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Codification Technology strategy in Iran Power Industry

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Abstract

Due to the rapid advancement of technology in the world and a major influence in the development and progress of human civilization, other communities are in the need of new technologies , which takes on an intellectual framework design. To achieve the required technology company that aims to satisfy customers and to develop and maintain power grid stability is one of the core strategic objectives to address. This Article describes the characteristics of the electricity industry in Power Distribution Company of Eastern Azerbaijan, the role of technology in improving performance and future development needs of the industry and technology strategy in this industry And, we analyzed technology strategy Power Distribution Company of East Azarbaijan the Heks model and Mazlof.

Keywords: technology, strategy, technology assessment, technology strategy

Introduction

The development of technologies in the industry is among the most significant industry development strategies in every industrial society. Without any concrete technology strategy, planning and implementation of optimal development programs in every industry are excluded (Electricity Technology Roadmap: Summary and Synthesis, 1999).

Since the technology is on center of designed systems , to meet customers' needs or customer satisfaction, it should be considered. Throughout the history, technology has had profound effects on community development and progress of human civilization. One of the enormous changes that enabled humans to make fundamental changes in the course of his life, is producing electrical energy from water, heat energy and nuclear energy. Electrical power has caused expansion of industrial, agriculture and the service activities. So that today the global network of communications, business and financial communications conduct themselves in a moment by electrical energy. Thus, the power industry has become one of the cornerstones of economic development, and especially the development of production and consumption of it, is one of the country's growth rates. The role of industry in the activities of other sectors of the economy is effective as it is considered as mother of all industries in all countries. Considering the strategic importance of the industry and its significant role in the economic development, recently expanded efforts by the public and private sectors in different countries in relation to increase productivity and has been improved the performance of this industry. A significant portion of the steps has taken to improve the level of technology and is concerned the use of new technologies in this industry. Another part of the restructuring actions are associated with specific technical skills, while their demand is particularly to the application of new management theory and methods only based on an acceptable level of technology generation, transmission, distribution and operational management of the power grid, is applyable. In other words, improving the productivity and efficiency of the electric power industry, with an emphasis on the restructuring of the industry depends on the level of technology and technological skills. The role of technology in development is basic and pivotal. The future can not be predicted for any country or organization without appropriate technology development and presence in a competitive market. The development of appropriate technology requires strategy and planing (Arasti and Besharati Rad, 2002).

Technology strategy aims to achieve technological advantage in a competitive market place in order to achive an appropriate place in market. Having considered the application of technology strategy, finds meaning development and maintenance of knowledge and skills in the national arena. Technology strategy

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should be developed in the general framework of business goals and strategies. For example, the goal of any business strategy, is to identify thet what kind of work should be activated and how the organization can have best opportunity for itself and to obtain the desired position what technologies should be used. Considering that power distribution company of East Azerbaijan is a private company affiliated with government and its main task is to provide sustainable supply of energy and customer satisfaction, beside organization duties, technology development strategies in the long term, should be considered. With an overview of the current status of technology in the power industry of IRAN and other activities associated with the research and development of technology transfer in this industry are taking place, the need for an overall strategy of technology development is clearl obvious. This paper will examine issues affecting it and achive remarkable results.

Literature Review

In technology management literature, different definitions and interpretations of the technology have been given that reflect different points of view in this field.

So, to learn more about the concepts and definitions relevant to the study of technology strategy and literature approaches, we consider more about the matter.

Technology strategy is the operational strategy, and we can interpret it as the organization's overall strategy in the field of technology.

So, superior competitive position method or methods of achieving long-term goals of the organization through the development of technologies are to be determined.

Porter considers the strategy formulation process consists of the following steps:

- Identifying technologies and the technology value chain
- Identifying other related technologies in other industries
- Define the possible directions of technological change
- Identification of critical technologies for sustainable competitiveness and industry structure.
- Assessment of the firm's capabilities and potential investment required to develop the technology
- Define Technology strategy to strengthen the competitive position of firms Codification

As seen, after identification of technologies in the firm and related technologies and also possible direction changes in technology in other industries, the next step is to identify the critical technologies for sustainable competitiveness and industry.

Indeed, identifying current technologies and future technological options are important because it affects current competition in the current industry.

In the next step, the firm's resources are evaluated to be cleared that what combination of investments in key technologies are, first possible and second how they reinforce the firm's competitive position.

