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EXPERT PRICING SYSTEM AS PART OF MARKETING MIX

EKSPERTNI SUSTAVI ZA ODREĐIVANJE CIJENA KAO DIO MARKETINŠKOG SPLETA

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Abstract
Marketing mix is a set of elements with whose designing organisational system tends to realise a set of strategic aims. It is made up of product, price, promotion, and place. Price is complex marketing mix part that ensures organisational system with certain level of revenues, but at the same time price level influences customers' decisions on purchasing a service or a product, organisational system competitiveness, and its market position. Therefore it is important to estimate price realistically, and to choose appropriate method of its calculation. Applied method always depends on a set of business aims. Nowadays there is discrepancy of complexity in theoretical approach in pricing in microeconomics, macroeconomics, accounting, finance, and other economic disciplines compared to realistically applied methods. Theoretical approaches are often inapplicable, and actually applicable methods are "simpler", and are usually based on market estimation and a set of business aims of organisational system functioning. Expert systems are computer programmes that are able to translate "practical" experiences and applicable knowledge in a form of knowledge base, and serve as assistants and consultants in selection of pricing method for a product or a service. This paper researches and presents possibilities of expert system development for pricing of a product or a service as an element of marketing mix. Object-oriented declarative programme language Visual Prolog is used to develop exPrice expert system and it has showed satisfactory development and application power.

Sažetak
Marketinški splet je skup elemenata čijim oblikovanjem organizacijski sustav teži ostvarivanju postavljenih strategijskih ciljeva. Njega čine proizvod, cijena, promocija i distribucija. Cijena je složeni element marketinškog spleta koji organizacijskom sustavu omogućuje određenu razinu prihoda ali istodobno razina cijena utječe na odluke kupaca o kupnji usluge ili proizvoda, na konkrentnost organizacijskog sustava i njegovu tržišnu poziciju. Stoga se cijena uvijek mora realno procijenjivati i odabrati odgovarajuća metoda njenog izračunavanja. Primjenjena metoda je uvijek ovisna o postavljenim poslovnim ciljevima. Danas je vidljiva diskrepanca složenosti teorijskog pristupa oblikovanju cijena u mikroekonomiji, makroekonomiji, računovodstvu, financijama i drugim ekonomskim disciplinama i stvarno primjenjenih metoda. Teorijski pristupi su često neaplikabilni a stvarno primijenjene metode su „jednostavnije" i, u pravilu, temelje se na tržišnoj procijeni i postavljenim poslovnim ciljevima funkcioniranja organizacijskog sustava. Ekspertni sustavi su računalni programi koji mogu „praktična" iskustva i primjenska znanja u oblikovanju cijena marketinškog eksperta prevesti, pomoću formalizama prikaza znanja, u oblik baze znanja i poslužiti kao asistenti i konzultanti u izboru metode za određivanje cijene proizvoda ili usluge. U radu se istražuje i prikazuje mogućnost izgradnje ekspertnog sustava za određivanje cijena proizvoda ili usluge kao elementa marketinškog spleta. U izgradnji ekspernog sustava exPrice uporabljen je objektno orijentirani deklarativni programski jezik Visual Prolog a on je pokazao zadovoljavajuću razvojnu i aplikacijsku moć.

1. INTRODUCTION

Role of price in functioning of both market-oriented organisational system and economy as a whole is huge. Measured economic results directly depend on pricing system. In theoretical sense, pricing system is a mechanism that adjusts supply and demand. If observed from marketing aspect a customer should be in focus while creating a pricing strategy/**1**/. It is necessary to respect customers' attitude towards a product, their readiness to set some money aside to purchase it, and value category they classify it in. Price can be defined in different ways. In broader sense price is "totality of values that customer is ready to exchange for benefits that he/she has from possession or use of a certain product or service. (http://hr.wikipedia.org/wiki/Prodaja_i_oblikovanje_cijena dated 2/6/2014). It can also be said that price is money expression of product value or delivered service /**2**/. In direct exchange conditions price can be expressed in an amount of other goods for which it is exchanged /**3**/. It is necessary to mention that price influences customers and their decision about product has changed. Common level of economic development also determines intensity of price influence on purchase decision. Namely, lower level of development is related to powerful influence on purchase decision and vice versa. Psychological influence of price on a customer is especially interesting since price is often a measure of product or service value. In certain situations a company can increase price to emphasize product quality but also social status of customers that use listed product/service. Customers can also emotionally react on certain price level, and company can use such reaction to define its price policy. Price theory is a part of economic theory. It is a complex component and can be analysed at the same time with market theory development. Economic theory gives special place to prices because they influence costs, revenues, allocation of scarce resources, and production factors. Price complexity also results from nature of economic process that is generally in unbalanced condition, and price level is economic expression for such lack of balance. For working theory price is money amount of goods value. Price is defined as money expression for goods value or as "relation" of some goods unit or service exchange for certain amount of money. Price is number of currencies that are asked for in sales or offered in purchase of some goods. Therefore it is market information through which it is attempted to establish balance between supply and demand. Price balance is new market condition because that level enables sales of all offered amounts of goods, and satisfaction of demand. It is a price in which both amount and demand are the same.

