Expert System for Price Determination

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ABSTRACT
This paper is concerned with proposing an Expert System to determine the Price of a product. Now-a-days the market is very complex and competitive. The price of the Product plays a major role in the Success of the product. Due to this Determining the price of the Product is very important. Price is the only element that affects revenues, and business's profits. Thus, we make use of an Expert system to make decisions considering the uncertainties in the market environments.

General Terms
Artificial Intelligence, Business.

Keywords
Expert System, Pricing.

1. INTRODUCTION
Today's firms face an unpredictable environment specified by frequent mortality and innovation and high priority on research and development to be located in the first place in the market. Market has been changed drastically and common strategies of the 1980s, such as cost saving and quality improvement are insufficient to win today's competitive markets. Price is a factors that influence the final price of goods and services. Companies adjust their basic prices to come along with different customers and changing situations

Here we will look at the few factors that influence price which are cost considerations, demand considerations, geographical considerations and promotional prices. These factors are very uncertain thus an Expert's judgement plays a vital role.

2. EXPERT SYSTEM
ES's are computer programs that are originated from a branch of computer science research called artificial intelligence (AI) (Jackson, 1990). AI's scientific objective is to understand intelligence by creating computer programs that show intelligent behaviour. It is related to the concepts and methods of symbolic inference or reasoning, by a computer, and how the knowledge used to make those inferences is represented inside the machine.

AI programs that achieve expert-level competence in solving problems in task areas by gathering a body of knowledge about specific functions are called knowledge-based or ES. Often, the term ES is reserved for programs whose knowledge base includes the knowledge used by human experts, in contrast to knowledge gathered from textbooks or non-experts. More often, the two terms, ESs and knowledge-based systems (KBSs), are used synonymously. Taken together, they show the most widespread type of AI application. The area of human intellectual strive to be captured in an ES is called the task domain. Task refers to some goal-oriented, problem-solving activity. Domain refers to the area within which the task is being performed. Typical tasks are diagnosis, planning, scheduling, and configuration and design. Creating an ES is known as knowledge engineering and its practitioners are entitled knowledge engineers. The knowledge engineer must make sure that the computer has all the knowledge required to solve a problem (Matthews, 2003). The knowledge engineer must select one or more forms in which to represent the required knowledge as symbol patterns in the memory of the computer, i.e. he (or she) must choose a knowledge representation. He must also ensure that the computer can use the knowledge efficiently by selecting from a handful of reasoning methods.

Every ES consists of two basic parts: the knowledge base and the reasoning, or inference, engine. The knowledge base of ESs contains both static and dynamic knowledge. Static knowledge is that knowledge of the task domain that is widely shared, typically found in textbooks or journals, and commonly agreed upon by those knowledgeable in the particular field. Dynamic knowledge is the knowledge obtained by asking questions to the user regarding the problem. Whereas an Inference engine is used to derive new knowledge form already existing knowledge.

The power of an ES lies in the knowledge Base about the task domain – the more knowledge a system is given, the more competent it becomes. Primarily, the benefits of ESs to end users include:

- A speed-up of human professional or semi-professional work – typically by a factor of ten and sometimes by a factor of a hundred or more.
- Improved quality of decision-making: in some cases, the quality or correctness of decisions evaluated after the fact show a tenfold improvement.
- Preservation of scarce expertise: ES's are used to preserve scarce know-how in organisations, to capture the expertise of individuals who are retiring, and to preserve corporate know-how so that it can be widely distributed to other factories, offices or plants of the company.
- Within companies, major internal cost savings: for small systems, savings are sometimes in the tens or hundreds of thousands of dollars; but for large systems, often in the tens of millions of dollars and as high as hundreds of millions of dollars. These cost savings are a result of quality improvement, a major motivation for employing ES technology

3. FACTORS EFFECTING THE PRICING DECISIONS
Specifically, we need to establish the key inputs to pricing decision. Although, there are a myriad of possible considerations in arriving at a price for a product or service, the following are what I have considered to be the inputs for the pricing decision:

- Cost Considerations
- Demand Considerations
- Geographical Consideration
- Promotional Pricing

3.1 Cost Considerations

Cost considerations determine the lower limits. Accurate, relevant, up-to-date cost information is essential to form pricing strategy. Accurate cost information allows the pricing decision-maker to identify costs on a very specific basis directly related to each product, activity or customer. This way, management is able to make informed decisions about pricing to target market segments.

