

Defining Technology Strategy in State Water and Sewage Engineering Company: A Case Study in Water and Sewage Company, Hamedan Province

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Abstract

Successful strategy definition depends on adapting the sources available to the organization and the opportunities in the environment. A great step is to know the internal weak and strong points, opportunities and outer threats in defining the strategy. Technology presents new dimensions to business view in a way that the organizations benefiting from a defined business try to put into operation a defined technology strategy in their organization, too; such strategy helps the organizations to select appropriate technology and enjoy it effectively. So, this study is to define the most appropriate technology strategy for water and sewage company, Hamedan. This article tries to define technology strategy for water and sewage company, Hamedan by Hex and Mosely model.

Keywords: Technology, strategy, technology assessment, technology strategy

Introduction

Nowadays, technology plays key role in the agencies' competition so it should be managed based on a strategic view. The first and the most important step in managing technology strategy are to define a program indicating agency investment priorities in technology sector for a long time. The technology strategy definition replies to following the main questions:

- 1 – Agency competitive advantage is based on which technologies?
- 2 – Are all these technologies available?
- 3 – What are the appropriate mechanisms to access such technologies?
- 4 – How is it possible to have the most benefits from agency's technologic assets and potentials? (Engineer Amir Hooshang Karimian, 2005).

Now in such atmosphere it seems Water and Sewage Company, Hamedan should define its technology strategy based on its goals and conditions so it becomes more powerful and more competitive by virtue of having such superiority. In fact, when technology strategy is defined the company has a device to achieve its goals and views (Zandi, 2002).

Review of literature

The technology strategy and Technology view is relatively new as a competitive lever in its studies fields, but surely technology is usually inseparable part of each business and is often effective factor enabling and promoting agencies' operation and utility. In actual world not only move is not possible without goal and strategy, but also it is necessary to gain enough data from environment to achieve goal and appropriate strategy. Central potentials of each organization are converted to the products as one or several final outcome(s); such products relate the organization to the clients. The administration should consider the organizational central potential as a special advantage and define the business strategy focused on these potentials (Malekzadeh, 2005).

Technology plays the essential and central role in development; without technology development and presence in competitive markets no good future is predictable for any country or company. It is necessary to define technology strategy and programs for technology development. The goal of defining technology strategy is to gain technologic advantage and superiority to be the

basis for having an appropriate position in competitive markets. As an important state industry Water Organization should take into consideration technology strategy definition as the title of all its activities in order to gain appropriate development and competitive advantage in the regional countries. In actual world. Policy and making and taking decisions regarding all issues including technology are based on scientific attitudes. Technology scientific direction means to use scientific devices in programming, organizing, guiding and directing activities related to selecting, acquiring, applying, utilizing and developing technologies. Thus, one of the main duties of the governments in the state level and great organizations in the level of the sector/industry is to define the goals and strategies to develop technology and allocate properly the sources to realize the programs; at the same time, it should be noted that technology strategy is realized as an operational strategy in line with macro-strategies of industry so the first step before defining technology development strategy is to define the goals and macro-strategies of industry so having defined and executed the technology strategy the main goals of the industry are achieved (Research and Technology in State Innovation System, 2000).

Conceptual Model of the study

By virtue of the features of the agency (case study), Hex and Mosely paradigm was taken into consideration as the study model.

Research questions

1. How much is the technologic abilities of the Hamedan Water and Sewage Company?
2. What are the strategic units of Hamedan Water and Sewage Company?
3. How much interesting are the technologies of Hamedan Water and Sewage Company?
4. What are the technology strategies appropriate to Hamedan Water and Sewage Company?

Methodology

The method of the study is applied and descriptive and related data were collected by field method and questionnaires.

Procedure

The Technologic Need Assessment Model was used in order to assess the technologic potentials of the company; by virtue of this model each agency has nine technologic levels. Grouping the agency's technologic ability dimensions based on Technologic Need Assessment Model (Khamseh, 2012).

Results

A questionnaire including 24 questions based on nine dimension model was issued to answer the question; the questionnaire was sent to 38 specialists and 30 ones were completed and returned.

By virtue of the results from the first questionnaire the Table 1 shows the point average and the percent of company technologic dimensions potential. Also, Figure 3 shows the company potential and the gap between actual and optimal situations.

Technologic ability based on Technologic Need Assessment Model

By virtue of the Technologic Need Assessment Model the agencies are grouped in four types shown in Table 2 (Khamseh, 2012).

Considering the total points of Hamedan Water and Sewage Company's technologic ability, which is 363.17, it is grouped as beginner of type 'D'; in other words, it is a creative agency.

