Prediction of Cost by using Linear Regression Method

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Abstract

Prediction of cost paves the way to the base line for development of industry. Before starting a business, it is imperative that one should know the potential of business to be cost-effective. As a business man, he is devoted to his business, thus predicting profit or loss before starting his business. Accordingly, he usually orders production manager or estimator to predict cost for industry on the basis of available data. Therefore, if an industry has a careful plan for cost prediction, it may be sure of great success in business. This paper describes a system as a model to predict cost in rice industry. Thus, this system applies linear regression method to cost prediction for rice production and its sale according to profit or loss. This system is appropriate to reporting formats, including provisions for product reporting rather than simply calculating cost estimates on paper by yearly.

Keywords: cost analysis, management, prediction, estimator, profit or loss measure

1. Introduction

Rice is a staple food in many countries and constitutes a major part of the diet in many others. It is considered as one of the most important plants and our staple food in Myanmar. Thus, rice farming provides income and employment opportunity for rice mill. But, the declining among major rice ecosystems may cause sudden loss of rice productivity and result in failure to support food for all members of the family in many months of the year. [1] This particularly explains why the production of rice is gradually declining throughout the years.

As a result, to maintain a close balance between rice production and food demand, effective rice monitoring programs are necessary at regional, national and global levels. In particular, there is a need to develop prediction of cost analysis system that can accurately assess the marketing profit or loss of producing rice from the industry based on rice cultivated area and rice production area. Prediction of cost analysis system even plays an important role in enhancing rice production and provides an alternative to rice production that addresses most of the problems that are being faced by managers. Although, scientific studies carried out in different parts, this system provides environmentally friendly sustainable rice cultivation and production that gives a great help for managers. [1, 5]

Moreover, a change of rice price will cause a major effect in the lives of consumes. On the other hand, there are so many factors that influence the rice price. Thus, analyzing the performance of rice production after monetary crisis, finding key factors which are significant to the rice price, as well as, forecasting the consumer's rice price are needed in order to maintain the stabilizatison of rice price [3, 4].

The aim of this paper is to present cost analysis in rice-farm management (self-produced) and production (bought from another suppliers) behavior of industry. To test this hypothesis, this paper will predict farm management by looking closely at input-output and cost-and-return relationships. The results of a regression analysis determination will also be presented to delineate the cultivation practices and production practices of rice mill. Therefore, to produce rice, rice industries are also depending on the investment and extend of rice production can be significant. In this system, the production and manufacturing are concerned with the predict cost manufacture in various ways. In order to appraise the cost estimating of an industry, it is necessary to use a convenient way by the linear regression methods.

Otherwise, rice varieties responses in different conditions and years have been considered by a lot of works in to determine yield adaptability and stability. In this system, the current study also determines the stability of grain yield and adaptability of promising lines of rice for ecological conditions of industries in Myanmar. In this system, there are two main purchased inputs as cultivation and production raw materials in the production of rice. It has been hypothesized that productivity of the rice is positively influenced by the application of preceding years. But in this system, linear regression method can be used to estimate the dynamic changes of the influence of the independent variable on dependent variable. As well, the independent variable makes predictions based on the knowledge of the dependent variable. For linear regression to work there needs to be a linear relationship between the variables.

This paper has four descriptions related to be short of prediction of cost analysis system. The first description is to briefly present the raw materials used for this system and obtaining knowledge of linear regression method. The second description is to carry out the general idea of this system to put up a simulation experiment varying the number of predictors which are commonly used in rice mill. Thirdly, we present prediction of cost analysis system to illustrate its application and interpretation in

ecological studies for industry. The last expresses the termination about an effective and efficient system for managers in rice industries according to straight line regression method.

2. Materials and Methods

Being agricultural country, paddy production is one of the popular businesses in Myanmar. Thus, to produce rice from paddy, rice mill or industry is performed for procedures of cost planning and cost control to predict cost analysis. Consequently, we initially say the raw materials which are used this system. We also confer about the idea of linear regression method why do make use of this system.

2.1 Materials

For the purpose of this study, raw materials to change rice as of paddy are features in production and cultivation varieties on former years. The charges for these features in cultivation region are cultivation cost, usage of raw materials to produce rice, cost of rice production utilize, rice selling cost to put on the market consumers, and the cost of remaining products such as broken rice(sankwe), paddy husk(Hpwekyan), and bran(Hpwenu) from rice for promotion. In production region, we also make use of features that are the cost of raw material (paddy), the cost of rice production, and rate of remaining things of rice products for selling and rice production cost which makes from industry to sell customers. The above these data are investigated commencement of rice mills in Ayeyarwaddy Division of Myanmar.

