

# DECISION SUPPORT SYSTEM FOR PERSONAL FINANCIAL ANALYSIS

Pradit Songsangyos, Supakorn Iamamporn

## Abstract

*The research study was, to develop a decision support system for personal financial analysis. Personal financial planning such as properties loan or car finance. The financial model was constructing for both what-if analysis and goal seeking. The system development process as follows. First, let the user to select his or her propose is what-if analysis or goal seeking. Then collecting input data from the user including, price; interest rate; year; monthly payment. Lastly, processing depends on the user preference then displays the results. For further study, development of a decision support system for the capital investment planning and analysis to resolve, how much properties and cash in hand needed to be invested.*

Index Terms: Decision Support System, Personal Financial, Financial Planning

## Introduction

Decision-making in financial matters has become a key issue in not only business enterprise activity but also in personal financial planning as well. Problems in financial planning are usually complicated. The user may face the difficulty to use the right formulas which are suitable for the matters. In addition, the calculation process is a time-consuming. Since real-time computing is beyond human capabilities, the process of financial decision-making is usually supported by computer software [1].

Computer software applications for management support are on the rise. The microcomputer revolution made computers available on many managers' desks. Managers may now access thousands of databases all over the country. Most organizations, private and public, use computerized analysis in their decision making. The cost of hardware and software is declining, whereas the capabilities of information system and networks continue to increase [2]. Decision support system is a computer system designed to help decision-makers improve decision making. They can be defined as an approach to effective decision making involving an interface between the individual and computer, from problem formulation to solution [3].

Many of computer software were built for support business enterprises, while very few applications were built to assist for personal proposes, especially in financial planning. So the proposed decision support system for personal financial analysis is developed for decision-making in personal financial analysis such as properties loan or car finance. Microsoft Excel was selected as a tool to develop an application. An interactive computer-based system includes three major parts: database; modelbase; and user interface.

## Literature Review

In recent years, the price of Crude oil in the international market has led to an increase in the cost of living. Deposit rate cannot keep up with price inflation, forced to salary earners to reduce expenditures and create savings plans. The study using Visual Basic for programming and use of the open database method of saving data in an access database, in order to develop a personal financial planning system management. The system provides with financial planning functions such as, accounting, budgeting, financial planning, and monitoring. The system design including, user accounts; password settings; a security management system; journal-type account management; displayable account subjects; options for additional budgeting lists; modification and deletion options; revenues and expenditures of annual accounting subjects; and legends and records displays for related incomes and expenses; assets and liabilities; profit and loss accounts. The proposed system is suitable for personal financial planning [4].

Decisions on financial matters are a complicated process especially when facing high risk and uncertainty because it may lead to unpredictable results. Improper decision may detriment the functioning of the organization. Distributed systems offering financial decisions are a viable solution, provided that they are able to create a single,

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reliable recommendation. However, if each node of the system creates multiple instances of the solutions, overall reliability of the system is lower. So proper care should be taken to ensure that users get the best possible solution generated automatically by the system, then he or she can make a correct decision that will result in benefits to organization. Use of consensus methods provides the potential of arriving at a best decision - one that not necessarily belongs to the original domain of decisions generated by individual nodes, but similar. So the level of risk involved is lower. If users were to perform own analyses and manually select from decisions generated by the system under time pressure, their choice would be burdened with error – the more so if we take into account the time pressure involved. Furthermore, consensus methods allow for considerable reduction of decision time, since the system presents the user with the best solution determined automatically on the basis of variants generated by individual nodes [1].

