EXPERT SYSTEM FOR VENDOR SELECTION

BY

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CERTIFICATION PAGE

I certify that this Project was carried out by **OTANLA INNOCENT ODOBI** of the Post Graduate School, Department of Mathematics, and Computer Science, Federal University of Technology, Mina Niger State.

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External Examiner

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My special thanks goes to Dr. Ben. I. Obidigbo whom assisted me in so many ways in the course of this project work and his entire staff especiall Mrs Christy Fajana who typed out this project work for me.

My sincerte appreciation goes to my family for their support and encouragement, most especially anti-Christy.

Above all , my deepest gratitude will always be devoted to Victoria my wife who lit up a candle for me when I was struggling in the dark.

DEDICATION PAGE

This Project work is dedicated to Almighty God and my Parent, Father, Sir, I.I. OTANWA , Mother, MRS R.O. OTANWA

Who gave me light and took good care of me throughout the infant and teenage part of my life.

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ABSTRACT

The survival of organisation, especially SMES, depends to the greatest extent, on those who supply them with the required material input. This is because if the supplier fails to deliver the right material at the right time and place, and at the right price, then the recipient organisation is bound to fail in its obligations to satisfy the needs of its Customers, and to stay in business.

Hence, the choice of choosing a suppliers from a list of vendors, that an organisation will trust is very important.

Because of time factor in the cause of this research, the researcher only evaluated the financial background (position) of a vendor, which is one of the twenty-one factors considered when selecting a vendor(s).

An expert system was used to assess the factor above.

CHAPTER ONE GENERAL INTRODUCTION

INTRODUCTION

Choosing one of a few suppliers from a list of many vendors poses great problems for those who are responsible for the selection and evaluation of potential suppliers. The suppliers are outside organisations who provide the materials required by other organisations.

These materials can be in the form of raw materials component parts, etc which constitutes the material input for an organization. They are used by the recipient organisations to manufacture their own products in order to satisfy the needs of their customers.

To select one or a few suppliers from a whole world of vendors out there could required a great deal of efforts. The chosen supplier(s) would be responsible for ensuring the availability of the materials, which the recipient organization(s) required for their existence and survival.

The act of solving a problem is bore down to human intelligence, which is the ability to analyse the ways and steps to been taken, specifically a more complex problem i.e. domain problem to be resolved using a simple techniques. For the purpose of this Topic Expert system which born out of Artificial intelligence (A1) has to be discussed.

1.1 ARTIFICIAL INTELLIGENCE (A1)

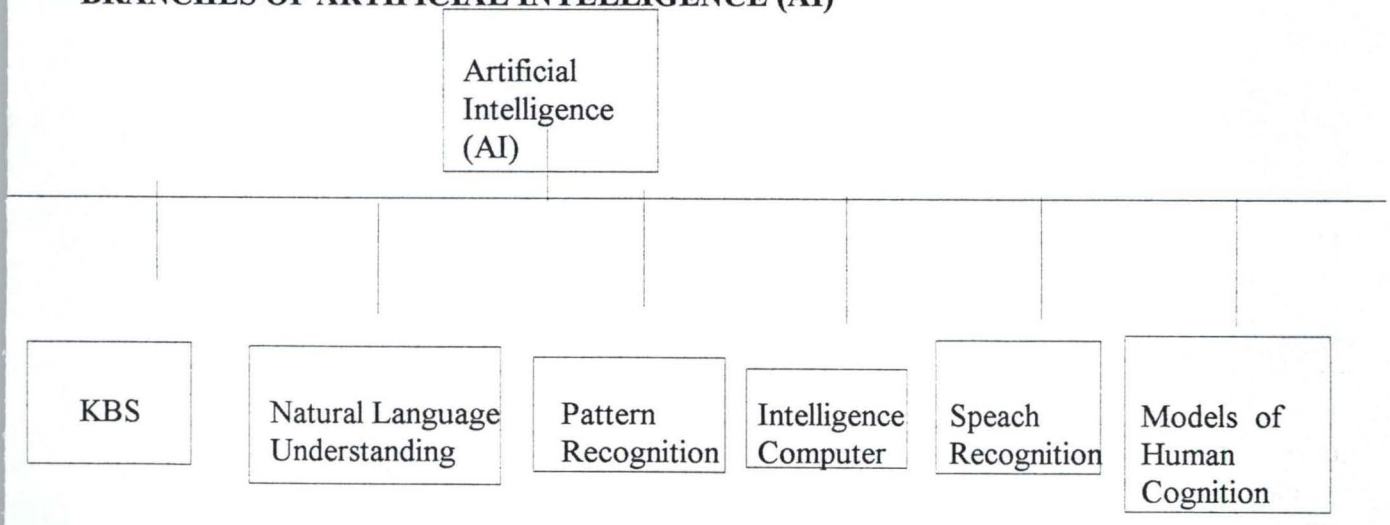
It is common knowledge that human being solve problems indifferent ways. It is also common for people to think when they are trying to solve difficult problems or make important decisions. This thinking process, according to Nickerson et al. (1990) is a feature of man's intelligence. It is believed that when the thought processes are studied and then broken down

into basic steps and a computer programme that solves problems using the same steps in designed, then Artificial Intelligence (AI) is born. They try to define AI as being simply a way of making computers think intelligently, and argue that AI, provide a simple structured approach to designing complex decision, making programs. It is believe that any problem for which no algorithime solution is known as a problem in AI. By contrast, most authors of AI texts and publications aviod delivering into defining the subject because it has no clear cut defination.

SIX DIFFERENT AREAS OF ARTIFICIAL INTELLIGENCE (AI)

1. Knowledge - Based systems (KBS)
2. Natural language understanding
3. Pattern Recognition
4. Intelligent computer - Assisted learning
5. Speach recognition
6. Models of Human cognition

BRANCHES OF ARTIFICIAL INTELLIGENCE (AI)



The topic of this Project limited to knowledge - Based systems or rather expert systems and as such, the other areas of artificial Intelligence which is the application on expert system will not be treated in a greater detail.