In particular, the cost analysis should enable the marketer to distinguish between fixed and variable costs. The importance and use of the distinction between fixed and variable costs be illustrated by a simple breakeven chart below

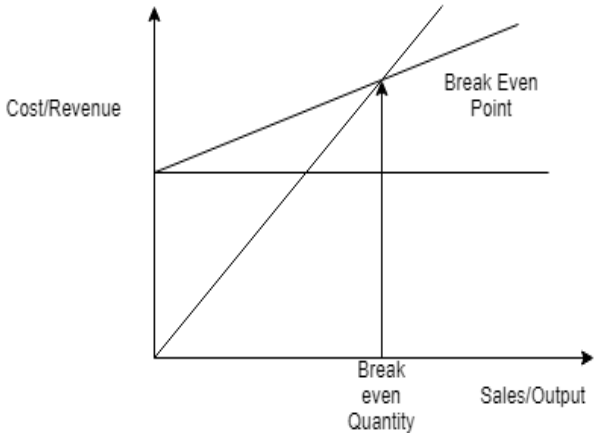

Fig 1: A break even chart

Fixed costs are those that do not vary with level of output, and therefore represented by the horizontal fixed cost curve in Figure 1. On the other hand, variable costs are those costs which are more or less directly related to production or sales. Increases in output or sales will lead to proportional increase in these costs. Taken together, fixed and variable costs combine to give total costs, as shown in Figure 1.

The breakeven point is the point at which total revenue exactly matches the total costs, i.e. there is neither profit nor loss. This information on cost revenue relationships can be very useful to the pricing decision-maker.

3.2 Demand Considerations

A key parameter affecting pricing decision is essentially customer based. The upper limit to the price to be charged is set by the market while the customer must purchase the product and we are sole supplier. Effectively, at least in competitive markets, demand, the price which customers are both willing and able to pay, is a major consideration in the selection of pricing strategies.

Ideally, the marketing manager needs to know the demand schedule for the products and services to be priced. The demand schedule relates prices to quantities demanded and can be illustrated by the use of a simple diagram, as shown in Figure 2.

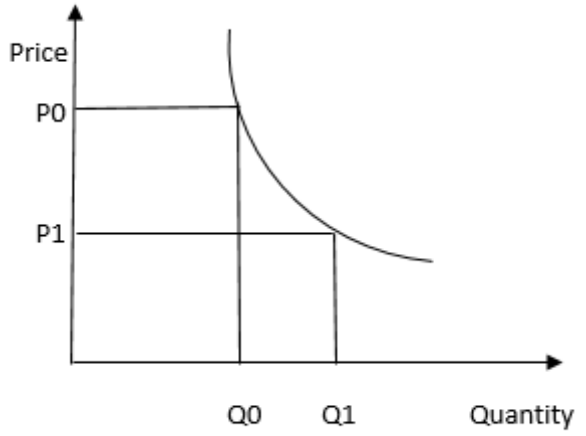

Fig 2: A simple demand curve

Even a slight increase in the price will result in the decrease of demand which in turn affects the sales and vice versa. We can see that in the figure 2 with the increase of price from p1 to p0 the demand decreased from q1 to q0.

3.3 Geographical Considerations

The company must decide how to price its products to customers located in different parts of the country. A product made in India and sold in America may be priced differently. Americans may have to pay the shipping charges as well but Indian won't because the product is based in India.

3.4 Promotional Considerations

With promotional pricing, companies will temporarily price their products below the list price, and sometimes even below cost, to increase sales. For example, sellers will use special event pricing in certain season to draw in more customers.