Term price is directly related to value theory of goods. There are two approaches to this. According to the first approach (objective value theory) value is objective characteristic of goods or product that is purchased or sold on the market. Objective value theory is concentrated on production conditions and it has two forms. According to the first, price is determined by value of goods, and value is determined with amount of labour spent on its production. Amount of labour is objective measurement of goods price. According to production cost theory goods value is a sum of costs that results from prices of production factors: labour (labour price is rental fee), land (land price is rent), and capital (capital price is interest). The other theory is theory of efficiency. Its idea is interpretation and analysis of interdependence between price and efficiency, or level of satisfaction customer gets from purchasing a product (goods) and its price. According to efficiency theory price is not something objective but it presents subjective experience of a customer from the aspect of his/her needs and criteria. There is an assumption that customers behave in economic (rational) way, and tend to maximise satisfaction with less investment (i.e. with the lowest price as possible) /**4**/.

2. PRICING METHODS

Pricing method is consisted of series of steps (procedures) with which company qualitatively determines a price. There are different methods for pricing but three of them are the most common – *cost-oriented, market oriented, and competitive- oriented methods* /**5**/.

Cost-oriented methods

According to cost-oriented method key parameter determining price level is cost of product and certain percentage is added on it (or absolute amount). In this procedure economic aspects of supply and demand are neglected. Cost-oriented methods also neglect competition assuming that there is a certain demand for products independently of their price. The most significant cost-oriented methods are the following: *cost plus*

pricing, mark-up pricing, break-even pricing, and target return pricing.

Cost plus pricing method should primarily cover total costs and contribute profit. If a company uses this method it has to calculate product unit costs and increase them for certain amount of money that represents profit made by that unit of product. It is very simple to apply this method, but it has one disadvantage because it neglects two important price limitations – demand and competition.

Mark-up pricing method is commonly used for pricing in retail. Producer's costs per product unit are calculated using the following formula:

costs_per_unit = variable_costs + fixed_costs/number of sold units

If a producer wants to earn 30% on sales of one unit then the price is calculated as follows:

price = costs per unit/81-0.3)

Using ***break-even pricing*** company determines unique price for its product on all markets where that product is sold. Price is only converted from producer's currency into local currency at the given market.

Target return pricing method is applied by companies which primarily goal is to achieve desirable return on investment on a certain market.

Market-oriented pricing methods take conditions on a given market into account. If a company decides to apply market-oriented methods in its pricings there are two available possibilities: demand-oriented pricing and high-low pricing method.

Demand-oriented pricing method includes implicitly pricing in accordance with demand level, where a company has to estimate amount of products that customers will look for at different prices. Regression models that show relations between price and demand, and price and supply are used.

Upon selection of pricing method it is necessary to take price elasticity of demand into account.

High-low pricing method is based on formation of the lowest product price on all markets. Prerequisite for application of this method is fast coordination of marketing experts for pricing on all markets.

Competitive-oriented pricing keeps costs and profit in the background. According to this method price becomes equal with prices of competition and assumes perfect level of information about competitors' prices. This is the most common to follow market leader when using this method.

2. EXPERT SYSTEM FOR PRICING

Expert systems are a part of computer science that implement symbolic and non-algorithm methods to solve tasks. They are computer programmes that use problem solving knowledge and techniques at the level that can be comparable with human experts [5]. Expert system is made of the following three basic components: knowledge base, inference engine and user interface. Inference engine, as its name says, brings decisions based on its own interpretation-represented knowledge of an expert. Domain expert, knowledge engineer, and user, who is generally a decision maker, are the main participants in expert systems' development. Knowledge engineer possesses knowledge about strategies of solving different problems and tries to identify similarities between solved problems and a problem that is being solved. He is familiar with techniques of knowledge elicitation and expert system techniques. During expert system development knowledge engineer requires from domain expert *to think aloud* and explain decision-making process for every decision he makes.