The earliest Artificial Intelligence were intended as general problem solvers, whilst much was learnt from these; they were not terribly sucefful in this activity. The emphasis thus shifted to reserach intended to minimise the performance of a human expert in a narrow well defined domain.

So in essence, AI which is the act of making a computer to think or reason like human beings with much speed, Robbst for instance.

Expert system on the other hand can not be very effective with out the application of Artificial Intelligence. Expert systems is an offspring of Artificial Intelligence (AI).

The approach underlying the development of expert systems was due to the in ability of the early systems to consistently solve complicated problems.

This was due to the ability of any reasonable complex logical system to generate an infinate number of provable theorens before stumbling onto the correct one.

In response to this in efficiently, many argue that purely formal, syntactive methods of guiding search are inherently in capable of handling such a huge space and that the only alternative is to rely on the informal, strategies that humans seem to use in solving problems.

Chapte two discussed expert systemd by definition, its benefits and application. It goes further to discuss the issues surrounding the use of expert systems in Organisations.

The work for this project is organised into three sections namely,

* Data collection
* Development
* Test domain

1.2 DATA COLLECTION

This part of the research programme involved making contracts with people who actually perform the task of selecting the supplier (s). The details discussion is presented in Chapter three (3).

1.3 DEVELOPMENT PHASE

Chapter four focused on the design and development process of the prototype system design. ESFVS. It includes programm Design methodology, the system design and System Design concept, Building the system, How the rules in the knowledge base were formulated.

1.4 TEST DOMAIN

Chapter five discuss the process of the trial tests of the prototype, and concluding remarks for the project.

1.5 OBJECTIVE OF THE STUDY

The survival of organisations especially SMES depends to the greatest extend, on those who supply them with the required material input. The study is to :

1. Investigate how purchasing personnel in organisation solve the problem of vendor selection.

2. To also ascertain whether an expert systyems model could be developed and used as a plansible solution to the problem.
3. To save the recipient organisation from the embarrasement to deliver the right materials at the right time and at the right price.
4. To investigate vendors financial background
5. To investigate suppliers position in the industry.

1.6 SIGNIFICANT OF THE STUDY

For a receipent organisation to survival effectively, a chosen supplier (s) would be responsible for ensuring the availability of the materials at the right time and the right place.

If this is done a receipent organisation do not normally operate in a vacum.

Meeting up with the required quality and quantity of the of the material and on-time delivery of the input material will go along way to sustain the receipent organisation and its customers.

1.7 THE SCOPE OF THE STUDY

The scope of this study is only limited to expert system on vendor selection. About five major factors outlined when selecting a vendor this are the production methods used, vendors financial background, manufacturing capacity, size of the vendor organisations and suppliers position in the industry. Because of time in an expert systems programme was designed to asses the fiancial background of a vendor. The expert system could still be use on the other factors mentioned above.

CHAPTER TWO

2.0 INTRODUCTION:

This literature review looks at the definition of expert system within the scope of the research and analysis their capabilities, especially in performing general selection tasks and the benefits of using an expert systems approach to solving domain specific problems. An attempt is made to establish the reason why expert systems usage in solving purchasing problems is a rare occurrence. It is hoped that, at the end, the prospects of using expert systems technologies for the selection and evaluation of suppliers would be reviewed.

2.1 EXPERT SYSTEM

Expert systems can be described as a type of analysis or problem – solving model, almost always implemented on a computer, which deals with problems the way a human expert does. It involves the process of

* Electricity specific experience and knowledge from the human expert (s)
* Coding the acquired knowledge and experience of the human expert (s) into a Computer.
* Storing the coded the knowledge in a knowledge base, and
* Consulting the knowledge base as and when required to solve specific problems or to offer advice on related issues.

An expert system is defined by the British Computer Society specialist Group on Expert Systems as "an Embodiment within a Computer of a knowledge – base component from an expert skill [such that] the system can offer intelligent advice or take an intelligent decision about a processing function" Theoretically, unlike Conventional Computer Programs but quite like human experts, an expert system has the ability to justify its own line of reasoning in a manner directly intelligible to the enquirer. One method used to attain this reasoning character is known as rule based programming. The rules are in the form of IF.....THEN... i.e. IF <condition> and <condition> and THEN <condition> and <condition> etc where all conditions and conclusions are statements with a truth value. The condition is also called the antecedent while the conclusion is also known as the consequent, i.e. IF <antecedent> THEN <consequent>.

Such rules are known as IF.....THEN.....rules or production rules. These can be used to construct powerful inference systems by being combined into networks in which the consequents of some rules (or parts of the consequents) are antecedents of other rules (or parts of the those antecedents).

Overleaf demonstrates an example of a rule network.

An expert system can be summed up as a rule – based A1 application Program for doing a task, which requires expertise.

Many different Schools lay claims on Expert systems for instance, the Computing School believes that because an expert system is implemented on a Computer System (s) (i.e. as a Computer Program), it sis a Computer Science discipline. The Psychology School argues that since an Expert System is to do with the simulation of human behaviour, i.e.

* The way we think
* The way we solve problems
* The way we acquire, manipulate and disperse knowledge there, it is a psychology module.

It does not really matter whichever School wins the argument. The researcher acknowledges the fact that, as far as this research is concerned it is dealing with a behavioural phenomenon, captured and simulated with a Computer System for use by business organisations to enhance performance. Therefore, the psychology, the Computer and the business Schools are all winners in their respective rights.

2.2 EXPERT SYSTEMS COMPONENTS

An Expert System has three basic components, namely:

1. Interface
2. Knowledge Base
3. Interference Engine

The Interference: This refers to the point at which both human and non-human interactions with the system take place.

