

## DESIGNING A DECISION-MAKER EXPERT SYSTEM FOR EVALUATING THE BUSINESS POTENTIAL OF PROPOSED PLOTS TO MEHR IMAM REZA FUND

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### ABSTRACT

Evaluation of business potential of plots is a technical and expert task, and a plot's justifiability could not be judged from every aspect without studying each aspect and without considering the hidden costs and cost of missed opportunities. The application of tools by which the novel approach of plots potential evaluation could become functional is expert systems. The expert systems present powerful and flexible tools in order to solve various problems which are solved through traditional and common methods.

The main objective of this research is to identify the potential evaluation criteria of the plots proposed to Mehr Imam Reza Fund. In fact, this research pursues the question that what is the best method to evaluate the proposed plots to Mehr Imam Reza Fund. This paper is important from this perspective that by identifying and ranking these criteria in Mehr Imam Reza Fund, determining proper policies in order to improve the evaluation of entrepreneurship plots could be guided. Therefore, it was tried to create a proper basic framework, based on previous research, to carry out this experiment. In this research, the previous studies were utilized in order to study the entrepreneurship activities. Then, the research framework was extracted based on information obtained from case study and carried out interviews. Finally, analyzing the obtained results, it was signified that the potential evaluation criteria of proposed plots are divided into three categories, legal, technical, and market. 5 indices in legal criterion, 14 indices in technical criterion, and 9 indices in market criterion were extracted from interviews and literature reviews. During the research's quantitative stage, the statistical population was consisted of the managers and employees of the Mehr Imam Reza Fund, and the sampling was performed through the simple random sampling method. The questionnaires were the data collection tool for this stage and the research's validity in this stage was tested by experts in the qualitative stage. The approved questionnaires' reliability was 0.92 based on the Cronbach's alpha. In this stage, for data analysis, the averages test, and for approving and ranking the criteria, the Friedman test was performed.

**KEYWORDS:** Decision-maker expert System ,Evaluating the Potential of the Proposed Plots, Mehr Imam Reza Fund.

## INTRODUCTION

Every society is facing two inconsistent and unbalanced factors in achieving its goals. On one hand, the desires that it wants to achieve them, which are infinite and never enough, i.e. while they are innumerable, even when reaching to the today's desires, it is not satisfied and presents new desires. On the other hand, there are the resources that should be utilized to reach those desires, which are naturally limited. Establishing a balance between these two inconsistent factors is one of the major tasks of planners in each society and even every individual of the societies (Appelbavm et al., 2002).

Although the first step in establishing such balances is to prioritize the desires, which achieving them is every society's wish, mere prioritizing would not suffice. Also, evaluating the potential of commercial plots for prioritized activities is another important task for society's planners, since there might be more than one approach to each goal and, naturally there could be different indices for the approaches' justifiability, and considering only one of these categories could have negative consequences (Chen et al., 1997).

One of the common mistakes in this field is that in most plots and projects, the technical justifications are considered to be identical to the plot's justifiability and whenever a plot is technically justified, it is implemented. Also, sometimes people and groups only compare plots' implementation costs with each other in order to indicate that a plot or project is justified or to show that their proposed approaches are better, and if the plot's implementation costs are lower than other plots, then it is considered economically justified and implemented. While the commercial potential evaluation, with economic evaluation as one of its parts, is a technical and professional task and a plot's justifiability could not be judged from every aspect without studying each aspect and without considering the hidden costs and cost of missed opportunities. (Griffiths, Beynon, 2005).

On the other hand, one of the today's novel approaches, which is most considered by management systems, is the knowledge management approach. This approach, according to the current process of the organizations changing towards learner systems and using information technology (IT) and artificial intelligence (AI) techniques, has received a significant importance. The high emphasis of management area in knowledge management system has also formed on this basis, but what is missed in terms of management analyses is the application of tools by which this novel approach could become functional. One, or may be the most important, of these tools is the expert systems. The expert systems present powerful and flexible tools in order to solve various problems which are solved through traditional and common methods. These systems are the most successful fields of AI in commercial aspect. Increasing accessibility, reducing costs, and gathering multiple-expertise are some of the main advantages of using expert systems (Darlington, 2000).