Table 1: Mean and percentage of dimensional ability

Rating Average Capabilities	Index	Dimensions
٪83/42	2	Knowledge
٪81/83	2	Search
٪80/92	2	Core competences
٪79/06	3	Technology strategy
٪78/25	2	Evaluation and Selection
٪76/92	2	Technology acquisition
٪74/42	2	Employing absorbing
٪78/78	3	Learning
٪65/14	6	External links
٪77/64	24	Of total

Table 2: The form defining the findings from assessing technologic needs (Engineer Amir Hooshang Karimian, 2005)

General differential findings	Total points	Ability level	Grouping agencies	Detailed grouping	
Your company in important sectors, utility acquisition, technology strategy development is weak & insufficient and needs an immediate & vast improvement program	1 – 120	1	Passive (A)	1 - 40	Beginner
				41 - 80	Intermediate
				81 - 120	Advanced
Your company has often developed weakly in fields of strategy, study, acquisition and capacity creation for technology & needs many potentials for recovery	121- 240	2	Reactive (B)	121- 160	Beginner
				161- 200	Intermediate
				201- 240	Advanced
Your company is relatively powerful in internal potentials & has a strategic attitude to technology, but is backward in most of state technologic fields	241- 360	3	Strategic (C)	241- 280	Beginner
				281- 320	Intermediate
				321- 360	Advanced
Your company is a set of technologic potentials developed completely & may identify the state technologic border. In some fields it has creative and advanced attitude & benefits from technology in gaining competitive advantages	361- 480	4	Creative(D)	361- 400	Beginner
				401- 440	Intermediate
				441- 480	Advanced

Defining company's technologic, strategic units

Considering the type of the company activity the related units were taken into consideration based on the processes effective in the construction value chain in order to define the technologic,

strategic units in this study. In a vast level, the projects' process of Hamedan Water and Sewage Company is shown in Figure 1.



Distribution network → Production → Pumping → Delivery to client → Services after sale

Figure 1: Value chain in Hamedan Water and Sewage Company:

Usually the focus is on the agency's key processes in defining technology strategy; that is why it is necessary to assess the processes forming construction value chain with indexes indicating the company's goals and strategies to define key processes. Also, that is why each process has been assessed directly in line with the company's strategic goals.

The company's strategic goals were defined in line with the company's strategies and with interaction with the company directors and related specialists. The fields for opportunities and threats to the technologies were taken into consideration in order to create competitive advantages and new fields for business. The goals include profit, new technology acquisition, quality increase, and costs decrease.

Table 3: Scoring the processes of Hamedan Water and Sewage Company in proportion to the company's goals

	Cut Costs	Increase the quality	Access to Technology	Profit	Purposes	
The total score	40%	15%	15%	30%	Weight Purposes Processes	Row
24.5	20	40	10	30	Production	1
25.5	30	30	20	20	Distribution	2
24.5	20	10	40	30	Service of the subscriber	3
14.75	20	10	15	10	Customer Satisfaction	4
10.75	10	10	15	10	Manage	5
	100	100	100	100	Plural	

As you see in Table 3, the distribution process is more important than others and is the key process; that is why the strategic units of technology are defined by focus on this process.

Technology is interesting and if it is used, it increases considerably the competitive situation of the agency and supports it. Only if the technologic, qualitative features to be used in the agency are understood deeply, it is possible to create strategic thought to be the basis to know well the agency's needs for long – term development and gain competitive advantage.

The findings from third research question

The couple comparison method and AHP hierarchy analysis model were used to define the technology attractiveness rate; when the technologies were assessed by the couple comparison method each index rate and the effect of each technology to achieve the goals were defined and having done necessary calculations by Expert Choice software the attractiveness of the technologies were defined.

AHP questionnaire was distributed and the managers and specialist were asked to state their views in order to gain attractiveness matrix and then the effect of each technology was questioned two by two in defined indexes in AHP hierarchy tree in Hamedan Water and Sewage Company.

The data collected by questionnaires were analyzed by Expert Choice software and the attractiveness of the technologies was defined. It should be noted that the gained numbers were scored from zero to 100 for each technology whose data are shown in Figure 2.

