



## Comparative analysis of profits of paddy cultivation under owner - cultivated land and tenant-cultivated land

Kajenthini Ganeshamoorthy<sup>1\*</sup> and Prasad Serasinghe<sup>2</sup>

<sup>1</sup>Department of Economics, Faculty of Commerce and Management, Eastern University, Sri Lanka

<sup>2</sup>University of Colombo, Sri Lanka  
kajethinig@esn.ac.lk

Available online at: [www.isca.in](http://www.isca.in), [www.isca.me](http://www.isca.me)

Received 5<sup>th</sup> March 2018, revised 20<sup>th</sup> May 2018, accepted 10<sup>th</sup> June 2018

### Abstract

*The economy of Batticaloa district depends mostly on agriculture and fishing for livelihood. In Batticaloa district farmers use approximately 61,321 hectares of paddy land in out of total land to cultivate paddy seed. Nevertheless, not all of them own paddy land for cultivation. Hence farmers, who encounter the shortage of paddy land, have to rely upon tenancy givers to access paddy land. Even though, in Batticaloa district, most of the tenancy agreements do not have a form of written contact and associate mostly with verbal agreements without any legal evidence. Thus, in the prevailing situations, farmers who have been engaging in either owner-cultivated land or tenant-cultivated land. In this circumstantial, there may be distinction in profit earning of paddy cultivation among both owner- cultivated land tenant- cultivated land. The main objective of this study is to examine the difference of profit between tenant – cultivated land and owner- cultivated land. The study is based on primary data, which was gathered during the 2015/16 paddy Maha season by a structured questionnaire. The study utilize four hundred sample of farmers were selected using both snow ball sampling and random sampling technique. To investigate the objective, OLS regression analysis was employed using Cobb Douglas production function. The results expose that, profit of paddy on tenant-cultivated land was not less compare to owner-cultivated land as well as there was no significance difference between owner-cultivated land and tenant-cultivated land in term of profit as there was a slight difference between tenant-cultivated land and owner- cultivated land in term of profit. Nonetheless, the study found that owner cultivated land is slightly higher in input use as well as cost of inputs also higher than tenant-cultivated land.*

**Keywords:** Paddy cultivation, profit, owner-cultivated land, tenant-cultivated Land, Batticaloa District.

### Introduction

Paddy farming being as direct source of income for the majority of the rural farmers as well as an indirect source of income for the providers of support services including paddy millers and traders of paddy and rice in Sri Lanka<sup>1</sup>. Around 879,000 farmers' families rely on agriculture for their survival in rural parts of Sri Lanka. This represents twenty per cent of the total population of the country. 807,763-hectares paddy lands, of which 524,803-hectares land is used for Maha season and 282,960 hectares of land is used for the Yala season<sup>2</sup>.

Similarly, paddy is the most important staple food and a mainstay for the rural population in Batticaloa district as most of people engage on paddy sector as well as the paddy sector offers employment opportunities for rural laborers in Batticaloa district<sup>3</sup>. In Batticaloa district, paddy is cultivated during two main distinct seasons, encompassing the Maha season from October to March, and the Yala season from April to September. Except these two seasons, farmers in Batticaloa also cultivate paddy in inter-seasonal period which is known as late maha. Maha season is continued to be reliant on monsoon rainfall due to lack of sufficient irrigation facilities, though Yala season depends on irrigation.

In Batticaloa district, Paddy cultivation has been experiencing fluctuation trend continuously. According to the statistics average Yield (Bushel/Net Acre) of Yala season was 62.20, 72.41 and 47.6 in 2005/2006, 2011/2012 and 2014/2015 during the periods respectively. Correspondingly average Yield (Bushel/Net Acre) of maha season was 71.38, 81.24 and 76.90 in 2007, 2009 and 2012 respectively. The lower paddy yield was in 2014/2015 at 47.6 bushels per acre in comparison to 78.17 bushels per acre in 2009/2010<sup>4</sup>.

In order to increase the profit through local production of paddy, Sri Lankan government has been supporting agricultural sector in various forms such as price support programmers, direct payments, and input subsidies to influence the cost and availability of farm inputs like credit, fertilizer, seeds, irrigation water<sup>5</sup>. Although, these assistant systems are not fully reachable by the local famers since there are issues involved regarding land ownership of the cultivated paddy in Sri Lanka.

Further, land is a vital component to obtain productivity in agricultural field. Some people are landless while others own excessively large extent of land. Some people who own land have no intension of farming while many of those who wish to

farm have no access to land. Thus, all farmers do not own agriculture land to engage in it for cultivating crops. Farmers, who own land, sometimes lease their land from others in order to expand the space for their cultivation as well as who has no own land they gain tenancy land to cultivate seed paddy<sup>6</sup>. In this case, farmers acquire paddy land to engage on for the purpose of cultivating seed paddy as well as increase the share of paddy cultivation. Eventually, tenancy takers obtain land under the tenant system to cultivate paddy. Thus, the present system of land structure and ownership is a culmination of a series of changes on the land tenure systems which were prevalent from early times<sup>7</sup>.

Tenancy givers provide most of the land for tenancy because of a number of reasons, such as lack of labour in their families to cultivate paddy, agriculture sector becomes unattractive, more involvement of family members in salaried jobs, major portion of income depends on other sources than agriculture, funds needed for urgent activity, could not maintain the paddy land and losses incur in paddy cultivation<sup>8</sup>. According to Chandrasiri, because of the lack of family labor in agriculture sector, it causes losses of income in paddy cultivation. This cause is an opportunity for the tenancy givers to lease their land to others. Applying the above-mentioned condition, inefficient paddy production has been being prevailed in Batticaloa district. In addition to this farmer also have been facing continuous loss in paddy cultivation. Therefore, paddy cultivation becomes unattractive sector as the sector possess numerous issues in profit earning.