Finally, it is necessary that most of the organizations responsible for supporting business and employment, such as Mehr Imam Reza Fund, in Iran, as an under-development country, to choose and implement different industrial plots accurately and delicately. Not considering each of these delicacies might bring special costs and losses, which in turn could influence the economical development process. Therefore, accurately recognizing and evaluating the costs and

advantages of implementing each plot, and specially being aware of its exogenous consequences, such as environmental pollutions, are of significant importance, which in doing so the expert systems are quite efficient. Thus, the main question of the present paper is that how to design a decision-maker expert system to evaluate the potential of proposed commercial plots to Mehr Imam Reza Fund?

## LITERATURE REVIEW

## RESEARCH THEORETICAL FRAMEWORK

In this research in order to achieve a proper theoretical framework, the Ravi (2003) model was employed, which consists of 3 main subjects, technical, legal, and market, and largely covers the effective factors on this field. This framework was chosen due to its generality in employing all the desired variables of the previous researches.

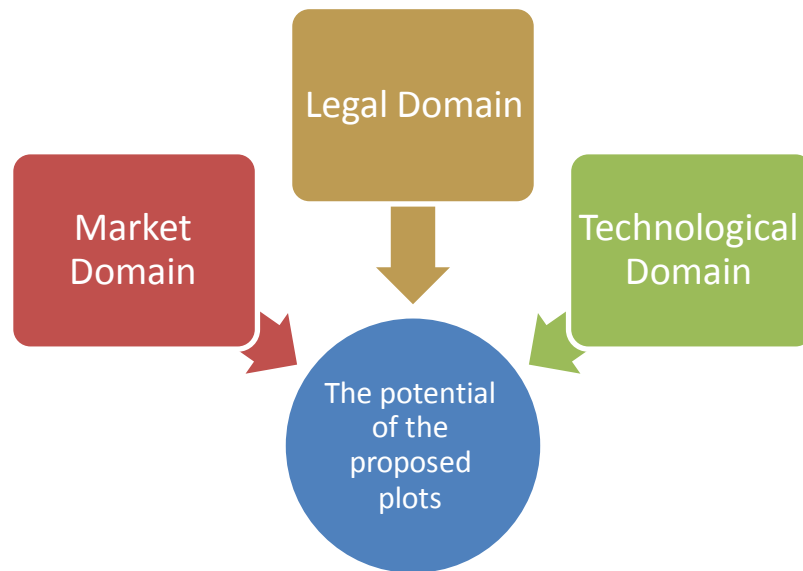


FIGURE 1 – THE RESEARCH'S CONCEPTUAL MODEL

## RESEARCH REVIEW

Using the researches results or commercializing the technologies derived from research and development is the main issue of each country, and therefore most countries have attempted to provide mechanisms for commercializing these technologies. One on these mechanisms is financial support for innovations which have achieved economical and commercial efficiency (Wong and Monaco, 1995).

In some countries, such as France and Germany, these supports amount for up to 50 to 80 percent of the innovation's costs. Another mechanism is to provide proxies or centers which are responsible for commercializing the research and development products. Almost most countries either have such centers or have outsourced this responsibility to institutions and companies related to this issue. Nowadays, in most countries, the technologies transfer traditional centers

have evolved into centers which reflect the market opportunities and demands to research and development centers and vice versa; that is, they have turned into supply and demand centers for produced technologies inside the country (Zhiwei et al., 2005).

The potential of commercializing is defined as the commercialization probability of a new technology. In order to become commercialized and available in market, each new technology needs to move along a complicated, variable, and unpredictable path. Therefore, the precondition to successfully define the commercial approach of a new technology is to determine its commercial potential (Cheng et al., 1994).

Fernandez and Gomez (2007) investigated factors such as market size, market development, and market share. Kathleen (2003) stated that the risk-taking investors of the newborn markets prefer markets which are not large today but a favorable future is forecasted for them. Kamp suggested that most of entrepreneurship supporting organizations prefer to invest in new companies which intend to enter large markets. Logar et al. (2001), carrying out a study in US, found that market development and size are two main factors in decision-making of the organizations which evaluate the entrepreneurship plots. Martyniuk et al. (2003) performed another study US and suggested criteria other than market size and development, in market domain, such as market accessibility, need for market, few obstacles for entering, and price-insensitive markets.