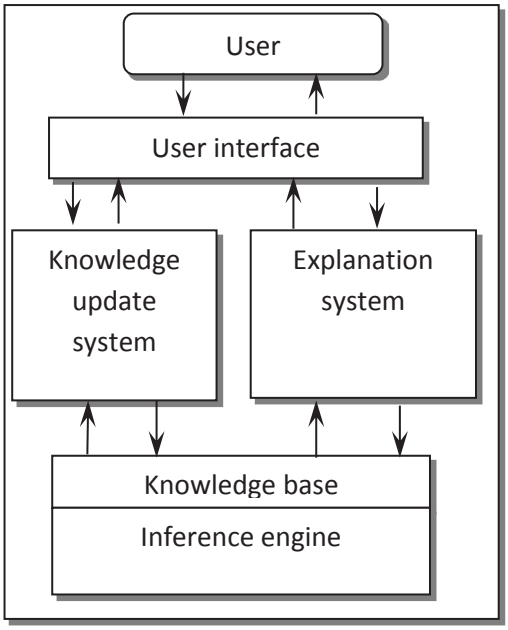

Figure 1.: Expert system components /**6**/

After he has completely understood knowledge structure, knowledge engineer models knowledge and makes decision about tools he is going to use in expert system development. Knowledge elicitation is complex and simultaneously one of the most important steps in expert system development. There are a number of difficulties in this process. One of them is the difference between the way domain expert has the knowledge and the way he represents it in the programme. There are difficulties due to impossibility of an expert to show explicitly the knowledge he possesses. There are also limitations in technology, complexity of testing, and improvement of expert system performances.

In most cases expert system development follows prototype logic. That logic is then tested, modified, and upgraded and the second prototype is created, then the third one until expert system provides with good test results to solve defined problem. It is important to observe that final result of expert system development is directly dependent on knowledge eliciting process. Expert system development is a process in which knowledge base acts as its dynamic element. Different types of expert systems, with regards to their size, also require engagement of different resources. Costs and benefits must be observed during expert systems' development. Their relative relationship will determine exploitation time of expert system in economic sense /**7**/.

3.1. Variables for product or service pricing in „exPrice" expert system

Product or service price is marketing mix element that directly influences organisational performances of a company. It is possible to include great number of variables in forming price level. However, there must not be too many variables because it complicates decision-making on product or service price level, neither too low since decision-making on price level becomes trivial. The following variables will be used in *exPrice* expert system development for decision-making on price level:

1. Elasticity of demand in relation to price ($E_{p,d}$)
2. Market structure
3. Level of business activities
4. Business goals.

$E_{p,d}$ variable can have one of the three values (fuzzy variables) (low, significant, high) depending on numerical value of elasticity coefficient. Namely, it is possible to conduct research and calculate elasticity coefficient of demand for previous periods of time in relation to price change. Expert system uses qualitative values of variable $E_{p,d}$.

The second variable is market structure. This variable determines number of product or service offerings on a certain market. Number of offerings can be high, significant, and low. The third variable consulted by *exPrice* while extracting or implementing decision-making rules on product or service price level is diagnosis of intensity of organisational system business activities. There are three possible values: increase in level of stocks and decrease in their flow coefficient, decrease in market share of product or service sales or decrease in total demand for that product on the market (saturation phase of product's life cycle). Business goal is the fourth criterion, which can be considered as the most important one among listed criteria. It is possible to observe higher number of goals but for the needs of *exPrice* expert system for pricing the following goals can be observed: to retain existing customers, to attract new customers to purchase product or service, to increase market competitiveness, and to prevent new offerings' entrance on the market.

Decision about price change is a new variable that can, in theoretical sense, have numerous different values. The following decisions can be suggested by *exPrice* expert system:

1. Retain existing price (no price change)
2. Retain existing price but simultaneously intensify promotion activities
3. Apply Cost plus pricing method (increase costs for p% of profit)
4. Equalise price with competition
5. Decrease price for p%
6. Explore product or service value first, and determine price then.

