

SOFTWARE MODEL FOR REAL ESTATE LEASING CONSULTING

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Abstract

In this article we intend to present a software model, made with the help of the generator of management expert systems Exsys Professional / Corvid / Developer, a program to help us in the substantiation decision to invest in an asset of the nature of the land or construction appealing to the real estate leasing, as an alternative to the mortgage banking, both for the individuals and for the corporate ones. Depending on the data entered by the applicant (customer), the program shows to what extent it can or can not obtain financing by real estate leasing in order to purchase an asset.

Keywords: business expert system, leasing contract, real estate leasing.

JEL classification: G21, G23, G29

1. INTRODUCTION

The expert systems, as a branch of the artificial intelligence, are used in many areas of the management of the companies. Using the expert systems are based on the premise that any problem can be solved through a sequence of reasonings that can be decomposed into logical rules. An important aspect to be considered is that a well designed expert system can successfully replace the analysis by most of the time subjective performed by the human employees.

Without being itself a source of investment financing, the leasing creates the opportunity for the business to dispose of certain assets without being required to buy them (without becoming their owner). For the user (the direct investor) the leasing is a way of financing the investments that does not affect its indebtedness capacity, not being a loan in the classic sense of the word. Hence the obligation to register separately in the accounting the rentals corresponding to the leasing operations. Unlike a usual rental or a conventional bank loan, the lease gives the lessee (the beneficiary) the right to become owner of the property at the end of the contract, at a specified price. So the lease is an interesting alternative of a financing sources of the investments as a substitute of the loan (credit).

Determining the costs involved with leasing (credit - bail or cession bail for the immovable property) is a rather complex operation. The aspect is particularly important in determining the structure of financing of the investment when it comes to choosing sources

of financing, of their contribution to the training fund for accomplishing the projects or programs of the company.

The real estate leasing represents that lease that has as its object the immovable properties such as the land, the buildings, the constructions etc. this type of lease could be both financial and operational, depending on how the lease ends between participants.

2. THE PROBLEM IDENTIFICATION

We propose the creation of a prototype of an expert system to advise potential customers to call on the services of a real estate leasing company. The consulting is realized on the basis of the data carried by those seeking funding by, taking into account different aspects, depending upon the quality of the person. Thus, in the case of the individuals it is taken into account the annual income correlated with the annual lease rate. To the legal entities it is taken into account the possibility of payment of the annual rental rate and the funding risk.

3. THE ACQUISITION OF THE KNOWLEDGE

The acquisition of the knowledge was made by consulting legal acts related to this form of financing of various materials from the literature and using the knowledge already gained, as a result of the analysis of the financial statements of several companies.

Following this stage it has been reached to the acquisition of knowledge regarding the:

- The possibility to pay the lease rates;
- The financing risk.

Regarding the financing risk, we used the method of the scores that classify the situation of the firm and the risk of bankruptcy firm in four categories:

1. a very good financial situation, bankruptcy risk <10% ;
2. a good financial situation, bankruptcy risk between 10% and 30% ;
3. a financial situation in attention, bankruptcy risk between 30% and 65% ;
4. the bankruptcy risk higher than 65%.

The method of the scores involves the formula:

$$Z = 0.24 * X_1 + 0.22 * X_2 + 0.16 * X_3 - 0.87 * X_4 - 0.10 * X_5, \text{ where:}$$

$$X_1 = \text{GOS} / \text{TOTAL_LIABILITIES}$$

$$X_2 = \text{INVARIABLE_CAPITAL} / \text{TOTAL_LIABILITIES}$$

$$X_3 = \text{CURRENT_ASSET} / \text{TOTAL_ASSET}$$

$$X_4 = \text{FINANCIAL_COSTS} / T$$

$$X_5 = \text{PERSONAL_COSTS} / \text{ADV}$$

In the case of the individuals, the ability to pay the rate is established by reporting the annual income to the annual lease rate, the minimum condition being that the annual income to be two times higher than the annual lease rate.

In the case of the legal entities, the ability to pay the rate is established by reporting the gross profit to the annual rate lease, the minimum condition being that the gross profit to be two times higher than the annual lease rate.