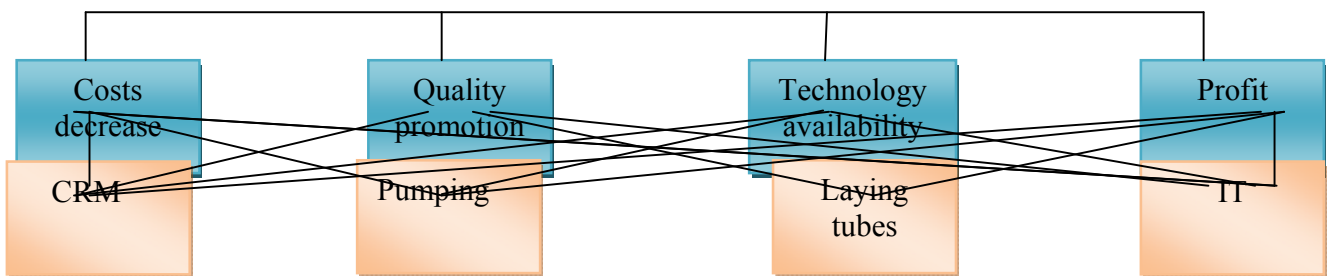


Figure 2: Prioritizing technologic choices

It is interesting that the questionnaire inconsistency coefficient was 0.09 which is acceptable (The coefficient is acceptable, if it is less than 0.10).

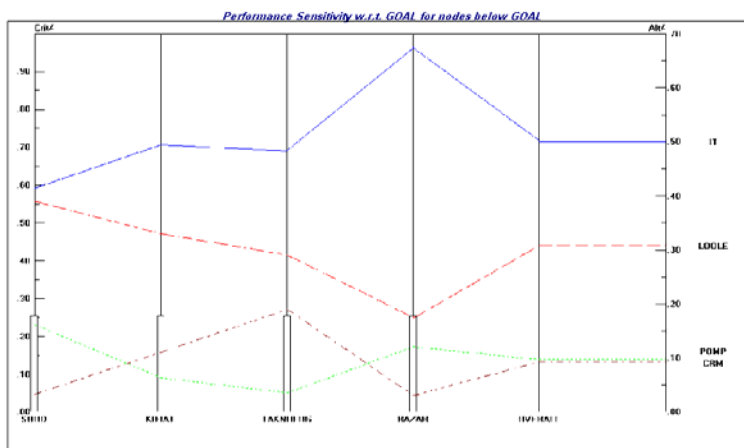


Figure 3: Analyzing the sensibility based on the efficiency in relation to the priorities of technologies' attractiveness

Table 4: The list of technologies' attractiveness

Attractiveness number(percent)	English name	Name of the technology	Priority
100	IT	IT	1
60	Pipe	Tubing	2
7	Pomp	pumping	3
39	CRM	Customer Satisfaction	4

Defining the strategies of the technology appropriate to the company

The Technologic Need Assessment Model was used in order to define the potential rates of key process technologies; by virtue of the Technologic Need Assessment Model the technologic potentials are grouped in six following types:

- 1 - Conversion potential (Score: 0 – 10).
- 2 - Sale potential (Score: 11 – 30).
- 3 - Acquisition potential (Score: 31 – 50).
- 4 - Change potential (Score: 51 – 67).
- 5 - Design potential (Score: 68 – 85).
- 6 - Creation potential (Score: 86 – 100).

The indexes presented in the questionnaire were arranged by Table 5 and delivered to the company managers and specialists and by virtue of its results the company's technologic ability was defined in each strategic unit of the technology.

Table 5: The rate of technologic ability of the strategic units in Hamedan Water and Sewage Company

Whole position Capability percent	The ability to create 86-100	The ability to design 68-85	The ability to change 51-67	Ability to earn 31- 50	The ability to Sale 11-30	Convert 10-0	Technology
295	86	80	60	31	30	8	IT
311	95	80	65	50	11	10	Tubingrun
282	90	80	55	45	11	1	Pumping
274	95	68	55	45	11	0	CRM

The views about technologies' ability were registered by the panel composed of specialists and managers and Table 5 and having collected the views and related findings averages are shown in Table 6 and Figure 6.

Table 6: The Hamedan Water and Sewage Company's ability in technologies

Capability percent	Technology	Rank
94.85	IT	1
100	Tubing	2
90.67	pumping	3
88.1	CRM	4