The organizations evaluating plots potential try to obtain information, such as patent status, distinction and uniqueness, simplicity, and the product's entering time to market, during their multi-perspective examinations (Martyniuk, 2001; Popadiuk and C. W. Choo, 2006; Pries and Guild, 2003; Seigel et al., 2001). They want to know how the product's patent is and how hard is it for other companies to copy that product. The third factor in this domain is the entering time to market that is the time taken for a product to enter a market (Walker and Hodgkinson, 2003).

The organizations evaluating the potential of plots consider various factors such as history, the entrepreneur progress path, and the management group combination/arrangement in this domain. (Kao and Kallber, 1994). On management group combination/arrangement, Huang et al. (2004) mentioned that the group must be complete and have knowledge about important domains like finance, sale, marketing, and operations.

The financial factors which affect investment are the initial and post-deployment amount of required asset, valuation, and exit (Hsieh, 2005; Dourra and Siy, 2001). Chifos and Jain (1997) stated that if the risk-taking investors could not observe an exit approach during an acceptable time (3 to 5 years) in received plots, they would not investigate. Azzone and Rangone (2001) also found that the exit approach is as important as both factors of investment appropriateness and break-even point.

Finally, the organizations evaluating the potential of entrepreneurship plots often prefer to invest in a specific domain or industry (Huang et al., 2004). Walker and Hodgkinson (2003) suggested that the reason for such expertise is that the risk-taking companies could not obtain and maintain a deep knowledge from every industrial domain. The other factor considered by evaluating organizations during their all-aspects investigation, is the location of investment-receiving companies. Also, some authors mention that the location importance has not reduced and still is

considered as an important factor is decision-making of the companies evaluating the potential of plots.

## **RESEARCH METHODOLOGY**

The present research is considered a practical research. The data is gathered through combinational research method. In the qualitative stage we will examine the qualitative data collection in the case study. In the quantitative stage the survey method is used.

## **STATISTICAL POPULATION**

In the qualitative stage of the research, the statistical population is experts in the technology commercialization. Expert in this research is defined an individual familiar with technology commercialization, has cooperation in, at least, three technology commercialization outputs and has teaching experience in the field of academic entrepreneurship and technology transfer. The statistical population in the quantitative stage includes managers and staff of Mehre Imam Reza fund.

## **SAMPLING METHOD**

In the qualitative method the sampling was limited. It was done to the saturation level; a list of experts was prepared by the researchers, then the respondents were called and they were informed about the meeting subject. Then, meetings were held at their offices and interviews were done. Finally 18 individuals cooperated in the research and the data for research was gathered.

In the quantitative stage, since the staffs and managers were limited, the statistical sample was calculated and gathered according the sample volume estimation in unlimited population. A hundred and fifty individuals responded. Measurement error ( $\epsilon$ ) in the formula which shows the precision of the estimation is 8% and certainty level 0.95%. To maximize the sample volume, p and q values were assumed 0.5. This way, the questionnaires were distributed among the respondents and finally 137 questionnaires were gathered (return rate, 91%).

## **SAMPLING METHOD**

In the qualitative method, sampling was targeted (purposeful); the list for all experts was prepared and the respondents were told about meeting time and subject. The sampling method in the quantitative stage was random.

## **DATA COLLECTION METHODS**

In the qualitative stage, authentic journals and library studies were used for data collection. Also, half-structured interviews with experts about competency factors affecting the commercialization of information technology were done to collect data. As multiple validation resources, documents related to measurement of commercialization proposal were reviewed. In the quantitative stage, data was gathered with the help of interviews done with the managers and

staff of Mehr Imam Reza Fund. Measurement scale in the questionnaire was the five scale Lickert questionnaire ranging from "Completely disagree" to "Completely agree".

## VALIDITY AND RELIABILITY MEASUREMENT METHOD

In the qualitative stage, we tried to increase the measurement validity through documentation of the data and methods during the plan and usage of quality standard methods. And the reliability was reached through consultation with experts in the area. In the quantitative stage, to measure the validity of the measurement instruments the Cronbach's alpha method was used. As it could be seen in the Table 1, Cronbach's alpha value for market factors is 0.96 (very good), for rules and legal factors 0.80 (very good) and technical factors 0.84 (very good). The validity of the research was tested using the experts in the qualitative stage.