4. THE DESIGN OD THE PROTOTYPE OF EXPERT SYSTEM

The knowledge base related to the prototype of the expert system **Leasing_Imobiliar** will be developed with the help of the generator of the expert system EXSYS. This development propose at its turn:

- a) the setting goals;
- b) the setting of the variables used;
- c) the setting of the qualifiers;
- d) the establishing of the working parameters.

- a) The list of goals include:

Table no. 1- The list of the set goals

No. of purpose	Name of the purpose
1	It provides finance , high option to pay de plată a ratei de leasing
2	The finance is granted, the possibility to pay the rate lease
3	It can not obtain financing.
4	You did not opt for consulting
5	There are not enough data for the consulting
6	Advance 10%
7	Minimum advance 20%
8	Advance 30%
9	A very good financial situation
10	A high possibility to pay the leasing rate
11	A very good financial situation, bankruptcy risk <10%
12	A good financial situation, bankruptcy risk between 10% and 30%
13	A financial situation in attention, bankruptcy risk between 30% and 65%
14	The bankruptcy risk higher than 65%
15	The ability to pay the leasing rate
16	The impossibility to pay the leasing rate
17	No funding is granted
18	There are not enough data for the consulting of the potential client
19	The finance is granted. In this situation the advance is between 10% and 30%
20	The finance is granted. In this situation the advance is between 20% and 30%
21	The finance is granted. In this situation the advance is of 30%

Source: [Projection accomplished by the author]

- b) The variables used are:

Table no. 2 - The list of the variables implemented

Variable symbol	Address	Variable name
LEASE T	C5	LEASE TERM
GOS	E8	GROSS OPERATING SURPLUS
TOTAL_LIABILITIES	E9	TOTAL LIABILITIES
CURRENT_ASSETS	E10	CURRENT ASSETS
TOTAL_ASSETS	E11	TOTAL ASSETS
FINANCIAL_COSTS	E12	FINANCIAL COSTS
T	E13	TURNOVER

PERS_COST	E14	PERSONNEL COSTS
ADV	E15	ADDED VALUE
INV_CAP	E16	INVARIABLE CAPITAL
A	E18	THE COEFFICIENT USED TO CALCULATE THE RISK OF THE FUNDING
B	E19	THE COEFFICIENT USED TO CALCULATE THE RISK OF THE FUNDING
C	E20	THE COEFFICIENT USED TO CALCULATE THE RISK OF THE FUNDING
D	E21	THE COEFFICIENT USED TO CALCULATE THE RISK OF THE FUNDING
E	E22	THE COEFFICIENT USED TO CALCULATE THE RISK OF THE FUNDING

Source: [Projection accomplished by the author]

c) The qualifiers that appear:

Table no. 3- The list of the qualifiers of the system

The symbol qualifier	The name of the qualifier	The values of the qualifier
Q1	The consulting of the real estate leasing	1.yes 2.no
Q2	The potential customer is	1.individual 2.corporate body
Q3	The ratio analysis between the annual income and the annual leasing rate	1.yes 2.no
Q4	Owns land	1.yes 2.no
Q5	The ratio analysis between the gross income and the annual leasing rate	1.yes 2.no
Q6	The analysis of the financial risk	1.yes 2.no

Source: The projection accomplished by the author

d) Establishing the working parameters is to specify the following:

- The way of the assignment of the probability coefficients (in our case this represents an integer from the interval 0-10)'
- The use of some external file of the type Lotus 1-2-3 (Leasing.WK1) ;
- The way of display and scroll of the base of rules;
- The establishment of the standard messages, etc.

5. THE REPRESENTATION OF KNOWLEDGE

The generator Exsys allows the achieving of the knowledge with the help of the production rules. For this we shall first present the tables of decisions through which it is realized the combination of the variables and of the qualifiers in order to achieve the goals.

