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Strategies for Development of Energy Services Companies in Iran

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ABSTRACT

During the recent decades, energy services companies (ESCOs) have played an important role in energy management and building an appropriate tool for performing energy policies, especially in the case of existence of energy saving potentials in the energy system. These companies have been established in Iran as well and are running now due to the crucial need to energy efficiency improvement in the country. Since extending the markets and activities of these companies needs legislative infrastructures and governmental support, the matter is that how they should be reinforced with these facilities in Iran in order to be involved in energy optimization projects in the post-sanction situation. In this study, ESCO mechanism development strategies in interacting with its internal and external environment are represented. For this purpose, an analytical method based on the identification and evaluation of weaknesses and strengths as well as threats and opportunities of this mechanism is used due to advance the performance of this industry. The obtained results from the evaluation of ESCO mechanism development show the higher scores for external factors in comparison with the internal ones. The strengths, weaknesses, opportunities and threats analysis indicates that the appropriate strategy for developing ESCO mechanism in Iran is WO strategy. According to this strategy, the goal of ESCO industry is to reduce weaknesses and to increase opportunities.

Keywords: Strategy, Energy Services Company, Internal and External Factors, strengths, weaknesses, opportunities and threats Analysis

JEL Classification: Q40

1. INTRODUCTION

An energy services company (ESCO) manages and coordinates all phases of an energy project and provides a variety of services. It is a commercial or profitable business providing a broad range of energy solutions including designs and implementation of energy saving projects, retrofitting, energy conversion, energy infrastructure, outsourcing, power generation, energy supply and risk management.

The contracts of energy service companies are known as contracts based on energy effectiveness including a comprehensive set of services for energy efficiency improvement, utilization of renewable energies and performing distributed generation projects. In these contracts, the amount of economized value by a project is sufficient for investment cost of it. An energy service company can provide full services required to accomplish a project with energy effectiveness based contract (Hourì Jafari and Khodaei, 2013). The aforementioned services consist of:

- Energy audit
- Extending and performing engineering design of energy effectiveness projects

- Structure management
- Providing financial capital of energy conservation projects
- Commissioning
- Operation and maintenance
- Measurement, supervision and confirmation of energy economies achieved during a project.

In a contract based on energy effectiveness, ESCO joins the series of comprehensive actions in order to meet customers' demands. Performing an energy service project starts with energy audit for the demanded unit. Through energy audit, patterns of energy consumption in the unit are determined. Based on these patterns, energy economy strategies are obtained. By the time basic and detailed design of the project is done, a technical and economic feasibility study of the project is carried out. When financial capital of the project is provided via consulting financial institutions, commissioning steps of the project will start and the equipment will be installed. The important phase just after the commissioning is to measure project effectiveness and to determine the level of energy conservation. Through supervising energy consumption and confirming energy economies by an even-handed organization, necessary modifications, if needed, are carried out on the operating

system. At this step, it is possible to examine the guaranteed level of conservation. As a result, ESCO and the customer, both, take benefits from performed conservation based on their contract (Zamani, 2007).

ESCOs are able to add new measures to the project based on the customers' demands. These companies and their customers conservatively choose technologies for their projects as the project costs are paid by energy conservation and they are often guaranteed by financial warranties. Most of the contracts based on energy effectiveness receive their financial capital through long-term bonds or leases. However, some customers are able to handle a part or the whole project cost concerning their budget allocation programs. At first, since financial institutes did not comprehend fully these types of contracts and therefore were not willing to provide finance, ESCOs were responsible for both technical services and financial capitals. Moreover, some ESCOs work as distributors of efficient products as some usual distributors are not willing to invest in new efficient technologies.

In many projects, ESCOs give a guarantee to customers stating that project conservation is sufficient to pay all costs of a long-term project. Types of guarantees being offered differ as they are designed for special requirements of customers and are based on the relating laws of a particular country.