Therefore, based on Porter's theory technology strategy is defined to support the overall strategy (positioning school).

Furthermore, the model is proposed a step by step process for developing a technology strategy, so that every input step is multyplyed by output step (rational models) (Arasty and Pakniyat, 2010).

General steps that should be taken in formulating technology strategy, includes the following steps:

A - Evaluate the ability and technology level in the areas of major organizations

B - Identify all important and related technologies in the field of organization

C - Determine the strengths and weaknesses of the organization

D - Identifying opportunities and threats facing the organization

E - Define technology development strategy, according to the organization s strategy. It should be noted that to define strategy is not a single process and should not be studied once.

Due to changes in technology and market depending on its speed, technology development strategy should be continuously reviewed corrected and supplemented (Tabatabaei, 2004).

Due to the increasing of technologies, technology strategy in Power Distribution Company of Eastern Azerbaijan is one of the basic and infrastructure needs and thus to achieve the goals set for the development of operational plans, are listed bellow:

1- Exploit the technology upgrade plans

2- Repair and maintenance technology upgrade plans

3- Plans to standardize, improve quality and productivity improvement

4- Planning and development of power grid facilities

5- Research Conceptual model

According to the characteristics of the firm, Maslow and Heks conceptual model is intended as a research model.

Figure 1 shows the conceptual model used in this study.

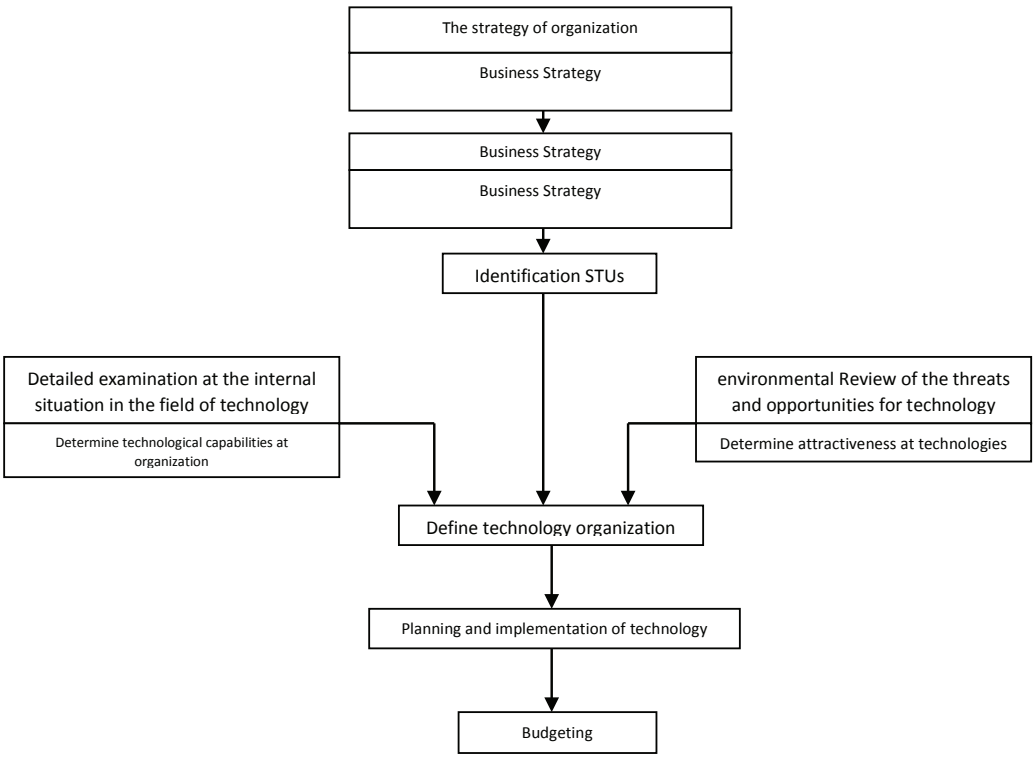

Figure 1: Model for Mazlof and Heks technology strategy

Research Questions

1) How much the current level of technological capabilities of power Distribution Company of East Azerbaijan is?

2) What is the strategic Units of Electricity Distribution Company East Azerbaijan?

3) How much is the Power Distribution Company of East Azerbaijan attractiveness of the technology?