Table no. 4 - The decisional tables to obtain or not financing through real estate leasing

The report between the gross profit and the leasing rate is :	R= Gross profit / leasing rate		
	>2.5	2 =< R<=2.5	R<2
	High possibly to pay the leasing rate	The ability to pay the leasing rate	The impossibility to pay

The financing risk is	Z (financing risk)			
	>0.16	0.10 =<Z<=0.16	0.04 =<Z<0.10	Z<0.04
	A very good financial situation, bankruptcy risk <10%	A good financial situation, bankruptcy risk between 10% and 30%	A financial situation in attention, bankruptcy risk between 30% and 65%	The bankruptcy risk higher than 65%

		Z (financing risk)			
		>0.16	0.10=<Z<=0.16	0.04=<Z<0.10	Z<0.04
The report between the gross profit and the leasing rate is :	>2.5	The finance is granted. In this situation the advance is between 10% and 30%	The finance is granted. In this situation the advance is between 20% and 30%	The finance is granted. In this situation the advance is of 30%	No funding is granted
	2 =< R<=2.5	The finance is granted. In this situation the advance is between 10% and 30%	The finance is granted. In this situation the advance is between 20% and 30%	The finance is granted. In this situation the advance is of 30%	No funding is granted
	R<2	No funding is granted	No funding is granted	No funding is granted	No funding is granted

The report between the annual income and the leasing rate is:	R= Annual income /leasing rate		
	>2.5	2 =< R<=2.5	R<2
	High possibility to pay the leasing rate	The ability to pay the leasing rate	The impossibility to pay the leasing rate

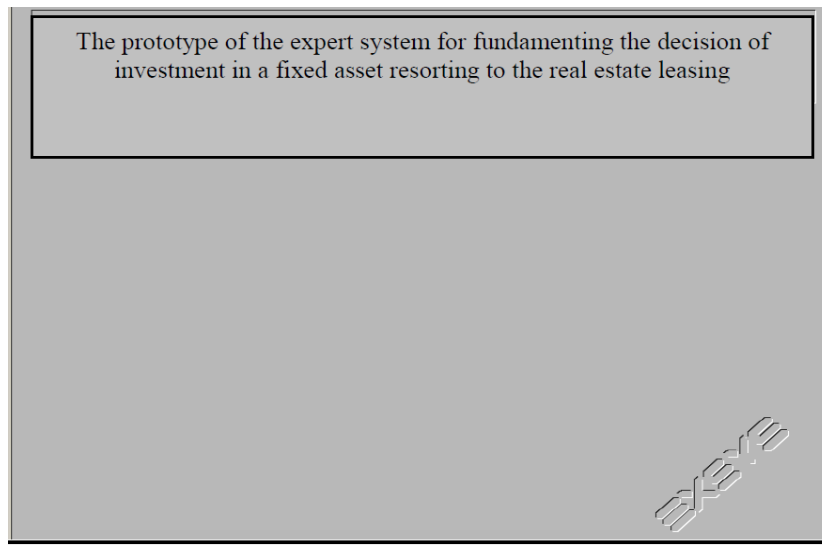
		R= Annual income /leasing rate		
		>2.5	2 =< R<=2.5	R<2
	YES	The finance is granted, high possibility to pay the leasing rate. Advance 10%	The finance is granted, the ability to pay the leasing rate. Minimum advance 20%	No funding is granted
Owens land	NO	The finance is granted, high possibility to pay thr leasing rate. Minimum advance 20%	The finance is granted, the ability to pay the leasing rate, The advance is 30%	No funding is granted

Source: [Projection accomplished by the author]

We present below the structure of the knowledge base (the source code of the prototype, without the presentation of the calculation formulas) generated by Exsys:

