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CEO의 효율적/유효적 의사결정을 위한 경영성과 데이터마이닝 시스템의 구축

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Construction of Manamgement Performance Data-Mining System for CEO's Efficient/Effective Decision Making

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요 약

본 연구는 변화하는 기업환경에 부응하기 위하여, 경영성과지표를 관리하는 최고의사결정자의 관점에서 정보기술의 효과적인 활용을 통하여 기업 전체의 조직이 공유할 수 있는 경영성과 정보시스템을 전개하고자 한다. 이를 위하여 기업의 경영성과분석에 대한 일반론을 서술하여 이해관계자 관점에서의 부가가치(Value-Added)와 가치경영 관점에서의 경제적부가가치(Economic Value-Added)를 기업 경영성과의 두 축으로 제시한다. 제시된 경영성과분석 체계를 통하여 기업내부의 이해관계자는 물론 기업 외부의 이해관계자 역시 기업의 경영성과를 올바르게 평가할 수 있는 토대를 마련함으로서 기업의 경영성과라는 지식체계를 기업 내·외부의 전 조직이 공유할 수 있는 이론적 틀을 제시한다.

본 연구에서 제기되는 경영성과 데이터마이닝 시스템은 경영성과의 변화를 주도하는 중요 관리변수를 추출하기 위하여 유전알고리즘(Genetic Algorithms)을 활용한 데이터마이닝(Data Mining)체계를 구현함으로써, 기존의 단발적인 방법으로 기업 경영성과를 분석하는 것이 아니라, 경영성과의 변화를 연속적으로 추적하고 이에 영향을 미치는 여러 가지 변수를 실시간으로 분석할 수 있으며 기업 내·외부의 모든 이해관계자가 경영성과에 대한 정보·지식을 공유할 수 있는 물리적 토대를 제공할 수 있다. 그리고 구축된 경영성과에 대한 정보·지식의 발견·공유체계는 급격한 변화에 능동적으로 대처할 수 있는 바람직한 의사결정의 토대가 될 수 있을 것이라 판단된다.

기업 경영성과분석의 기준이 되는 5개 운영데이터 테이블의 자료는 (주)한국신용평가의 재무제표 데이터베이스인 KISFAS(Korea Investors Services Financial Analysis System)를 활용하였으며, 국내의 자동차산업을 대상으로 1981-1996년까지의 자료를 이용하였다.

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Abstract

In modern dynamic management environment, there is growing recognition that information & knowledge management systems are essential for CEO's efficient/effective decision making. As a key component to cope with this current, we suggest the management performance data-mining system based on IT(Information Technology). This system measures management performance that is considered with both VA(Value-Added), which represents stakeholder's point of view and EVA(Economic Value-Added), which represents shareholder's point of view. The relationship between management performance and 85 financial ratios is analyzed, and then important financial ratios are drawn out. In analyzing the relationship, we applied the explanation-based Gas(Genetic Algorithms) that consider predictability, understanability
(lucidity) and reasonability factors simultaneously. To demonstrate the performance of the system, we conducted a case study using financial data over the 16-years from 1981 to 1996 of Korean automobile industry which is taken from database of KISFAS(Korea Investors Services Financial Analysis System).

Ⅰ. INTRODUCTION

In modern dynamic management environment, there is growing recognition that information & knowledge management systems are essential for CEO's efficient/effective decision making. To cope with this current, CEO must have timely/requisitely an united information & knowledge to concentrate all organization powers on enterprise object.

Accordingly, it is more important factor to survival that information & knowledge transformation mechanism for the present conditions in finance manufacturing marketing areas. As a key component to cope with this current, we suggest the management performance data-mining system based on IT[10].

The system measures management performance that is considered with both VA(Value-Added), which represents stakeholder's point of view and EVA(Economic Value-Added), which represents shareholder's point of view. Through the suggested management performance scheme, CEO can analyze the enterprise performance real-time. To model the management performance data-mining system, we will apply the GAs for exploring/finding important managing factors from management performance database. We will construct this system based on intranet/internet.

This system can measure the management performance momentary (as in a traditional system), but it also can trace the management performance continuously and analyze the related factors.

Ⅱ. MANAGEMENT PERFORMANCE DATABASE BASED ON VA & EVA

Today, most enterprises are threatened with plural challenges such as intensive enterprise competition, diversity/luxury customer needs, higher energy cost, lower economic growth and transparent management. So, the integrated management system is needed to accomplish efficient/effective increment through qualitative integrated control with man, machine and material.

In this paper, we suggest the management performance scheme that is considered with both VA(Value-Added), which represents stakeholder's point of view and EVA(Economic Value-Added), which represents shareholder's point of view.