4) What are the appropriate technology strategies for electric power Distribution Company of East Azerbaijan ?

Materials and Methods

This research is applied and methodology of research is descriptive – survey.

Statistical population

An important part of East Azerbaijan Electricity Distribution Company duty is to provide electricity to consumers. Electricity is the most infrastructure energy for households and industry. In order to use appropriately and minimize energy losses, EAEDC needs updated technologies of world.

Top and middle managers and experts with advanced degrees and bachelor's super graduate with more than 5 years working experience were regarded as the population of research.

Figure 2 shows the work experience and figure 3 shows population educational statistics.

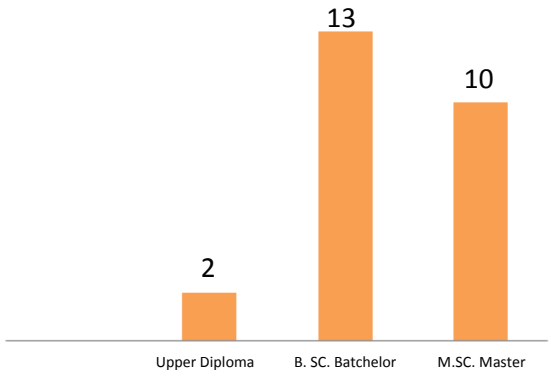

Figure 2: The population of working experience

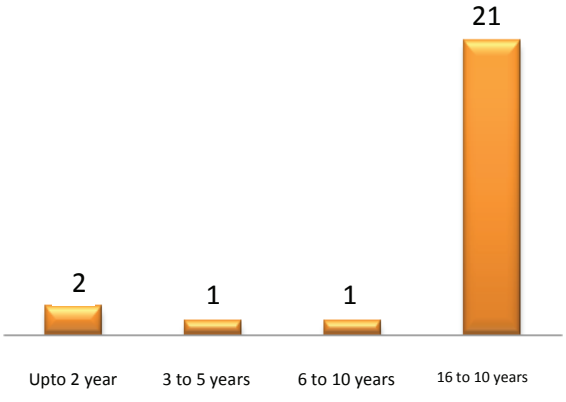

Figure 3: Education

Research steps

1 - Assessing the technological capabilities of firms.

To assess levels of technological capability of the firm technological need evaluate model is used. According to this model, each firm's technological level is 9 (Figure 4).

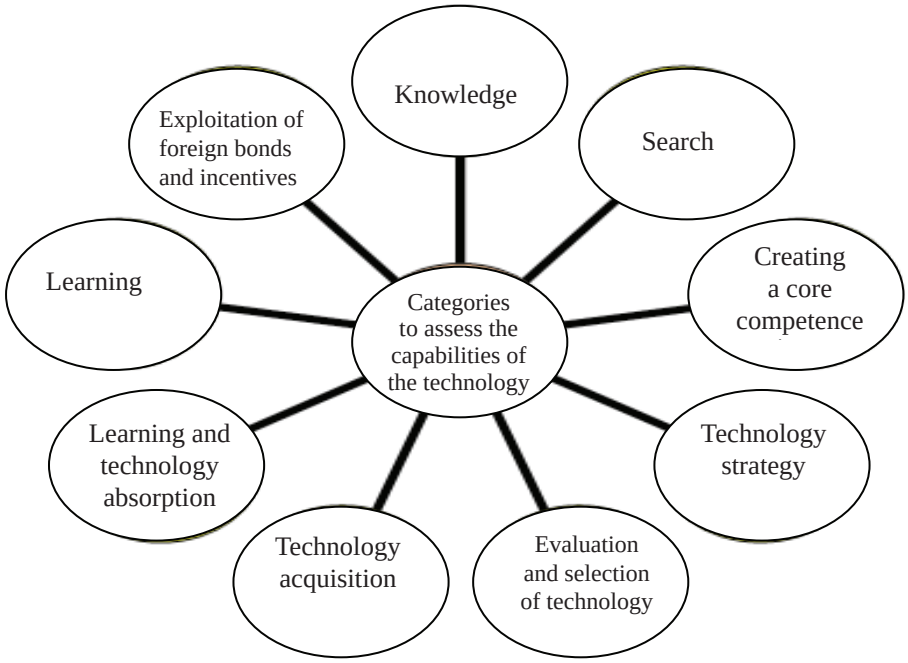

Figure 4: Classification of technological capabilities based on technological needs.