Governmental support is one of the most important factors of ESCO mechanism development in all countries, no matter what their situation of energy consumption or energy and economy management is. Although types of support depend on social and economic situations in each country, its necessity is undeniable. Governmental support can be divided in two major parts:

1. Passing laws for energy conservation and reducing energy intensity; this provides a huge potential market for conservation projects that can be done by ESCOs.
2. Preparing instructions and governmental circulars for large governmental energy consumer companies and municipalities, which make them reach financial agreement and accept energy audit and conservation projects with ESCOs.

A set of structural, persuasive, supportive, punitive and strict laws is needed to develop ESCO mechanism. These laws are different in each country according to its situations. In the public sector, circulars and legislative requirements of energy audit and continuous improvement of energy performance indices are the most important factors to perform energy conservation projects. Some countries have supported ESCO activity and increased energy conservation rate by passing persuasive laws and giving financial incentives or exempting energy service projects from tax.

Larsen et al. in 2012 utilized two parallel analytic approaches to characterize ESCO industry and market trends in the U.S. They have found that the ESCO industry has generated \$23 billion in net direct economic benefits for customers at projects installed between 1990 and 2008.

Also ESCOs are expected to play an important role in improving energy efficiency in countries outside of the US. Based on a survey

data (Vine, 2005) the total amount of ESCO activity outside the US in 2001 calculated to be between \$560 million and \$620 million. This is approximately one-half to one-third of the ESCO revenues in the US for 2001. Bertoldi et al. in 2006 performed a survey of ESCO businesses in Europe. Their study showed that major differences exist in the development of the ESCO business among the various countries. In some countries a large number of ESCOs have been successfully working for a number of years, while in other countries only a few ESCOs have started to operate. This difference could be explained by several factors, such as different levels of support offered to ESCOs by national and regional energy authorities, local market structures and rules, and variation in the definitions, roles and activities of ESCOs.

Akman et al. in 2013 evaluated Turkey's energy efficiency law, enacted in 2007, had been expected to transform the energy policies in government and private sectors, and offer opportunities for, then-impending, Turkish ESCO market. However, they expected that some of its principles and procedures to be enforced may be deterrent for small-scale candidate ESCOs and may slow down the development of the Turkish ESCO market.

Fang et al., 2012 investigated empirically the effect of ESCO activities on energy use. Their model provided significant evidence that ESCOs reduce energy use. Finally, they discussed energy policy implications.

Hannon and Bolton, 2015 explored how some UK local authorities have opted to engage with the ESCO model in a way to enhance their influence over local energy system change and help them to deliver on their political objectives. Based on their results, stronger alignment of local and national energy agendas through communication and coordination between different governance actors could help to remove critical barriers to ESCO engagement and their wider energy governance activities.

However, there have been no studies examining the current level of ESCO activity in Iran and analyse its internal and external impacting parameters. Thus, regarding this fact that Iran needs ESCO mechanism for improving energy efficiency in different level of the energy system, such a study is essential.

In Iran, during recent years, government's attention towards energy service companies has increased and its role in energy intensity reduction has been stated more clearly. In order to develop the activities of these companies, the following steps can be taken:

- Making contracts based on energy effectiveness
- Preparing a suitable structure and financial system to provide financial capital of energy service projects in the country
- Motivating ESCOs to increase their technical and professional capacities
- Carrying out some sample projects by government in order to inform and educate people and industries of ESCOs' advantages.

One of the hindrances in ESCO mechanism development is weakness of infrastructures in building and industry sectors. This includes:

- Lack of comprehensive laws and related by-laws
- Description of standard services
- Identical contracts in building and industry sectors (contracts based on energy effectiveness)
- Lack of standard mechanisms of interaction between ESCOs, banks and insurance companies
- Lack of a determined system of measurement and confirmation
- Lack of governmental support.