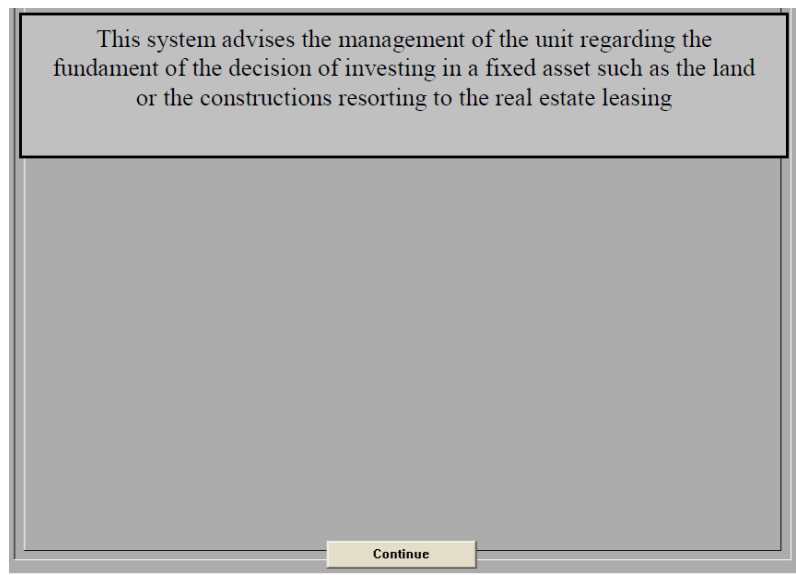
6. THE TESTING OF THE PROTOTYPE OF THE EXPERT SYSTEM LEASING_IMOBILIAR

To provide a pleasant graphical interface at the use of this prototype have been used the facilities of the graphic editor ExDesign. With its help screens have been created through which the user can easily communicate with the application. The user will select the values for each qualifier with the help of a mouse.



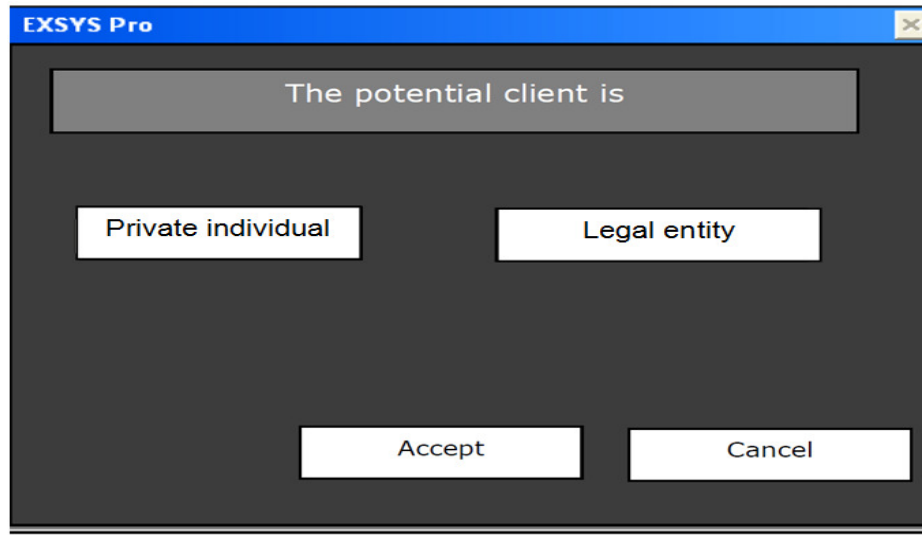
Source: [Projection accomplished by the author]

Figure no. 1 The screen of the subject of the knowledge



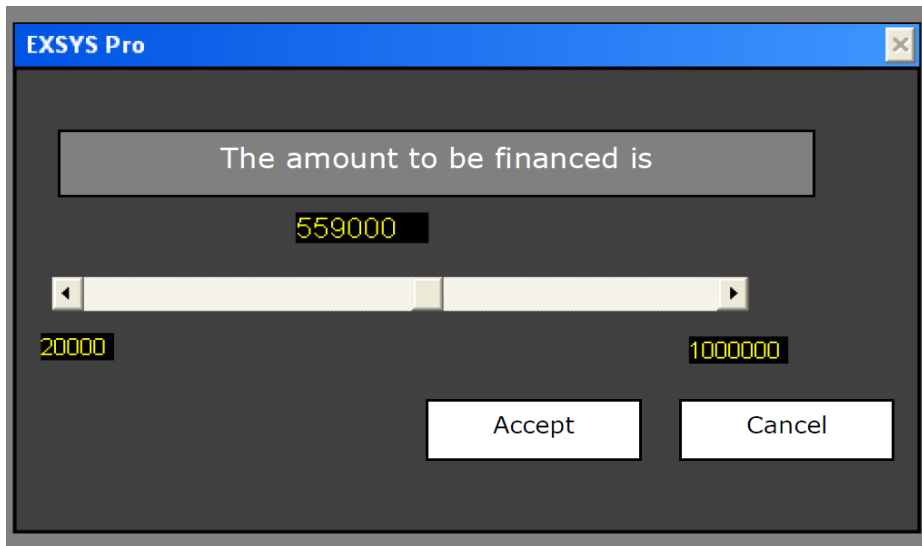
Source: [Projection accomplished by the author]