**TABLE 1: THE CRONBACH VALUES OF THE QUESTIONNAIRE**

Scale	No. of questions	Cronbach's alpha coefficient
Market factors	44	0.96
Rules and legal factors	15	0.86
Technical factors	20	0.84

Data analysis in the qualitative stage was done through content analysis and in the quantitative stage it was done using the statistical mean tests and Friedman ranking.

## DATA ANALYSIS (RESEARCH FINDINGS)

In this section, a comprehensive table, just the same as Table 3, is obtained for each interview. This table shows the above mentioned factors affecting the commercialization performance of academic researches.

**TABLE 2 –THE POTENTIAL EVALUATION FACTORS OF PROPOSED PLOTS  
(SUBJECTS, ASPECTS, RANK, AND THEIR AVERAGES) (RESEARCH-BUILT)**

Subject	Aspects	Average	Rank
Technical Domain	Patent Status	3.317	7
	Product’s distinction and uniqueness	3.167	8
	The necessary technical capability of the potential clients to employ new technologies	4.4	2
	Simplicity	3.625	5
	Acceptability of the manufacturing method from the end user perspective (manufacturing method significance)	4.714	1
	Market reception	4	3
	Consistency with current technologies	3	9
	Entering time to market	3.5	4
	Exporting capability	3.417	6
Market Domain	The current and post-deployment expected investment	3.625	6
	Time of reaching to the break-even point	3.714	5
	Expected profit rate	4	2
	Investment return period	3	10
	Liquidity exit method	3.5	7
	The technology application costs	3.125	8
	Market size	4.4	1
	Market development	3.025	9
	Accessibility to new markets	3.875	3
Market need	2.68	13	

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	Ease of entering to a market	2.78	12
	End user's feeling and opinion which was pointed out in the feasibility plan	3.865	4
	Product's advantages from end user's viewpoint which was pointed out in the feasibility plan	2	14
	Product's defects from end user's viewpoint which was pointed out in the feasibility plan	2.9	11
Legal Domain	Considering the environmental considerations	4.2	3
	The geographical location of the company	5	1
	Supporting the proposed plots for regions	4.333	2
	Compliance with current national laws	4	4
	Compliance with laws being established	3.714	5

## RESULTS AND DISCUSSIONS

The industrial and economical development of each society is indebted to its scientific and organized researches. Identifying the market need, implementing researches and studies on technological development, and finally commercializing it are the inevitable stages of creating a new technology. The supervising organizations provide an investment opportunity in better and more progressive technologies for society through choosing, financially supporting and commercializing the entrepreneurship plots. One of the approaches proposed to eliminate the commercializing issue of proposed plots is the primary evaluation of their commercialization potential before its implementation, but what is of utmost importance is how to assess the commercial potential of research achievements. Each new technology needs to move along a complicated, variable, and unpredictable path. Therefore, the necessary precondition to successfully define the commercial approach of a new technology is to determine its commercial potential. In this research, in order to evaluate the commercial potential, three criteria, legal, technical, and market, were investigated, and consequently, all criteria derived from interviews were approved by experts, ranked, and prioritized.

## SUGGESTIONS

According to the presented analyses and contents in previous sections, the following suggestions could be proposed to managers, policy-makers, and future researchers:



## SUGGESTIONS FOR FUTURE RESEARCHES

Using other weighing methods like experts poll by means of Delphi, Shannon's Entropy, LINAMP, etc. methods and comparing the results of this paper and/or using multiple-weighing method simultaneously and combining the obtained results

Using the network structure in case of uncertainty or fuzzy condition

Using this structure for selecting plots and presenting their obtained results

Identifying plots evaluation algorithms and using these criteria in these algorithms

Identifying the effective institutes on plots evaluation and extracting a system from the organization's perspective

Suggestions for managers and policy-makers:

It is suggested that managers and policy-makers of the Fund should consider criteria, priorities, and rankings in their executive instructions so that they could obtain more acceptable results from their investments.

It is suggested that the Fund should address its research subjects to universities so that it would be able to obtain more scientific basis in this domain and therefore could establish a more effective relationship with academic area.

