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Research Article

THE ANALYSIS OF TECHNOLOGICAL CAPABILITIES IN SUGARCANE INDUSTRIES: CASE STUDY OF SALMAN FARSI CULTIVATION AND INDUSTRY COMPANY

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ABSTRACT
Profitability forms the basis of performance of enterprises. In order for them to boost their profit, maintain or improve their position in the marketplace, enterprises compete with each other. Of all the factors contributing to achieving better competitive position, technological developments play the most prominent role. As a factor transforming outputs into inputs, technology is composed of various components, and its improvement requires harmonious development of all these parts. Improving technological level of an enterprise is possible through transfer of technology from other enterprises with higher technology level or its internal development. Using needs assessment model, current study tries to analyze Salman Farsi Cultivation and Industry Company's level of technological capabilities. The model assesses the company's level of capabilities through 9 dimensions, in each of which it determines position of the company. Finally, the study introduces some suggestions for filling the existing gap.

Keywords*: Technology, Technology Capabilities, Capabilities*

INTRODUCTION
Having brought about significant changes in human life, Technology is one the key social actors. It is necessary to conduct studies aiming at better understanding of the consequences of technology development in society with an emphasis on effects, which are not normally predictable. This is why technology assessment studies are carried out. (Karimi, 2011).

Technology assessment opens the possibility that by having deeper understanding of the status quo, better future decisions will be made. Also, it can help management have a more comprehensive view of the technology status quo. Current topic assumes more significance for organization, in which technology plays more important roles. (Zamanian, 2013)

Technology is all the knowledge, products, means, methods and systems utilized for the introduction of a service or a product. It is the process, through which resources are transferred into products using knowledge, experience, information and tools. Technology assessment concept means maximizing positive effects and developing technologies compatible with surrounding environment. (Ja'afarnezhad et. al, 2006).

RESEARCH METHOD
In terms of goal, current study is practical and of a survey type. Statistical population is composed of middle and senior managers and also experts of Salman Farsi Co. who has MA degrees and more than 3 years of job experience. Considering conditions of the company, statistical population is specified at the research time.

Introduction of the Research Model
In current study, the use is made of Technological Needs Assessment model, according to which capabilities of the enterprise are evaluated using 9 dimensions of a questionnaire. Classification of technological capabilities dimensions in this model is as follow:

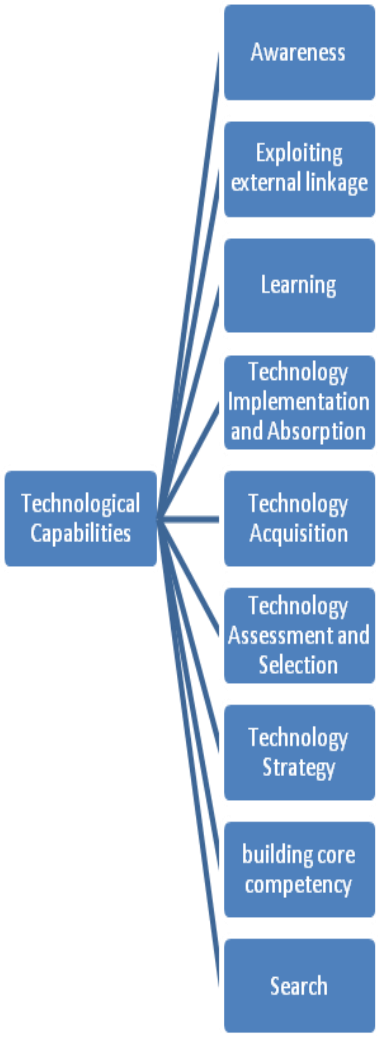


Figure 1: Research Conceptual Model. Technological Needs Assessment Model (Khamseh, 2012)

Classification of Dimensions of Technological Capabilities

Awareness: Ability and awareness of the need to improve the company

Search: Ability to recognize the relationship between opportunities, external threats and company products.