There are different types of informal land transaction among farmers namely leased on cash, leased on fixed production and mortgage. Both tenancy takers and tenancy givers determine a leasing period for the usage of land. In tenancy system, payment condition, the amount of rent and other terms regard tenancy have no similarity. This is different from location to location under various conditions<sup>8</sup>. Nevertheless, there is a similarity in facing the problem by tenancy takers, even if the location differs in tenancy system.

Land tenure systems have not been modified properly in countries to develop agriculture sector<sup>9</sup>. In particular, tenancy cultivated land may not provide feasible to farmers to induce stable growth of paddy production. In Batticaloa district, most of the tenancy agreements do not have a form of written contact. It associates mostly with verbal agreements and made alone without any legal evidence. When tenant farmers engage on tenancy land, they do not access assistance regard paddy cultivation due to the informal tenancy system. Even if the government of Sri Lanka assists for paddy sub-sector in many forms, all paddy farmers don't get the access to assistance from the government. These farmers are not considered eligible to gain assistance, since they do not own the land. Even if they have tenancy land, it should not have ownership. Nevertheless, government assistance depends more on land ownership. Therefore, tenancy takers cannot access to government

assistance including cultivation loan, fertilizer subsidy, and sale of stocks by the paddy marketing board. Even if the government of Sri Lanka facilitates assistance for promoting paddy productivity, which is not reached to tenancy farmers. Thus, there is a similarity that, among tenant farmers who cannot assess the necessary government assistance since the absence of legal land rights on land. The absence of legal land rights on land, which appear as severe barriers to tenancy takers to access credit. In addition, informal land transaction appears to be a barrier for common management of irrigation due to informal operator don't act for by common management rules.

In Batticaloa district where informal land transactions have been being prevailed more like tenancy and mortgaging. It has been observed that farmers who have been gain tenancy land, which has no any legal document to prove the tenure. In Batticaloa district the absence of legal land rights, which would lead as barrier to obtaining government assistance. In addition, when farmer secures with tenure, they tend to invest in their paddy land, which leads to promoting productivity of land<sup>10</sup>. In general tenant farmers don't like to invest long run investment in promoting on lease in land, since long term investment gives its return in long term. Therefore, they usually invest in the short term than long run investment. It leads to lower productivity of lease in the land. Similarly, stability of tenure may induce farmers to tend sustainable land use practices and invest in soil productivity to increase profit<sup>11</sup>.

In input use and paddy production of tenant-cultivated land, which requires adjustment in the existing form of tenancy characteristics to obtain optimal utilization of available inputs. Though, there is no effort to adjust their tenancy system to raise their paddy yield and profit. Even if there is an act regard tenancy it is not implemented in the research area. Since now both tenancy takers and tenancy givers have not developed their tenancy agreement for receive assistance from the government under the tenancy system. Therefore, cost of input use and amount of input use may be differed among owner farmers and tenant farmers.

Generally, the cost of inputs is high in tenancy in the land compared to owner in land. This higher amount of cost occurs by land rent, seeds, seed treatment, and fertilizer and protection chemicals. In Sri Lanka paddy farmers, can access credit to lower interest and they can obtain fertilizer subsidized price regarding paddy sector. In this way, farmers can reduce their input cost of paddy cultivation. Vice-versa in the research area, even if the government facilitates assistance to paddy sector to reduce cost of cultivation, all of farmers could not access those subsidies to reduce their cost of paddy cultivation because of absence of ownership.

Furthermore, the government of Sri Lanka assists for paddy sub-sector in the form of, compensation and purchase of stocks by the Paddy Marketing Board, etc. Even though, all paddy farmers don't obtain those assistances from the government. If farmers'

paddy cultivation is affected by either natural disaster or animals, government provides compensations to corresponding farmers. Though, it would not obtain by tenant farmers in Batticaloa district. However, the government assistance depends more on land ownership. Even if they have tenant land it should not have ownership. As mentioned above, most of the tenancy agreements associate mostly with verbal agreements and made alone without any legal evidence. When tenant farmers engage on tenancy land, they do not access assistance regard paddy cultivation due to the informal tenancy system. Even if the government of Sri Lanka assists for paddy sub-sector in many forms, all paddy farmers don't get the access to assistance from the government for promoting paddy productivity. Thus, those are not obtained by all of farmers since farmers are being as a not eligible person to obtain the assistance due to absence of ownership.

In this background, there may be distinction in the use of inputs on paddy cultivation among both owner- cultivated land and tenant cultivated land. This may lead restriction in earning profit in paddy sector between owner cultivated land and tenancy cultivated the land. For that reason, present study attempts to investigate whether tenant-cultivated land differs in profit gaining from owner- cultivated land in Batticaloa district. Therefore, the key objective of this study is to analyze the difference of profit between tenant – cultivated land and owner-cultivated land in Batticaloa district.

**Literature Review:** This section reveals a brief review of the literature of pioneering studies on the profit of paddy cultivation under owner-cultivated paddy land and tenant-cultivated paddy land. Studies on the issues relating to this topic have been conducted by previous researchers.

Authors develop a theoretical model of land rental that comprises transaction costs of labor effort, risk combining motives and non-tradable capital inputs using multinomial logit model in Ethiopia. Their study exposed that owner cultivated land increases the average land productivity and profit. They also mentioned that, it did not impact significantly on labour productivity. Similarly, they found that there was no statistical significant effect of land lease system on profit. Additionally, they were reported that sharecropping system get eight percentage less than owner cultivated land. Under the sharecropping system, total input use and profit are lower than other tenancy provision<sup>11</sup>.

Scholars who studied land tenure arrangements on the intensity of investment in soil-improving measures and farm productivity in Pakistan. Their findings emphasized that “tenure security tends to increase the intensity of investment in long-term soil-improving measures” and when investment increase in soil maintenance, it also leads to an increase in the agricultural productivity significantly. Besides, their results revealed that tenure security decrease the intensity of chemical fertilizer. Thus, they point out that when tenure security exists and non-

farm work increases, it would be affected positively and significantly on the agricultural productivity. Overall, owner-cultivators are willing to invest more in soil-improving actions, due to higher security of land rights but less in chemical fertilizer<sup>12</sup>.