Figure no. 2 The text of beginning of the consulting session



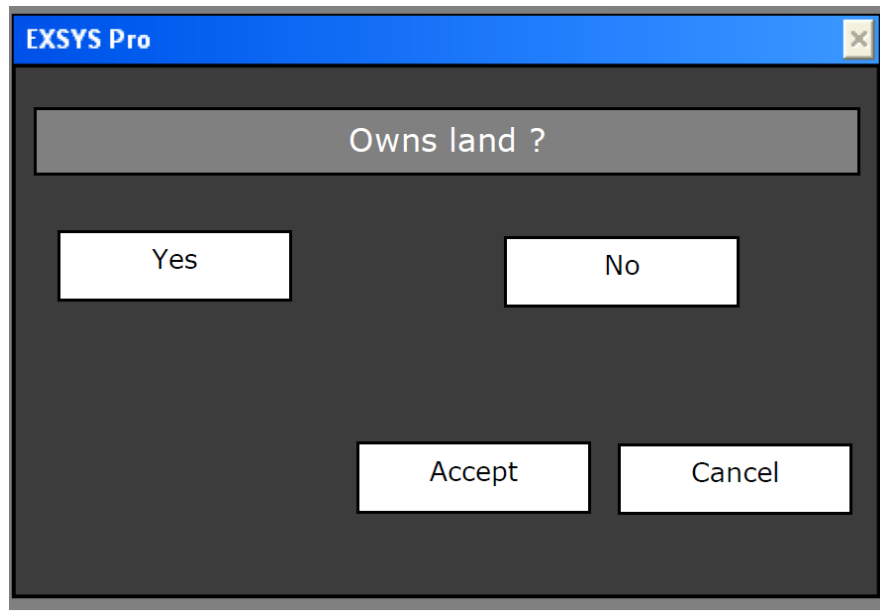
Source: [Projection accomplished by the author]

Figure no. 3 The screen of the selection of the value for the qualifier "the potential client is"



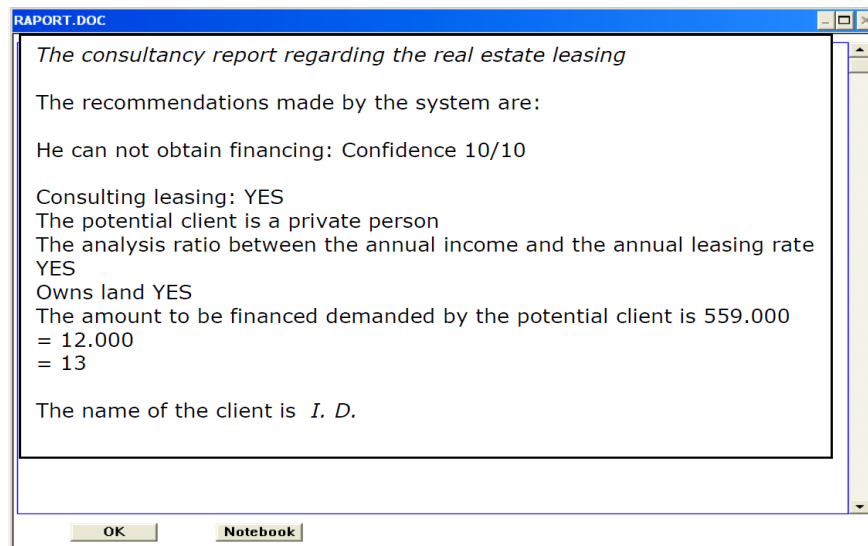
Source: [Projection accomplished by the author]

Figure no. 4 The screen of selection of the value for the variable "The amount to be financed is"



