The Development of Decision Support System for Dyeing and Printing Works of Fabrics

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Abstract

Decision Support System (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. Decision Support System (DSS) is a subset of computer-based information systems (CBIS). Goal-seeking Analysis and what-if Analysis are the Decision Support System's analytical modeling. Typically, the value of only one variable is changed repeatedly, and the resulting changes on other variables are observed. What-if analysis is a powerful tool for identifying and quantifying the impacts of inputs and system parameters on modeling results. Goal-seeking analysis is a reversed case of what – if analysis involving repeated changes to only one variable at a time. In this thesis, dyeing and printing works of fabrics is developed for decision support system to identity the alternative for production to forecast based on user's constraints.

1.Introduction

Decision Support System is a type of information system. It helps the analysis of business information. The basic idea is to collect business operational data and to reduce it to a form that could be used to analyze the behavior of the business and modify that behavior in an intelligent manner. The strength of Decision Support System lies in supporting decision making in situations where both human judgment and the power of the computer are required. Contemporary organizations also need to access historical, summary data and to access data from other sources than those available through Database Management System. To get this purpose, the concept of data warehouse has been created. Information Systems have to do with analyzing data and making decisions, often major decisions, about how the enterprise will operate, now and in the future. And not only do information systems have a different focus from operational ones; they often have a different scope. Where operational data needs are normally focused upon a single area, informational data needs often span a number of different areas and need large amounts of related operational data.

Decision Support System is a system that provides tools to manager to assist them in solving semi-structured or unstructured problem. A decision support system supports the human decision making process, rather than providing a means of replacing it . Decision-making is a process of choosing among alternative courses of action or choices for the purpose of attaining a goal or goals. The major objectives of decision models are to support the decisions made and to provide insight about decision situations. In this sense, the decision models are prescriptive rather than descriptive. Decision analysis involves the decomposition of the elements of a decision situation to allow detailed separate and yet integrated study of those elements.

2.Decision Support System

A decision support system (DSS) provides tools that enable managers to develop information in the manner that best suit the decisions they are currently trying to make. DSS are 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.

A new decision is basically made when either an individual or an organization feels dissatisfied with the existing states of situation and also has few alternatives (courses of action or strategies) to improve the existing states. Decision theory which is defined as the process of logical and quantitative analysis of all factors that influences the decision problem, assists the decision-maker in analyzing these problems with several courses of action and consequences. The basic objective of decision theory is to provide a method of natural decision-making wherein data concerning the occurrence of different outcomes (consequences) may be evaluated to enable the decision-maker to identify the best course of action [3].

Management Information System indirectly support decision making, Decision Support System (DSS) [1] is a type of information system whose

principle objectives is to support a human decision maker during the process to get the better decision. Decision Support System (DSS) focus on providing information interactively to support specific types of decision by individual manager. DSS are interactive information system that assists a decision maker in solving problems, when solutions require a combination of human insight and computerized support. The development process for a DSS includes the same basic steps that are required for most applications- idea generation and approval, information requirements determination, design, development, and maintenance[2].

A cohesive and integrated set of programs that share data and information and provide the ability to query computers support system is clearly not an application that simply manipulates data or supports decision-making. For example, an enhanced user interface that permits querying and analysis of a single database is not a decision support system; nor is a spreadsheet application with basic analysis and advanced "if/then" planning features. Even a database management system (DBMS) that permits a user to select and analyze data within a single database for reporting and analysis would not qualify, because it does not integrate multiple databases. Rather, a decision support system is disparate sources of raw intentionally and explicitly more comprehensive, and is designed specifically to enable users to support problem solving and decision-making by compiling information from data. A robust definition of a decision support system should encompass: (1) users who understand what the data mean and how they can be accessed with a (2) technology system (hardware, software, and user interfaces) that manipulates (3) a data system (integrating data from multiple sources) explicitly for the purposes of (4) a decision-making system (user-driven within an organization). While not a formal definition, this description was developed for this publication to stress multiple emphases on user skills, technology tools, data quality, information use, and organizational management encompassed by true decision support systems. Such as description incorporates technology tools for managing, analyzing, communicating, and using data; an understanding of data within the system and the implications of the use of those data; and an intention by decision-makers to employ information for the purpose of planning and action within an organization[1].