The relationships among land tenure, investment and implementation of Sawah rice production technology have been thoroughly studied in Nigeria and Ghana. Based on this study, the use of land tenure security effects significantly on the adoption of Sawah technology, causing higher returns in the long run. Therefore, they suggested that, to enhance the incessant adoption and considerable profit of this technology, problems of land tenancy rights must be appropriately established by farmers<sup>11</sup>.

In this line, a study exposing that there is difference between different land tenure system on gaining profit. Particularly paddy production of individual land tenure system was relatively more profitable than communal land tenure system<sup>13</sup>. Moreover, the average rental of major form of tenancy is equal to the marginal product of land, nonetheless the average rental under the contracts established is lower than the marginal product<sup>14</sup>.

A study on current land policy issues in India which explored that, in present most of the tenancy system particularly informal tenancy takers have occupied without any proper legal security under the tenancy system. Additionally, they can not to access credit from both bank and financial institutions. Further, the study has mentioned that if legalizing tenancy will also support to gain access of institutional credit<sup>15</sup>.

Following studies reported the input usage among owner-cultivated land and tenant- cultivated land. A study had given important to examine the input use among owner-cultivated land and tenant-cultivated land. According to the study, total cost of cultivation and net returns of owner-cultivated land was not similar with total cost of cultivation and net returns of tenant-cultivated land. In addition, cost on land rent, plant protection chemicals, fertilizers, seeds and seed treatment of leased in farmers was greater than the cost of owner farmers. Nonetheless cost on labour and organic manure was greater among owner farmers than leased in farmers. Total variable cost was higher among owner farmers than leased in land because of higher cost of labour than cost on rental<sup>16</sup>.

The study was conducted to analyse the land inequality influences in accessing input use in paddy production and also paddy productivity. Especially, the study revealed that, the government policies like fertilizer subsidy, agricultural credit (Agricultural credit is meant the provision of finance required for agricultural purposes or the means of facilitating the flow of capital, both working and fixed capital, into agriculture, whenever it can be profitably used), minimum support price policy that increases the share of input in Indian agricultural

system. Consequently, smallholders increase the share of inputs over the years than other farmers. In this circumstance, agricultural policies make worse the negative effect of land inequity on productivity. The study also indicates that share of inputs has been increased substantially, nevertheless a huge number of smallholders do not acquire to these inputs due to inequity of land, which is the primary reason for the inequity to negative effect on agricultural productivity<sup>17</sup>.

The concentration of investment of organic fertilizer and green fertilizer is lower to fixed rent tenancy takers related to sharecroppers. Though, fixed rent tenancy takers tend to use higher levels of chemical fertilizers compare to sharecroppers. In addition, the intensity of investment regarding organic fertilizer and green fertilizer is higher for owner cultivators than sharecroppers. Though, sharecroppers apply more of chemical fertilizers than owner cultivator<sup>13</sup>.

The share tenancy appeared to create serious implication to tenancy takers corresponding to using input if the contract was maintained by absentee landowners<sup>18</sup>. In this line literature also showed the difference in term of input use between landlord and tenant.

Similar to those studies another research also found that owner-cultivator obtains more profit compared to tenant<sup>12</sup>. Thus, previous empirical studies review show that owner-cultivated land is more profitable compare to tenant- cultivated land. Moreover, most of the studies have emphasized that tenure security tends to increase the concentration of investment in long-term consequently tenant can obtain efficiently profit of paddy. In contrast, a study found that productivity and profitability of paddy cultivation is better among informal operators compared to owner cultivators in Sri Lanka<sup>8</sup>.

**Conceptual Frameworks:** This section introduces the conceptual framework to analyse whether tenant-cultivated land differs in gaining profit from owner cultivated land. In order to

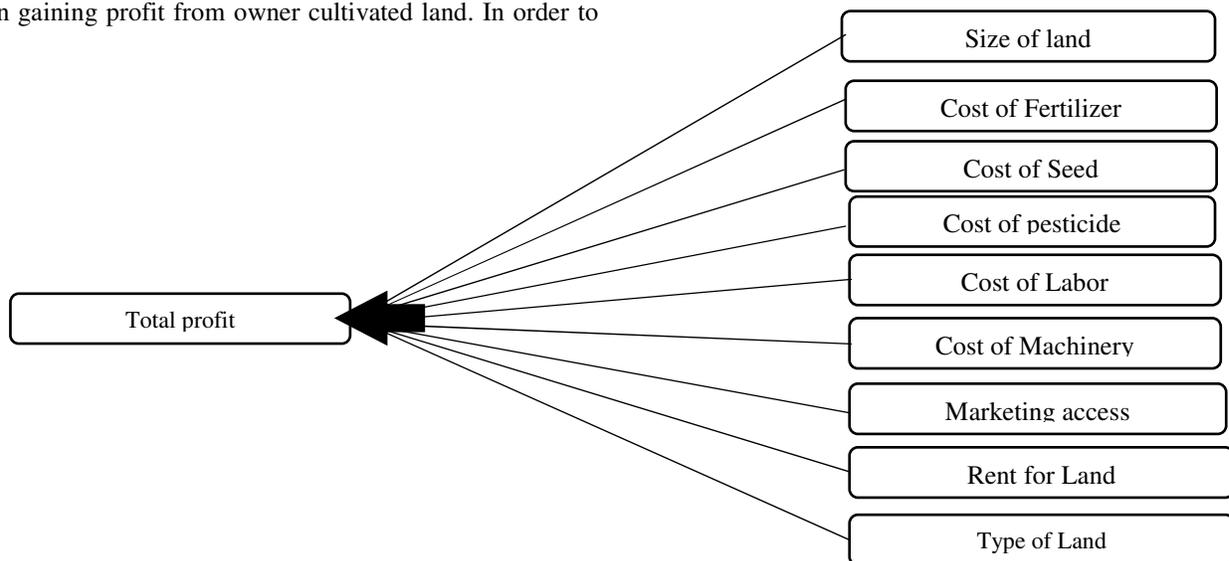
increase the farmers' output two vital things are ne necessary. One is financial assistance to enhance input use, another one is adequate price to increase marketed surplus and maximizing farmers profit. As paddy profit attributed to several factors, this study is carried out based on cost of production factors namely cost of inputs with land size and irrigation are determined mostly the profit of paddy since paddy cultivation depends on more inputs like seeds, fertilizer, irrigation, soil, pesticides etc., that influence the producing<sup>12</sup>. As mentioned above, institution arrangement and adequate price are expected to influence production it also assists to earn more profit. Present study considered that difference of accessing marketing board to both cultivated land.