Making identical contracts for projects based on energy effectiveness needs its own special legislative infrastructures that can be applicable according to legislative and organizational characteristics in Iran. Decisions of Money and Credit Council and role of government in reducing interest rate of energy service contracts are very significant. Since these contracts have not been put into practice in the country yet, parameters like interest rate, contract duration, repayment and tax discourage ESCOs and customers.

During recent decades, development of ESCO mechanism market has played an important role in reduction of energy consumption and establishing the culture of energy conservation. The number of active companies in energy sector is not high and even these companies have faced many challenges because they do not have sufficient professional knowledge and money. These reasons along with insufficient governmental support bankrupt the companies or force them to close or move to more beneficial and interesting sectors rather than energy sector. Meanwhile, only a few of these companies could stand challenges and still remain active in energy sector of the country. There are some main questions remained unanswered:

What is the reason of the aforementioned phenomenon in energy sector of the country? What kind of action is necessary in order to develop the market and activities of these companies? What are the weaknesses and strengths of ESCO mechanism? What are the threats and opportunities in external environment? What are the functions and duties of private sector in this process? What is the role of public sector in this process? What is the role of credit institutes? How insurance companies can help market development? What legislations are needed?

In the present paper, first the methodology of the strengths, weaknesses, opportunities and threats (SWOT) analysis is presented. Next, the results of Iran elite ESCO seminar are presented and weaknesses and strengths of ESCO mechanism in the country are analysed. Finally, some strategies to develop this industry are proposed.

2. METHODOLOGY OF THE ANALYSIS

Through SWOT analysis, a tool for developing strategies, one can plan strategies for organizations that are appropriate for their environments. This method provides the possibility of analyzing internal and external environments and then making strategic decisions which balance strengths of the organization with environmental opportunities (Pearce and Robinson, 2000).

2.1. Internal Factor Evaluation (IFE) Matrix

The structure of matrix used to evaluate weaknesses and strengths of an organization is shown in Table 1. To do this, 10–20 items are entered as the weaknesses and strengths of an organization. Then by allocating a coefficient to each of these factors, the relative importance of it in success or failure of the organization compared to other factors is determined, no matter if it is a weakness or a strength. The more is the effect of a factor, the bigger its coefficient is. The sum of coefficients allocated to weaknesses and strengths of the organization is 100. Coefficients 0 and 100 mean unimportant and very important criteria, respectively. Next column in the evaluation table of internal factors is the rank of each factor and shows their degree of weakness or strength with a value from 1 to 5. Numbers 5, 4, 3, 2 and 1 indicate the impact of the factor as huge, powerful, average, weak and essential weak, respectively. Next column is the final grade of each factor and is the product of two previous columns (Tabibi, 2003).

Regardless of the number of factors entered into the matrix, the total grade of the matrix is a value between 1 and 5 with the average of 3 (in the percentage scale, the values are in the form of 100 to 500 with the average of 300). If the final grade of the organization is <3, it means that the organization is weak in terms of internal factors and if it is more than 3, it demonstrates that the organization is strong in terms of internal factors. The most suitable number of factors for analyzing this matrix is between 10 to 20 factors and this number does not have any impact on the final grade because the sum of coefficients is 100. If an internal factor has both weakness and strength effects, it should be entered into the matrix twice with two coefficients and grades.

2.2. External Factor Evaluation (EFE) Matrix

The structure of the matrix used to evaluate external factors act as opportunities and threats is presented in Table 2. For this purpose, 10–20 items are considered as opportunities and threats of an

Table 1: IFE matrix

Type of factor	Items	IFE	A	B	A*B
			Coefficient	Rank	Final score
Strength	1.				
	2.				
	3.				
Weakness	1.				
	2.				
	3.				

IFE: Internal factor evaluation

Table 2: EFE matrix

Type of factor	Items	EFE	A	B	A*B
			Coefficient	Rank	Final score
Opportunity	1.				
	2.				
	3.				
Threat	1.				
	2.				
	3.				

