Solving cost fluctuation problem in Mini-Tractor Industry

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Abstract

It is very interesting in developing a decision support system (DSS). In this paper, the system is developed for mini-tractor industry concern with production cost by using DSS. It is developed as data-driven DSS. An effective product strategy links productions with cash flow, market dynamic, product life cycle, and the organization capabilities. The production system may determine not only production cost but also product quantity. This thesis calculates the estimated production cost of a mini-tractor. It intends to determine the lower limit of cost and the upper limit of quantity. Thus, it also intends to decide tractor will be produced in which suitable quality of assembly parts with acceptable cost. It calculates the production cost on the items in various brands. The system can decide reasonable product according to the fluctuation of the cost. The production rate can also be controlled by the cost depended on the demand. It is important in the rate of the industry to become modernized developed country.

1. Introduction

Myanmar is one of the agricultural countries in the world and agriculture plays an important role. There are so many fields in Myanmar. The crop, rice and others are planted around the year. The tools for the agriculture are so important.

This thesis is about Myanmar Agricultural machines manufacturing factory in Monywa Industrial zone. The Myanmar Government has planned to transform its agricultural section to a fully mechanized one with this objective, factories producing agricultural machines and spare parts are set up and Industry zone in Monywa is one of them.

The main machine manufactured from this factory is mini-tractors. The main benefits obtained from the use of these machines are increased in productivity, time saving speedy activities, accuracy and use scrap and wastages.

Some of the machines and spare parts have to be imported from aboard. Though factory has been producing these mini-tractor and other parts, with the assistance and encouragement of the government control and guidance of local authorities concerned and the efforts and efficiencies of the employee, it is planning to produce more kinds of agricultural machines and spare parts in future.

The very important problem which is occurred in the mini-tractor industry is cost-fluctuation problem. The manager of the industry should know current status of the industry in terms of costs. Manager occasionally needs information of the industry to make changes to adapt or improve the current status of the industry.

Manager should have concepts on the industry such as marketing point of view, production point of view, investment point of view, profit point of view. The information needs to know about the above case is complex and time consumable. So, the industry needs to implement decision support system for manager for their decision making support.

Decisions may be categorized as being either programmed or non-programmed. In a programmed decision, the rules for making the decision are explicit. That is, given a certain set of actions will be taken. Programmed decisions are often incorporated into transaction processing system, and thus computer can make those important to isolate decisions that can be programmed, thereby relieving human of the necessary of making those routine day-to-day decisions.

Non-programmed decisions deal with non-repetitive and ill-defined problems and required human decision making. Non-programmed decisions are made at all levels within an organization, including operational, technical and strategic levels. However, as one moves to higher levels of decision making a greater percentage of decisions made are non-programmed.

Programmed decisions require timely, accurate and reliable information, whereas non-programmed decisions require a great deal of flexibility with the information system to gain information to make a non-programmed decision.

A manager needs Information. Needed information is determined by the decisions that must be made, which in turn are determined by objectives.

Decisions need to be made about which products should be emphasized in order to reach the desired 50 percent in profits. Choosing a certain product might require further decisions concerning expansion of plants, or a decision to purchase the product from outside. All of these decisions are based in part, on information from the computer

based information system. As the company moves toward the 50 percent increased in net profit reports showing how well each product is selling that are crucial. These reports could indicate that a decision should be made to emphasize an alternative product that might be more profitable. This approach to determining the information needs of management is essential to the development of information systems. The systems analyst, who is responsible for developing the system, must always keep in mind the decision and the objectives are the management information system supports.

2. Decision support system

DSS is a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions [1].

The best decision support systems include high-level summary reports or charts and allow the user to drill down for more detailed information.
Computerized decision support systems became practical with the development of minicomputers.

By the early 1970s, the demand for all types of IT had begun to accelerate. Increased capabilities and reduced costs justified computerized support for a growing number of non-routine applications and the decision support system (DSS) concept was born. The basis objective of a DSS is to provide computerized support to complex, non-routine decisions, as illustrated in the following IT at Work.