The knowledge Base: This is where the facts and data relevant to a specific application are stored. It is accessed by the Interference engine in the course of reasoning out a problem.

The Inference Engine: In Conventional Computer Programs, algorithms are used to organise data files and choose records. Expert System Programs too need a mechanism for selecting which rule (i.e. in a rule – based system) to fire and in what order. The knowledge base contains the knowledge (e.g. the facts and rules) about a defined problem domain but not information on how to find the rules that apply and when to evaluate them. It is the inference engine that processes the knowledge base in this way.

2.3 APPLICATIONS OF EXPERT SYSTEMS

An expert system is not the only solution to any specific problem. It is an approach to solving a domain problem, or it can assist a solution process. An Expert System can be used in areas where:

- Human experts are in SHORT SUPPLY
- There is no algorithmic method of solving problems
- Data is noisy
- Diagnosis is required
- Configuration is required e.t.c

so that it can offer:

- Advice
- Consultancy service
- Assistance in decision making, e.t.c.

Expert System has the following applications.

XSEL for sales (Expert selling Assistant)

XCON for engineering (i.e. for specified configuration)

IBUS for manufacturing (using IMACS and ISA)

IMACS - intelligence manufacturing Assistant Computer system.

ISA - Intelligent Scheduling Assistant

XSITE for customer service, e.t.c.

2.31 EXPERT SYSTEM FOR TILLAGE SELECTION

Developed for selecting tillage alternatives for corn and soyabean production in Ontario, Canada, by Clake, mcleish and Vyn [1992]

LARS:

An expert system for laboratory reactor selection. A rule based system within a frame structure, developed by Han ratty Joseph, and Dudukovic [1992] at the chemical reaction Engineering laboratory of Washington University, Saint Louis.

RSES:

An expert system for respirator selection was designed to assist the user in the selection of a respirator for a specific application, by DCARMO [1992.

RSES was developed because the National Institute for Occupational Safety and Health [NIOSH] in Ohio issued a guideline on respirator selection. The system would also provide Industrial hygienists and other Professionals with a procedure for selecting suitable classes of respirators for particular concentrations of specific contaminants.

EXPERT SYSTEM FOR MACHINE SREWS SELECTION IN ENGINEERING DESIGN.

This system was designed by Chen, Yan and Shine [1992] as an online consultant to give the less experienced engineers advice on selecting suitable machine screws for their product design.

2.4 THE BENEFITS OF EXPERT SYSTEMS

As previously mentioned, an Expert systems approach is only one of the many available tools for solving domain specific problem(s). In organisations where they are used, Expert systems must offer sufficient benefits; otherwise those organisations would most probably not consider the technology.

Naturally, all organisations have their individual reasons for using Expert systems technologies. Expert systems not only perform the primary function for which they are developed such as selecting machine screws in engineering design developed by chen.yan and shine [1992], selecting database by Zalir and Cang [1992], selecting equipment for earth moving operation by Amirkhanian and Baker [1992], e.t.c but they also provide other benefits, among which are:

Making knowledge available.

The knowledge and experience of human expert(s) in a defined domain application are acquired and preserved so that they can be consulted to solve related problem(s). This is referred to as "rare skill archiving" by Kraft [1985]. In many cases, business problems arise through ignorance, some organisations, for example, suffer because they do not know how to solve certain purchasing or production problem(s) or what causes the problem they are suffering or how to get help. The information they required may be available, but hidden in the head of a professional. With the expert system, the necessary information or knowledge is acquired from the professional and made available to those concerned hence providing the solution to the particular purchasing or other defined problem(s).

Training the domain personnel.

Since it is the knowledge and experience of the human since it is the knowledge and experience of the human expert(s) that is preserved and called up to address related issues. The novice personnel can therefore gain the knowledge and experience by observing how expert systems tackle problem(s). as the novice buyers are guided and trained by the system. Their performance is enhanced as though they were very knowledgeable and experience,

hence improving their productivity. As Trecha and Helferich [1988:31] put it in their discussion of the purchasing buyer worker station.

By introducing the expert knowledge of the seasoned buying professional into the every day procurement operation provides the ability for the novice buyer to perform in an experienced mode. This mode has proven to provide legitimate cost and productivity saving as a result velazzo [1990] reported his "expert system that joined the Navy" would train or instruct new employees as well as simplify the job the experienced ones, and this is reinforced by DeArmon and lino [1991] in their report on the expert system for respirator selection pillard etal. [1987] too shared the experience that expert systems provide training tools for the domain personnel.

Usually, most benefits of using expert systems are specific to individual situations. For instance, Arnold Kraft of Digital Equipment Corporation [Kraft 1985] stated that it supported the use because expert systems offered among other things financial benefits and solved difficult problems. Hanratty, Joseph and Dudukonic [1992], Pham and Taggin [1992], etc, all cite the benefits of good explanation facilities. Kamarthi et al [1992] developed ES Adisor – an expert system which advised the students of the pennsy Ivania state university (USA), and recommended to them the best possible combination of courses for the students, forth coming semester the system performed the function as desired, and provided the additional benefit of facilitating the maintenance of students records.