Therefore, conceptual framework concerning profit, give importance to marketing access in which institutional assistance like marketing board, private rice mill also assists to sell paddy production to appropriate price.

The following Figure-1a framework for understanding the profit of paddy under the owner-cultivated land and tenant-cultivated land. Thus, developed conceptual framework is adapted from previous studies regarding this topic.

**Total profit:** Gross profit is the surplus which augment to a paddy farm when it subtracts its total costs in producing paddy yield from its total income received from the sale of paddy yield. Indeed, Cost of process of paddy cultivation should differs to both owner and tenant due to tenant has to pay rent to tenancy givers. Further this study has to investigate the profit difference among owner farmer and tenant farmer.

**Land size:** The expansion in total area harvested indicates much of the rise in rice production. Rise in total output was driven by horizontal expansion of land size through bringing extra land into cultivation<sup>19</sup>.



**Figure-1:** Conceptual framework on profit.

**Cost of Fertilizer:** Fertilizer's price is measured as total expenditure on fertilizer kilogram excluding transportation and application cost<sup>19</sup>.

**Cost of Seed:** Cost of seed is measured thus total expenditure which spend to purchasing seed to cultivate paddy by farmers.

**Cost of pesticide:** Cost of pesticide comprises both cost of pesticide and cost of herbicide. Farmers spend their money on purchasing to avoid or control the issues when paddy land is affected by diseases like insects, plant diseases, snails, weeds. In this study, both insecticides (Insecticides are a type of pesticide that is used to specifically target and kill insects into the paddy land) and herbicide (Herbicides are used to kill undesirable weeds which affect the paddy cultivation) are included into cost of pesticide.

**Labor cost:** The total expenditure on total cultivated acre consist of the calculated costs of family labor used in production and wage of hired labor<sup>19</sup>.

**Cost of machinery:** Machinery (Machinery is included into the farm mechanization which comprise use of tractors, motorized equipment in farming and other equipment like sprayers, pumps, irrigation and drainage equipment) utilized for farming operations such as land preparation, cultivation, harvesting, processing and transporting are used to increase the output per human-hour and maximize yields by improve operations. Previous researcher utilizes the machinery charge to conduct the research. Authors have utilized and their findings revealed that machinery affect negatively on owner-cultivated land<sup>17</sup>. Though, it showed insignificant effect on tenant- cultivated land. In contrast, another study has showed machinery include equipment has positive impact on paddy productivity<sup>13</sup>.

**Marketing access:** Marketing place should determine the price of paddy production. It would differ based on marketing place. There are different type of marketing access available namely private rice mill, agencies and marketing board. In particular, the government has facilitated guaranteed price scheme via marketing board. It is one of the institutional arrangement in order to maximize farmers' profit. Previous studies also have given important to marketing place to gain appropriate price to paddy production<sup>18</sup>.

**Rent:** According to Adam Smith, the rent of land varies with its fertility and situation. Thus, land rent differs land to land and different cultivated area to area. Previous authors have investigated the impact of land rent among owner - cultivated land and tenant-cultivated land. In this line, rent of lease in land influences the land holding size<sup>14</sup>. Further, if land rental price is reduced, it would lead to further raises in participation of farmers<sup>20</sup>. Farmer obtains land under the fixed rent which would reduce the inefficiency of paddy production<sup>10</sup>. Thus, tenant cultivated farmer can increase paddy productivity via fixed rent since fixed rent tenant land has positive effect on productivity,

as worthy noted that productivity of fixed rent tenancy land is higher than sharecropping agreements<sup>13</sup>.

**Type of Land:** Type of Land comprising both owner-cultivated land and tenant-cultivated land. It was employed to obtain study objective that to analyze whether tenant-cultivated land differs in profit gaining from owner-cultivated land.

Thus, to check the profit difference between owner cultivated land and tenant cultivated land conceptual framework has given important to cost of inputs and other factors rent and marketing access. In this line, inputs are considered as land size, cost for both family labor and hired labor, cost of seed, fertilizer cost, pesticides cost, cost of machinery, and irrigation with land rent and marketing place.

## Methodology

Using primary data, the study was conducted in Batticaloa district in Sri Lanka. Especially, the study is conducted using cross-sectional production data, which was collected during the 2015/2016 paddy production Maha season. Primary data was gathered by structural questionnaire survey from both owner farmers and tenant farmers. The interview also was conducted to gather further relevant data from the selected farmers and key target informative. Secondary data namely journal articles, books, statistical records, and central bank annual report were also utilized for further reference as well as secondary data were collected from Department of agriculture, Agrarian Service Centre and District Secretariat, Batticaloa.

The choice of the study area was random because of the concentration of paddy farmers in the area, while the selection of the paddy farmers in the sample was snow ball sampling as there were no records about total population of both owner farmers and tenant farmers. From selected ten Divisional Secretariat Divisions, Girama Niladari Divisions of 30 were selected by using random sampling technique. Thus, from each Divisional Secretariat Divisions, three Girama Niladari Divisions were selected for gathered data. Whereas, a total of 400 samples were selected who were both owner farmers and tenant farmers.