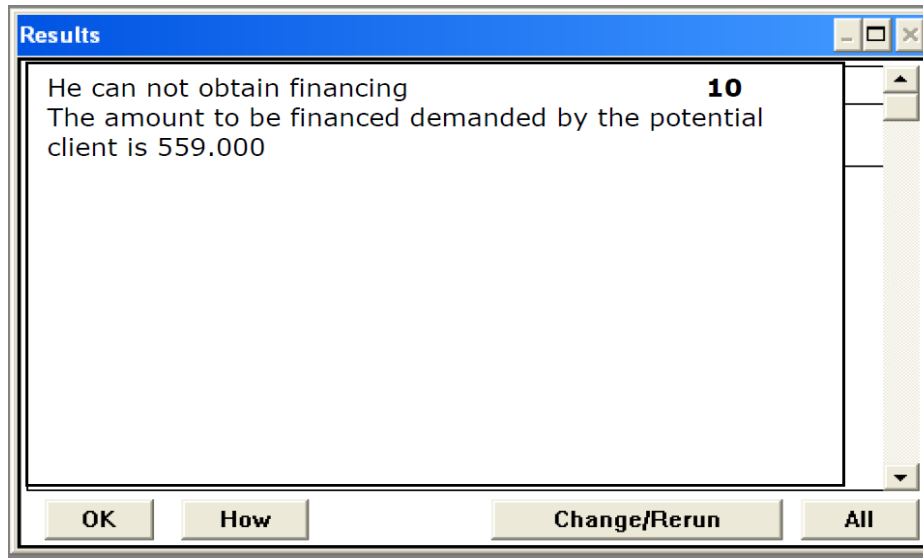
Source: [Projection accomplished by the author]

Figure no. 5 The screen of selection of the value for the qualifier "Owns land"



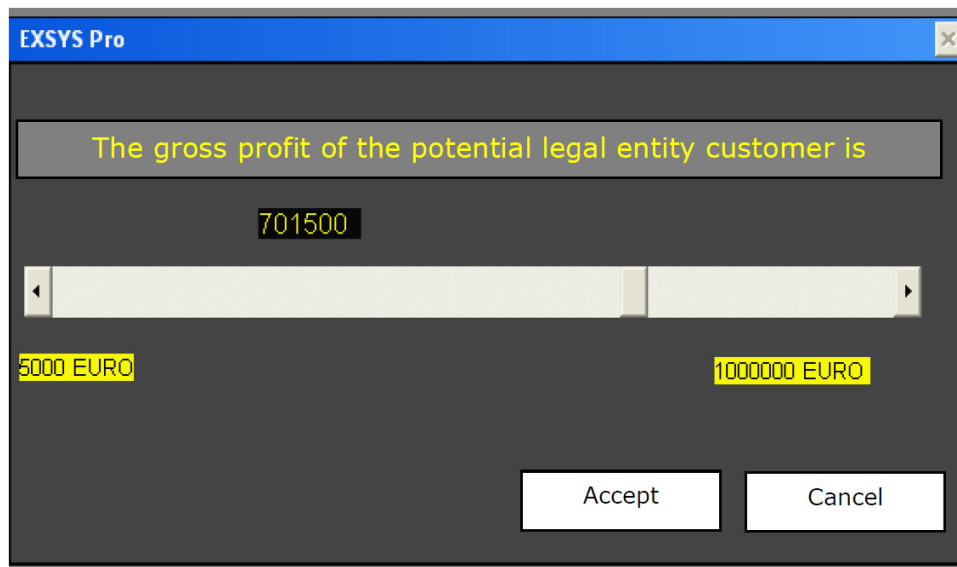
Source: [Projection accomplished by the author]

Figure no. 6 The report of display of the prototype solution (in the case in which the potential customer is an individual)