The financial model of the proposed decision support system for personal financial analysis was constructing for both what-if analysis and goal seeking. Microsoft Excel has functions and tools to support the financial analysis. In addition, this package software provides what-if analysis and goal seeking, so it is one popular tool for construct a decision support system. Turban [2] has defined “What-if” analysis as a model builder makes predictions and assumptions regarding the input data, many of which deal with the assessment of uncertain future. When the model is solved, the results depend, of course, on these data. Sensitivity analysis attempts to check the impact of change in the input data on the proposed solution (the result variable). This type of sensitivity analysis is called “what-if” analysis, because it is structured as “*What* will happen to the solution *if* an input variable, an assumption, or a parameter value is changed?” For example, *what* will be the market share *if* the advertising budget increases by 5 percent? In addition, “Goal seeking” analysis checks the inputs necessary to achieve a desired level of an output (goal). It represents a “backward” solution approach. For example, what is the annual R&D budget needed for an annual growth rate of 15 percent? Furthermore, in many regular computer-based decision systems, it is difficult to conduct such an analysis because the prewritten routines usually present only a limited opportunity for “what-if” and the goal seeking options are easy to execute and provide ample opportunity for flexibility and adaptability.

The Decision Support System for Hierarchical Portfolio Management is developed for investment to select the securities in the Thai stock market, from a properly diversified stock portfolio, by using multi-criteria decision making technique. The hierarchical methods like AHP make complex decisions become easy make it easy in multi-criteria chosen. The system lets the user to create a rating for each criterion, calculates a relative weight to each criterion and then ranks securities listed on the stock market. Finally, the top rank security from each industry is collected to the portfolio [5].

C.C. Yu [6] presents an integrated framework for developing web based consumer-oriented intelligent decision support systems to facilitate all phases of consumer decision-making process in business-to-consumer e-services applications. Major application functional modules comprised in the system framework include consumer and personalized management, navigation and search, evaluation and selection, planning and design, community and collaboration management, auction and negotiation, transactions and payments, quality and feedback control, as well as communications and information distributions. System design and implementation methods will be illustrated using an example. Also explored are various potential e-services application domains including e-tourism and e-investment.

### Research Methodology

The structure of the proposed decision support system was used as a basis for the implementation as shown in figure 1. Microsoft Excel was selected as a tool to develop an application. This package software is user-friendly, and provides a good user interface. It is like a spreadsheet which is so easy to develop and flexible enough for a developer.

The proposed decision support system for personal financial analysis has three major parts; user interface, database, and modelbase.

User interface: human-computer dialogue is the interface of between the user of decision support systems and computers, it is very important to transfer order and transfer or change data between user, database, model base and method base. Human computer dialogue system is a window of decision support systems which indicates the level of this system.

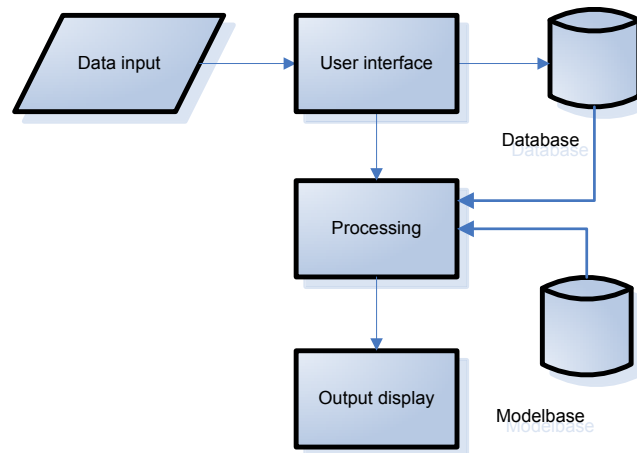


Fig.1 Structure of the proposed DSS.

The users of decision support systems have tremendous different requires to human-computer dialogue subsystem. New users demand to gain enlightenment and help from system who neither knowing about ABC to use computer nor knowing special grammar of system. Then the proficient users do not need explaining function that only new users needs. The temporary users do not use it frequently because they do not treat repetitive work.