An Expert System, as a form of advanced computer program and/or a process of automating the decision making paradigm, also shares the benefits which are common to other advanced computer programs, such as:

1. Accuracy of result (based on the input) and repeat ability of result.
2. Less operator fatigue

3. More reliable result. Human beings can make erroneous judgements when they are tired or distracted, whereas experts systems do not make mistakes unless they are deliberately caused to do so, (ie base on the principle of "garbage-in and garbage-out" GIGO)

CHAPTER THREE

3

RESERACH PROBLEM DEFINATION

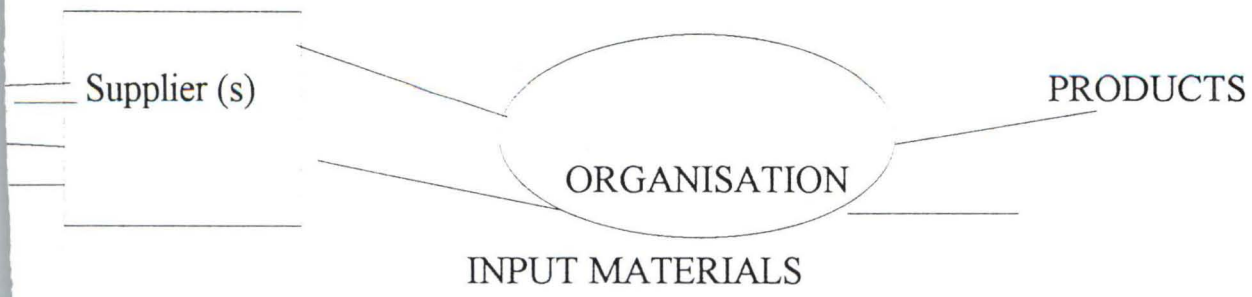
3.1 THE RESEARCH PROBLEM DEFINITION

Usually, medium and large sized manufacturing organisations have their own purchasing departments. In many cases, small and medium enterprises (SMES) too have purchasing departments. In some other cases the SMES too have purchasing departments. In some other cases the SMEs can integrate the purchasing function into a broader department such as production or operations or any other, depending on the structure of the organisation lockyer et al (1988).

Although the roles of a purchasing department may differ from one company to another, Bally and farmer (1981) agreed that there are specific activities which are common on them.

Organisation need a steady supply of material from suppliers. If for instance, a supplier fails to deliver the required input materials for whatever reason as agreed to the organisation, then the reciepent organisation will not be able to produce and provide the needed products to satisfy its customers organisation do not normally operate in a vacum the suppliers themselves depend on other suppliers or organisations for their own existence and survival.

The fig below describes the relationship between the supplier and the receiving organisation. The bold arrows represent the good going in and out of a manufacturing organisation. They indicate that goods have to be going into an organisation to enable it produce its own goods in order to satisfy its customers.



3.2 THE PURCHASING FUNCTION

The function of a purchasing department, is to ensure the efficient running of the firm by providing the following:

a. THE REQUIRED MATERIAL INPUT

This refers to the physical characteristics of the materials which the organisation needs in order to manufacture its own products. In the absence of the material input, it is unlikely that there will be an effective business process. It is the responsibility of the dept therefore, to ensure that the shape the size, the colour etc of the raw materials meet the business process requirements. It is also necessary to indicate that in certain business activity the material inputs contribute to the full definition of the company's business process. For instance the type of raw material used by an organisation determine the type of out put/product of the said organisation.

reporting to the managing director, so there comes based system) that can minimise the way human experts solve the problem, will be welcome as an alternative solution to the problem.

CHAPTER FOUR:
FINANCIAL POSITION OF POTENTIAL VENDOR (S)

4.1 PROGRAMME DESIGN METHODOLOGY

Research programme methodology has to do with the methods and techniques used to collect data and information used for this project work.. There are various techniques that could be employed to collect project data.

Among them are:

(i) Questionaire (ii) Observation (iii) Interview; and (iv) Record inspection.

The choice of one or combination of these techniques for a particular project work depends on certain criteria. These are

(i) The nature of the data to be gathered;

(ii) The sample population; and

(iii) The area

Having put the above criteria into consideration, the following techniques are found to be most suitable for this project work..

(i) Interview (ii) Questionaire

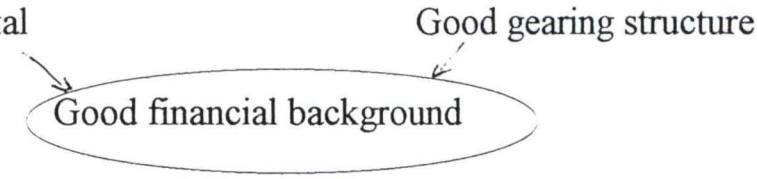
4.2 BUILDING THE SYSTEM

After acquiring the relevant knowledge above assessing the financial position of an organisation, the next phase of the project was to organise and translate this knowledge into an expert systems programme. A prototype expert systems programme for the sub-programme FNCE which is for determining the financial background of a prospective suppliers.

4.3 THE SYSTEMS DESIGN CONCEPT

For a company to be regarded as one with a good financial background, it must have:

Sufficient working capital, and good gearing structure.



Conceptual View: Working capital and gearing are the vital elements for assessing a company's financial position.

4.4 SYSTEM DESIGN

The system design should be able to asses the companies financial ratio. The prototype design was a sign fixed values for ratio and percentages and then modify them accordingly to suit an individual organisation's requirements. However, these percentages and ratios can be changed from time to time in order to relect any current trading condition.

The acceptable values for the ratios and percentages used at this initial stage of the design are:

the current ratio of 0.8 or more

the quick ratio of 0.5 or more

the loan capital of 60% or less

Taking into consideration the historical analysis of the company's performance. The length of the trading periods to be studied could range from two to ten years or even more.

