further progressed to analyse large-scale irrigation participation of farmers in Trincomalee district. The government of Sri Lanka allocating sufficient funds to maintain the vast amount of irrigation structures in the country. Under the present financial crisis in the country, it is highly unlike to invest such a huge allocation for operation and maintenance of irrigation structures.

b) This study focused on only the factors affecting irrigation participation in small-scale irrigation. The cost and benefits of farmers engaging in irrigation participation was not included in this study. Therefore, this study further extended to find the cost and benefits of farmers while they are involving in irrigation participation. This results really motivate the other farmers who are not participating in irrigation management.

c) This study can be extended for further investigation on productivity variation among the farmers of irrigation participants and non-irrigation participants. This result will helpful to the government to invest further on irrigation related development activities in future.

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Appendix-A: Sample Questionnaire

Survey Questionnaire

The questionnaire is prepared to undertake a study "to analyse major demographical, socio-economic and institutional factors influence the participation of farmers in small-scale irrigation and income". Dear respondents, the result of this study will help different stakeholders and policy makers to make appropriate measures on irrigation development in the future. Your responses are confidential. Therefore, you are kindly requested to provide genuine responses. Thank you for your time and cooperation.

1.0 Background Information

1.1 Name of Division_____

1.2 Household head name (Optional): _____

1.3 Category of the household

☐ Irrigation user ☐ non-user

2.0 Household Demographical characteristics

2.1 Gender of the household head

☐ Male ☐ Female

2.2 Age of the Household head

☐ 18-28 ☐ 29-39 ☐ 40-50 ☐ 51-61 ☐ 62-72

3.0. Household Socio-economic characteristics

3.1 Education level of the household head

☐ Illiterate ☐ Elementary (grade 1-6) complete

☐ Junior (grade 7&8) complete ☐ High school and above (grade 9 and above)

3.2 Age and sex of all household members of Family Labour Force

Total Number of household member's _____

Member No	Name (Optional)	Gender 1. Male 2. Female	Age

3.2.1 Do you face labour shortage?

☐ Yes ☐ No

3.3 The number of cultivable area in acres

☐ 0-2 ☐ 3-5 ☐ 6-8 ☐ 9-11 ☐ 12-14 ☐ 15-17

3.4 Distance from the nearest market place from your cultivable land in km

☐ 0-2 ☐ 3-5 ☐ 6-8 ☐ 9-11 ☐ 12-14

3.5 Distance between the sources of water to your irrigated land in km

☐ 0-2 ☐ 3-5 ☐ 6-8

4.0 Household Institutional Characteristic

4.1 Do you receive any sort of extension services available in your locality?

☐ Yes ☐ No

4.1.1 How often do you get assistance from extension officers per month?

☐ Once ☐ Twice ☐ Thrice ☐

4.2 Did you get credit facilities for your agricultural production?

☐ Yes ☐ No

4.2.1 If 'yes' what are the sources?

☐ Banks ☐ Friends/relatives
☐ Traders ☐ Micro finance
☐ Local lenders ☐ Others

4.2.2 If 'no' what are the reasons?

☐ High interest rate ☐ Not available on time
☐ No need ☐ Shortage of money for down payment
☐ Other

5.0 Factors affecting small-scale irrigation participation with income

5.1 Please indicate the monthly income from agriculture

☐ 0-10,000 ☐ 10,000-20,000 ☐ 20,000-30,000 ☐ 30,000-40,000
☐ 40,000-50,000

5.2 Do you agree that the following factors effects irrigation participation with income?

Gender	☐ Yes	☐ No
Age	☐ Yes	☐ No
Education	☐ Yes	☐ No
Labour Force	☐ Yes	☐ No
Size of cultivated land	☐ Yes	☐ No
Access to market	☐ Yes	☐ No
Distance to water source	☐ Yes	☐ No
Extension service	☐ Yes	☐ No
Credit Facilities	☐ Yes	☐

5.3 If yes, Please indicate the level of significant of the factors, those affects the irrigation participation and income.

	Low				High
Gender	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Age	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Education	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Labour Force	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Size of cultivated land	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Access to market	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Distance to water source	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Extension Services	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
Credit Facilities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Appendix-B: Conversion factors used estimate man equivalent

Years of age	Men	Women
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.70
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.80
30-60	1.00	0.82
60plus	0.84	0.74

Source: Haile (2008)