2.2 Methods

Rice production is indeed a major deciding factor of importation. The profit or loss of rice production forecast for cost analysis in industry is made by linear regression method based on the income (the selling cost of rice production subtracts the buying cost of raw materials) which are captured by cultivation area and production area. Linear regression method is useful statistical technical for solving environmental problems. It has the power to empirically tease out very complicated relationships between variables. It is also useful in helping explain observations of a dependent variable, usually denoted *y* (the output result of cost analysis having profit or loss for future year), with observed value or prediction value denoted by *x* (the value which differs the user input year and the midpoint year from previous years).

In contrast, linear regression is a method of estimating the conditional expected values of one variable *y* given the value of variable *x*. The variable of interest *y*, is conventionally called the "dependent variable". The other variable *x* is called independent variable. The term independent variable suggests that its value can be chosen at will, and the dependent variable is an effect. Regression refers to the fact that although observed data are variable, they tend to "regress" towards their mean. The standard linear regression is typically stated in the form of Equation (1).

$$y = \alpha + \beta x + \varepsilon \quad (1)$$

The right hand side may be taken other forms, but generally comprises a linear combination of the parameters, here denoted α and β. The term ε represents the unpredicted or unexplained variation in the dependent variable; it is conventionally called "error" whether it is really a measurement error or not. The error term is conventionally assumed to have expected value equal to zero, as a nonzero expected value could be absorbed in α as shown in Equation(2). In this equation, $\overline{Y}$ is denoted by the mean value of response variables as the value from total incoming cost by dividing the count of previous year and $\overline{X}$ represents the mean value of prediction variables as the value from total amount value of *X*s by dividing the count of previous years. The *b* means the midpoint year from the selection of previous total years.

$$\alpha = \bar{Y} + b\,\bar{X} \quad (2)$$

The response variable (usually denoted *Y*: the incoming value which differs from buying raw materials to selling rice products) can be expressed as a function of a specific set of prediction variable (usually denoted *X*: the amount value which substrates from midpoint year to each previous year), where the function is linear in unknown coefficients or parameters, and additive error (disturbance) term. The coefficient in Equation (3) is assumed to be constants but is unknown. From theory in economics, the primary constituents of demand are price, income and prices of substitutes and complements. Thus, first we calculate α and β by using Equation 2 and Equation 3 and then the prediction result of *y* is calculated by using Equation 1.

$$\beta = (\sum(XY) - \sum(\bar{X})(\bar{Y}))/(\sum X^2 - \sum(\bar{X}^2)) \quad (3)$$

For purposes of illustration, suppose that we identify and quantify the factors that determine earnings in the market. For the time being, this cost analysis system uses restrict attention to a single factor-call it profit or loss. In this system, we assume that profit or loss in cost analysis of rice production can be measured by a single attribute: years of mill's life. At the outset of any regression study, one formulates hypothesis about the relationship between the variables of investment or earnings, purchasing of raw materials and rice, selling of rice and remaining things from producing rice. Linear regression method gives an opinion that upcoming or future year, rice products tend to make more profit or loss for cost analysis in industry.

3. Framework for Prediction of Cost Analysis System

Strategies for cost analysis in profit or loss oriented product development are an essential strategy for remaining competitive in a highly competitive business environment with changing trade price. To estimate the profit or loss in cost analysis from the working framework for this system, cultivation sector and purchasing sector are described as prediction of cost analysis by using linear regression method as shown in Figure 1. In this system, cultivation has four factors such as paddy cultivation, producing raw materials from paddy, producing rice which produces from industry in raw materials, rice to sell the consumers to analyze cost in profit or loss. Also, purchasing sector provides three causes such as purchasing raw materials from suppliers, producing rice and income from selling rice and remaining products which produces with rice.