2.1 The Purpose of Decision Support System

The purpose of a decision support system is to support managerial decision making. This support may come about indirectly thorough staff operation of the DSS or as a result of hands-on use by management. The DSS developed may require a new organization unit with a position within the organization's structure, requiring relationships with other organizational units and submitting them to the administrative control of management. The purpose of a DSS is to support the manager's decision making responsibilities, and that decision making is often a difficult task to specify or structure, it is logical during the development of a DSS. The actual operation of a DSS may require skills that are not possessed by many managers. In these cases, an intermediary may operate the system for the user. The purpose of DSS is to support the manager in the decision making process by supplying needed information[3].

A decision support system involves an interactive analytical modeling process for example, using a DDS software package for decision support may result in a series of displays in response to alternative what –if changes entered by a manger. Decision support system is gaining an increased popularity in various domains, including business, engineering , the military and medicine. Decision support system can provide intelligent access to relevant knowledge, and aiding the process of structuring decision. Instead, they use the DSS to find the information they need to help them make a decision. That is the essence of the decision support system concept.

A Decision Support System (DSS) is an interactive computer based information system that helps people makes decisions, use judgment, and work in areas where no one knows exactly how the task should be done in all cases. Thus, a DSS supports complex decision making and increases its effectiveness. Decision support system is a specialized Management information system designed to support an executive's skill at all stage of decision making. Decision support system use decisions model and specialized database[4]. A decision support system involves four basic types of analytical modeling activities:

(1) What-if analysis
(2) Sensitivity analysis
(3) Goal-seeking analysis
(4) Optimization analysis

2.1.1 What-if Analysis

In order to be able to evaluate beforehand the impact of a strategical or tactical move, decision makers need reliable previsional systems. What-if analysis satisfies this need by enabling users to simulate and inspect the behavior of a complex system under some given hypotheses. A crucial issue in the design of what-if applications in the context of business intelligence is to find an adequate formalism to conceptually express the underlying simulation model.

In what-if analysis, a client makes changes to variables, or relationships among variables, and

observes the resulting changes in the values of other variables. A managerial user would be very interested in observing and evaluating any changes that occurred to a variable. To many managers, net profit after taxes is an example of the bottom line, that is, a key factor in making many types of decisions[5]. This type of analysis would be repeated until the manager was satisfied with what the results revealed about the effects of various possible decisions.

2.1.2 Goal-seeking Analysis

Goal-seeking analysis reverses the direction of the analysis done in what-if and sensitivity analysis. Instead of observing how changes in a variable affect other variables, goal-seeking analysis sets a target value for a variable and then repeatedly changes other variables until the target value is achieved[5]. Therefore, this form of analytical modeling would help answer the question, "what happens if we change revenue or expenses?" thus; goal-seeking analysis is another important method of decision support.

3. Related Work

Like many other industries, the textile dyeing and finishing industry has been through a period of adjustment and accommodation to environmental requirements and regulations. The industry is now more responsive to environmental issues and community concerns and committed to producing positive environmental outcomes. One of the mechanisms for achieving these outcomes and maximizing environmental performance is for industries to define and adopt Best Practice Environmental Management (BPEM) guidelines. This publication sets out BPEM guidelines for the textile dyeing and finishing industry[6].

Maximizing the probability of bypassing an aspiration level, and taking increasing risks to recover previous losses are well-documented behavioral tendencies. They are compatible with individual utility functions that are S-shaped, as suggested in Prospect Theory. The system explores evolutionary foundations for such preferences. Idiosyncratic innovative activity, while individually risky, enhances the fitness of society because it provides hedging against aggregate disasters that might occur if everybody had pursued the same course of action. In order that individuals choose the socially optimal dosage of innovative activity, the individuals' preferences should make them strive to improve upon the on-going convention, even if it implies taking gambles that reduce their expected achievements[7].