Results

The results of the first research question

To achieve the first research question, we attempted to design a questionnaire containing 24 questions based on main 3D indexes and 9 sub-indexes and questionnaire has been sent to 40 experts, and 25 questionnaires were returned.

According to the results of the questionnaire, Table 1 shows the average percentage of technological capability of the firm. Also figure 5 shows participation and empowerment and the gap relative to the optimum.

As can be seen in Figure 5, high Scores of technological capability are Tactical Technology Capabilities and low scores sre complementary technological capabilities.

Table 1: Average percentage of capacity levels of technological capabilities

Rating Average	Number of index	Dimension
10/68%	2	Knowledge
70/64%	2	Search
90/68%	2	Core competences
63%	3	Technology strategy
70/64%	2	Evaluation and Selection
30/57%	2	Technology acquisition
60%	2	Employing absorbing
03/65%	3	Learning
67/65%	6	External links
91/68%	24	Average of Total Score

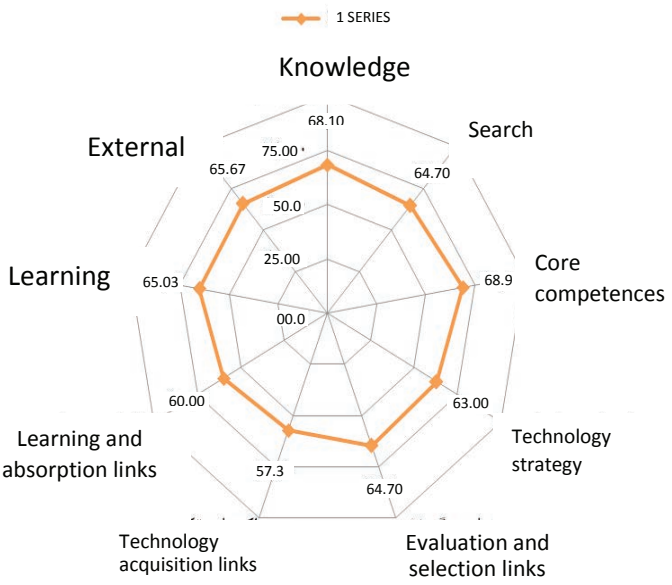

Figure 5: Radar graph of the technological capabilities in various sizes

The results of the second research question

Depending on the type of operations, to define strategic technological units in the study subjects on the basis of the processes in the value chain in manufacturing are considered. At the macro level, the power distribution projects process is shown in Table 2.

Table 2: The value chain in power distribution company of East Azerbaijan

Acceptance →	Visit the site and design →	Cost Declaration →	Network construction and energy supply →	Installation of measurement equipment →	After Sales Service →	Assessment Operation

Identifying technology strategy, the focus is generally based on key processes of firm and in order to

determine key processes every forming processes in manufacturing value chain with an index that reflects the goals and strategies of the company shoul be assessed.

To this end, each process is evaluated directly with the company's strategic objectives. To perform this assessment in terms of management and expert interviews were used.

The strategic objectives of the company, with a view to formulating corporate strategy and interaction with company management and relevant experts were determined. Areas of opportunity and threat technologies in order to create competitive advantages and develop new areas of business were considered in determining these goals. Objectives are:

1 - profitability

2 - Access to new technology

3 - Creating Customer Satisfaction

4 - Develop a sustainable network

Process associated with the company's goals is measured through the matrix, Then the results were determined by their importance to the work which has been used by board and other company experts.

Table 3. shows the analysis results of the assessment processes is related objectives.

As the results from Table 3, the process of network construction and energy security is more important than other processes and is a key process. Therefore, determining strategic units focused on this process.

Determine the attractiveness of the company's technology

High attractive technologies are those which increase competitive position of firms remarkably and supports it. Only a deep understanding of quality, of technologies used in firm can create strategic thinking. Upon which a firm needs to develop long-term and gain competitive advantage can be accurately identified.