The term of profit in paddy cultivation under tenant-cultivated paddy land and owner-cultivated land was studied by fitting Cobb-Douglas production function. An Ordinary Least Square (OLS) regression were employed to analyse these research objective. The Cobb Douglas Production function was transformed to log linear form for analyse the objective by using employing Ordinary Least Square technique and the Model which were analyzed via the STATA computer software.

In this study, it claims that farmers follow same farm practices in Batticaloa district and climate change does not influence in the selected season (Maha 2015/2016), and especially cultivated was not affected by the natural disaster during this period.

Furthermore, the study limits itself that: i. Based on the period of study only Maha season 2015/2016 is selected to analyze the research objective, ii. The study was carried out in selected ten Divisional areas, out of fourteen Divisional Secretariat Division, Batticaloa district and can be generalized to other rest of four Divisional Secretariat Division. iii. The data gathered was limited to the Maha 2015/2016 season in which there is no effect of climatic factors. iv. Four hundred farmers were selected for both tenancy holders and owner cultivator. The usage of variables was determined by the availability of the data.

The present study specified the empirical function as follows:

$$\ln\pi = \beta_0 + \beta_1\ln SL + \beta_2\ln CS + \beta_3\ln CF + \beta_4\ln CP + \beta_5\ln CL + \beta_6\ln CM + \beta_7\ln MA + \beta_8\ln TL + \beta_9\ln RL + \varepsilon$$

Where:  $\pi$  = profit (Rs), SL = Size of land (acre), CS = Cost of Seeds (Rs), CF = Cost of fertilizer (Rs), CP = Cost of pesticides (Rs), CL = Cost for labour (Rs), CM = Cost of Machinery (Rs), MA = Dummy for Marketing access (1 = Agency 0 = otherwise, 1 = Rice mill 0 = otherwise and 1 = Paddy marketing board 0 = otherwise), TL = Type of Land (1 = Owner-cultivated land 0 = Tenant - cultivated land), RL = Dummy for Rent (1 = If farmers paid rent 0 = Otherwise).

## Results and discussion

**Empirical results of ordinary least square (OLS) regression analysis:** Finally, the research part explains the result of Ordinary Least Square (OLS) regression. It was utilized to analyze whether tenant-cultivated land differs in profit gaining from owner-cultivated land as profit is determined by not only input use but also cost of inputs and market price of yield. Hence, the study tried to examine the difference between owner-cultivated land and tenant-cultivated land in term of profit by using OLS regression analysis.

Further, the data was tested to check the fitness of the model. Accordingly, the data was checked for heteroscedasticity and the results showed that there was problem of heteroscedasticity since probability was found 0.3239. Therefore, the heteroscedasticity problem detected by applying robust regression. Like that, the data was checked for multicollinearity test for variables. It was also done by using variance inflation factor (VIF) which was 7.68.

The results also confirmed that there is no multicollinearity problem as there is no linear relation among explanatory variables. Furthermore, test for omitted-variable bias were done to improve the fitness of the model. The p-value is 0.0008 which lower than the usual threshold of 0.05, so we can conclude the model has no omitted variables in this study. Furthermore, the study has done to test model specification is linktest. It basically checks whether we need more variables in our mode. The result of linktest also conclude that our model is correctly specified. According to the conducted test, ordinary least squares (OLS) regression possesses the problem of

heteroscedasticity. Therefore, robust regression results are exposed in the Table-1.

The estimated coefficient of the robust regression function is presented as

$$\ln\pi = 8.951742 + 1.042188SL - 0.1526217CS - 0.1029271CF + 0.0518323CP - 0.0385497CL + 0.3294857CM - 0.6201738MA + 0.6942416MM - 0.2473325MR + 0.2106229TL + 1.20RL + \varepsilon$$

Where dependent variable is profit ( $\pi$ ) of paddy cultivation. SL refers to the size of land, CS is Cost of Seeds, CF is cost of fertilizer, CL is cost of labour, CP is cost of pesticides, CM is Cost of Machinery, TL is type of land and RL Rent for Land. Likewise, MA, MM and MR denotes way of marketing access in which MA denotes marketing by agency, MM denotes marketing by Marketing Board, MR represents marketing by Rice mill.

The comparison of profit gaining between owner-cultivated land and tenant-cultivated land, it was analyzed by using dummy variable (1 = owner-cultivated land and 0 = tenant-cultivated land). In general, type of land has the coefficient elasticity of 0.2106229 along with probability value of 0.002 which indicates that both owner cultivated land and tenant cultivated land significant positively on paddy profit at one percent level. It has revealed that both type of land impact positively in term of profit gaining in the study area. Though, the results should be focused separately, since this research utilized the variable as dummy. In this line, under the owner-cultivated land, the re-estimated coefficient elasticity is 9.162364 implying that an increase in the owner-cultivated land by one percent it would lead to an increase of paddy profit cultivation by 9.162364 percent.

Moreover, tenant-cultivated land has coefficient elasticity of 8.990753 indicating that if there is an increase the tenant-cultivated land by 1 percent it would enhance paddy profit by 8.990753. Thus, the robust regression result has found that an increase in the owner-cultivated land, it will enhance the paddy profit by 9.162364 vice versa an increase in the tenant-cultivated land it will increase the paddy profit by 8.990753. Therefore, there is a slight difference in profit gaining between owner-cultivated land and tenant-cultivated land in Batticaloa district.

According to the data, most of the farmers including owner farmers and tenant farmers, sell their paddy stock in rice mill than paddy marketing board; since marketing board does not purchase paddy yield on time. Therefore, the type of government's assistance that paddy stock should be purchased by paddy marketing board, it is not achievable to serve not only tenant farmers but also owner farmers on time. Thus, both tenant farmers and owner farmers would not sell their yield at an appropriate price. Further, few of tenancy givers willing to sell tenancy takers' paddy stock in marketing board since many of the tenancy transactions occurred among tenancy takers'

including relatives and friends. The results also agree with earlier study which found that, most of the informal land transaction was among tenancy takers' friends or relations, and therefore there was no ill effect among relatives<sup>8</sup>. Therefore, the study could find a slight difference in profit gaining between owner- cultivated land and tenant- cultivated land in Batticaloa district. Though, the present study disagrees with earlier studies, in which owner cultivator obtains more profit than tenant cultivator<sup>12,21</sup>.