Foundations for a new approach to modeling of critical world relationships are presented, based on the regionalization of the world and multilevel—multigoal concepts. The fundamental structure of the model is described and the directions for further developments indicated. Areas of possible applications of the model both for the analysis of these critical relationships and as a decision-making tool are demonstrated[8]. This paper discusses the subject of "best practices" for designing and implementing Integrated Financial Management Information Systems (IFMIS) and how to put them into place in specific environments: namely, in developing and transitional countries as well as in conflict and post-conflict situations. The IFMIS provides a critical financial management solution for countries whose administrative and economic infrastructure is obsolete, or has been destroyed through war and years of conflict.

There is broad agreement that a fully functioning IFMIS can improve governance by providing real-time financial information that financial and other managers can use to administer programs effectively, formulate budgets, and manage resources. Sound IFMIS systems, coupled with the adoption of centralized treasury operations, can not only help developing country governments gain effective control over their finances, but also enhance transparency and accountability, reducing political discretion and acting as a deterrent to corruption and fraud.

Obstacles should not be underestimated. The road to implementing successful IFMIS in developing countries is paved with difficulties, such as resistance from the bureaucracies involved; lack of decision-making from the top; weak human capital; corruption and fraud; and, in the case of conflict-ridden countries, the instability and violence that impair any efficient long-term work. Moreover, IFMIS systems are complicated, expensive, and difficult to manage and maintain. Indeed, a 2003 review of 34 IFMIS projects supported by the World Bank over 15 years estimated that only few of the systems were likely to be sustained after donor support ceased[9].

4. Overview of the Proposed System

Projecting possible features during a planning process are particular strengths of DSS. There are the two principle modules of analysis: "what-if" and "goal seeking". To study these concepts and the use of accounting module such as income statement, a DSS is implemented for a firm of Dyeing and Printing of Fabrics.

This system is an implementation of decision support system for Dyeing and Printing Works of Fabrics. The raw materials used in this system are rolls of plain clothes (fabric) and these plain clothes are printed as required designs. The designs that can be printed are stored in the tables. Other raw materials are paint for dying, design blocks, bleaching and wax. The costs each item for different design are also stored in tables so that total cost for each design can be seen. The printing and dying process used as a case study in this proposed system is : firstly, need to choose the desired design

and colour. After that designer designs it on the block and press it on the cloth (fabric) rolls. Next stage is bleaching and then the fabric rolls are dried in the sun for at least two days. After that, dying stage is done and dried these rolls in the sun for two days. Then, the painting is done and bleached it again. After this, the rolls need to be dried again for three days. Only then, the fabric rolls are ready for market. This system helps the owners in making decision in how to control and manage the manufacturing and sale process effectively.

In this system, the owner or manager can see the previous years' production status and decides what to do for the coming year. The user can also make changes to some expenses in order to get the desired profit or income. The system provides various profit and sale volume by making changes in some expenses. Hence, financial plans can be made by seeing the dependence of projected financial results on the values of input variables. In this system, income statement module is used for a DSS that helps the user to obtain a pro-forma annual income statement. By entering the sale volume, the system will show how much gross profit and net profit will be obtained.

The process flow of the system is shown in figure 1.