Value-Added includes ordinary income, employment costs, financial expenses, rents, taxes dues and depreciations. It means organization's outcome as creating value and reflects distribution of profit for each contributor, namely each interest groups.

Using additive method, the VA is composed of following items[9].

$$\begin{aligned} VA = {} & \text{ordinary income} + \text{Employment costs} + \\ & \text{Financial expenses} + \text{Rents} + \\ & \text{Taxes and Dues} + \text{Depreciations} \end{aligned} \quad (2\text{-}1)$$

The value management based on EVA puts a priority on value creating and takes the most important object as maximizing cash flow in long-term. EVA is introduced in the latter half of 1980 by Stern Stewart Consulting. It is residual costs that is left NOPAT(Net Operating Profits After Taxes) minus total capital cost.

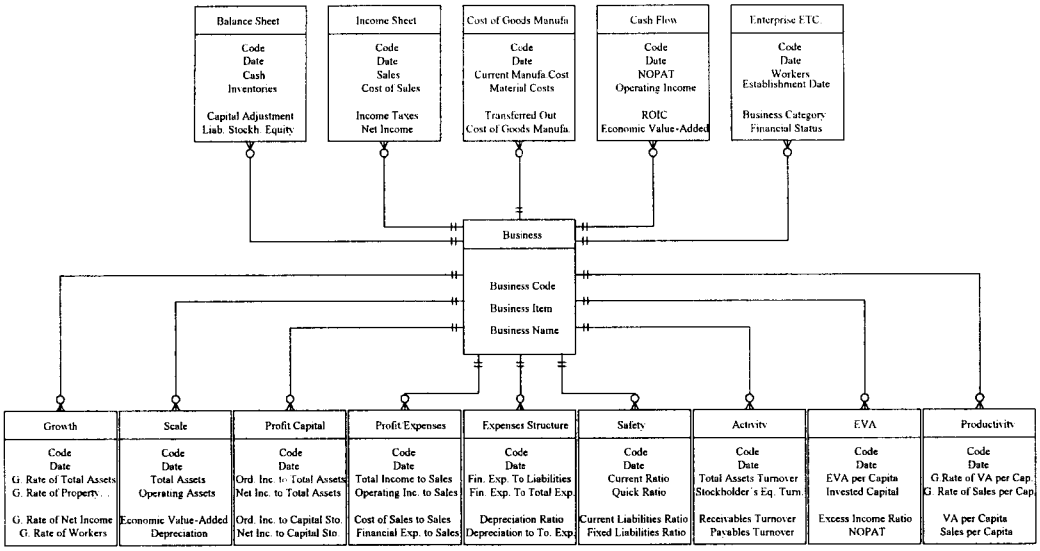

Figure 1. E-R diagram of management performance database

NOPAT is net increasing value through operating activities and total capital cost is the sum of debt's cost and equity's cost.

EVA Calculating is following[8].

$$
\begin{aligned}
EVA &= NOPAT - \text{Capital Cost} \\
&= NOPAT - \\
&\quad (\text{Capital Cost Ratio} \times \text{Operating Investment}) \\
&= (\text{Operating Investment} \times ROIC) \\
&\quad - (\text{Capital Cost Ratio} \times \text{Operating Investment}) \\
&= \text{Operating Investment} \times \\
&\quad (ROIC - \text{Capital Cost Ratio}) \qquad (2\text{-}2)
\end{aligned}
$$

EVA plays the role of an organized bridge among the important financial policies such as value evaluation, performance evaluation and investment analysis.

We use enterprise's financial statements for raw database. According to user's need, Data Warehouse is made from raw database. It includes two management performance(VA, EVA) and 85 management variables(financial ratios). In Figure 1 of the E-R diagram of management performance database, administrator inputs management performance data into 5 operational data tables.

When an user requests the data in client, the system makes 9 information data tables based on 5 operational data tables. Actually, a client can only access 9 information data tables for mining.

Ⅲ. KNOWLEDGE DISCOVERY USING EXPLANATION-BASED GAs

We use the GAs, a kind of machine learning for extracting important managing factors. GAs is robust in statistical restriction such as linearity, normality and fast finds a global

optimum opposite to neural network in case that solution space is big and data noise is extreme. So we use GAs in this paper among many machine learning methods[1][2][3][6]. But it is difficult that experts overall accept the inductive result from GAs of machine learning because general GAs makes the final results via evaluation selection crossover mutation course using random number. Especially, it is more serious in case that the object has semi/non structural properties[4].