Pricing variables, their values, and price changes' decisions are presented in the following table:

Elasticity of demand in relation to price changes	Market structure	Intensity of business activity	Business goals	Price
a)low b)significant c)high	a) great number of offerings b)significant number of offerings c)low number of offerings	a) increase level of stocks and decrease their flow coefficient b) decrease market share of product or service sales c) decrease total demand for product and service on the market	a) retain existing customers b) attract new customers to purchase product or service c) increase profit d)increase market competitiveness, and e) prevent new offerings' entrance on the market	a) retain existing price (no price change) b) retain existing price but simultaneously intensify promotion activities c) apply Cost plus pricing method (increase costs for p% of profit) d) equalise price with competition e) decrease price for p% f) research product or service value firstly, and determine price after

Table 1.: Variables of exPrice expert system for pricing product or service[6]

[6] Further in this text an appropriate code will be added to each variable value:
Em=low elasticity; Ez=significant elasticity; Ev=high elasticity; TSv=great number of offerings; TSz=significant number of offerings; TSm=low number of offerings; IPAz=stock flow coefficient is decreased; IPAu=market share of product sales is decreased; IPAd= total demand for product or service is decreased; CPl=retain existing customers; CPn=attract new customers ;CPp=increase profit; CPk= increase market competitiveness; CPb=prevent new offerings entrance; Cop= retain existing price and intensify promotion; Co= retain existing price; C1= change price using Cost plus pricing where profit is p%; C2= equalise price with competition; C3= decrease price for k%; C4= research product or service value for customers and determine price then.

After conversation with marketing expert for product and service pricing (domain expert) knowledge engineer must transform extracted (elicited) knowledge in some of *exPrice* knowledge formalisms. Since object-oriented declarative programme language Visual Prolog is applied in *exPrice* development, knowledge engineer translates knowledge in form of first order predicate. Namely, Visual Prolog uses in *exPrice* facts and production rules. Relations between objects in *exPrice* are expressed by predicates and rules are in form of reversed Horn clauses:

action :- condition.

Knowledge engineer concludes that theoretically 135 production rules can be formed based on marketing expert decision-making about prices. Namely, total number of rules (Rn) is a set made of Cartesian product of four sets: elasticity of demand in relation to price ($E_{p,d}$), market structure (TS), intensity of business activity (IPA), and business goals (CP).

Condition field in some n production rule (R_n) can formally be written as:

$R_n \subseteq (E_{p,d} \times TS \times IPA \times CP)$.

Using first order predicate action field or conclusion in *exPrice* production rule is one of price variable values.

3.2. Knowledge base of exPrice expert pricing system

Values of variables are fuzzy values in *exPrice*. Namely, fuzzy logic system is created to process and make conclusions based on insufficiently precise language concepts such as long, short, fast, average, good, bad, moderate and the like /**8**/. Fuzzy logic provides flexibility in data processing, as well as unachievable advantage in relation to logic based on conventional theory. Assuming that analysis result of elasticity coefficients of demand in relation to prices for products A, B, and C is presented in the following table:

Product name	Elasticity coefficient of demand in relation to prices	
A	-0,12	
B	-0,19	
C	-0,34	

Table 2: Demand elasticity coefficient in relation to prices

Using conventional logic values of product elasticity can be classified into three different sets with sharp limit: elasticity of demand in relation to price change is low, significant or high.

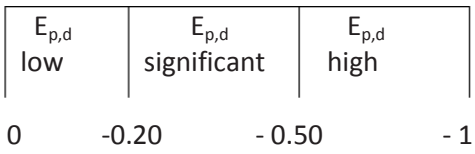

Figure 2: Elasticity coefficient of demand in relation to prices presented by classical logic

Such sharp limits of classification are not completely acceptable to human understanding of demand elasticity term. Therefore more flexible approach that translates numerical values of demand elasticity coefficient in relation to prices into fuzzy values is developed. Fuzzy values are described using terms low, significant, and high. Transition from demand elasticity condition in relation to prices "low" in condition "significant" and from condition "significant" into condition "high" and vice versa; from condition "high" into condition "significant", and from condition "significant" into condition "low" is graded but not sharp. That fact is clearly presented in the following figure.