EFE: External factor evaluation

organization. The relative importance of each factor is obtained by a coefficient allocated to each factor. Similarly, the sum of coefficients for opportunities and threats of the organization is 100. The rank of factor is another point of reference in this matrix indicating the degree of an opportunity or a threat varying from 1 to 5. Numbers 5, 4, 3, 2 and 1 show that the reaction of the organization is excellent, above average, average, lower than average and weak, respectively. Last column is final grade of each, the product of two previous columns (Tabibi, 2003).

The total grade of the matrix is a value between 100 and 500 with the average of 300. If the sum of final grades of an organization approaches 500, it means that the organization reacts excellently to factors which play the role of being an opportunity or a threat. That is to say, the opportunities are seized and the threats are avoided. The value 100 shows that the organization could not benefit from opportunities or avoid threats.

2.3. SWOT Matrix Formation

In the next step, SWOT matrix is formed as shown in Table 3. This matrix is a tool for choosing four general strategies for an organization. As seen from this Table 3, besides four important internal and external factors, there are four other empty spaces in the matrix in such a way that an intersection of the two of them determines a strategy. In general, there are four strategies for organizations (Pearce and Robinson, 2000):

1. SO strategies: Each organization is willing to maximize opportunities through using its capabilities.
2. WO strategies: The goal of this strategy is to decrease weaknesses and to increase opportunities. In this situation, organization cannot use opportunities because essential weaknesses exist.
3. ST strategies: In this strategy, the organization uses existing strengths in order to avoid threats.
4. WT strategies: The goal of this strategy is to minimize weaknesses and threats. If most factors of an organization are concentrated in this aspect, the organization does not have a good situation and is in danger of being bankrupted.

2.4. Internal-External Matrix Formation

After completing evaluation of internal and external factors, these two matrices can be merged into one internal-external matrix. A sample of this matrix is depicted in Figure 1. For example, if the total grades for internal and external evaluations are 250 and

220, respectively, the right strategy for this organization will be WT strategy.

The aim of analysis and examination of opportunities and threats of external environment of an organization is to realize whether the organization can seize opportunities and avoid threats or not. It becomes important when the organization is faced with an uncontrollable external environment.

2.5. Method of Analysis

An analytical method is used to present strategies for ESCO mechanism development in Iran. For this goal, Iran elite ESCO seminar was held and the most important factors of ESCO mechanism development were examined. In the next step, after preparing the questionnaire of analyzing internal and external factors (as weaknesses, strengths, opportunities and threats), internal-external matrix was completed by a group of experts. Then, necessary analyses are done through quantifying internal-external matrix. Finally, SWOT matrix is formed and by internal-external matrix, appropriate strategies are presented to develop this part of industry in Iran.

3. RESULTS AND DISCUSSION

In order to perform SWOT analysis and gather comments and point of views of elite, symposium of ESCO activity development was held on Monday 16/11/2015 with collaboration of employer Association of Energy Service Companies as well as honorary presence of expert professors and professionals in this field. Moreover, some guests from governmental organizations like Ministry of Oil, Ministry of Energy, Fuel Conservation Company, Institute of International Energy Studies, National Gas Company of Iran, Energy Conservation Organization and other guests from private sectors like managers of some ESCOs, board of directors and experts of Iranian Association of Energy Economics attended this meeting in order to reveal the obstacles available in the progress of ESCO mechanism.

In this meeting, questionnaires of effective factors for ESCO mechanism development were filled by attendances in the form of weaknesses, strengths, opportunities and threats. They were also asked to provide any comments and suggestions they might find informative during the meeting.

The achieved results for weaknesses and strengths are inserted in the IFE table (Table 4) and the results for opportunities and threats are placed in the EFE table (Table 5). Evaluation of internal factor matrix results in the score of 270. It means that the organization is weak in regard to internal factors and some strategies are necessary to overcome these weaknesses. However, the score of 402 for external factor matrix declares that the organization has reacted well towards opportunities or threats implying that it has seized the opportunities and avoided the threats. Based on this, SWOT analysis matrix is formed and presented in Table 6.