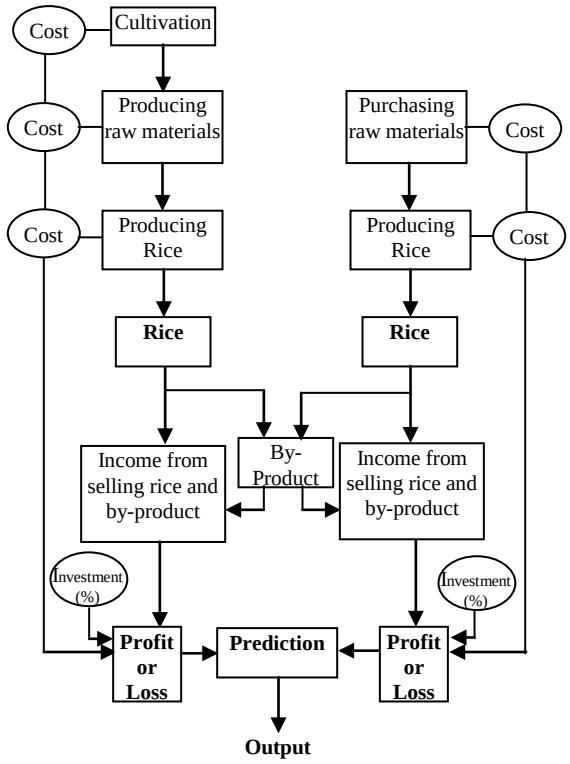

Figure 1: Design of Frame for the System

According to linear regression method, the selling of rice and products are computed from the other facts or causes to produce the response variable (*Y*) in cultivation or purchasing. Also, the prediction variable (*X*) is performed a number variable count from forecast time of year. But this forecast time is subsisted amount of odd value in year for this system. After that, we calculate predict variable and response variable along with Equation 3 for prediction of cost analysis in market to upcoming year. We illustrate the cultivation phase and purchasing phase to predict cost analysis along with profit or loss in this system.

Phase 1: Raw materials are cultivated.

- Paddy are cultivated and calculate the cost C_{culti}
- Production of raw materials and calculate the cost C_{raw}
- Rice Production and calculate C_{prod}
- Selling Process
  - Calculate income I_{rice}
  - Calculate income of $I_{by\text{-}product}$
- Calculate yearly profit or loss
  Year profit or loss=$(I_{rice}+I_{by\text{-}product})-(C_{culti}+C_{raw}+C_{prod})$
  Investment reducing rate(IRR)=(Initial investment)/(factory life age * 100))%

Phase 2: Raw materials are purchased from Suppliers.

- Raw materials are purchased and calculate the cost C_{raw}
- Production of raw materials and calculate the cost C_{raw}
- Rice Production and calculate C_{prod}
- Selling Process
  - Calculate income I_{rice}
  - Calculate income of $I_{by\text{-}product}$
- Calculate yearly profit or loss
  Year profit or loss=$(I_{rice}+I_{by\text{-}product})-(C_{raw}+C_{prod})$
  Investment reducing rate(IRR)=(Initial investment)/(factory life age * 100))%
  $Investment_{i+1}$=$Investment_i$-(Yearly Profit or Loss + Investment Reducing Rate

Moreover, investment rate for industry or rice mill is also worked out the investment reducing rate (IRR) based on factory life age and initial investment. In addition, for prediction of cost analysis, investment by years also calculates final investment in mill from yearly profit or loss and investment reducing rate (IRR). As well, we also exemplify the purchasing phase to predict and analysis cost in profit or loss for rice production. In this system, when we draw on the calculation of cost analysis in yearly profit or loss, raw products in cultivation or purchasing region are substrate from charges of rice and by-product things in selling process.

The prediction of continuous values can be modeled by statistical techniques of regression. Just the regression line is used for purpose of estimation prediction or focusing in cultivation region. In this system, we use linear regression method where the target variable to be estimated is continuous. In order that, the success of mill operations exclusively relies on variation depend on features or causes of rice in previous years. The integration of raw materials in cultivation or raw materials in purchasing has made it possible to explore the nature of linear regression formula.

Numeric prediction is the task of predicting continuous (or ordered) values for given input in cultivation region such as cost of cultivation, cost of production raw materials, cost of production on rice, rice in selling price to consumers and by-product in selling price based on Cost per Pyi as viewing in Table 1. Prediction of cost analysis is evaluated by Kyats consistent with rice production data in Myanmar.

Table 1: Raw Materials in Cultivation

Year	Cost (kyats) per Pyi			Selling price (kyats)	
	Cultivation	Production raw material	Production on rice	Rice	By-product
1995	8	57	3	113	25
1996	19	170	8	125	13
1997	8	71	6	156	40
1998	11	75	6	156	28
1999	8	164	12	156	18
2000	23	156	14	188	27
2001	15	140	11	313	27
2002	13	115	10	312	27
2003	13	113	11	344	31
2004	13	108	11	375	33
2005	23	203	13	375	42
2006	22	219	10	437	55
2007	16	125	13	468	57
2008	16	204	25	561	87
2009	15	114	25	625	88

Previous data is the task of predicting continuous (or ordered) values for given inputs in purchasing region, namely, cost of purchasing raw materials, cost of production on rice, rice in selling price to consumers and by-product in selling price based on Cost per Pyi as illustrate as Table 2.

