EXCELLENCE MEASUREMENT BY ESI CASE STUDY: IRAN POWER MINISTRY

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Abstract- Excellence synergic index (ESI) is a new method for excellence measurement. This technique is a causal method. ESI method was developed for studying the relations and interaction of excellence criteria and organizational pathology. By "ESI", it is possible to measure the performance excellence of any service enterprises, to diagnosis organizational pathos and to propose problem solving and weakness removing methods for service enterprises. The "ESI" method is a self-assessment tool for service and nonprofit enterprises. Stages of ESI are: Determination of affecting score per criterion, Calculation of ESI, Calculation of synergic gaps, Determination of priority attention area (Paa)s, Determination of Priority Action Area (PAA)s, provide application solutions for resolve organizational pathos and review.

Keywords- Business Excellence, Quality, Self-Assessment, Organizational Pathology.

I. INTRODUCTION

In 1991 Garvin published his article: 'How the Baldrige Award really works' in Harvard Business Review. In this article, he concludes that the Baldrige Award is an ideal conceptualization of total quality management (TQM), i.e. not too narrow and not too broad. He concludes, that the seven pillars of the award "have created a common vocabulary and philosophy bridging companies and industries". More than 20 US experts in the field of quality reacted to the publication; most of them very positively and with general approval (Debate, 1992). However, Deming and Crosby were strongly opposed. In their opinion the Baldrige Award criteria concentrate too much on business results and quality control. The debate was closed with an open letter from business leaders encouraging academics to undertake research in order to gain more insight and facts regarding the quality principles. Six years later the Baldrige criteria were revised and the criteria for performance excellence were launched.

A similar process has taken place during the last few years in Europe. The European Foundation for Quality Management (EFQM) Model was launched in 1991 and the first award winner was decorated in 1992. The reactions of the European profit and non-profit organizations were very positive concerning the EFQM Award scheme (Zink, 1995). Within a few years many companies used the tool of self-assessment and introduced the EFQM for criteria business excellence and RADAR logic for excellence measurement.. In contrast to the USA, however, the EFQM criteria were applied not only by businesses but also by organizations of the public sector. It was also typical for the European situation that many traditional national quality organizations were critical about the framework and modified the model to meet their specific needs (Hardjono & Hes, 1996). Although, research in the field of quality was growing and the criteria of EFQM were reviewed annually, the need for a more fundamental debate on the model‘s excellence measurement method increased..

In this article we introduce a new method for excellence measurement that follows mathematical rules. This method developed on base of HES model.
Literature review Different investigators are achieved different results in their research for critical excellence factors. We explore Saraph et.al., Flynn et.al., Black and Porter , Ahire et.al and zeitz et.al studies.

Saraph et al. (1989) conducted one of the first empirical efforts to validate an instrument for integrated quality management. They developed and tested a 78-item quality management questionnaire to measure the extent to which some technical aspects of a quality system have been implemented in a plant or company .This instrument derived TQM constructs primarily using the quality prescriptions of Deming, Juran, Crosby, and Ishikawa .A factor analysis produced 8 different factors, that measure the quality practice of an organization .In this study, Cronbach's alpha was used for scale refinement. Construct validity was checked using principal component factor analysis on each construct. In addition, content validity and criterion validity were also established. The major strength of this instrument was the high level of external validity since both manufacturing and service industries were included in the sample. (Saraph , 1989).

The Flynn et al.(1994) study , based on Saraph et al's. Study, focuses on a plant rather than an organization as a unit of analysis and utilizes the perceptions of both line and managerial level employees. This study identified seven dimensions of quality management primarily based on the empirical and practitioner literature. The scale refinement and validation used

for development of this Research was similar to that of Saraph et.al's research. However, Cronbach's alpha of this research was higher than that of Saraph et al's study (see table.1). (Flynn 1994). Ahire et al. (1996) identified, validated, and tested 12 constructs of integrated quality management through an empirical survey of 371 manufacturing firms. This research is based on an extensive review of the conceptual and empirical literature on TQM. In this study factor analysis was used and for estimating correlation LISREL 7 used. [Ahire, 1996].

Black and porter (1996) developed a 39-item questionnaire based on a series of items from the Baldrige model and the literature. It was sent to over 200 managers drawn from a target sample of members of the European foundation for Quality management. Data was examined using similar analytical and validity techniques discussed in the studies above. The 10 factors extracted in this study exhibited an acceptable degree of reliability in terms of internal consistency and the splithalves test result. (See table. 1). (Black, 1996).