Based on the attained scores, internal-external matrix for this industry is formed in Figure 2. According to this matrix, the appropriate strategy for ESCO mechanism development in Iran is WO strategies.

Table 3: Sample structure of SWOT analysis matrix

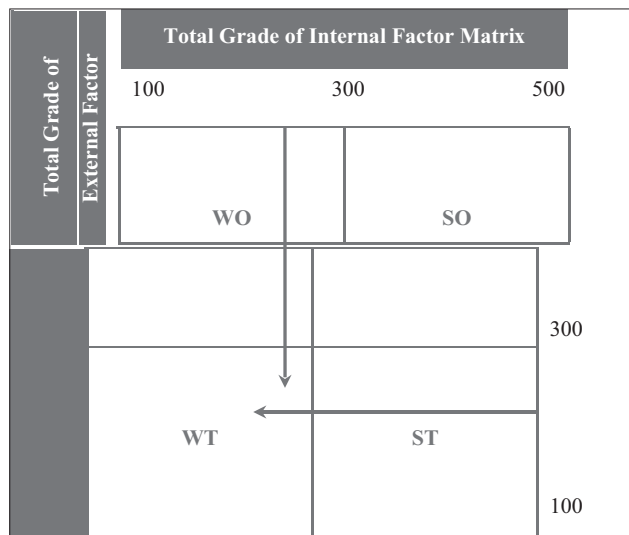
	Strengths (S)	Weaknesses (W)
Opportunities (O)	1.	1.
	2.	2.
	3.	3.
	SO strategies	WO strategies
Threats (T)	1.	1.
	2.	2.
	3.	3.
	ST strategies	WT strategies

SWOT: Strengths, weaknesses, opportunities and threats

Table 4: IFE matrix for ESCO mechanism in Iran

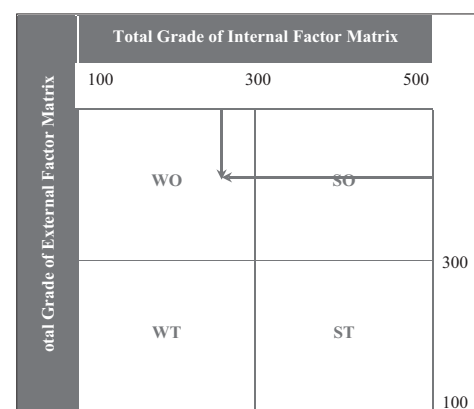
Type of factor	Items	IFE	A	B	A*B
			Coefficient	Rank	Final score
Strengths	1.	ESCOs are newly established and dynamic	5	3.5	17.5
	2.	Educating human resources and the presence of professional fields of energy engineering	5	4.5	22.5
	3.	Powerful financial motivations of ESCOs	5	4	20
	4.	Well-known market due to performed energy audit projects in building and industry sectors	10	4.5	45
	5.	The possibility of providing financial capital for small-scale projects especially in building sector	5	3.5	17.5
Weaknesses	6.	Useful experience of EPC companies for ESCOs	8	5	40
	1.	ESCOs are unexperienced and unstable, leading to disbandment in a few years after their establishment	5	1	5
	2.	Lack of technical knowledge and technology	5	2.5	12.5
	3.	Local companies are financially weak and unable to attract foreign investments	5	2	10
	4.	Deconstructive competition among ESCOs of the country	1	3	3
	5.	Incapability to create continuous and cooperative relations with large and famous foreign companies	4	3	12
	6.	Incapability in reassuring customers about services possible to be provided	3	2.5	7.5
	7.	Presence of small EPCF companies in this sector and absence of large companies	5	1.5	7.5
	8.	Absence of real ESCO in the country	10	1	10
	9.	ESCOs unwillingness to create financial support coffers	8	1.5	12
	10.	ESCOs unwillingness to create technical and scientific centres	8	1.5	12
	11.	Lack of successful operative experiences in the country	4	2	8
	12.	ESCOs do not pay enough attention to educate and inform people in order to extend their market	4	2	8
Total			100		270