Fig 4.2 Requirement for prudent current Ratio

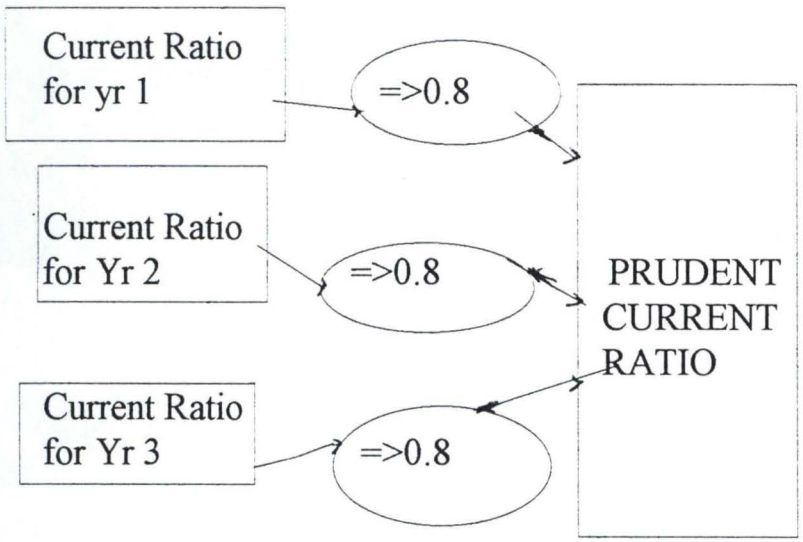


Fig. 4.3 Requirements for Good Quick Ratio

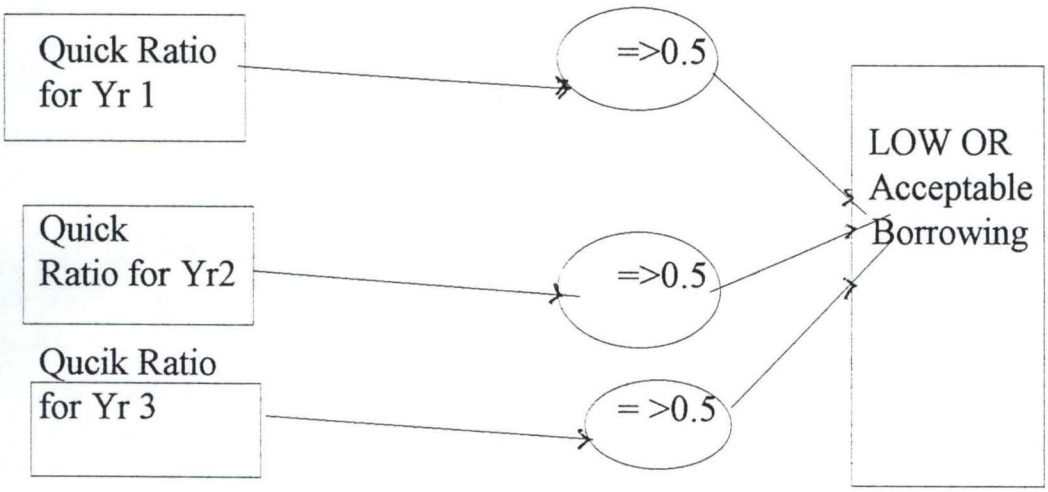
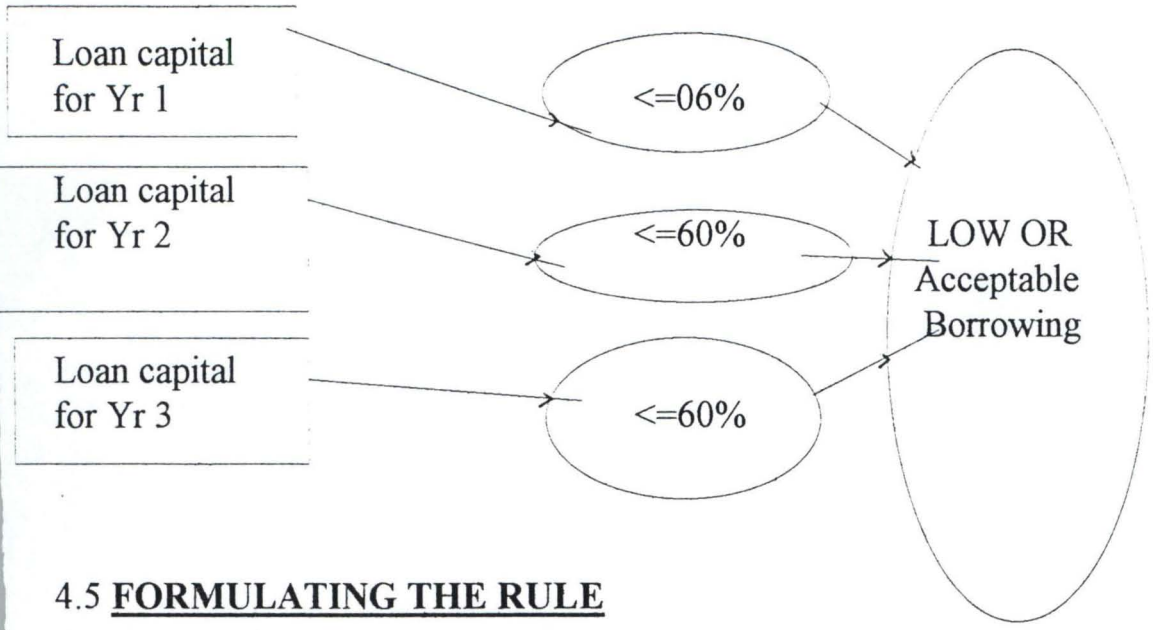


Fig 4.4 Requirements for Acceptable Borrowing level



4.5 **FORMULATING THE RULE**

Having acquired the relevant knowledge and produced a conceptual design of the prototyp, attention was then devoted to formulating the rules which to be stored in the knowledge Base.

An example of the rule is if

Current Ratio for year 1=>0.8

AND

Current Ratio for year 2 = >0.8

AND

Current Ratio for year 3 = >0.8

THE

CURRENT RATIO IS PRUDENT.

Good FINANCIAL BACKGROUND is the systems altimategoal, if all the requirements are met if on the other hand, the conditions (ie those that will cause the system to achieve its goal are not satisfied then the system will not accept the FINANCIA POSITION as being hood and thus the processing would end. The system will then tell why it has failed by displaying the results of the anlysis and the appropraite comment on the computer screen.