Building core competency: Ability of the company to build core competency (differentiating among competitors)

Technology assessment and selection: Abilities to assess and select a special technology

Technology acquisition: Ability to acquire and apply technology in an enterprise

Implementing and absorbing technology: Ability to implement and utilize technology

Learning: Learning from past experiences in order to apply them in new technology and products

Exploiting external linkage: Ability to establish connection with supply network and exploiting external linkages (Universities, Counseling institutes, etc.), state incentives

Table 1- The Form of Determining Technology Needs Assessment Results (Khamseh, 2010)

Results of the overall audit	Total Score	Level of Capability		Detailed Classification	
Your company is weak and ineffective in all important areas, acquisition of exploitation and development of technology strategy. It needs a general and urgent improvement plan	1-120	1	Passive (A)	1-40	Beginner
				41-80	Middle
				81-120	Leading
Your company is developed weakly in areas of strategy, research, technology acquisition and capacity building. It needs many capabilities for rebuilding these areas	121-240	2	Reactive (B)	121-160	Beginner
				161-200	Middle
				201-240	Leading
Your company is relatively good at internal capabilities, and has a strategic approach to technology. But it is lagging behind the national technology in most areas	241-360	3	Strategic (C)	241-280	Beginner
				281-320	Middle
				321-360	Leading
Your company has a collection of completely developed technological capabilities and it can identify the border of national technology. In some areas, it has a creative and leading approach and uses technology to achieve competitive advantages	361-480	4	Creative (D)	361-400	Beginner

After completing the questionnaire by experts, scores are summed and total score is compared with those in Table 1. Finally, results and comparison of this analysis show the enterprise level of capabilities.

RESEARCH GOALS AND QUESTIONS

Research Questions:

1- What is the level of each of Salman Farsi Cultivation and Industry Company's constituent indexes of technological capabilities?

2- What are the levels of the above mentioned company's technological capabilities?

3- How much is the existing gap at each dimension of Salman Farsi cultivation and industry company's technological capabilities, compared to optimal level?

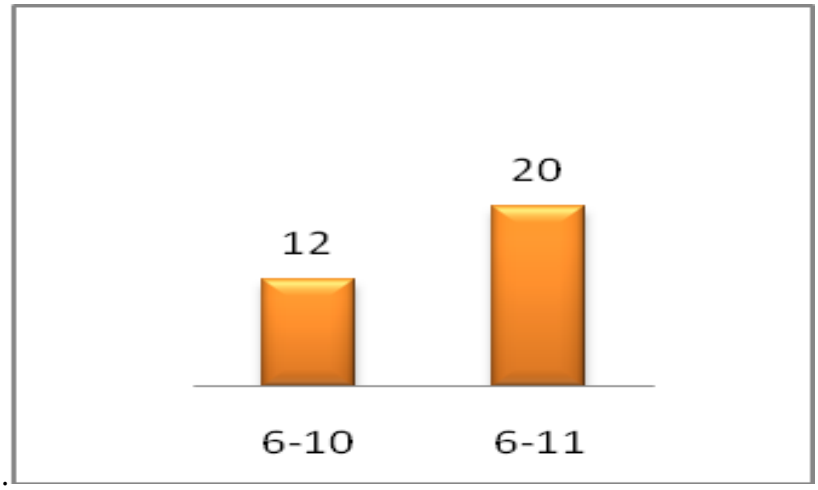
4- According to levels of technological capabilities, Salman Farsi Cultivation and Industry Company is in the classification of what type of organizations?

Introduction of Salman Farsi Cultivation and Industry Company

The company is one of the 7 units of sugarcane development companies. Its exploitation process started in 2004 and so far has had 10 periods of successful exploitation. In order to achieve dynamic profitability at the level of World Standards, Public Company is considered as the template unit. The company is 12000 hectares, and is located at the east of Karun, at 40 km south east of Ahvaz-Abadan Road. It also has the capability of producing 100000 ton raw sugar.