IFE: Internal factor evaluation, ESCO: Energy services company

Figure 1: Sample structure of internal-external matrix

Therefore, the selected strategies for ESCO mechanism in Iran are as follows:

1. Using capacities of syndicates in order to support ESCOs to receive guarantees, long-term loans with short interest
2. Proposing supportive governmental legislations, to create standard systems like tip. Contract, M and V system, accounting, audit, appropriate laws, evaluation system for companies, financial capital and insurance

Figure 2: Internal-external matrix of energy services company mechanism in Iran

3. Creating effective relations with foreign companies in order to import technology
4. Attracting governmental support in order to perform sample projects in building and industry sectors especially in the post-sanction situation

4. CONCLUSIONS

In this research, the most important strengths and weaknesses as well as opportunities and threats of the ESCO mechanism have

Table 5: EFE matrix for ESCO mechanism in Iran

Type of factor	Items	IFE	A	B	A*B
			Coefficient	Rank	Final score
Opportunities	1.	Law of reforming the pattern of energy consumption, article 134 of the law, subsidy reform plan and other related laws	10	5	50
	2.	Huge conservation potential in different part of industry and building sectors	5	5	25
	3.	Using other countries' experiences to develop ESCO mechanism in the country	5	4	20
	4.	Formation of Employer Association of Energy Service Companies	5	3	15
	5.	Existence of interesting foreign markets and the possibility of exporting services to other countries	1	2	2
	6.	Newness of the domain and the fact that the market is unsaturated	5	4	20
	7.	Serious attempt of the government to develop ESCOs in the country in the post-sanction situation	10	1	10
Threats	1.	Low price of forms of energy	5	5	25
	2.	Banks unfamiliarity with ESCO mechanism and lack of their cooperation in providing financial capital for related projects	5	3	15
	3.	Continuous change of public managers and impossibility of making long-term contracts	5	5	25
	4.	Closed economy system, dependency on oil, unstable economic situation of the country	10	5	50
	5.	Insurance company unfamiliarity with ESCO mechanism and lack of their active cooperation in this industry	5	4	20
	6.	Lack of standard systems like tip? contract, M and V system, accounting, audit, appropriate laws, evaluation system for companies, financial capital and insurance	5	4	20
	7.	Lack of comprehensive energy conservation program in the country	10	5	50
	8.	Sanctions and its effect on usual procedure of importing technology, investment and technical knowledge	5	3	15
	9.	Process of choosing ESCO companies based on existing call for bids mechanisms in governmental laws	5	4	20
	10.	Uncertainty of income	4	5	20
Total			100		402

EFE: External factor evaluation, IFE: Internal factor evaluation, ESCO: Energy services company

Table 6: SWOT analysis matrix of ESCO mechanism in Iran

Strengths (S)	Weaknesses (W)
S1. ESCOs are newly established and dynamic	W1. ESCOs are unexperienced and unstable, leading to disbandment in a few years after their establishment
S2. Educating human resources and the presence of professional fields of energy engineering	W2. Lack of technical knowledge and technology
S3. Powerful financial motivations of ESCOs	W3. Local companies are financially weak and unable to attract foreign investments
S4. Well-known market due to performed energy audit projects in building and industry sectors	W4. Deconstructive competition among ESCOs of the country
S5. The possibility of providing financial capital for small-scale projects especially in building sector	W5. Incapability to create continuous and cooperative relations with large and famous foreign companies
S6. Useful experience of EPC companies for ESCOs	W6. Incapability in reassuring customers about services possible to be provided
	W7. Presence of small EPCF companies in this sector and absence of large companies
	W8. Absence of real ESCO in the country

(Contd...)