Decision Support Systems (DSS) are computer-based systems that support some or several phases of the individual, team, organizational or inter-organizational decision making process. DSS may involve many technologies drawn from multiple disciplines, including information science, cognitive science, computer science, economics, engineering, business and management science, and statistics, among others. DSS can be categorized based on the complexity of the decision problem space and group composition.

- Decision support system is a computerized system for helping make decision.
- There are many types of decision support system.
- Data-driven or data oriented DSS emphasizes access to and manipulation of internal company data and sometimes, external data.

2.1 Benefits of decision support system

1. Improves personal efficiency.
2. Expedites problem solving.
3. Facilitates interpersonal communication.
4. Promotes learning or training.
5. Increases organizational control.
6. Generates new evidence in support of a decision.
7. Creates a competitive advantage over competition.
8. Encourages exploration and discovery on the part of the decision maker.
9. Reveals new approaches to thinking about the problem space [2].

2.2 Components of DSS

A DSS has three basic components (1) a database, (2) a model base and (3) the DSS software system.

The DSS database is a collection of current or historical data from a number of applications or groups, organized for easy access by a range of applications. The DSS database management system protects the data while controlling the processing that keeps the data current historical data.

A database consists of all the files of an organization, structured and integrated to facilitate update of the files and retrieval of information from them. The term has often been used rather loosely. Technically a data base consists of the files that are part of a data-base management system. However, database is used to refer to all the files of an organization.

A computer program that stores, retrieves, and updates data that are stored in one or more files.

Batch processing, with batch processing changes and queries to a file are stored for a period of time. A processing run is made periodically to update the file, produce reports and produce responses to the queries. Batch run can be made on a schedule basis (such as daily, weekly, on monthly) required basis.

Batch processing with sequential tape files, changes used to update a master file is called transactions. Since the records are stored sequentially on the master file usually in ascending order by the primary key the transactions are sorted in this same order prior to updating. In the file-update program, records are read off the old master files simultaneously with changes read off the transaction file. The old master-file records updated and then to the new file [3].

3. Break-even analysis

The breakeven point is the point at which the cost of making a product equals the revenue made from selling the product.

Although breakeven analysis fairly simple and straightforward, it assumes that demand is basically inelastic and that the primary task in setting prices is to recover costs. Instead of focusing on the achievement of pricing objectives such as increasing market share or return on investment, breakeven analysis focuses only on how to breakeven. Hence, marketing managers can use this analysis to determine more accurately whether a product will at least achieve a breakeven volume.

Breakeven analysis is an application of marginal costing and seeks to study the relationship between cost, volume and profit at different cost, volume and profit at different activities level and can be useful guide for short term decision on making on planning [4].

(1) Breakeven Unit = Total Fixed Cost / Unit Contribution
= -------- Units

Unit Contribution = Selling Price – Variable Cost

(2) Break Even Sale = Selling Price x Break Even Units
= ----- -- $

(3) Required Units = Fixed Cost + Profit / Unit Contribution
= --------- Units

(4) Required Profit on Sale = Selling Price x Required Units
= ---------$

3.1 Marginal analysis

Marginal cost is the additional cost incurred when a firm produces one more unit of a product.

In economics and finance, marginal cost is the change in total cost that arises when the quantity produced changes by one unit. It is the cost of producing one more unit of a good. Mathematically, the marginal cost (MC) function is expressed as the first derivative of the total cost (TC) function with respect to quantity (Q). Note that the marginal cost may change with volume, and so at each level of production, the marginal cost is the cost of the next unit produced.