Zeitz et al. (1997) developed a survey instrument designed to measure TQM and supporting organizational culture. In this study, 13 dimensions of TQM and 10 dimensions of organizational culture/climate were included in a 113- item survey designed to measure the impact of cultural change and TQM measures experienced by individual members of the organization. A factor analysis of result from 886 respondents indicated that 7 TQM and 5 cultural dimensions accounted for most of the scale variance.

The scale refinement and validation used for the development of this instrument were similar to the above researches. The 7 TQM dimensions in the reduced instrument (management support, suggestions, use of data, supplies, supervision, continuous improvement, and customer orientation) are consistent with the TQM literature (zeitz , 1997).

Excellence models are also explored in this research. These models are: Deming model in Japan, Malcom Baldring National Quality Award model and EFQM model. Performance and competitiveness of industries in their respective countries has drawn much world attention and many countries have modeled their award program on the basis of these three awards.

Table 1. Excellence frameworks

Saraph et al.	Flynn et al.	Black and Porter	Ahire et al.	Zeitz et al.
Top management leadership	Top management support	Strategic quality management and corporate quality culture	Top management commitment	Management support
Quality data and reporting	Quality information	Quality improvement Measurement system and communication of improvement information	Internal quality information usage	Use of data
Process management	Process management	Operational quality planning		
Product /service design	Product design	External interface management	Design quality management	
Training	Workforce management		Employee training	
Supplier quality management	Supplier involvement	Supplier partnership	Supplier quality management and supplier performance	Supplier relationship
Role of the quality department			Employee involvement	Employee suggestion
Employee relations		People and customer management	Employee empowerment	Employee improvements
	Customer involvement	Customer satisfaction orientation	Customer focus	Customers
			SPC usage	
			Benchmarking	
				Supervision

II. RESEARCH METHODOLOGY

Our research shows that existing Business Excellence Models such as EFQM are not comprehensive in dimensions and methods; and therefore these models are insufficient for broad application in Iranian organizations.

The most important limitations of existing models are:

1- There is the possibility that intentional or unintentional mistakes occur in auditing.
2- The existing models don't provide organizational pathology.
3- The existing models don't provide feasible suggestion solutions in some cases.
4- Sub-criteria of the models are not appropriate for Iranian organizational conditions.

Because of the limitations of existing business excellence models, the objective of our study is to identify the criteria that could be appropriate for being in the model of business Excellence of Iranian service enterprises.

Our literature review included more than 125 articles and books published since 1990.We applied concept mapping method for determining the relevant criteria and developing HES model too.

Selecting a method
The first task was to select a method or procedure to develop the model. Four possible methods were

considered: 1- the expert group approach; 2-the Delphi method; 3- The broad survey approach, and 4- the statistical approach.
The expert and the Delphi method are inductive approaches, which have the advantage that the expertise of the participants is used fully. In contrast, the survey and statistical approaches are deductive procedures, which are more democratic and highly transparent. It is concluded that the best procedure to develop a Business Excellence Model should combine the inductive aspects of the expert group approach and the deductive aspects of statistical procedures. The method of concept mapping seems to be a good mix of induction and deduction and was, there fore, selected by the researchers.

Concept mapping
Concept mapping is an applied procedure, which was developed in the fields of educational, social, cognitive and management science in order to generate conceptual frameworks based on specific items. It is a stepwise approach in which statements are generated, rated, statistically analyzed and finally interpreted. The method is used to create clarity, develop a model or to specify a conceptual framework. In most studies, the six steps of Trochim (1989) are used to define a framework or to specify a model. (See fig.1).

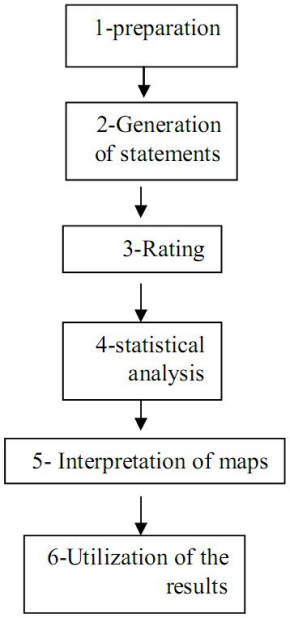


Figure 1: concept mapping process

In concept mapping process researchers selected the participants of the study and focus statements, then through brain storming sessions, the participants discussed different statements and could generate a set of statements which represented the entire ideal conceptual domain. After different sessions, it was possible for participants to extract eighty main statements by common consent. The main statements were clustered and rated. The data was analyzed by concept system 1.75 package and a draft model for business excellence of service enterprises in Iran was designed. The draft model was achieved by point map, Rating point map, cluster map and Rating cluster map.

