Economic Impact of Establishment of Quality Management Systems in Tea Industry: A Case Study in Matara District

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Abstract

Tea is the main export plantation crop and the main foreign exchange earner among agricultural products of Sri Lanka. In 1998 Food and Agricultural Organization (FAO) named tea as a food commodity. Consumers in the global market are very conscious on the quality of tea as a healthy beverage. Thus, "Food Safety Standards" have adopted for tea to prove its suitability for human consumption. Among food safety management systems, ISO 22000 is the most widely used and most accepted system and the 5S is a supporting system, which helps to establish ISO 22000. To establish this system it spends large amount of cost. Therefore, it is worthwhile to find out that the economic benefits of establishing these quality management systems. Matara district was selected purposively and five factories within the district were selected randomly. They are Dhampahala, Mulatiyana, Nilgiri, Sudugaha hena and Bogoda. To find out the "economic impact" of the project, the project analysis tools such as Net Present Value (NPV), Internal Rate of Return (IRR), Benefit cost ratio (BC ratio) and Payback period were employed. Results revealed that establishment of Quality Management Systems (QMS) in to a tea factory are beneficial economically. The NPV was 2,482,774.00 LKR. The IRR was 74% and the BC ratio was 1.69. The payback period was 3 years. Therefore, the introduction of QMS is a worthwhile investment for tea factories in economic aspect.

Key words: ISO 22000, 5s system, Quality management systems, Project analysis tools

Introduction

Tea *(Camellia sinensis* L.*)* is globally one of the most popular and lowest cost beverages, next only to water. More than three billion cups of tea are consumed daily worldwide (Barker, 1995). Africa, South America, the Near East and especially the Asian region produces a varied range of teas (Barker, 1995). Huge populations in Asia, Middle East, Africa, UK, EU, and countries of the CIS consume tea regularly and throughout the day.

Ministry of Plantation Industries (2009) shows that Sri Lanka as the 3rd biggest tea producing country, has a production share of 9% in the international sphere, and one of the world's leading exporters with a share of around 19% of the global demand . The total extent of land under tea cultivation has been assessed as approximately 2.22 million hectares.

Tea was named as a food commodity since 1998 by FAO. Subsequently consumers in the global market are very conscious on the quality of tea as a healthy beverage. Quality standards have been developed to prove its suitability for human consumption.

As one of the world's major tea exporter, it is necessary to concern about the quality standards for tea in order to maintain the demand and also to protect the name of "cleanest tea in the world".

The ISO 22000 is the most accepted and popular food safety standard in the world. There is a growing trend in many tea factories for establishing ISO 22000 food safety management system and 5S system. Financial and technical cost is very high for establishing the requirements of the standards and training the working staff. Not only for establishing but also for maintaining, it spends a large amount of cost.

Factory owners generally believe that these systems are efficient and effective. Hence, they are not hesitating to spend money and capital to establish these systems and also they would like to know whether they will get adequate return to the money they spent.

Therefore, the objective of the study is to evaluate the economic impact of establishing ISO 22000 food safety management and 5S systems in tea factories.

Materials and Methods

As Matara is the second largest tea growing district in Southern province, it was selected for the study and it consists about 23454 ha of tea lands. Out of the total land extent, 17150 ha (73.12%) are in the small holding sector and rest 6304 acres (26.9%) belongs to the estate sector (Ministry of Plantation Industries, 2009).

There are 102 tea factories in Matara district and among them five were selected randomly. They are Damapahala (7000 kg/ day Maximum green leaves capacity), Mulatiyana (15000 kg/day), Nilgiri (7000 kg/day), Sudugahahena (6500 kg/day), and Bogoda (13000 kg/day).

To achieve the main objective, the basic requirements (cost components) that had to establish for ISO 22000 and 5s systems were identified initially. The cost that spent for establishing those requirements (fixed cost) and maintaining (Variable cost) / per year was calculated using the secondary data and information collected through the interview of relevant officers.

Income after establishing ISO 22000 food safety management and 5s systems were calculated by comparing factory records of 2 years {2011 and 2012} (before and after establishing quality management systems). Above information was used to calculate net gain due to establishment of quality standards for selected factories. Net profit/ loss after establishing quality management systems were also computed. (Profit/ loss due to ISO 22000 and 5s)

Data were collected from monthly and annual factory accounts, records and interviews of factory managers and officers. Data were analyzed using following project analysis tools; Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost ratio (BC Ratio) and Payback period.

Net present value (NPV): Net present value is defined as the sum of the present values (PVs) of the individual cash flows. In the case when all future cash flows are incoming and the only outflow of cash is the purchase price, the NPV is simply the PV of future cash flows minus the purchase price.

$$\frac{R_t}{(1+i)^t}$$

Where,

t - the time of the cash flow

i - the discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk.)

R_t - the net cash flow (the amount of cash, inflow minus outflow) at time t. For educational purposes, R_0 is commonly placed to the left of the sum to emphasize its role as (minus) the investment.

Benefit cost ratio: The BCR is the ratio of the benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs should be expressed in discounted present values.

Internal rate of return: The internal rate of return on an investment that makes the net present value (NPV) of all cash flows (both positive and negative) from a particular investment equal to zero.

$$IRR = i + \frac{(i_2 - i_1)\ PV}{PV + NV}$$

Where

i_1 = Discount rate that gives positive Net Present Value

i_2 = Discount rate that gives negative Net Present Value

PV = NPV in i_1

NV = NPV in i_2 (not consider minus mark)

Pay Back Period: Payback period in capital budgeting refers to the period of time required for the return on an investment to "repay" the sum of the original investment. The time value of money is not taken into account. Payback period intuitively measures how long something takes to "pay for itself." All else being equal, shorter payback periods are preferable to longer payback periods.