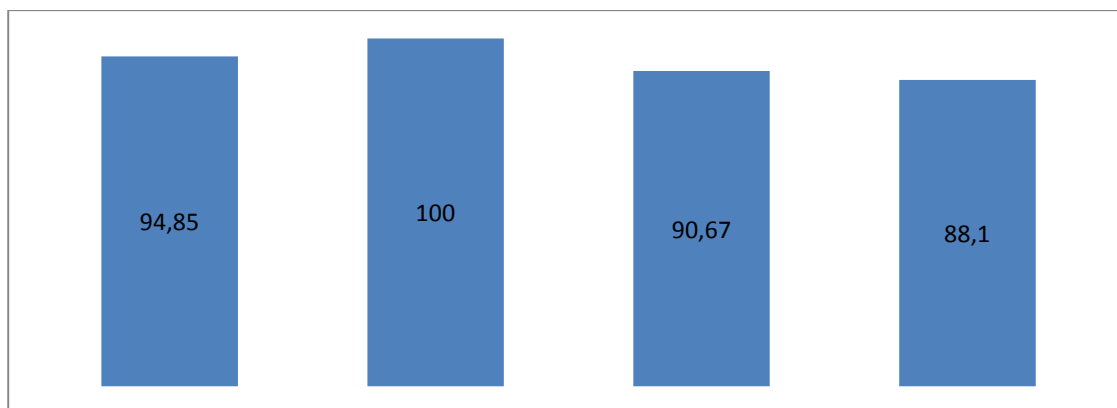


Figure 4: Company's technologies ability

By virtue of Table 6 the ability – high attractiveness matrix was gained by virtue of Table 7.

Area A (High attractiveness)	Area B (High attractiveness)
Laying tubes →	Pumping →
IT →	CRM →
Area C (Low attractiveness)	Area D (Low attractiveness)
(High ability-high)	(High ability – low)
(Low ability-high)	(Low ability-low)

Figure 5: General technologies attractiveness – ability matrix

By virtue of Table 7 and attractiveness – ability matrix the company's attractiveness – ability technologies matrix is shown in Figure 5.

Table 7: The summary of the results from ranking attractiveness and ability of the technologies

Technology title	Attractiveness score	Ability score
IT	100	94.85
Laying tubes	60	100
Pumping	7	90.67
CRM	39	88.10

As far as question 4 is concerned, by virtue of Figure 6, the strategies of the technology appropriate to Hamedan Water and Sewage Company are as follows for each area of the matrix:

Area A technologies: IT and laying tubes technologies are in area A. By virtue of the company's ability in these technologies and attractiveness of each one, it is recommended:

- To keep actual situation in software systems
- To continue education process
- To continue to use powerful private sector to execute projects

By virtue of the special software necessary for the technologies in this area, the presence of these apparatus is considered as a competitive advantage. So if possible, the technique science of these technologies should be transferred to other companies.

Area B technologies: CRM and pumping technologies are in this area. By virtue of high ability and low attractiveness of these technologies, it is recommended:

- To promote pumping capacity
- More interaction with clients

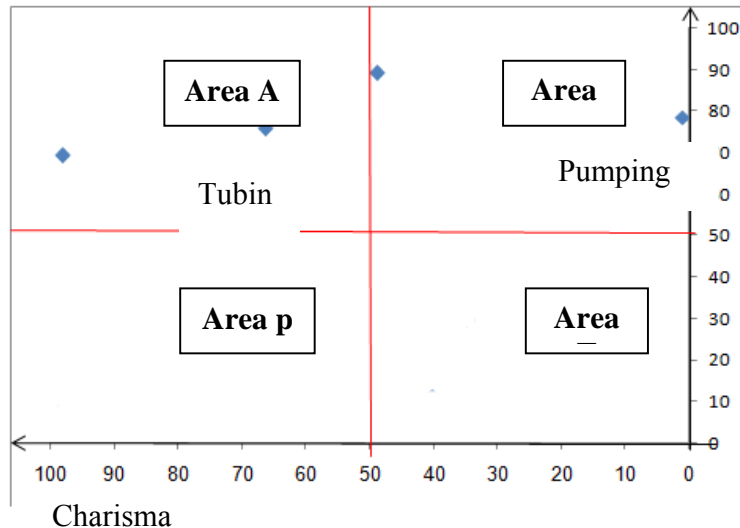


Figure 6: Location of Hamedan Water and Sewage Company's technologies in attractiveness – ability matrixes

Conclusion

If a strategy is defined and executed properly, considerable results are gained; such results are fruitful, if they are with necessary inputs such as enough credits and necessary materials and equipments available to specialist researchers.

The managers are able to direct better although it is difficult to present a comprehensive list of indices and signs to warn to understand the situation of Hamedan Water and Sewage Company and necessity of fundamental changes. However, if they should bear in mind the following items:

- Accelerating technologic changes
- Change in the area
- Change in competition
- Keeping stable competitive advantage
- Competition intense
- Rapid change in consummation pattern

The following factors should also taken into account to make Hamedan Water and Sewage Company:

1 – To understand the importance of defining technology strategy, gain new competitive advantages, up-to-date its data, use IT technology and lay tubes according to the Attractiveness and Ability Table List in order to survive.

2 – To pump and CRM properly among different units according to attractiveness and ability ranking in the company and prevent parallel activities there and define technology strategy definition completely to increase the yield to have very valuable effect on operation and success of the company in long – term.

Therefore, the results from the study attitude have very valuable effect on operation and success of the company.

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