Table 2: Raw Materials in Purchasing

Therefore, according to analyze these

Year	Cost (kyats) per Pyi		Selling price(kyats)	
	Purchasing raw materials	Production on rice	Rice	By-product
1995	60	40	130	30
1996	75	50	150	40
1997	90	60	200	52
1998	160	100	100	57
1999	110	80	250	59
2000	115	80	300	59
2001	125	88	300	60
2002	150	100	350	80
2003	144	100	400	60
2004	156	150	365	50
2005	175	130	500	70
2006	200	150	600	70
2007	210	180	600	80
2008	230	200	625	90
2009	250	200	700	100

measurements yearly, we take the income rate founded on rice in industry. Then, it is followed by investment in industry in Table 3 and Table 4 as the examples of factory investment yearly in cultivation or purchasing region. Therefore, this investment value of cultivation or purchasing plane for industry or rice mill is deliberate based on the factor of industry's life. In this example, the invest amount is completed as a result in relation to yearly.

Table 3: Cultivation Investment Information in Industry

Year	Factory Investment (Investment-kyats)
1995	800,000,000
1996	739,466,660
1997	673,933,333
1998	571,400,000
1999	570,866,000
2000	451,333,333
2001	285,800,000
2002	123,266,667
2003	-

Table 4: Purchasing Investment Information in Industry

Year	Factory Investment (Investment-kyats)
1995	800,000,000
1996	729,466,667
1997	728,933,333
1998	617,400,000
1999	524,866,667
2000	524,333,333
2001	501,800,000
2002	327,266,667

4.Implementation of the System

In this system, the current study determines the stability and adaptability of promising lines of rice for ecological conditions. Years has been used as main point for promising lines. In testing this system, we employ cost analysis as the profit or loss in future year by using linear regression method as show in Figure 2.

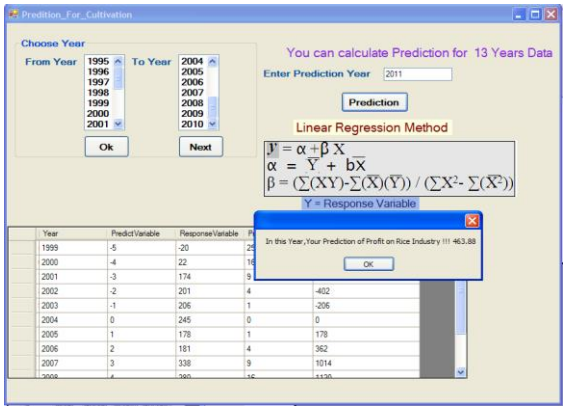

Figure 2: Prediction of Profit in Cultivation Region

To analysis investment, Figure 3 shows the calculation amount that concerning the factory life age is engaged cost analysis in profit or loss of rice production.

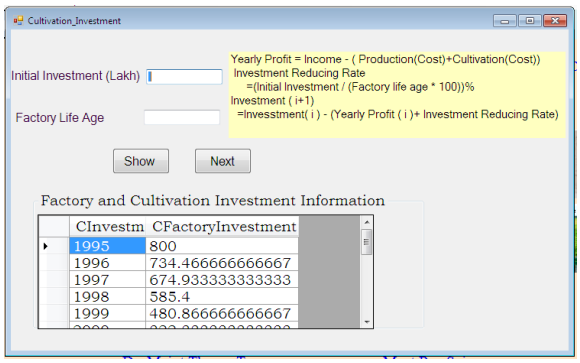

Figure 3: Calculation of Investment Amount

In this system, significant effect of year interaction emphasizes that influence of cultivation or purchasing in raw materials (grain yield, paddy) of rice lines during years is obviously different. Thus, while maintaining the stability of price for profit in cost analysis, this system opens up to the imports path from time to time.

5. Conclusion

Cost analysis of production seeks to ensure the efficient use of available input products specification data. Cost planning and cost estimation, which must be monitored and calculated in usage of raw materials. Therefore, the main purpose of this system is established and calculated the prediction of cost analysis for rice production by using linear regression method. This system supports manager in performing the exteriors and interiors of production industries.

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