Statistical Population

Statistical population is composed of 32 senior experts having at least 6 years of job experience at technology units



Graph 1: Statistical Population Job Experience

CONCLUSION AND SUMMARIZATION OF RESEARCH RESULTS

Research first question: What is the level of each of Salman Farsi Cultivation and Industry Company's constituent indexes of technological capabilities?

According to the data collected through questionnaire, levels of the technological capabilities of the Salman Farsi Cultivation and Industry Company in each one of the indexes are specified according to Table 2.

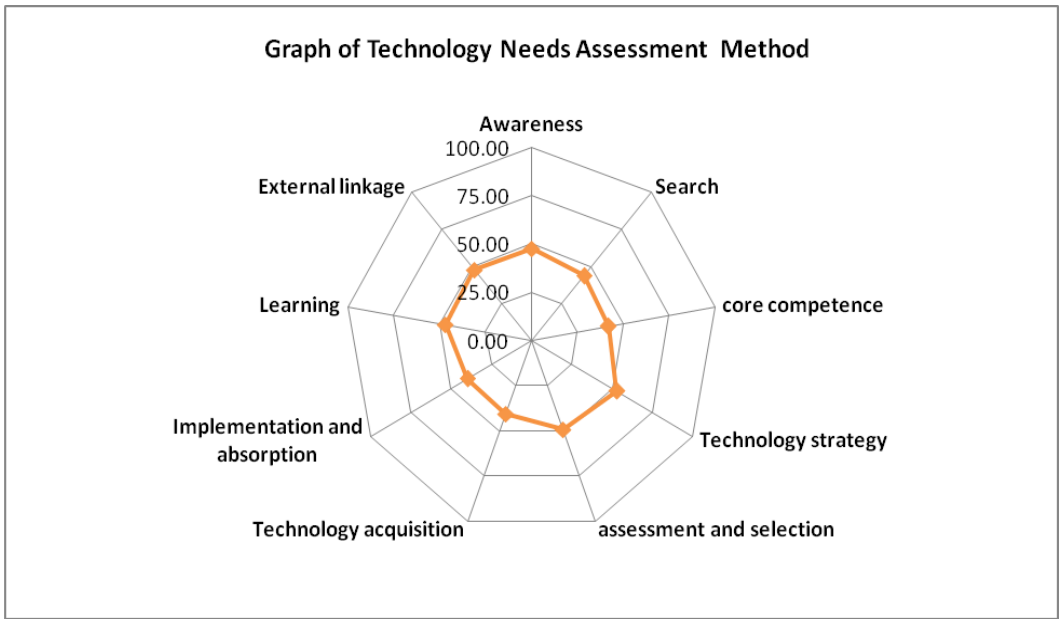
Table 2- Level of Technological Capabilities of Salman Farsi Cultivation and Industry Company In Each One Of The Indexes

Dimensions	Index	Gap (%)	Average (%)
Awareness	Our company is aware of its most important technology in business	54.37	45.63
	Technology plays a vital role in our company's business strategy	50.62	49.38
Search	Our company is prepared for the assessment of technology opportunities	61.87	38.13
	Our company is capable of assessing technology weaknesses with ease	50.62	49.38
Building core competency	Our company has special technology capabilities, which it can utilize	61.87	38.13
	Our company is aware of external and internal technology resources	54.37	45.63
Technology strategy	Our company's management team is accomplished at developing technology strategy for achieving commercial goals	51.25	48.75
	Our company is aware of its technology main priorities	45.62	54.38
	Our company has an appropriate outlook for technology development	45	55
Technology assessment and selection	Our company knows how to select its necessary technology	53.12	46.88
	Our company is aware of the best technology resources	48.75	51.25
Technology acquisition	Our company has an effective performance at acquiring technology from external resources	58.75	41.25
	Our company is in touch with external suppliers of important technology	60	40
Technology implementation and absorption	Our company's technological activities (engineering, research and development) are effectively organized	61.25	38.75
	Our company has a clear process of conducting technological projects	59.64	40.36
Learning	Our company has an appropriate system of technological projects assessment	59.64	40.36
	Our company take account of future projects	55	45
	We are capable of learning from one technology to other one	45	55
Exploiting external linkage	Our state's policies encourage us to invest in technology	58.12	41.88
	We use counseling enterprises/counselors in assessing technology	45	55
	We receive assistance from external individuals in order to develop technology	48.12	51.88
	We receive assistance from other companies in implementing technology strategy	46.87	53.13
	We receive assistance from universities in implementing technological key projects	59.64	40.36
	We cooperate with state research centers in implementing important projects	56.25	43.75