Table 3: Scoring the power distribution company of East Azerbaijan towards firm goals

	Sustainable Network Development	Satisfac-tion	Access to Technol-ogy	Profit	Goals	
The total score	20%	40%	25%	15%	Goals Weight / Processes	Row
14.75	20	15	10	15	Acceptance	1
13.25	20	10	15	10	Visit the site and design	2
17	15	20	15	15	Cost Declaration	3
18.75	20	15	20	25	Network construction and energy providing	4
17	15	15	20	20	Installation of measurement equipment	5
10.25	5	15	10	5	After Sales Service	6
9	5	10	10	10	Performance Evaluation	7
	100	100	100	100	Sum	

The results of the third research question

To determine the attractiveness of technologies paired comparison method and analetical-hierarchical AHP method is used.

In this method, by evaluating technologies in paired comparison method to any of modified indicators. The effect of each of the technologies in achieving the strategic goals are set and after performing the necessary calculations with the Expert software choice, the technology attractiveness has been specified.

To obtain attractiveness matrix, AHP questionnaire designed to obtain and managers were surveyed. And, based on that, the impact of technology in each of indicators was questioned two by two.

Figure 6 shows the hierarchical tree of AHP in power distribution company in eastern Azerbaijan. Data collected from the questionnaires were analyzed by Expert choice software and attractiveness level of technology were determind.

It should be noted that the calculated values obtained from evaluation ranged from zero to one hundred which is shown in figure 6.

The results of the AHP in order of preference on the attractiveness are shown in figure 6, and sensitivy analysis on performance are shown in figure 7.

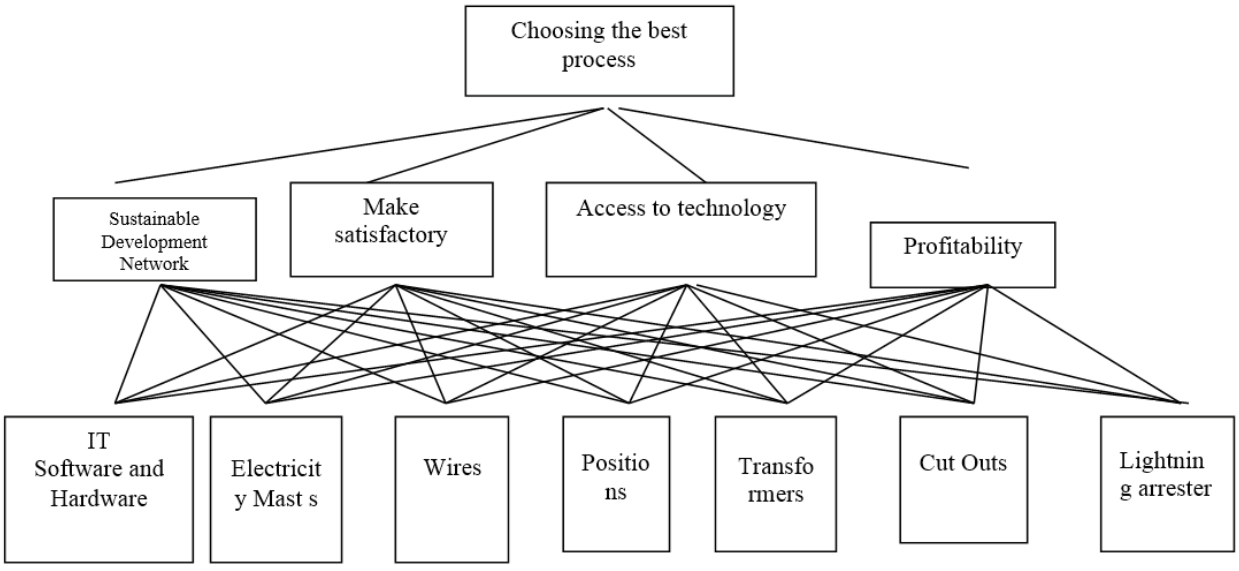

Figure 6: The tree hierarchical AHP to determine the attractiveness of technologies priority

Figure 7: The final prioritization of technological options

The remarkable thing is that the incompatibility factor of questionnaire provided by power Distribution Company of East Azarbaijan is acceptable.(Acceptance area ratio is smaller than 0.0).