Results & Discussion

Cost for establishing ISO 22000 & 5S system

The initial cost for establish the ISO 22000, 5S system and annual maintain cost of each factory are given in Table 1.

By studying the Table 1, it can be understood that to establish ISO 22000 and 5s system to a tea factory it needs around Rs. 1836900 on average and as maintain cost it needs Rs. 389800 per annum.

Income/ Expenditure after establishment of ISO 22000 and 5s systems

Here it was only considered the income/expenditure due to establishment of quality management system (ISO 22000 and 5s). Changes of income and expenditure after establishment of quality management system were calculated under five aspects. They were reduction/ increment of electricity bill, fire wood cost, made tea selling income, factory maintain cost and machine maintain cost. Those five aspects were calculated by comparing the values of two years (2011 and 2012) before establishing quality standards and after establishing quality standards. It was assumed that there was no any change in rate of above aspects in considered two years.

Table 2 describes reduction/ increment of electricity bill, fire wood cost, made tea selling income, factory maintain cost and machine maintain cost of each factory comparing with before and after establishing quality standards.

Table 1. Initial establishment and annual maintain costs of ISO 22000, 5S system for selected factories

Factory Name	Establishment cost (Rs.)	Average Annual maintain cost (Rs.)
Dampahala	1466500	314000
Mulatiyana	2470000	530000
Nilgiri	1565000	322000
Sudugahahena	1378000	308000
Bogoda	2305000	475000
Average	**1836900**	**389800**

Table 2. Income/ expenditure after establishment of ISO 22000 and 5S systems

	Dampahala	Mulatiyana	Nilgiri	Sudugaha Hena	Bogoda	Average
Increment of Electricity bill Rs.	3857.78	55957.18	2745.18	27963.95	7065.6	19517.94
Reduction of fire wood cost Rs.	243040.14	239571.08	71147.9	17478.13	374482.6	189143.96
Increment of selling tea income (Rs.)	370346.9	7985.69	160083	517329.2	614716.5	334092.25
Reduction of factory maintain cost Rs.	50151.14	57432.13	255335	34269.9	498260	133129.33
Reduction of machine maintain cost Rs.	227609.02	664449.94	287614	313909.7	361977.8	371112.13
Annual average sum of the income after establishing ISO 22000 and 5s (Rs.)						1007959.7

Electricity bill is the only factor that increases in all five factories. The reasons might be new machines, lights and other electric equipments (fans) etc were established for the requirement of ISO 22000 and 5S systems. The reasons for reducing the cost of fire wood may be giving proper instructions for operator to operate hearth efficiency and machine maintenance according to the ISO 22000 and 5S. Made tea selling income has also increased in all factories after establishing quality standards. High price due to quality improvement may be the reasons. Factory maintains cost also considerably decreases after establishing quality standards in all selected factories. Not only that, machine maintenance cost also decreases after establishing quality standards. The reason might be working staff (specially machine operators and mechanics) had identified their duty well and they had followed up those regulations due to special training obtained and maintain relevant check list for each machine to repair and maintain them regularly.

Predicted benefits for next ten years

It was predicted that the benefits of this project could be got in next 10 years and the benefits that predicted to achieve were given in Table 3.

Table 3. Predicted benefits for next ten years

Year	Cost for establishing ISO 22000 & 5s Rs.	Annual average sum of the income after establishing ISO 22000 &5s Rs.	Net Profit/ Loss after establishing ISO &5s Rs.
1	1836900	1007959	-828941
2	389800	1007959	618159
3	389800	1007959	618159
4	389800	1007959	618159
5	389800	1007959	618159
6	389800	1007959	618159
7	389800	1007959	618159
8	389800	1007959	618159
9	389800	1007959	618159
10	389800	1007959	618159

Values in the Table 3 were used to compute project analysis tools Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BC Ratio), and Pay Back Period.

NPV= Rs. 2,482,774.00 (Assumption: Normal market interest rate= 10%)

IRR= 74%

Benefit Cost Ratio = 1.69

Payback period = 03 years

The Net Present Value (NPV) is Rs. 2,482,774.00. It indicates that if Rs. 1836900.00 invest as the fixed cost for establishing basic requirements of ISO 22000 and 5S quality management systems and Rs. 389800.00 spent annually as a variable cost, it is possible to earn Rs. 2,482,774.00 at the end of the 10th year in today's money value (Assumption: Normal market interest rate is 10%). NPV value of this project is considerably high value. According to project analysis theories, projects that get positive value for NPV are accepted for implement.

Internal Rate of Return (IRR) for above project is 74%. As, high IRR is resulted, it could recommend to invest in the project than investing money in the bank. (Taking a bank loan and investing in this project is also profitable). Benefit Cost Ratio (BC Ratio) is calculated as 1.69. As benefits should exceed the cost, BC Ratio should exceed one. Here BC Ratio of this project is greater than one. Therefore, this project is accepted for implement.

The Pay Back Period is 3 years. Payback period simply indicates that the period required to settle the establishment cost. According to the project analysis theories this should be minimum number. Result indicates that at the end of the third year, all establishment costs are settled and from 4th year onwards it earns profit. Therefore, this project would be accepted for implementing.

The mandatory criteria to recommend a project for implementation are, positive NPV value & more than one BC Ratio. In addition, IRR & Pay Back period are also considered in profit maximizing.

IRR should be higher than the market interest rate and Pay Back period should be minimum as possible. In this case all are in accordance with the project recommended theories. Therefore, establishment of quality management systems (ISO 22000 and 5S system) in tea industry can be recommended in economic aspect.

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