The result of concept mapping were 8 distinct clusters, that are: 1)leadership,2)People in organization ,3)Creative organizational culture, 4)Service quality , 5)Service strategy, 6)Information management, 7)Customer-orientation and 8) Organizational structure.

For more confidence about prepared questionnaires with 434 items, which were the base of structuring the business excellence model and concept mapping results, causal and statistical analysis with SPSS and LISREL on 66 questionnaires was applied.

Causal and statistical analysis application revealed that, there is acceptable model reliability and ,furthermore, there is suitable reliability about appropriateness of affecting channels of major factors in designed business excellence model of Iranian service enterprises (such as leadership, people,…). (See table 2). Business excellence model for service enterprises in Iran was shown in fig 6. The table 3 shows different characteristics of the designed model like, criteria, weights, affecting scores and synergic scores. The last two characteristics, affecting scores and synergic scores, are used in HESM algorithm only.

Table 2. The result of LISREL test

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Goodness of Fit Statistics

Minimum Fit Function Chi-Square = 0.00 (P = 1.00)
Normal Theory Weighted Least Squares Chi-Square = 0.00 (P
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The Model is Saturated, the Fit is Perfect .
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Hassanzadeh Excellence Synergic (HES) Model for Business Excellence Hassanzadeh (2002) developed a causal model for business excellence as HES model .this model developed by using of concept mapping and consist of 8 criteria that are:

1)leadership,2)People in organization ,3)Creative organizational culture, 4)Service quality , 5)Service strategy, 6)Information management, 7)Customer-orientation and 8)Organizational structure.

HES model was shown in fig 2. The table 3 shows different characteristics of the model like, criteria, weights, affecting scores and synergic scores.

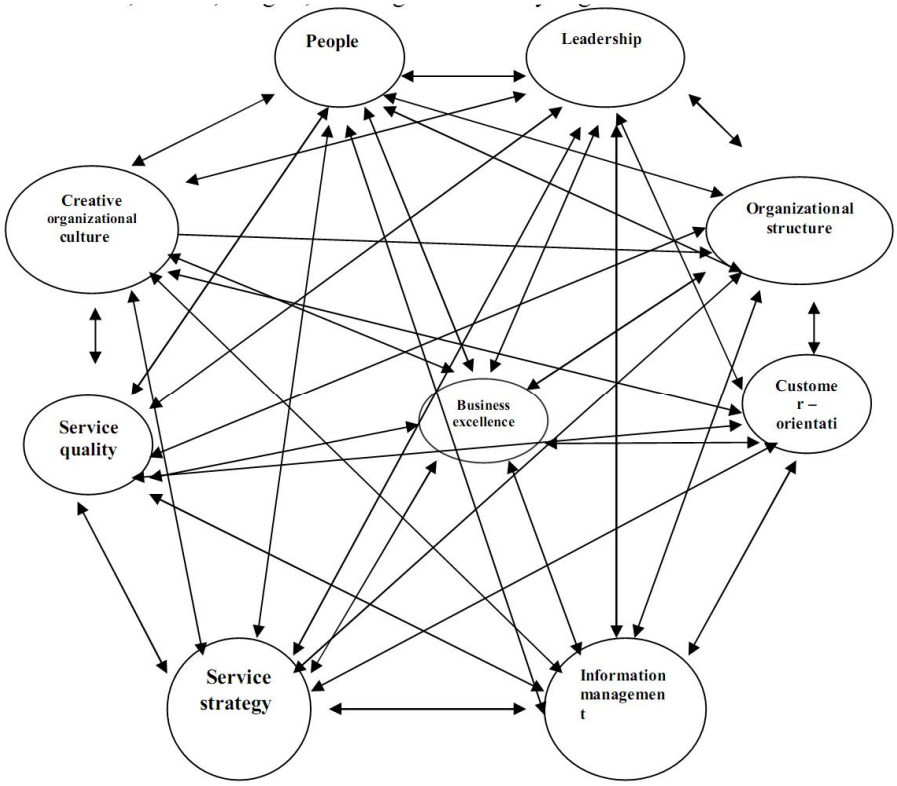


Figure 2: HES Model

Table 3. Criteria and their scores

Criteria	weight	Affecting score	Synergic score
Leadership	18	49.17	1.0536
People	17	48.22	.9833
Creative organizational culture	16	45.77	.9726
Service quality	11	46.3	.9588
Service strategy	11	48.4	1.0142
Customer –orientation	10	47.75	.9909
Information management	10	47.29	1.0183
Organizational structure	7	47.39	1.0098
Sum	100	380.29	8.0015

ESI method for business excellence measurement and organizational pathology In order to determine the business excellence level of any service organization, or competition capability of a specific service enterprise, we developed a decision index as, Excellence Synergic Index (ESI). By ESI calculations we can investigate the current performance conditions of any service enterprise and we can enter the field of organizational pathology.