CHAPTER FIVE

SYSTEM IMPLEMENTATION

CONCLUSION AND FURTHER WORK

5.0 SYSTEM TRIAL/IMPLEMENTATION

It is considered appropraite at this point to emphasize that the target group for this prototype is the group of small organisations which do not have as much resources as the larger ones, presumbly, due to lack of expertise. The system will therefore help the small firms to acquire this expertise.

5.1.1 IN-HOUSE TRIAL TEST

The system was tested every step of the way during the development stage for errors ranging from spelling, typing, repetitions.

5.1 TEST PARAMETERS

1. The first test assumed that all the criteria for the three-year analysis were met. This meant that the Quick Ratios for each Yr1, Yr2, and Yr3 were =>0.5 and current Ratios for each of Yr1, Yr2, and Yr3 were =>0.8 and loan capital for each of Yr1, Yr2 & Yr3 were < = 60%
2. The second test assumed that the Quick Ratio for the first year failed. In this case, the system switched to the Two-year plan where the criteria was satisfied, ie
   Quick Ratio for Yr1<0.5 OR N/A (not available)
   and current Ratio for Yr2 => 0.5
   and current Ratio for Yr3 =>Yr2

Loan capital for Yr1>60% OR N/A (not available)

and loan capital for Yr2<=60%

and loan capital for Yr3<Yr2

and then concluded GFB (Good Financial Background), if the rules that derived the conclusion fired.

3. The third test failed the three-year - analysis and then switched to the two - year - plan. It also failed because the requirement for the third years Quick ratio was not met.

At the end of the test, Five potential achievements were suggested . These are:

- Speed of processing
- Consistency of results
- Performance Efficiency
- Cost reduction
- Others

5.2 CONCLUSION AND FURTHER WORK

The research programme has helped to expose one of the biggest problems which confronts those responsible for procuring materials used in organisation.

The problem is determining a reliable sources of supply. Establishing a source (s) that would not disappoint, as disappointment could mean closing down an entire business organisation.

An objective of the research project was to discover whether an expert system programm could be used in solving the problem (s) of vendor selection.

Time constraints and resource limitations did not permit the development of a comprensive system that would solve the entire problem of vendor selection. There a prototype expert

system (ESFVS) was built to address one of the these factors. The prototype was to determine whether a potential suppliers financial background is good or not.

5.3 THE VALIDITY

The validity of a programm determines whether valid and reliable conclusions can emanate from such a program.

The system out put were compared with the knowledge and experience of the human experts in the human application to verify whether the system was right or wrong. It not recommended that this should happen when ever the system draws a conclusion, otherwise it would not be cost effective to keep both systems (ie human and the programm/performing the same task. The human expert should conduct this reliability check a few times and once it is certified that the systems results are correct, reliable and consistant, then the system should be allow to run.

5.4 FURTHER WORK

The research project identified twenty one factors which those in the purchasing and supply function consider during the process of vendor selection.

The project went further to devlop a prototype of an expert systems programm that addressed one of the factors. Ie the financial Background of a potential supplier (s). In order to have a comprehensive program which could address the entire problem of vendor selection, the entire factors will have to be developed.

These factors are:

1. Product price: which details the price, additional discount etc
2. Product quality:stating the size, type, shape etc
3. Delivery Date; due date

4. Production method; types of methods used

5. Financial Background; which assesses a company's financially stability

6. Manufacturing capacity

7. Management efficiency

8. Technial competence

9. Similarity in technology used

10. Size of the organisation

11. Geographical location

12. Position in the industry

13. Conduct of the sales Representatives

14. Honesty

15. After sales/Back up services

16. Recommendation from Associates

17. Loyalty to friends or Relatives

18. Ability to provide sufficient information about the product

19. Whether the company is listed in business Directories

20. Company's interest in your product (s)

21. Personal opinion

Further work should therefore focus on developing these remaining factors

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EXPERT SYSTEMS' OUTPUT

THAT ASSESSES THE FINANCIAL POSITION OF POTENTIAL VENDOR (S)

This program is designed to be used by those in the purchasing function.

It calculates financial ratio which it uses in determining the financial background of a potential vendor(s).

The ESfSv system analysis three years data before providing a credible conclusion. It can also provide sound judgement base on only two years, figures.

1) ACQUIRE - ONE - YEAR - VALUES

Press.. (Enter) to continue

AND DO: Yes/No Question

YOU SHOULD ENTER FIGURES AS THEY ARE REQUIRED,

STARTING FROM THE BALANCE SHEET OF THE YEAR ONE, AND

THEN YEAR TWO AND FINALLY YEAR THREE

XXX NOW, START BY PRESSING Y, OK? ***

X AND [40] YR ONE CURRENT ASSETS
X AND [41] YR ONE CURRENT LIABILITIES
X AND [43] YR ONE STOCK VALUE
X AND [44] YR ONE TOTAL FINANCE

[2] ACQUIRE - THIRD - YEAR - VALUES

X JF [18] THIRD YEAR CUR ASS
X AND [17] THIRD YR CUL IAB
X AND [20] THIRD YR STOCK
X AND [19] THIRD YY LOAN
X AND [21] THIRD YR TOT FUND

[3] ACQUIRE - YEAR TWO - VALUES

+ IF [34] YR 2 CUR ASS
+ AND [33] YR 2 CULIAB
+ AND [38] YR 2 STOCK
+ AND [35] YR 2 LOAN
+ AND [39] YR 2 TOT FUND

[4] BET A3 RESULTS

IF DO: Test Expression
YER 3QKRATIO > YR2 Q RATIO

AND DO: Test Expression
YER 3 BORROWING < YR 2 BORROWING

[10] GOOD FINANCIAL BACK GROUND
+ IF [17] FIRM HAS THE DESIRED FINANCIAL PROFILE
F AND DO: Display Form

!! GOOD FINANCIAL BACKGROUND !!