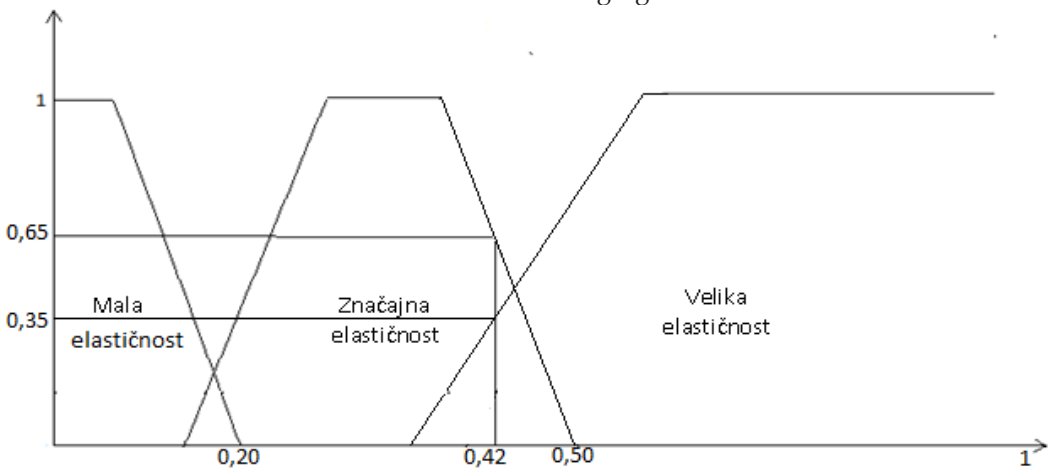

Figure 3: Demand elasticity in relation to prices presented by fuzzy logic

Marketing expert determines form and function of elasticity coefficient membership in fuzzy logic. Determining membership function of elasticity coefficient enables its classification in a set consisted of low, significant or high elasticity. In the Figure 3 elasticity coefficient $E_{p,d}$=0.42 denotes membership intensity 0.65 to fuzzy set "significant elasticity", 0.35 to fuzzy set "high elasticity", and 0 to fuzzy set "low elasticity". Symbolic (fuzzy) values of variables "market structure" and "intensity of business activity" can similarly be presented.

Numerical values of variables "market structure" and "business activities intensity" can be recorded in dimension data storage of organisational system or marketing business function (data mart). These numerical values of number of product or service offerings, for example, are then transformed into fuzzy values and appropriate membership function is joined to them. Knowledge base of *exPrice* expert system is based on rules meaning that certain combinations of values of variables "elasticity", "market structure", "intensity of business activity", "business goals", and "price change" activate only one rule. Of course, rules that have same values in action field can be described with one complex rule that contains combinations of values of "elasticity", "market structure", "intensity of business activity", and "business goals" variables in action (hypothesis) field. Rules that have same values in action field can show certain redundancy so total number of rules can be decreased.

Expert system knowledge base must ensure price change "advice" to user depending on values of elasticity", "market structure", "intensity of business activity", and "business goals" variables, i.e. it must provide with answer on product or service price for each possible world state. Production rules in knowledge base are automatically activated as data input result for each product or service during pricing procedure. Total number of possible target conditions is 3 x 3 x 3 x 5 = 135.

The following table presents the idea of *exPrice* expert system knowledge base development.

Rule number	Elasticity ($E_{p,d}$)	Market structure (TS)	Intensity of business activity (IPA)	Business goals (CP)	Price (C)
R1	Em	TSv	IPAz	CPl	Cop
R2	Em	TSv	IPAz	CPn	Cop
R3	Em	TSv	IPAz	CPp	Cop
R3	Em	TSv	IPAz	CPk	C3
……	……	….		…..	……
R74	Ez	TSz	IPAd	CPk	C3
R75	Ez	TSz	IPAd	CPk	C3
……..	……..	……	……	……..	……..
R101	Ev	TSv	IPAu	CPl	C4
R102	Ev	TSv	IPAu	CPn	C4
……..	……..	……..	……..	……..	……..
R134	Ev	TSm	IPAd	CPk	C3
R135	Ev	TSm	IPAd	CPb	C3

Table 3: Production rules in "exPrice" knowledge base

Total number of production rules in *exPrice* expert system knowledge base is 135 and they detect five different conclusions about price change. It is not necessary to record every row in the previous table using new production rule because same values are displayed in the part of rule called action (conclusion). So, the first three rows in the previous table can be recorded in the form of the first order predicate as follows:

C="Cop" :- Elasticity="Em", TS="TSv", IPA="APAz",CP="CPI"; CP="CPn"; CP="CPp".