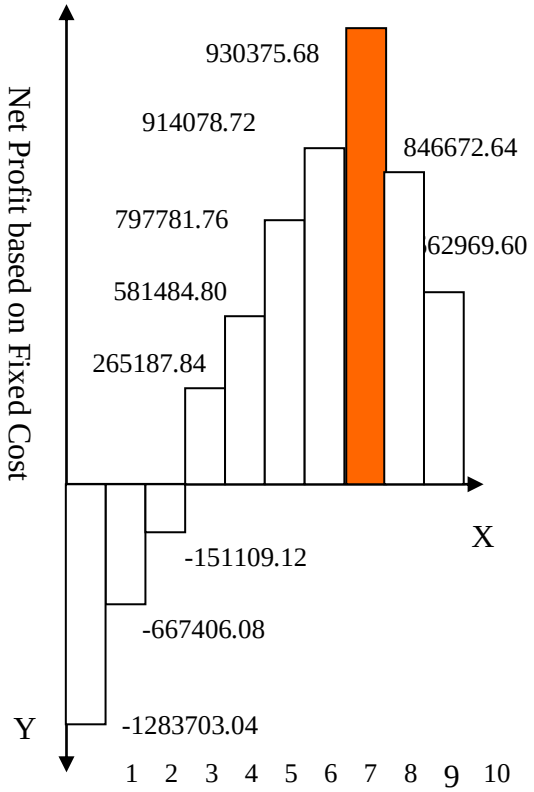
$$MC = \frac{dTC}{dQ}$$

In general terms, marginal cost at each level of production includes any additional cost required to produce the next unit. If producing additional vehicles requires.

Marginal Analysis is the process to estimate the best profit production for the industry based on the marginal cost, fixed cost, and marketing associated data.

By using the marginal analysis, manager can avoid the production overhead of the industry.

In addition, manager can decide how the sale price of the product by effective manner [5].



"Figure 1. Graph on marginal analysis"

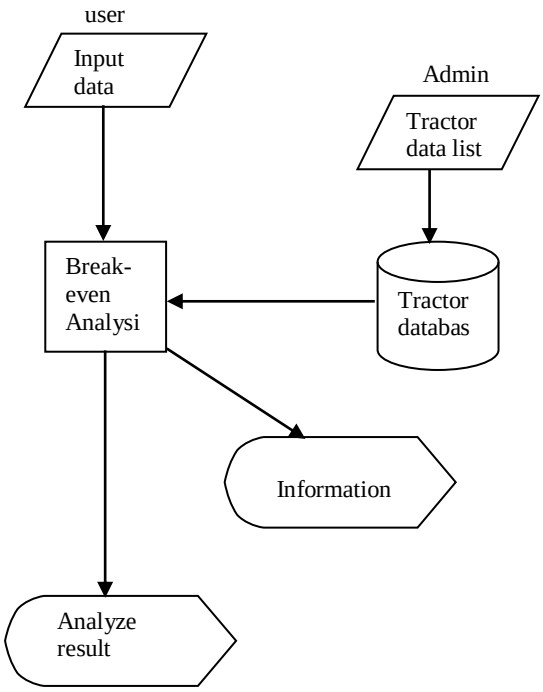
The above graph is shown for the result of the marginal analysis process to estimate best profit production line based upon marketing point of view. From the graph the industry have maximum profit for at 8 mini tractors sold. So, the industry should be prepared for 8 mini tractors production line. By using the marginal analysis the industry can avoid over head for production line cost.

3.2 System flow diagram

When the user start the system, the user can do one of the processes, Break-even Analysis process. When the user want to record daily operational data for the industry, the administrator can enter data entry process in database.

When the user wants to view the daily operational data, also user can view the operational data.

When the user wants to analysis the industry base on the operational data of the industry, the user must choose Analysis process. The analysis process can display the information in marketing and production point of view based on the current operational data.