**Table-1:** Robust regression results.

Variable	Coefficient	t-Statistic	Prob
Size of land	1.042188***	6.67	0.000
Cost of Seeds	-0.1526217**	-2.22	0.027
Cost of fertilizer	-0.1029271*	-1.87	0.062
Cost of pesticides	0.0518323	1.18	0.239
Cost for labour	-0.0385497	-0.74	0.457
Cost of Machinery	0.3294857***	2.82	0.005
Marketing Access: Agency	-0.6201738***	-3.53	0.000
Marketing Access: Marketing board	0.6942416***	3.56	0.000
Marketing Access: Rice mill	-0.2473325	-1.46	0.146
Type of Land	0.2106229 ***	3.09	0.002
Rent for Land	1.20e-06	1.32	0.187
R-squared	0.7767		
F (11, 387)	141.31		
Prob> F	0.0000		

The asterisks \*, \*\* and \*\*\* denote the statistical significance at 10%, 5% and at 1 % level respectively. Source: Data used for robust regression analysis.

Entirely, based on the robust regression results the present study reveals that lease land does not differ significantly in profit gaining from owner land, because of the fact that the study found slight difference in profit gaining between owner-cultivated land and tenant-cultivated land in Batticaloa district.

The size of land also had positive and statistically significant impact on paddy yield at one per cent level. It has positive coefficient elasticity of 1.042188 implying that an increase of the size of land by 1 percent would lead to an increase of profit

of paddy cultivation by 1.042188. Similar to the size of land, cost of machinery had a positive coefficient sign and significant at one percent level with an elasticity of 0.3294857 implying that an increase of cost for use of machinery by one percent would lead to an increase of profit by 0.3294857 percent. Thus, profit of paddy cultivation would enhance when the size of land and cost of machinery is increased in the study area.

Cost of Seed has a negative significant sign implying that it is negatively significant influence on profit of paddy farming at five percent level. Estimated coefficient elasticity of cost of seed is -0.1526217 implying an increase of cost on purchasing seed by one percent would lead to a deterioration of profit by -0.1526217 percent.

The estimated coefficient of cost of fertilizer elasticity is -0.1029271 which indicating that increasing the cost on fertilizer it would reduce the profit on paddy farming in the study area. It has been found to be negatively significant with a profit of 10 percent level.

The cost for labour has a negative and insignificant impact on profit, indicating that an increase in the cost on labour, will not impact profit of paddy farming in the study area, since it has coefficient elasticity of -0.0385497.

Similarly, the coefficient elasticity of cost of pesticides (0.0518323) has a positive and insignificant on profit, implying that the increase of cost on pesticides would not influence on enhancing the profit of paddy farming.

Similar to the cost of pesticides, rent for land has seemed positively insignificant effect on profit of paddy farming. The coefficient elasticity of rent for land is 1.20e-06. It has seemed that not associated with profit. The results indicating that either if farmers spend money to obtain tenant in land, or if owner farmers do not spend for rent it is not associated with the profit in determining profit gaining. Thus, cost of pesticides, rent, and labour did not determine the paddy profit in the study area since it's insignificant on paddy profit.

Marketing access also analyzed using dummy variable with more than one category (The category consisting farmers accessed marketing ways in Batticaloa district namely Marketing board, Rice mill and Agency or brokers). The result of marketing access with agency which is found the coefficient elasticity of -0.6201738 implying agency purchasers has significantly negative impact at one percent level with the paddy profit. As dummy variables, the coefficient elasticity is rewritten as 8.3315682. Therefore, if the marketing agency increases by one percent, then it would lead to reduce paddy profit by 8.3315682 percent.

Likewise, the marketing access at marketing board also is positive and statistically significant impact on paddy yield at one per cent level as positive coefficient elasticity of 0.6942416

indicating that sale in Marketing board positively correspond with paddy profit. The reevaluated coefficient elasticity is 9.6459836 that explain if an increase in the sale in Marketing board by one percent it will increase paddy profit by 9.6459836 percent.

Additionally, the result of sale of paddy yield at a rice mill which is found to be insignificant negatively (-0.2473325). Therefore, if farmers increase marketing access in rice mill, it would not correspond with paddy profit. From the results of robust regression analysis, it was revealed that R – squared is 0.7767 which is exposed that approximately 77 percentage of the variation in paddy production is explained by the explanatory variables utilized in the model. In this study, the F statics reveals that the explanatory variables in the model collectively have significant influence on paddy production.

Furthermore, F–statistics value which is also considerable with the highest value of 141.31 implying that the model was well specified. In addition, the overall significance of the model at one percent is shown by F – statistics with a probability (0.0000).

On the whole, the results revealed that both owner cultivated land and tenant cultivated land positively influence on paddy profit. Though, owner cultivated land obtained slightly more profit than tenant-cultivated land. Further, size of land, cost of machinery and marketing access in marketing board positively contributed to paddy profit. In contrast to the cost of seed, fertilizer and agency purchasers contributed negatively on paddy profit. Other factors were not significant on paddy profit, in particular cost of pesticides and rent for land would not be corresponded with paddy profit since those were positively insignificant effect as well as cost for labour and marketing access in rice mill would not correspond with paddy profit as those were negatively insignificant effect on paddy profit in Batticaloa district.

On the whole, the study not found a significance difference in profit gaining between owner- cultivated land and tenant-cultivated land in Batticaloa district it may attributed due to the fact that most of the farmers including owner farmers and tenant farmers sell their paddy stock in rice mill than paddy marketing board since marketing board do not purchase paddy yield on time. Therefore, the form of government assistance to purchase paddy stock by paddy marketing board which is not achievable to not only tenant farmers but also owner farmer.