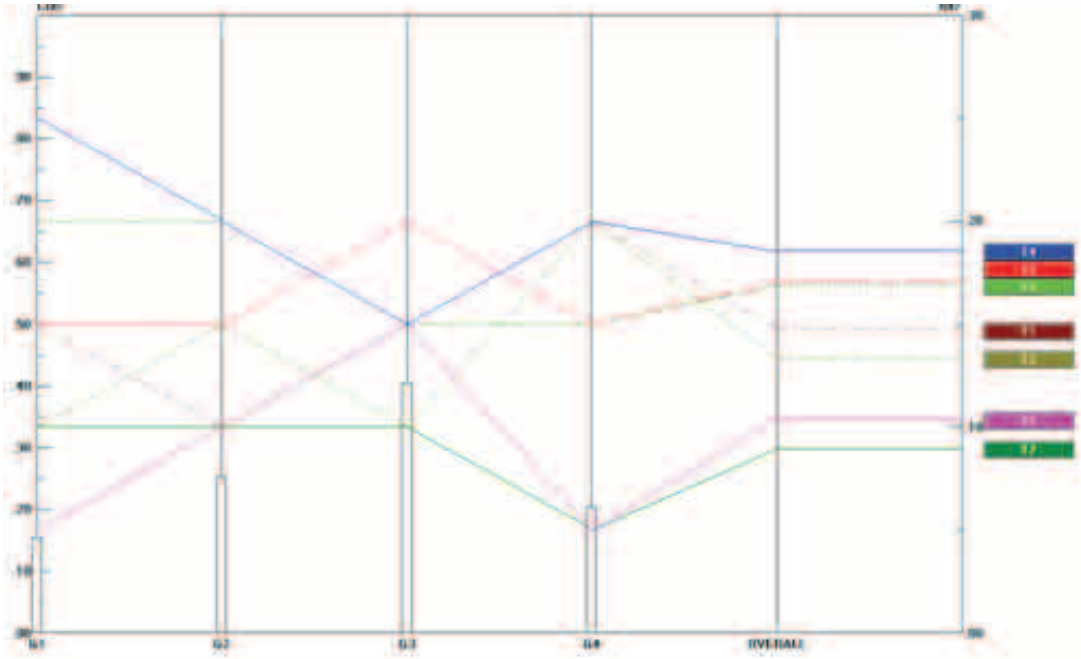

Figure 8: Sensitivity Analysis Based on the superior performance of technologies attractiveness.

Table 4: List of technologies Attractiveness

Attractiveness number (percent)	English Name	Name of technology	Priority
100	Tk4	Transformers	1
91.93	Tk3	Wire	2
90.86	Tk5	Poles	3
79.03	Tk1	Insulators	4
72.04	Tk2	Cut out	5
55.91	Tk6	Lightning Arrester	6
48.38	Tk7	IT	7

Determination of suitable technology strategies for the company

To determine the technological capabilities of the company's strategic technological needs, the evaluative technological model was used. Technological capabilities of the technology assessment is divided into 9 categories from technology assessments needs, which are:

- Ability to convert (Score: numbers 0 to 10)
- Ability to sell (Score: numbers 11 to 30)
- Empowering business (Score: numbers 31 to 50)
- Ability to change (Score: numbers 51 to 67)
- Design Capabilities (Score: numbers 68 to 85)
- Ability to create (Score: numbers 86 to 100)

Indicators were presented to managers and experts as shown in table 5 and based on its results the technologycal capabilities' rate on each strategical unit was determined.

Table 5:Level of technological capabilities of power distribution company of East Azerbaijan strategic units

Total percent capacity	The ability to create 100--86	The ability to design 85-68	Ability to change 67--51	Ability to earn 50 --31	Ability to sell30--11	Ability convert 10—0	Name of technology
335	98	82	65	50	30	10	Transformers
332	95	80	67	50	30	10	wires
320	95	80	65	45	25	10	poles
317	92	82	65	45	25	8	Insulators
315	95	80	60	45	25	10	Cut out
298	92	76	55	45	20	10	lightining
286	88	70	60	45	15	8	IT

With a panel of experts and managers, and table 5 feedback form on technologies capabilities are provided, and after collecting and suumarizing data, results are shown in table 6 and figure 9.

According to Table 6 and 9, attractiveness capabilities matrix were obtained as figure 10.

Table 6: Power Distribution Company of East Azarbaijan empowerment in technologies

Rank	Name of technology	Capabilities
1	Transformers	100
2	Wires	99.10
3	Poles	95.52
4	Insulators	94.63
5	Cut out	94.03
6	Lightining arrester	88.95
7	IT	85.37

Figure 10. were obtained according to the overall Attractiveness.

According to Table 7 and capabilities - Attractiveness matrix, Locating technology capabilities-attractiveness matrix for firm's technologies, are formed as figure 11.