Table 6: (Continued)

Strengths (S)		Weaknesses (W)
		W9. ESCOs unwillingness to create financial support coffers W10. ESCOs unwillingness to create technical and scientific centres W11. Lack of successful operative experiences in the country W12. ESCOs do not pay enough attention to educate and inform people in order to extend their market
Opportunities (O)	SO strategies	WO strategies
O1. Law of reforming the pattern of energy consumption, article 134 of the law, subsidy reform plan and other related laws O2. Huge conservation potential in different part of industry and building sectors O3. Using other countries' experiences to develop ESCO mechanism in the country O4. Formation of employer association of energy service companies	SO1. To be specialized in one of two sectors of industry or building SO2. Creating effective relations with foreign companies in order to import technology	WO1. Using capacities of syndicates in order to support ESCOs to receive guarantees, long-term loans with short interest WO2. Proposing supportive governmental legislations, to create standard systems like tip. Contract, M and V system, accounting, audit, appropriate laws, evaluation system for companies, financial capital and insurance WO3. Creating effective relations with foreign companies in order to import technology
O5. Existence of interesting foreign markets and the possibility of exporting services to other countries O6. Newness of the domain and the fact that the market is unsaturated O7. Serious attempt of the government to develop ESCOs in the country in the post-sanction situation	SO3. Using capacities of syndicates in order to extent the market SO4. Cooperation with local EPC companies in order to be successful in internal and external markets	WO4. Attracting governmental support in order to perform sample projects in building and industry sectors
Threats (T) T1. Low price of forms of energy T2. Banks unfamiliarity with ESCO mechanism and lack of their cooperation in providing financial capital for related projects T3. Continuous change of public managers and impossibility of making long-term contracts T4. Closed economy system, dependency on oil, unstable economic situation of the country T5. Insurance company unfamiliarity with ESCO mechanism and lack of their active cooperation in this industry T6. Lack of standard systems like tip? contract, M and V system, accounting, audit, appropriate laws, evaluation system for companies, financial capital and insurance T7. Lack of comprehensive energy conservation program in the country T8. Sanctions and its effect on usual procedure of importing technology, investment and technical knowledge T9. Process of choosing ESCO companies based on existing call for bids mechanisms in governmental laws T10. Uncertainty of income	ST Strategies ST1. To extend and to develop education and modification of the culture in different levels of customers, bank, insurance and government ST2. To cooperate with foreign companies or local EPC ST3. To unite ESCOs through syndicate in order to create standard systems like tip? contract, M and V system, accounting, audit, appropriate laws, evaluation system for companies, financial capital and insurance	WT Strategies WT1. To extend and to develop education and modification of the culture via forming professional and scientific centers WT2. To perform and to present successful projects in building sector – as this sector is less complicated and needs less financial capital compared to industry sector WT3. Making contacts with EPCs, attracting support and making contracts with local ECPs in order to cooperate in ESCO mechanism

ESCO: Energy services company, SWOT: Strengths, weaknesses, opportunities and threats

been identified using advice from elite and professionals of this industry in Iran. The following conclusions are taken from the above analysis:

Obtained results from internal factor matrix show that the organization is weak in regard to internal factors and it is necessary to perform strategies in order to overcome these weaknesses.

Obtained results from external factor matrix indicate that ESCO mechanism of Iran reacts perfectly towards opportunities and threats. It means that this industry can seize opportunities and limit threats.

Since ESCO mechanism of Iran has essential weaknesses at current situation, it can't seize the existing opportunities unless these weaknesses are remedied.

Through SWOT analysis and internal-external factor matrix, WO strategies are currently advised as appropriate strategies for this industry in Iran. The goal of this strategy is to decrease weaknesses and to increase opportunities.

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