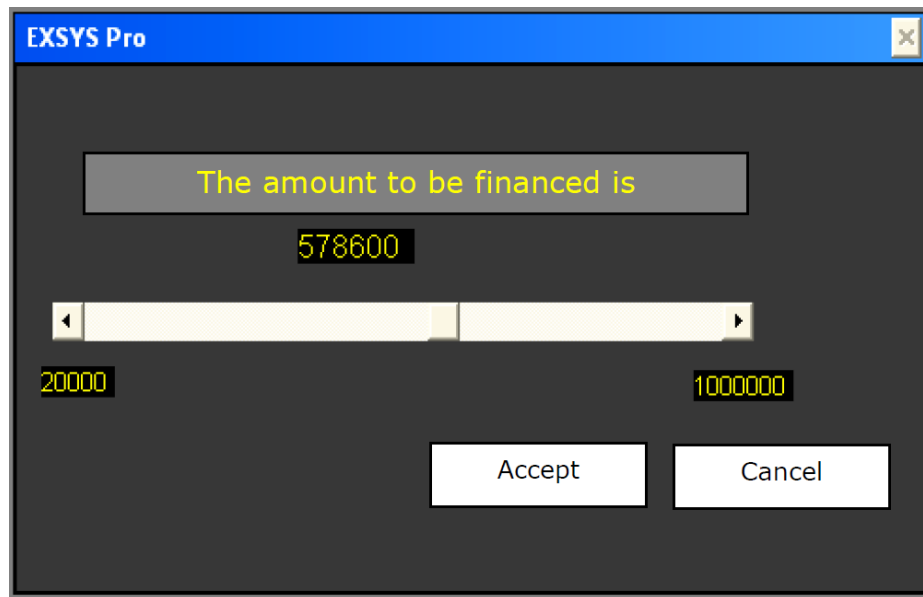
Source: [Projection accomplished by the author]

Figure no. 7 The display of the advice given by the system (in the case the potential customer is an individual)



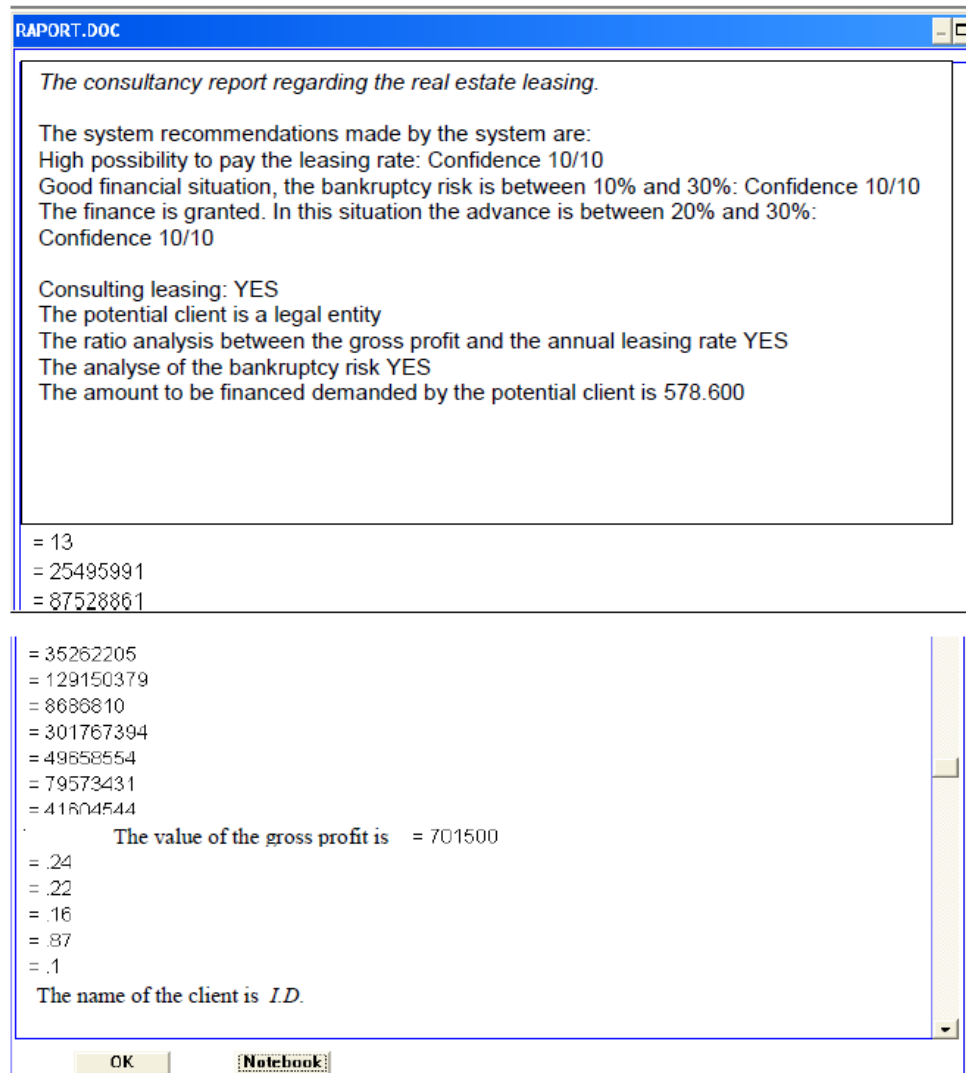
Source: [Projection accomplished by the author]