"Figure 1. System flow diagram for Solving cost fluctuation problem for Mini-Tractor Industry"

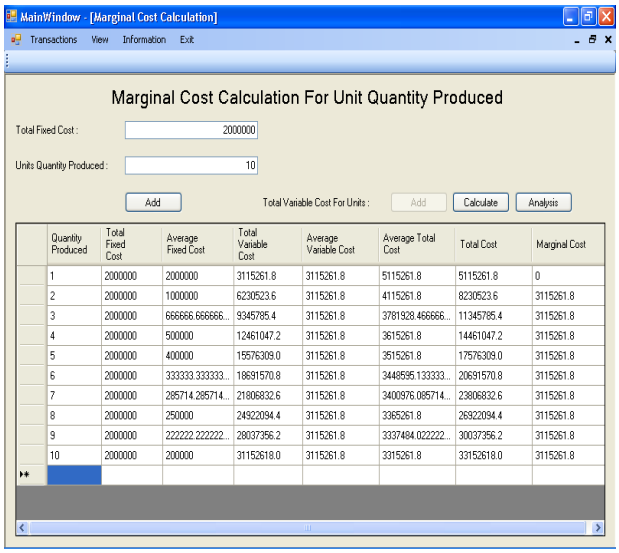
4. Result

In this system, the mini-tractor industry can store, retrieve the operational data easily and quickly. Cost of the product can be changed, and the total production cost of the mini-tractor can be calculated accurately and quickly.

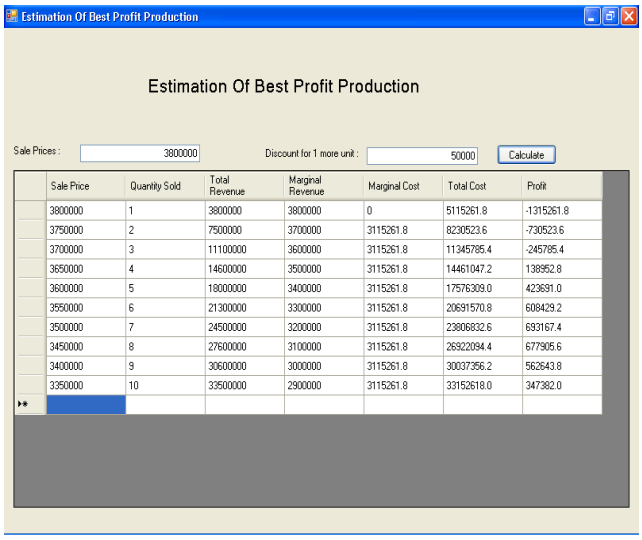
More over, manager of the industry can find the production strategy and marketing strategy by using marginal analysis and break-even analysis based on the stored data.

Especially, manager can establish the production line with the effective manner that is appropriate for the marketing strategy.

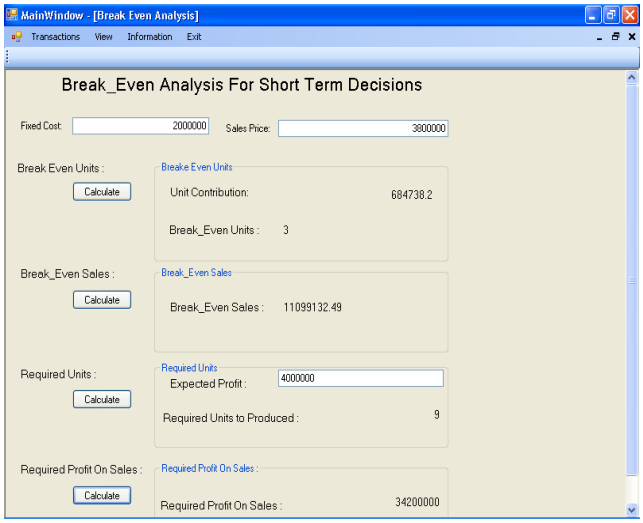
Following the tables are detailed explanation of calculating break-even analysis and marginal cost for mini-tractor.



"Figure 1. Marginal cost calculation for quantity produced"



"Figure 1. Estimation of best production"



"Figure 1. Break-even analysis for short term decision"

5. Conclusion

Myanmar is an agriculture based country. The national economic greatly rely on the agriculture. By using this system, manager of the mini-tractor industry can effectively manage the industry. This system is developed as an decision support system and therefore the system is appropriate for strategic and manager level of the mini-tractor industry.

The system also provides to store and retrieve the day to day operational data. So, the system can be used for operational level of the mini-tractor industry.

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