After all rules are recorded in knowledge base using formalisms of first order predicate, facts for every product or service are entered. New table is added in database that looks as follows:

Product (service) name	Elasticity of demand in relation to price changes(Edp)	TS	IPA	CP
A	Em	TSv	IPAd	CPk
B	Ev	TSm	IPAd	CPb
C	Ez	TSz	IPAu	CPn
.....	.....	.....	.....	.....

Table 4: exPrice expert system data

User enters data for each product using data input forms that look as follows:

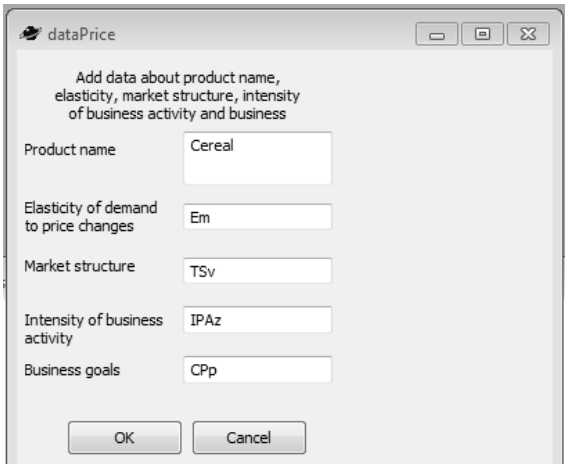

Figure 4: Interface of expert system exPrice

Data are entered into database in *Sanja.txt* file as facts in Visual Prolog language. They look as follows:

clauses

expriceind("Cereal","Em","TSv","IPAz","CPp").
expriceind("B", "Em", "TSz", "IPAz","CPn").
expriceind("C", "Em", "TSv", "IPAu","CPI").
expriceind("D", "Em", "TSv", "IPAu","CPb").
expriceind("E", "Em", "TSv", "IPAu","CPp").
expriceind("F", "Em", "TSv", "IPAu","CPn").
expriceind("G", "Em", "TSv", "IPAz","CPk").
expriceind("H", "Em", "TSv", "IPAz","CPI").
.....
.....

Besides facts knowledge base is also made of rules. They are derived on the basis of marketing expert replies for prices. Namely, a marketing expert gives replies to knowledge engineer for each possible combination of values of elasticity of demand in relation to price change, market structure, intensity of business activity, and business goals variables. Knowledge engineer forms relation as presented in Table 3 and records rows (tuples) in form of formalisms to present knowledge in declarative programme language of Visual Prolog and that means in form of first order predicate.

The following table, for example, presents first ten rows of relation and they have to be translated into clauses of Visual Prolog language.

Elasticity of demand in relation to price change	TS	IPA	CP	Price
Em	TSv	IPAz	CPl	C0p
Em	TSv	IPAz	CPn	C0p
Em	TSv	IPAz	CPp	C0p
Em	TSv	IPAz	CPk	C0
Em	TSv	IPAz	CPb	C0
Em	TSv	IPAu	CPI	C1
Em	TSv	IPAu	CPn	C1
Em	TSv	IPAu	CPp	C2
Em	TSv	IPAu	CPk	C2
Em	TSv	IPAu	CPb	C3
.....	.....	.....	.....	.....