Figure no. 8. The screen of selection of the value for the variable “The gross profit of the potential legal entity customer is”



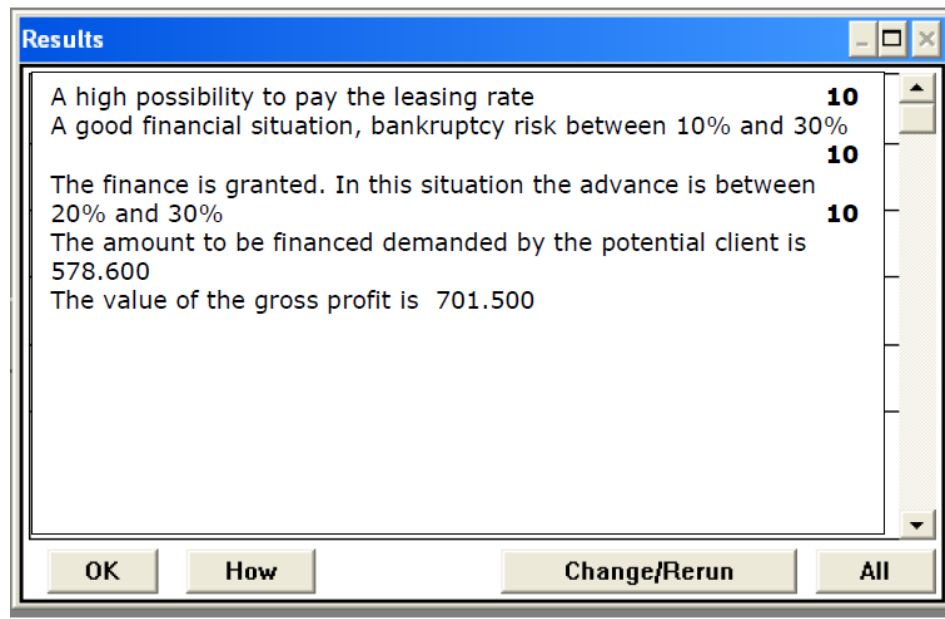
Source: [The projection accomplished by the author]

Figure no. 9 The screen of selection of the value for the variable “The amount to be financed is”



Source: [Projection accomplished by the author]

Figure no. 10 The report of display of the prototype solution (for the case in which the potential customer is a corporate body)



Source: [Projection accomplished by the author]

Figure no. 11 The display of the advice given by the system (for the case in which the potential customer is a corporate body)

7. THE UPDATING AND THE MAINTENANCE

There are a series of activities that must be performed after the implementation of the system. These take into account: the regular assessment of the operation function, the knowledge of the maintenance cost in report to the benefits, the accuracy of the solutions, the degree of accessibility to the user. Depending on the results of these activities it can and is appropriated to proceed to update the product information.

8. CONCLUSIONS

The generators of expert systems of management are informational complex systems that generate useful informational programs both to the academic environment, for training the students and to the business environment, facilitating or even replacing the work of the economic-financial analysts.

The program realized and presented in this article calculates a series of economic - financial indicators (presented in Table no. 2) on the basis of the data required by the interfaces of the dialog of the program and user input (customer, applicant), offering solutions and recommendations, with a certain degree of confidence, with regard on the possibility of the client to obtain financing through real estate leasing, whether it is a individual or legal entity (company).

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