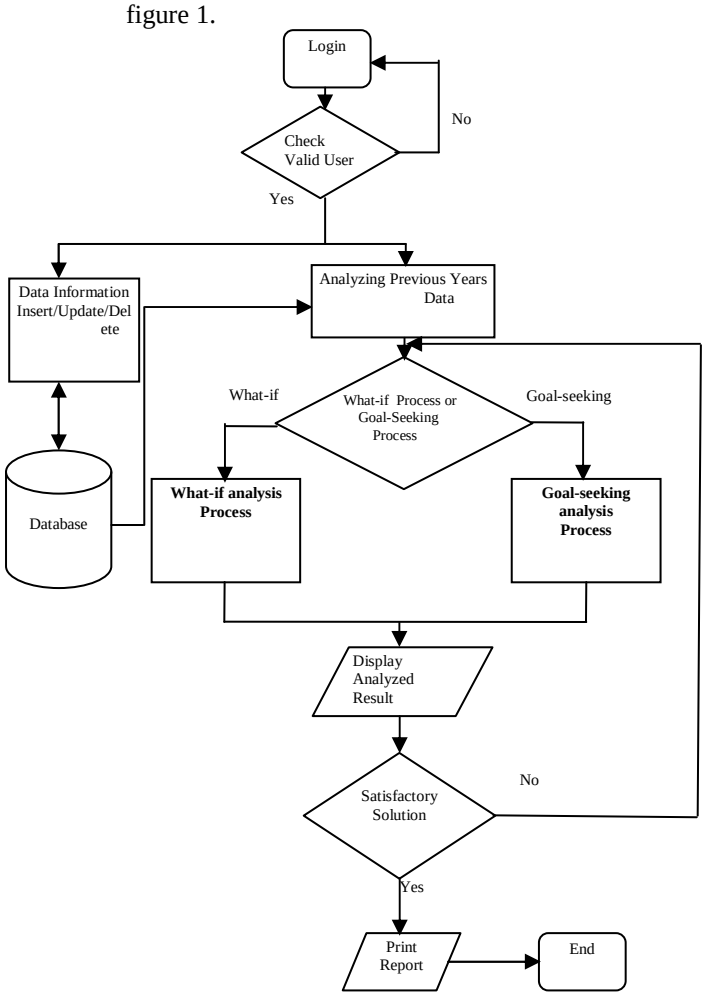

Figure 1 . Process Flow of the System

As seen in figure, the user (owner) can view the previous year information such as volume of sales, sales amount, profit, expenses etc. And then he/she can decide whether to increase or decrease sales volume or income or profit by choosing what-if analysis mode or goal seeking mode. In what-if analysis process, the user can give the desired profit and see volume of sales. Upon this condition, the user can make changes on some controllable expenses and see the changes in the profit and volume of sale as what-if concepts. In goal seeking analysis process, the user can give the profit which he needs to be the goal of his firm and can see the volume and expenses that might be changed.

5. The model or equation of income Statement

Sale Income = Production * Selling Price

Sale Tax = 1/11 over Sale income

Operating Expense = Indirect Labour + Indirect Cost

Income Tax = 30% over Net Profit (Before Tax)

Gross profit = Net sales – Costs of goods sold

Net sales = Sale – Sale tax

Cost of Good Sold = Raw Material + Direct Labour + Direct Cost

Net profit (before tax) = Gross profit – Operating expenses (Indirect cost)

Net profit (after tax) = Net profit – Income tax

In this system, some expense accounts can be controlled in what-if and goal seeking analysis in order to get the desired profit. These expense accounts are, for example, overtime, meal allowance, power charges, repair and maintenance, stationery and office supply, etc. By making changes on these controllable expenses, the manager can get various profit and sale volume.

6. Database Design of the System

The tables used in this proposed system are shown in figure 2.