Research second question: What are the levels of the above mentioned company's technological capabilities?
Table 3 and Graph 2 show the comparison of the present level of technological capabilities for each one of the dimensions of technological capabilities and also total technological capabilities

Table 3- The Present Level of Technological Capabilities for Each One of the Dimensions of Technological Capabilities

Dimension	Average Score	Percentage of Capability
Awareness	9.50	47.50
Search	8.75	43.75
core competence	8.38	41.88
technology strategy	10.54	52.71
assessment and selection	9.81	49.06
Technology acquisition	8.13	40.63
Implementation and absorption	7.94	39.69
Learning	9.38	46.88
External linkage	9.54	47.71
Total capability average	9.11	45.53



Graph 2- The Present Level of Capability Technological Innovation in Each One of the Dimensions of Technological Capabilities

Research third question: How much is the present gap at each dimension of the technological capabilities of Salman Farsi cultivation and industry, compared to optimal level?
Table 4 illustrates the comparison of the present level of technological capabilities with the optimal level (100 %) for each one of the research dimensions and also total technological capabilities

Table 4- The Comparison of Gap Present in Dimensions of Technological Capabilities with Optimal Level

Dimensions	Average of Present Capabilities (%)	Average of Gap Degree (%)
Awareness	47.50	52.50
Search	43.75	56.25
Building core competency	41.88	58.13
Technology strategy	52.71	47.29
Technology acquisition	40.63	59.38
Technology implementation and absorption	39.69	60.31
Learning	46.88	53.13
Exploiting external linkage	47.71	52.29
Average of total technological capabilities	45.53	54.47

Research fourth question: According to levels of technological capabilities, Salman Farsi Cultivation and Industry Company, is in the classification of what type of organizations? According to data collected from questionnaire, the sum of questionnaire average score (0 to 20) is 222, showing the position of the company's technological capabilities. In other words, according to Table 1, Salman Farsi Cultivation and Industry Company, is at the Reactive zone and classification of Leading companies group. These enterprises are acutely aware of the necessity of technological capabilities improvement for achieving development goals. But due to limitation of their internal resources (not having key skills and individual skills) they only react to environmental threats and are not capable of taking advantage of events. Their external networks are poorly organized. They receive most of their technological practical knowledge from suppliers and watching behaviors of other enterprises. They may have a good linkage with enterprises having the same weak points and limitations in their technological capabilities.

ANALYSIS OF RESULTS:

According to results of Table 2, of technological capabilities dimensions, "implementation and absorption" dimension with score of 39.69 % and "technology strategy" dimension with score of 52.71 % are the weakest and strongest dimensions, respectively. On the other hand, according to Table 2, of the indexes, "readiness for assessment of technological opportunities" with score of 38.13 % and also "having special technological capabilities" index with score of 38.13 % has the lowest rating. "Having technology learning capability" index with score of 55 % and "using counselors for technology assessment" index with score of 55 % have the highest rating among all the indexes of technology capabilities. Considering Table 2, some of the projects of technology capabilities improvement are as follow:

1- Cooperating with university centers in implementing technological key projects

2- Encouraging graduate and PHD students into writing MA and PHD theses in areas related to the company

3- With regard to appropriations for research projects, the use can be made of state research centers in implementing important and large projects .

4- Holding developed courses for personnel in order to familiarize them with the company's technological improvement projects

5- Organization should have a developed and periodic assessment of its technological opportunities

6- Establishing effective connection with external suppliers of technology having better performance compared to their competitors.

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