Considering these properties, we use a linear combination model for GAs learning structure. Although this model's predictability will be more decreased than non-linear model, this model can increase the knowledge's understandability that is meaning of induced values. Moreover, we introduce a random variable scheme based on normal distribution for initial chromosomes in GAs, so we can expect to increase the knowledge's reasonability that is degree of expert's acceptability. The random variable scheme based on normal distribution uses statistical correlation/determination coefficient that is calculated with training data.

To extraction of important managing variables, explanation-based GAs process is following.

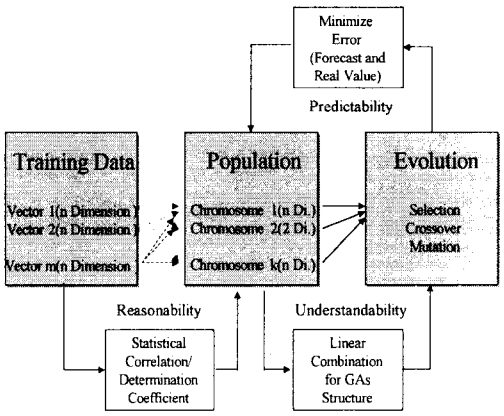

Figure 2. Explanation-based GAs process to extraction of important managing variables

By means of explanation-based GAs, we can consider simultaneously three factors such as predictability, understandability and reasonability. And CEO uses the extracted variables as main managing factors to control the enterprise.

Ⅳ. CONSTRCUTION OF MANAGEMNT PERFORMANCE DATA-MINING SYSTEM

The management performance data-mining system is based on Client-Server system using relational database. Server OS is Windows NT 4.0 and Data Warehouse is realized on MS-SQL 7.0. The Server OS is Windows NT 4.0 and Mining system is constructed by MS-Visual Basic 6.0. Also, The Client OS is Windows 98 and Mining system is constructed by MS-Visual Basic 6.0.

To demonstrate the performance of the system, we conducted a case study using financial data over the 16-years from 1981 to 1996 of Korean automobile industry which is taken from database of KISFAS(Korea Investors Services Financial Analysis System).

The management performance database is Figure 3.

NOPAT is net increasing value through operating activities and total capital cost is the sum of debt's cost and equity's cost.

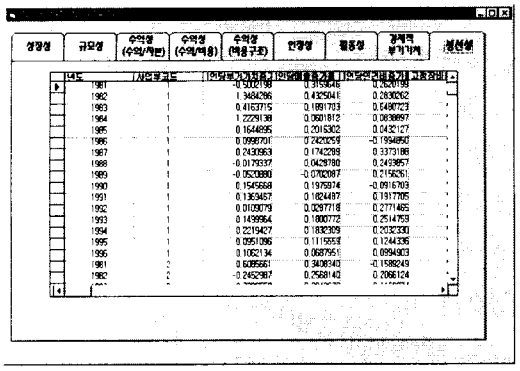

Figure 3. Management Performance Database

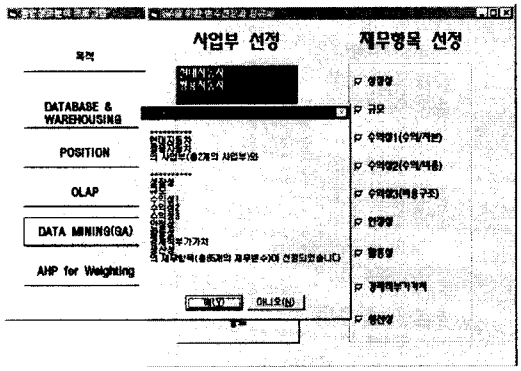

Figure 4. Interface of Explanation-Based GAs

Interface of explanation-based GAs is Figure 4, and the result of data-mining is Figure 5.

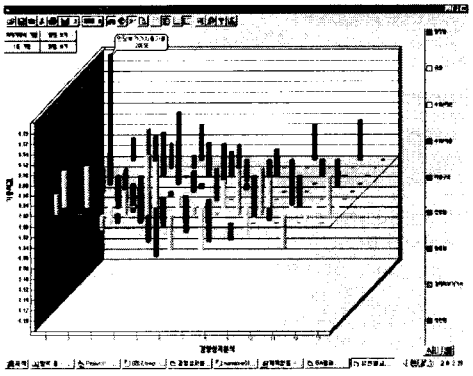

Figure 5. The Result of Data-Mining

V. CONCLUSION

Using this management performance data-mining system based on Information Technology, CEO can not momentary measure management performance but continuously trace management performance and analyze related factors. So we can induce an efficient/effective decision making to overcome dynamic management environment.

As further studies, many data are cumulated in database and absolute criteria are made for judging management performance. Especially, non-financial factors such as customer satisfaction, business process efficiency, learning, inventory level and enterprise culture must be included in management performance scheme.

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