## REFERENCES

- Appelbavm, S. H., and Heather Ayer and B. T. Shapiro, (2002) Career Management in Information technology:a Case study, Career Development International, PP.142-158.
- Cheng. Y, Fortier. P, and Normandin. Y, 1994; "A System Integrating Connectionist and Symbolic Approaches for Spoken Language Understanding", In Proceedings of the International Conference on Spoken Language Processing, Yokohama, pp. 1511-1514.
- Chifos, C. Jain, R. K.; "A Comprehensive Methodology for Evaluating the Commercial Potential of Technologies: The strategic Technology evaluation Method"; International Journal of Industrial Engineering; 1997; Vol. 4; No. 4; pp. 220-235.
- Chen, S., Hwang, C. L.; Fuzzy Multiple Attribute Decision Making: Methods and Applications; Springer Verlag; 1992.
- Dourra, H., Siy, P.,;" Stock evaluation using fuzzy logic"; IJTAF; 2001; Vol.4, No.4; pp.585-602.
- Darlington(2000), The essence of expert system, Prentice-Hall, England.

- Fernandez.A, Gomez.S, 2007; "Portfolio Selection Using Neural Networks", Computer & Operation Research, Vol 34, pp. 1177-1191.
- Griffiths. B, Beynon. M.J, 2005; " Expositing Stages of VPRS Analysis in an Expert System: Application with Bank Credit Ratings", Expert Systems with Applications, Vol 29, PP 879–888.
- Hsieh. N.C, 2005; "Hybrid Mining Approach in the Design of Credit Scoring models", Expert Systems with Applications, 28(4),pp. 655–665.
- Huang. Z, Chen. H, Hsu. C. J, Chen. W. H, Wu.S, 2004; "Credit Rating Analysis With Support Vector Machines and Neural Networks: a Market Comparative Study", Decision Support Systems, 37(4), pp 543–558.
- Kathleen,A.R.; Bringing New Technology to Market; Prentice Hall, New Jersey, 2003.
- Kao.D.L, Kallberg.J, 1994; " Strategies for Measuring and Managing Risk Consideration in Loan Portfolios", Journal of Commercial Bank Lending, Vol 76, Issue 5, pp. 18-27.
- Logar, C.M., Ponzurick, T.G., Spears, J.R., France, K.R.,; (2001) "Commercializing Intellectual Property: A University-industry Alliance for New Product Development"; Journal of Product & Brand Management;, Vol. 10; No. 4.
- Martyniuk,A.O., Jain,R.K., Stone,H.J(2003), "Critical Success Factors and Barriers to Technology Transfer: Case Studies and Implications"; International Journal of Technology Transfer and Commercialisation;; Vol.2; No.3; pp. 306-327.
- Martyniuk,A.O.; "Market Opportunity Analyses and Technology Transfer".International Journal of Technology Transfer and Commercialisation; 2002; Vol. 1, No.4; pp. 385-404
- Popadiuk and C.W. Choo, Innovation and knowledge creation: How are these concepts related?. International Journal of Information Management, 26 4 (2006), pp. 302–312.
- Pries, F., Guild, P.,(2003) "Analyzing the Commercialization of University Research: A Proposed categorization Scheme"; University Research Commercialization Categories; University of Waterloo; Waterloo; Ontario; Canada.
- Ravi K. Jain,R.K, Martyniuk,A.O., Harris,M.M., Niemann,R.E.; Woldmann,K.; "Evaluating the Commercial Potential of Emerging Technologies"; Int. J.Technology Transfer and Commercialisation; 2003; Vol; pp. 32-50
- Siegel,R.A, Hansén,S.O., Pellas,L.H.; "Accelerating the Commercialization of Technology: Commercialization through Co-operation", Industrial Management & Data Systems; 1995; Vol. 95; No. 1; pp. 18-26.

- Walker.E and Hodgkinson.L, 2003; "An Expert System for Credit Evaluation and Explanation", CCSC,: Midwestern Conference.
- Weick, C.W., Sim Kaur, S., Abel Fernandez, A., "Application of A Method for Selecting and Evaluating Environmental Technologies with Commercial Potential; International Journal of Technology Transfer and Commercialisation; 2003; Vol. 2, No.4; pp. 399-428.
- Zhiwei Xu,; Khoshgoftaar, T.M.; Allen, Edward B.; (2005) "Application of Fuzzy Expert Systems in Assessing Operational Risk of Software"; Information & Software Technology;; Vol.45, Issue 7, pp. 373-388.
- Wong, B. K. and Monaco, J. A. (1995) A bibliography of expert System applications for business (1984-1992), European Journal of Operations Research, 58(2): 418-32.