4. MODELLING THE EXPERT SYSTEM

A Knowledge Engineer must collect the required information from various text books or by conducting a questioner with a human expert in that task. Then the obtained knowledge must be represented in any one of the forms of Knowledge representations like IF-Then rules or semantic networks or frames. The knowledge engineer must make sure that the computer has all the knowledge required to solve a problem. The input to the system will be based on the factors that affect the price of the product or a service based on the input the Expert system will search in the knowledge base and tries to give an answer.User interface: the means of communication with the user. The user interface is generally not a part of the ES technology, and was not given much attention in the past. However, it is now widely accepted that the user interface can make a critical

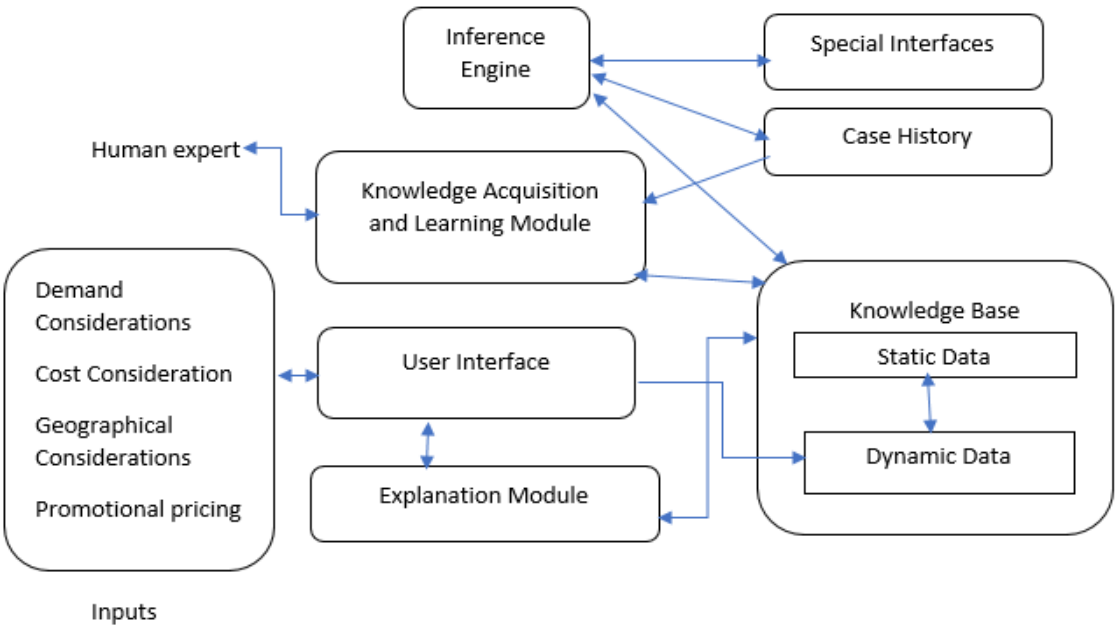

Fig 3: Proposed Expert System Architecture

difference in the perceived utility of a system regardless of the system's performance

Explanation Module: a subsystem that explains the system's actions. The explanation can range from how the final or intermediate solutions were arrived at to justifying the need for additional data.

Knowledge acquisition and Learning module: a subsystem to help experts build knowledge bases by Collecting knowledge Needed to solve problems. Building the knowledge base continues to be the biggest bottleneck in building ES.

Inference engine: inference Engine manipulating the symbolic information and knowledge in the knowledge base to form a line of reasoning in solving a problem. The inference mechanism can range from simple modus pones backward chaining of IF– THEN rules to case-based reasoning. It also helps in deriving new knowledge from already existing knowledge.

Knowledge base: a store of static and dynamic knowledge. An ES tool provides one or more knowledge representation schemes for expressing knowledge about the application domain. Some tools use both frames (objects) and IF–THEN rules. In PROLOG, the knowledge is represented as logical statements.

Case history: it stores the files created by the inference engine using the dynamic database and used by the learning module to enrich its knowledge base. Different cases with solutions are stored and these cases are used to solve the problems using case based reasoning. Special Interfaces: Knowledge is always uncertain and ambiguous to deal with special interfaces are used.

5. CONCLUSION

In this paper, an Expert System was presented to determine the price of products and services. This methodology can be applied for price adjustments in any field of service or product for any kinds of industries. As future research, modelling the problem making use of more complicated pricing equilibrium are considered.

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7. REFERENCES

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