THE FINANCIAL RATIO FOR THE THREE YEARS FIGURES MEET THE SET REQUIREMENTS.

First year
Current Ratio = [FRSTC]
QUICK Ratio = [FTACI]
Borrowing level [BORRO]
Second year
Currrent Ratio = [YEAR 2]
Quick Ratio = [YR2QK]
Borrowing level = [YR2BO]
Third year
Current Ratio = [YER3C]
Quick Ratio = [YER3Q]
Borrowing level = [YER 3B]

OUT: 11, 16, 22, 2
FRSTCRAT

OUT: 12, 16, 22, 2
FT ACID

OUT: 13, 18, 24. 2

[5] BORROWING

If Do: Assign Variable

BORROWING = YRONELOAN CAPITAL/YRONE TOTAL FINANCE

[6] FIRM HAS IMPROVING RESULTS

+ IF [11] NOT GOOD-FIRST-YEAR-FIN-RATIOS

AND DO: YES/NO Question

THE FIRST YEAR RATIOS ARE NOT ADEQUATE FOR OUR PURPOSE. THE SYSTEM WILL NOW ANALYSE TWO YEARS' DATA. DO YOU WISH THE SYSTEM TO PROVIDE YOU WITH A RECOMMENDATION BASED ON ONLY TWO YEARS' FIGURE?

+ AND [12] GOOD-SECOND-YEAR-FIN-RATIOS

+ AND [13] GOOD-THIRD-YEAR-FIN-RATIONS

+ AND [14] BETAZ RESULTS

4. FIRM HAS THE DESIRED FINANCIAL PROFILE

+ IF [11] GOOD-FIRST-YEAR-FIN-RATIOS

+ AND [12] GOOD-SECOND-YEAR-FIN-RATIOS

+ AND [13] GOOD-THIRD-YEAR-FIN-RATIOS

5. FRESTCRAT

IF DO: Assign variable

FT ACID: = (YR ONE CURRENT ASSETS – YR ONESTOCK VALUE)/YR ONE CURRENT LIABILITIES

OUT: 13,64,73,2

FRSTCRAT

OUT: 14,64,73,2

FTACID

OUT: 15,64,73,2

BORROWING

OUT: 17,64,73,2

YEAR 2 CURATIO

OUT: 18,64,73,2

YR 2QKRATIO

OUT: 19,64,73,2

YR2BORROWING

OUT: 21,64,73,2

YEAR 3 CURATIO

OUT: 22,64,73,2

YEAR 3 QKRATIO

OUT: 23,64,73,2

YEAR 3 BORROWING

[11] GOOD-FIRST-YEAR-FIN-RATIOS

+ IF [1] ACQUIRE-ONE-YEAR-VALUES

BORROWING

OUT: 16,16,22,2
YEAR 2 CU RATIO

OUT: 17, 16, 22, 2
YR 2 QK RATIO

OUT: 18, 18, 24, 2
YR 2 BORROWING

OUT: 21, 16, 22, 2
YER 3 CURATIO

OUT: 22, 16, 22, 2
YR 3QK RATIO

OUT: 23, 18, 24, 2
YER 3 BORROWING

\+ OR [6] FIRM HAS IMPROVING RESULTS
AND DO: CONCLUSION DISPLAY

FOR DO: DISPLAY FORM

THE RATIO ON WHICH THE ASSESMENT IS BASED ARE BELOW THE REQUIRED STANDARD, THEREFORE THE FIRM'S FINANCIAL POSITION IS NOT ADEQUATE FOR ONE PURPOSE.
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
THE CALCULATED FINANCIAL RATIO ARE:
FIRST YEAR RESULTS
. CURRENT RATIO = (FRSTCAT)
. QUICK RATIO = [FTACID]
. LEVEL OF BORROWING = [BORROWING]
SECOUND YEAR RESULT
.CURRENT RATIO = [YEAR 2 CUR]
.QUICK RATIO = [YR 2QKRAT]
. LEVEL OF BORROWING = [1/22 BORRO]
THIRD YEAR RESULTS;
. CURRENT RATIO = [YEAR 3 CUR
.QUICK RATIO = [YEAR 3 QKRA]
. LEVEL OF BORROWING = [YEAR 3 BORO]

Press Enter... to continue

+ AND [22] YEAR-ONE-CURRENT-RATIO

+ AND [24] YEAR-ONE-QUICK-RATIO

+ AND [23] YEAR-ONE-GEARING

[12] GOOD-SECOND-YEAR-FIN-RATIOS

+ IF [3] ACQUIRE-YEAR-TWO-VALUES

+ AND [26] YEAR-TWO-CURRENT-RATIO

+ AND [28] YEAR-TWO-QUICK-RATIO

+ AND [27] YEAR-TWO-GEARING

[13] GOOD – THIRD YEAR –FIN-RATIOS
+ IF [2] ACCQUIRE – THIRD – YEAR – VALUES
+ AND [14] THIRD YEAR – CURRENT – RATIO
+ AND [16] THIRD YEAR QUICK – RATIO
+ AND [15] THIRD YEAR – GEARING

[14] THIRD YEAR – CURRENT RATIO
+ IF [30] YER 3 CURATIO
AND DO: Test Expression
YER 3 CURATIO > = 0.8

[15] THIRD YEAR – GEARING
+ IF [29] YER 3 BOROWING
AND DO: Test Expression
YER 3 BOROWING < = 0.6

[16] THIRD YEAR – QUICK – RATIO
+ IF [31] YER 3 QKRATIO
AND DO: Test Expression
YER 3 QKRATIO > = 0.5