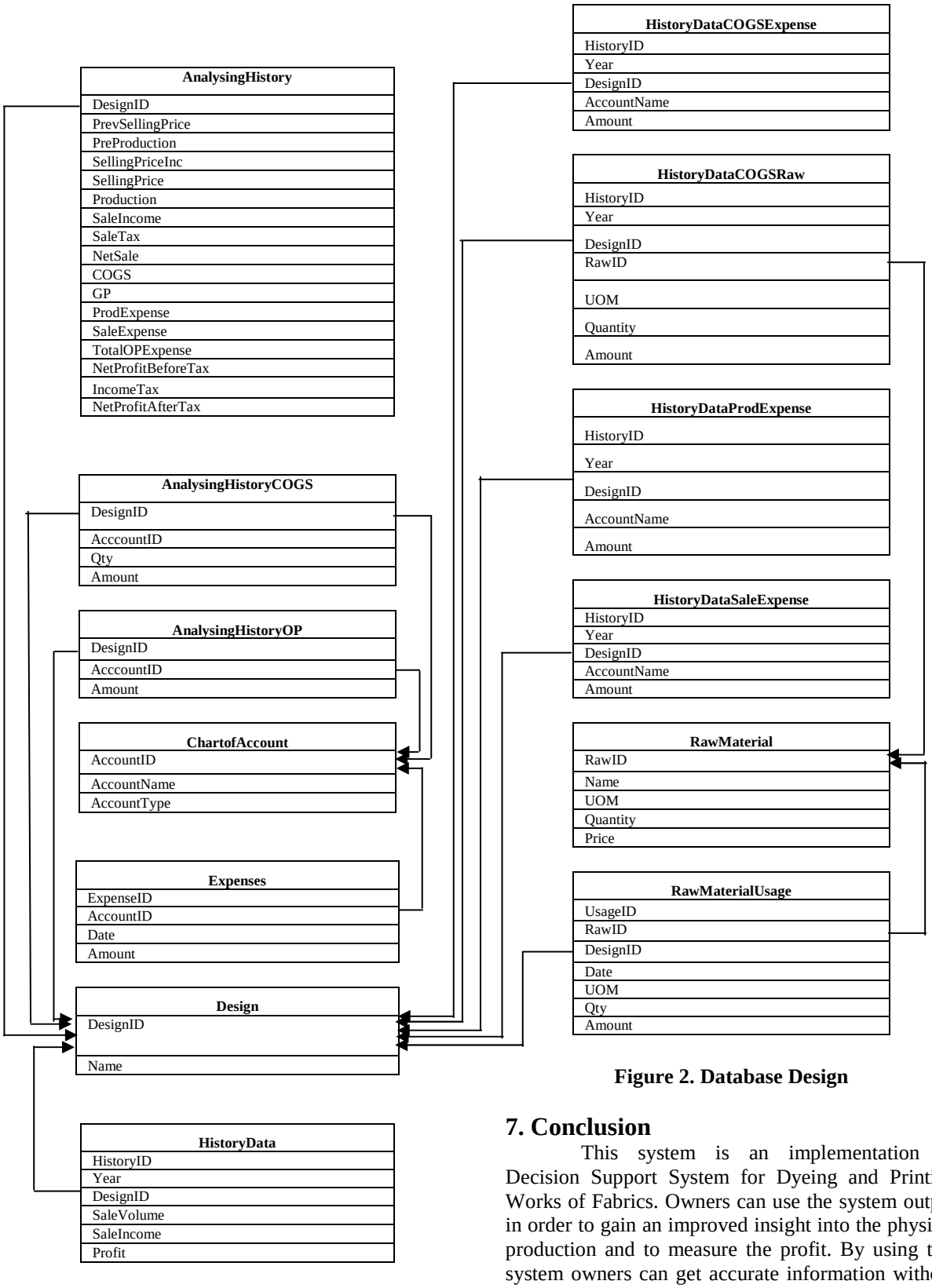

Figure 2. Database Design

7. Conclusion

This system is an implementation of Decision Support System for Dyeing and Printing Works of Fabrics. Owners can use the system output in order to gain an improved insight into the physical production and to measure the profit. By using this system owners can get accurate information without time lost and support to make effective decision.

The development decision support system for dyeing and printing works of fabrics is the essential model for manufacturing owner. By using the system, the owners can analyze their production with vast amount of profit and how should they

invest on production without any loss. The proposed system can also be easily modified to support other manufacturing problems and increase the efficiency of the decision making processes. This system gives access to all the information needed for management to reduce time consuming in decision making process.

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