Further, few of tenancy givers willing to sell tenancy takers' paddy stock in marketing board, since most of the tenancy transaction was among tenancy takers including relatives and friends. Moreover, both farmers have experienced lack of training, when both farmers access the training regarding paddy farming as training is only available to particular farmer organization's members. The study reveals that even tenancy givers assist tenant farmers by giving fertilizer subsidy, not all

of tenancy givers assist tenant farmers by giving fertilizer subsidy for using their property rights.

Further, the study found that if tenancy givers are being available to obtain compensation for insurance or other government compensation, tenant farmers cannot obtain compensation, thus, compensation was obtained almost by tenancy givers without any lose. Furthermore, the study was identified that both owner farmers and tenant farmers could not obtain an appropriate price for their yield of paddy. If marketing board purchases, the yield of paddy on time even owner farmers can obtain an appropriate price for their yield by using property rights. Though, as mentioned above, few of tenancy givers are willing to assist to sell tenancy takers' paddy stock in marketing board as their tenancy transaction is among relatives and friends. In term of accessing credit, owner farmers avoid themselves to obtain credit due to the inconvenient process and absence of paddy land register (PLR). As mentioned, adobe tenant farmer could not obtain cultivation loan, though tenant farmers had obtained credit from pawning, micro finance and Samurthi bank.

The results were showed that there is no significant difference in terms of profit in Batticaloa district since there is a slight difference between tenant-cultivated land and owner- cultivated land. It may be concluded that even if there is an absence of ownership among tenant cultivated land, it would not reduce more paddy profit. While in Batticaloa district, agreements between landlords and tenants are not legally registered. Further, there was no uniformity in agreement among the tenant takers and also there was a variance in term of rent to be paid in different areas. Since both tenancy takers and tenancy givers have not developed their tenancy agreement at present to receive assistance easily from the government under the tenancy system. If tenant farmers access government assistance directly like owner farmers, they will be able to reduce their cost of input use, thus they can obtain paddy profit like owner farmers without any slight difference. In addition, tenant farmers can obtain compensation also for their lose corresponding to their tenant cultivated land.

However, if tenancy takers acquire their tenant land under the registration then they can access cultivation loan from bank to below interest rate than informal interest rate since registered tenant farmers can use their tenant documents to access credit<sup>21</sup>. As mentioned by them if there is a feasible to access assistance regarding paddy under the tenant system via ensuring proper tenancy system with higher security, then similar to owner farmers, tenant farmers can access credit, fertilizer subsidy, paddy marketing board, and compensation themselves. It would be lead to use of higher amount of inputs and reduce higher cost of inputs and rent.

Therefore, the study recommends that if the government and tenancy givers take necessary actions to ensure proper tenancy system to obtain government assistance easily, it would lead to more to obtain higher profit.

**Table-2:** Input use and cost of input to per acre paddy land.

Input	Use of input per acre		Cost of per acre	
	Owner cultivated land	Tenant cultivated land	Owner cultivated land	Tenant cultivated land
Seeds	87.46 Kg	87.41 Kg	Rs. 3,601	Rs. 3,954
Fertilizer	144.40 Kg	144.53 Kg	Rs. 2,229.5	Rs. 2,542.5
Pesticides	1.29 Litter	1.27 Litter	Rs. 4,303.6	Rs. 4,808.3
Labour	2 Labour	2 Labour	Rs. 5,581.9	Rs. 5,625.6
Machinery	3.16 Hours	3.17 Hours	Rs. 10,400	Rs. 13,616

**Analysis of Input use between Owner-Cultivated Land and Tenant-Cultivated Land:** The following table 2 reported the average input use and average cost of inputs under the owner-cultivated land and tenant-cultivated land. The result explains that owner farmers have utilized slightly more quantity of seeds than those of tenant farmers in order to continue higher density of plant population for avoiding any kind of uncertainty. It is also observed that seeds owner farmers have utilized quantity of pesticides relatively more than tenant farmers on paddy farming.

Though, owner farmers have utilized the quantity of fertilizer and hourly usage of machinery is relatively lower when comparing to tenant farmers. However, there were no significant differences in use of labour as both owner and tenant farmers used the same number of labour on paddy farming.

According to the calculated average use of inputs, there is a slight difference between owner-cultivated land compared to tenant-cultivated land. The use of seeds and pesticide are slightly higher among owner farmers compared to tenant farmers. Even though, the use of fertilizer and hourly usage of machinery are approximately equal among tenant farmers as well as owner farmers. Furthermore, both farmers maintained equal number of laborers.

Generally, an extra amount of cost occurred due to rent of tenant land by tenant farmers compare to owner farmer. In the present study found, the average rent for per acre was Rs.7361.25. Further, the study reveals that another cost of input differences between owner farmers and tenant farmers. The results show that tenant farmers have occurred higher amount of average cost on seeds, fertilizer, pesticides, labour and machinery than owner farmers. It reveals that relatively tenant farmers bear higher amount of cost on entire input under the tenant cultivated land. The results similar to earlier study which found that cost of inputs is high in tenancy in land. On the other hand, owner farmers' amount of average cost is lesser compare to tenant farmers<sup>22</sup>. Finally, based on the results the study reveals that there is a difference found in the cost of cultivation between owner -cultivated land and tenant-cultivated land. Specially, the difference has obtained due to a higher amount of cost incurred by the tenant farmers.

Furthermore, the study has estimated average profit to compare profit between both owner-cultivated land and tenant-cultivated land. Owner farmers have obtained profit of 30179.5 Rs but tenant farmers have obtained profit of 29,378.92 Rs. According to the average profit, in owner-cultivated land, farmers obtain a slightly higher profit than tenant farmers. As a whole, the study found that there is no a significant difference between owner-cultivated land and tenant-cultivated land on average profit. Though, there is a difference in term of average cost of inputs between both owner-cultivated land and tenant -cultivated land in the study area.