Database: The database is an important resource of traditional decision support systems and it is infrastructure of model base and method base and dialogue system. The data that decision support systems need comes from the inside and the outside which both having the formal data and informal data, just like the data stored in computer reading catalogue marc is a formal data and the data stored in other marc is informal data in library decision support systems. Inside data among them maybe comes from various database of different subsystem. The function of decision support systems mainly depends on extracting the data narrated above promptly and nimbly from many ways [7].

Modelbase: the system was set modelbase on Microsoft Excel. There are 2 methods to analyze personal financial that decision-makers can choose:

(1) what-if analysis by

$$c = P * \frac{(i/100)12}{1 - (1/(1+(i/100)/12))^{t*12}} \tag{1}$$

When

- c is Monthly payment for compound interest
- P is Principal
- i is interest rate
- t is time (year)

(2) goal seeking by

$$P = c * \frac{1 - (1/(1+(i/100)/12))^{t*12}}{(i/100)/12} \tag{2}$$

Results

The proposed decision support system for personal financial analysis is work properly. By the way, to solve monthly payment by using spreadsheet software such as Microsoft Excel. It has financial function to support what-if analysis as in example 1 has shown in figure 2.

Example 1

- When Principal = \$200000
- interest rate = 15% / year
- time = 10 year

C7					=PMT(C3/(100*12), C4*12, C2)				
	A	B	C	D	E				
1									
2		Principal	200000						
3		interest rate	15						
4		time	10						
5									
6									
7		Monthly payment	(\$3,226.70)						

Fig.2.What-if analysis to solve monthly payment.

The result (monthly payment) in cell C7 was \$3,226.70. This can be solving by equation 1 as mentioned earlier or use the financial functions of Microsoft excel as follow.

$$=PMT(C3/(100*12),C4*12,C2)$$

For goal seeking, Microsoft Excel also supports to solve the affordable principal (from example 1) as shown in figure 3.

C2					=PMT(C3/(100*12), C4*12, C2)				
	A	B	C	D	E				
1									
2		Principal	200000						
3		interest rate	15						
4		time	10						
5									
6									
7		Monthly payment	(\$3,226.70)						
8									
9									
10									
11									
12									
13									
14									
15									
16									

**Goal Seek** ? X

Set cell: C7

To value: 4000

By changing cell: \$C\$2

OK Cancel

Fig.3.Goal seeking to solve the affordable principal.

From example 1, by enter monthly payment in Goal seeking value of cell C7 to \$4000 instead of previous payment \$3,226.70. Then the calculated Principal (cell C2) was \$247931.39, as shown in figure 4. This Principal (cell C2) also can be calculated by the equation 2 as mentioned earlier.

	A	B	C	D
1				
2		Principal	-247931.39	
3		interest rate	15	
4		time	10	
5				
6				
7		Monthly payment	\$4,000.00	
8				

Fig.4.Monthly payment by Goal seeking.

I. CONCLUSIONS AND RECCOMENDATIONS

The proposed decision support system for personal financial analysis is developed for decision-making in personal financial analysis such as properties loan or car finance. Microsoft Excel was selected as a tool to develop

an application. The system development process as follows. First, let the user to select his or her propose by what-if analysis or goal seeking method. Then collecting input data from the user including, price; interest rate; year; monthly payment. Lastly, processing depends on the user preference then displays the results. The proposed decision support system for personal financial analysis has three major parts; user interface, database, and modelbase. The what-if analysis used for solve the monthly payment of properties loan or car finance. This type of analysis is called “what-if” analysis, because it is structured as “*What* will happen to the solution *if* an input value is changed?” By the way, if the user wants to solve from his or her monthly payment back to amount of principal then goal seeking method can be supported. When “Goal seeking” analysis checks the inputs necessary to achieve a desired level of an output.

For further study, the input data of a decision support system should be extend to the initial payment amount or percentage, the personal financial statement be used as all income and payment for estimate the affordability. The development of a decision support system for the capital investment planning and analysis to resolve, how much properties and cash in hand needed to be invested for personal financial or business enterprises.

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