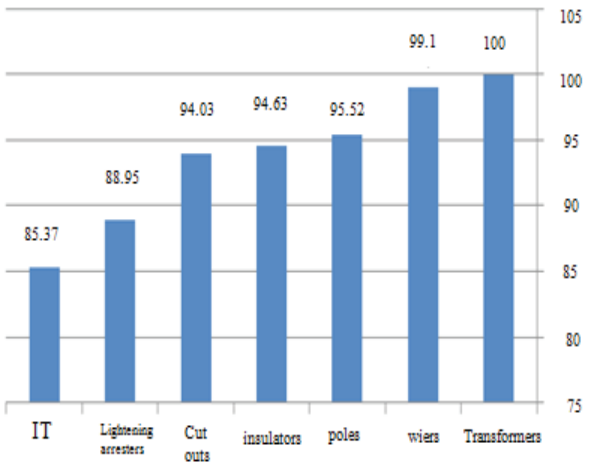

Figure 9: The company's technology capabilities

Capabilities	Attractiveness
Zone B (high capacity - low Attractiveness) IT	Zone A (high capacity - High-Attractiveness) - Transformers and surge arrester - Poles - Cut in August - Headquarters
The area (lower capacity - low Attractiveness)	Zone C (lower capacities - Attractiveness High)

Figure 10: The general capabilities - Attractiveness of Technology matrix

Table 7: Summary results of the ranking of Attractiveness and technology capabilities

Capabilities Number	Attractiveness Number	Name of technology
100	100	Transformers
99.10	91.93	wires
95.52	90.86	poles
94.63	79.03	Insulators
94.03	72.04	Cut out
88.95	55.91	Lightining arrester
85.37	48.38	IT

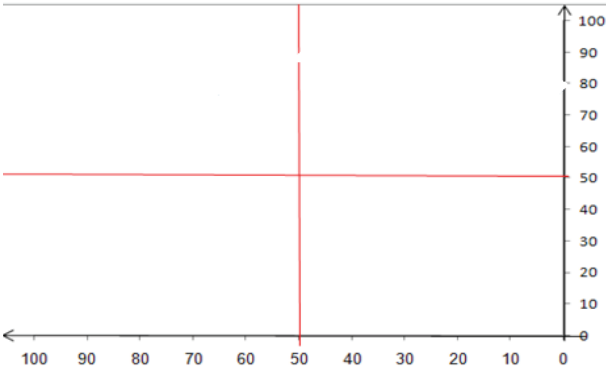

Figure 11: Locating technologies of Power Distribution Company of East Azerbaijan in the capabilities - Attractiveness matrix

The results of the fourth research question

Appropriate technology strategies of East Azerbaijan Power Distribution for each region of matrix are as follows: "A" district technologies transformers, cut outs, insulators, lightening arrestors, wires and poles are located in "A" region. According to the company s technological capability and interest rate of each technology the following actions are recommended:

- Maintain and improve the current situation.
- Efforts to develop and use more of these technologies.
- Trying to access new technologies used in the power industry in the world,
- Reducing energy loss and power supply and make sure of customer satisfaction

Having considered that the required hardware technology in this area, these devices in the company are competitive advantages, so if possible, we should transfer these technologies to other firms.

Finally, district Technology B: IT technology is located in this area. Due to high strength and low Attractiveness on these technologies, the following measures are recommended:

1. Enhance the Attractiveness promoting technology
2. updating IT technology due to rapid changes which occures in this technology around the world.

Conclusions

Our results suggest that East Azerbaijan Electricity Distribution Company in terms of IT is in high capability and Attractiveness is low and this is a sign of weakness in the IT technology.

It seems that the basic measures should be done to enhance the attractiveness of this technology in order to solve the problem.

Given that transformers, insulators, wire, Cut outs, lightning arresters and power poles are in high strength and Attractiveness. Therefore, the capacity of the current situation, prices, technologies are constantly changing.

In addition to maintaining the current status, trying to achieve new technologies in order to update various customer services is essential.

Technology plays an essential role in the function and future development of the various sectors of the country. The use of superior technologies in the power industry for the industry's strategic importance in economic development and the influence of developments in high technology is a national necessity. High volume technology in various fields of this industry, rapid technological developments, particularly in the field of IT require electricity industry in Iran.

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