### Conclusion

The study was conducted to investigate the difference between owner cultivated land and tenant cultivated land in term of profit. The comparison of profit between owner-cultivated land and tenant-cultivated land was dealt with ordinary least square (OLS) regression analysis. Though, ordinary least square regression analysis had a problem of heteroscedasticity, therefore robust regression was utilized to deduct the problem of heteroscedasticity. According to the results, both owner -cultivated land and tenant - cultivated land is positively significant on paddy profit at one percent level. Specially, the results revealed that tenant cultivated land differs slightly in profit gaining from owner- cultivated land, though there is no significance difference between owner-cultivated land and tenant-cultivated land.

Further, the study found positive contribution of land, machinery and marketing board on paddy cultivation in Batticaloa district. Conversely, cost of both seed and fertilizer negatively impacted the paddy profit as well as agency purchasers also affect negatively on profit in Batticaloa district. Moreover, paddy profit was not influenced by the cost of pesticides and rent on land as those factors found to be positively insignificant. As well as, the cost for labour and marketing in rice mill also would not be corresponding with paddy profit. Furthermore, the present study estimated the average profit which is also found to be a slight difference between owner-cultivated land and tenant-cultivated land. In

addition to that, there is a slight difference between owner-cultivated land and tenant-cultivated land in use of input and. Moreover, the study also revealed that there is a difference in the cost of cultivation between owner-cultivated land and tenant-cultivated land.

Entirely, the study can conclude that there is no significant difference between owner-cultivated land and tenant-cultivated land in term profit in Batticaloa district since being a slight difference. Further, use of input differed slightly in the owner-cultivated land and tenant-cultivated land and cost of input including rent was higher to tenant farmers than owner farmers in the study area. Therefore, in order to eliminate slight difference of profit, there is a need an appropriate tenancy system along with property rights to access government assistance like owner farmers.

## References

1. Gamawelagedara W.C., Wickramasinghe Y.M. and Dissanayake C.A.K. (2011). Impact of rice processing villages on house hold income of rural farmers in Anuradhapura District. *Journal of Agricultural Sciences*, 6(2), 92-99.
2. Ministry of Agriculture Development and agrarian services. (2008-2010). Colombo: Ministry of Agriculture Development and agrarian services.
3. Department of Agriculture (2015). Batticaloa.
4. District Secretariat (2015). Batticaloa.
5. Sharma V.P. and Thaker H. (2010). Fertiliser subsidy in India: Who are the beneficiaries?. *Economic and Political weekly*, 68-76.
6. Rahman A.A. and Othman P.F. (2012). The Agricultural Land Tenancy Contract from the Islamic Perspective and its Practice among Farmers: A Study in Selangor, Malaysia. *African Journal of Agricultural Research*, 7(10), 1584-1594.
7. Indraratna A.D.V.De.S. (2008). Development issues and concerns. A.D.V.De. S Indraratna Felicitation Committee.
8. Chandrasiri J.K.M.D. (2010). Impact of Informal Land Transactions in Settlement Schemes in Sri Lanka. Hector Kobbekaduwa Agrarian Research and Training Institute, Research Report No.132, 1-69.
9. Ubink J. and Quan J. (2008). How to combine tradition and modernity? Regulating customary land management in Ghana. *Based on Land Use Policy*, 25(2), 198-213. doi: 10.1016/j.landuse.pol.2007.06.002.
10. Donkor E. and Owusu V. (2014). Effects of land tenure systems on resource-use productivity and efficiency in Ghana's rice industry. *African Journal of Agricultural and Resource Economics*, 9(4), 286-299.
11. Oladele O.I., Kolawole A. and Wakatsuki T. (2011). Land tenure, investment and adoption of Sawah rice production technology in Nigeria and Ghana: A qualitative approach. *African Journal of Agricultural Research*, 6(6), 1519-1524.
12. Pender J. and Fafchamps M. (2002). Land Lease Markets and Agricultural Efficiency: Theory and Evidence from Ethiopia. CSAEWPS-19, 1-51.
13. Rakhshanda K. and Awudu A. (2014). Impact of non-farm work and land tenancy contracts on soil conservation measures. Annual Conference of the Agricultural Economics Society, 1-20.
14. Ben-Chendo G.N. and Joseph V.N. (2014). Comparative Analysis of Rice Productivity of Farmers on Different Land Tenure Systems in Imo State. *International Journal of Small Business and Entrepreneurship Research*, 2(3), 24-32.
15. Chi P.V.Q. and Fujimoto A. (2012). Land tenure and tenancy conditions in relation to rice production in three villages in the Red River Delta, Vietnam. *Jurnal ISSAAS*. [Internet]. [21 November 2017], 18(1), 31-48.
16. Deshpande R.S. (2003). Current land policy issues in India, Land Reform. Special Edition, FAO publications.
17. Prakash S., Patil S., Konda C.R., Amrutha T.J. and Siddayya S. (2013). Input use and production pattern of paddy cultivation under leased in land in Tungabhadra project area Karnataka. *Journal of Agricultural Science*, 26(2), 224-228.
18. Lakshmi P.P.A., Sant K. and Aruna S. (2009). Rice Production in India – Implications of Land Inequity and Market Imperfections. *Agricultural Economics Research Review*, (Conference Number), 22, 431-442.
19. Aung N.M. (2012). Production and economic efficiency of farmers and millers in Myanmar rice industry. *Institute of developing economies japan external trade organization*.
20. Deuinger K. and jin S. (2002). Land Rental Markets as an Alternative to Government Reallocation?. *Equity and Efficiency Considerations in the Chinese Land Tenure System. Policy Research Working Paper* no 293, The World Bank Development Research Group, 1-39.
21. Tseng H. (2002). Land Ownership Transfer and Productivity: Evidence from Taiwan. *Asia Conference on Efficiency and Productivity Growth*, 1- 47.
22. Bardhan P. and Mookherjee D. (2007). Land Reform and Farm Productivity in West Bengal. Stanford Center for International Development, 1-58.