Table 5: First ten rows of relation for exPrice knowledge base creation

The first ten rows are recorded in *exPrice* expert system as the first order predicate in the following way:

```
priceChange1():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAz",CP="CPI"),
stdio::write("Do not change the price of product ",
Product_name, " but you have to intensify  the pro
uct_name, " but you have to intensify  the promoti
on of product as soon as possible"), stdIO::nl,fail.
   priceChange1().
priceChange11():-
 ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAz",CP="CPn"),
stdio::write("Do not change the price of product ",
Prod-
uct_name, " but you have to intensify the promoti
on of product as soon as possible"), stdIO::nl,fail.
   priceChange11().
priceChange12():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAz",CP="CPp"),
stdio::write("Do not change the price of product ",
Prod-
uct_name, " but you have to intensify the promoti
on of product as soon as possible"), stdIO::nl,fail.
   priceChange12().
priceChange2():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAz",CP="CPk"),
 stdio::write("Do not change the price of product "
), stdio::write(Product_name), stdIO::nl,    fail.
   priceChange2().
priceChange21():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAz",CP="CPb"),
stdio::write("Do not change the price of product "
), stdio::write(Product_name), stdIO::nl,    fail.
   priceChange21().
priceChange3():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAu",CP="CPI"),
       stdio::write("Change the price using the meth
od costs plus for " ,Product_name), stdIO::nl, fail.
   priceChange3().
priceChange31():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAu",CP="CPn"),
 stdio::write("Change the price using the method c
osts plus for " ,Product_name), stdIO::nl, fail.
   priceChange31().
priceChange4():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAu",CP="CPp"),
stdio::write("The price must be equal to the compe
tition for " ,Product_name), stdIO::nl, fail.
   priceChange4().
priceChange41():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAu",CP="CPk"),
stdio::write("The price must be equal to the compe
tition for " ,Product_name), stdIO::nl, fail.
   priceChange41().
 priceChange5():-
ex-
PriceInd(Product_name, Elasticity,  TS, IPA, CP),
      (Elastici-
ty="Em", TS="TSv", IPA="IPAu",CP="CPb"),
stdio::write("Lower the price using the method co
sts plus for " ,Product_name), stdIO::nl, fail.
   priceChange5().
```

Total knowledge necessary to develop *exPrice* expert system knowledge base is presented after all 135 rows of the previous table are recorded. The task for *exPrice* expert system is to answer the following question: Which method of pricing should be applied for a certain product? User consults *exPrice* using entry menu to load data from *Sanja.txt* file. That file is another relation table in a form of fact set, and each row relates to one product. Table is defined using the following predicate in Visual Prolog /**9**/:

```
predicates
addIndica-
torsMS:(string Product_name, string Elasticity,stri
ng TS,  string  IPA, string CP) procedure.
```

It is sufficient to choose menu Price change after data are downloaded:

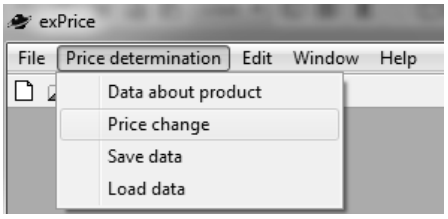

Figure 5: User interface of exPrice expert system

After that user consults *exPrice* expert system and it suggests him/her pricing method for each product. The following Figure 6 presents the result of consultation:

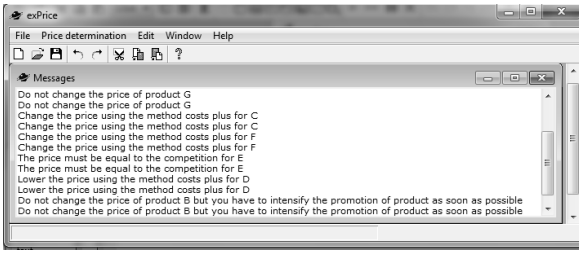

Figure 6: Consultation with exPrice expert system

Recommendations given by *exPrice* expert system for each product price from *Sanja.txt* are shown in the Figure 6. So, for example *exPrice* does not recommend price change for product B, but it suggests intensifying promotional activities for it. Product E must have same price as competition while product D should lower the price using Cost plus method. Years-long experience of marketing expert in product or service pricing is translated into clauses of *exPrice* expert system.

CONCLUSION

Pricing products and services is a complex marketing task that has strong influence on total organisational performances and economic results of doing business. Pricing mistakes directly influence customers' behaviour, weakening market position, and endanger company growth and development in a long term. Therefore it is necessary to analyse all important pricing determinants and marketing expert, who integrates theoretical cognitions with years-long experience, can conceive them on the certain market.

Expert systems are computer programmes that can "keep" decades' long experience of marketing experts in form of knowledge base. *exPrice* expert system contains production rules and facts recorded in Visual Prolog and helps users that do not have necessary knowledge, years-long experiences, and theoretical cognitions to "determine" product or service price level in an appropriate way.

Prototype of *exPrice* expert system for product or service pricing is presented and developed in this paper. Conclusions about pricing method are made based on the four following variables: elasticity of demand in relation to price change, market structure on the side of product or service supply, intensity of business activity, and set business goals. *exPrice* knowledge base shows flexibility and modularity because new variants and new production rules can be added without modifying existing ones. *exPrice* expert system is presented as a system open for new extensions, and users get intelligent assistant that helps them in selection of pricing method.

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