[17] THIRD YRCULIAB
IF DO: Assign Variable
THIRD YR CULIAB: = 0
W AND DO: Display Form
W POS: 2, 15, 10, 50

ENTER THE VALUES OF THE CURRENT LIABILITY < THIRD YR CULIAB>

[18] THIRD YR CURASS
IF DO: Assign Variable
THIRD YR CURASS: = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50

ENTER THE THIRD YEAR'S DATA
WHAT IS THE CURRENT ASSET?
< THIRD YR CURASS>

[19] THIRD YR LOAN
IF DO: Assign Variable
THIRD YR LOAN =0
WPOS: 2, 15, 10, 50
HOW MUCH IS THE LOAN CAPITAL
< THIRD YR LOAN>

[20] THIRD YR STOCK
IF DO: Assign Variable
THIRD YR STOCK: = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50
< THIRD YR STOCK>
ENTER VALUE OF STOCK

[21] THIRD YR TOT FUND
IF DO: Assign Variable
THIRD YR TOT FUND: = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50
WHAT IS THE TOTAL SUM OF THE CAPITAL EMPLOYED?
< THIRD YR TOT FUND>

[22] YEAR – ONE – CURRENT – RATIO
+ IF [8] FRSTCRAT
AND DO: Test Expression
FR STCRAT > = 0.8

[23] YEAR – ONE GEARING
+ IF [5] BORROWING
AND DO: Test Expression
BORROWING < = 0.6

[24] YEAR – ONE – QUICK RATIO
+ IF [9] KTAGD
AND DO: Test Expression
FTATGD> = 0.5

[25] YER 2 CURATIO
IF DO: Assign Variable
YEAR 2 CURATIO: = YR 2CURASS/YR2 CULIAB

[26] YEAR TWO – CURRENT – RATIO
+ IF [25] YEAR 2 CURATIO
AND DO: Test Expression
YEAR 2 CURATIO > = 0.8

[27] YEAR TWO – GEARING
+ IF [32] YR 2 BORROWING
AND DO: Test Expression
YR 2 BORROWING < = 0.6

[28] YEAR TWO – QUICK RATIO
+ IF [36] YR 2 QKRATIO
AND DO: Test Expression
YR 2 QKRATIO > = 0.5

[29] YER 3 BORROWING
IF DO: Assign Variable
YER 3 BORROWING" = THIRD LOAN/THIRD YR TOT FUND

[30] YER 3 QKRATIO
IF DO: Assign Variable
YER 3 CURATIO = THIRD YR CURASS/THIRD YR CULIAB

[31] YER 3 QKRATIO
IF DO: Assign Variable
YER 3 QURATIO: = [THIRD YR RCURASS – THIRD STOCK]
THIRD YR CULIAB

[32] YR 2 BORROWING
IF DO: Assign Variable
YR 2 BORROWING: = YR 2 LOAN/YR 2 TOT FUND

[33] YR 2 CULIAB
IF DO: Assign Variable
YR 2 CULIAB = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50
ENTER THE VALUE OF THE CURRENT LIABILITY
<YR 2 CULIAB>

[34] YR 2 CURASS
IF DO: Assign Variable
YR 2 CURASS: = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50

[35] YR 2 LOAN
IF DO: Assign Variable
YR 2 LOAN: = 0
AND DO: Display Form
WPOS: 2, 15, 10, 50
<YR 2 LOAN>
WHAT IS THE AMOUNT OF LOAN

[36] YR 2 QKRATIO
IF DO: Assign Variable
YR2 QKRATIO = [YR 2 CURASS – YR 2STOCK]/YR2CULIAB.

[37] YR 2 RESULTS
+ IF [25] YEAR 2 CURATIO
+ AND [36] YR 2 QUK RATIO
+ AND [32] YR 2 BORROWING

[38] YR 2 STOCK
IF DO: Assign Variable
YR 2 STOCK: = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50
ENTER THE VALUE OF STOCK
< YR 2 STOCK>

[39] YR 2 TOT FUND
IF DO: Assign Variable
YR 2 TOT FUND: =0
W AND DO: Display Form
WPOS: 2, 15, 10, 50
HOW MUCH CAPTIAL WAS EMPLOYED?
<YR 2 TOT FUND>

[40] YR ONE CURRENT ASSETS
IF DO: Assign Variable
YR ONE CURRENT ASSETS: = 0

F AND DO: Display Form
ENTER 0 [i.e. ZERO] WHERE NO DATA EXISTS
BEGINNING WITH THE FIRST YEAR'S DATA
WHAT IS THE VALUE OF THE CURRENT ASSETS?
< YR ONE CURRENT ASSETS>

[41] YR ONE CURRENT LIABILITIES
IF DO: Assign Variable
YR ONE CURRENT LIABILITIES: =0
W AND DO: Display Form
WPOS: 2, 15, 10, 50

<YR ONE CURRENT LIABILITIES>
ENTER THE VALUES OF THE CURRENT LIABILITY

[42] YR ONE LOAN CAPITAL
IF DO: Assign Variable
YR OEN LOAN CAPITAL: = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50
ENTER THE AMOUNT OF LOAN CAPITAL
<YR ONE LOAN CAPITAL>

[43] YR ONE STOCK VALUE
IF DO: Assign Variable
YR ONE STOCK VALUE: =0
W AND DO: Display Form
WPOS: 2, 15, 10, 50

WHAT IS THE STOCK VALUE?
<YR ONE STOCK VALUE>
[44] YR ONE TOTAL FINANCE
IF DO: Assign Variable
YR ONE TOTAL FINANCE: = 0
W AND DO: Display Form
WPOS: 2, 15, 10, 50

WHAT IS THE TOTAL CAPITAL EMPLOYED?

<YR ONE TOTAL FINANCE>

[45] + IF [10] GOOD FINANCIAL BACKGROUND