In the designed method of ESI, there are several affecting channels between the major factors of model like: leadership-people affecting channels, people–creative organizational culture affecting channels and etc. By studying the leadership–people affecting channels, for example, we intended to explain and determine the sum of ways or channels that leadership can affect the employees in the service enterprises on excellence direction. On the other hand through the people–leadership affecting channels, we

introduce different ways or procedures by which, the employees can affect the leadership on excellence direction.

Stages of ESI method are:

1- Diagnosis
1-1- Determination of affecting score per criterion.
1-2- Calculation of ESI

The excellence synergic index is calculated as follows:

$$ESI = \sum_{i=1}^{8} ESIij = \sqrt[7]{\prod ESIij} \quad (1)$$

And $$ESIij = \frac{aij}{aji} \quad (2)$$

Where
aij= affecting i on j
aji= affecting j on i
i and j are excellence criteria.

The amounts of aij and aji are computed, based on affecting channels .These channels represent the ways of affecting one of the business excellence criteria over the others one.

Affecting channels are determined through data analysis. The data, for this analysis, was collected from distributed questionnaires among the service industry experts.

The ultimate value of aij s and aji s can be computed in the following two ways:

1-Regression analysis which shows how much the i criterion can affect the j criterion .LISREL results analysis with .05 significance confirm all of the affecting coefficients.

2- Average analysis, which represents how much the i criterion can affect the j criterion. Average analysis procedure is easier than regression analysis and service enterprises can use it without any application problem. (see table 3).

1-3- Calculation of synergic gaps
Synergic gap of the ith criterion is equal to :

$$Sgi = 1 - \frac{ESIi}{ESIi*} \quad (3)$$

Where ESIi* is excellence synergic index of the ith criterion in HES Model (See table4); and ESIi is the same index in audited organization.

Total synergic gap is calculated as follows:

$$Tsg = 1 - \frac{ESI}{ESI*} \quad (4)$$

Where ESI* is excellence synergic index in HES Model (See table 4); and ESI is the same index in audited organization.

The computed ESI for Iranian service enterprises is a basic index or a measure of performance capability with any deviation from it being an unusual or abnormal deviation that must be retrieved. We named this index optimum ESI (ESI*).With benchmarking of ESI with ESI*, it will be possible to start organizational pathology of service enterprises.

Table 3. HES model scores

Criteria	leadership	people	Creative organizational culture	Service quality	Service strategy	Customer orientation	Information management	Organizational structure	score
leadership	////	7.33	6.92	6.77	7.95	7.16	5.85	7.19	49.17
people	6.93	////	6.87	7.38	6.36	7.24	6.66	6.78	48.22
Creative organizational culture	6.36	7.2	////	7.1	6.18	6.59	6.31	6.03	45.77
Service quality	6.44	6.68	6.47	/////	6.63	6.87	6.68	6.58	46.3
Service strategy	6.68	6.75	6.93	7	/////	7.11	6.77	7.16	48.4
Customer orientation	6.45	6.98	6.71	7.06	7.08	/////	6.94	6.53	47.75
Information management	6.92	7.13	6.41	6.16	7.03	6.68	/////	6.66	47.29
Organizational structure	6.89	6.97	6.75	6.52	6.49	6.54	7.23	/////	47.39
Total	46.67	49.04	47.06	48.29	47.72	48.19	46.44	46.93	380.29

Table 4. Synergic scores

Criteria	leadership	people	Creative organizational culture	Service quality	Service strategy	Customer orientation	Information management	Organizational structure	ESIi
leadership	////	1.0679	1.1548	1.6141	2.382	1.542	0.8635	1.029	1.297
people	0.937	////	0.847	1.149	0.732	0.942	0.939	0.687	0.888
Creative organizational culture	0.866	1.181	////	1.643	0.606	1.184	1.232	0.644	1.004
Service quality	0.620	0.871	0.609	/////	0.820	1.039	1.284	0.851	0.859
Service strategy	0.420	1.367	1.651	1.22	/////	0.892	0.943	2.08	1.098
Customer orientation	0.649	1.062	0.845	0.963	1.121	/////	0.929	1.107	0.952
Information management	0.984	0.065	0.812	0.779	1.061	1.077	/////	0.589	0.897
Organizational structure	0.972	1.456	1.553	1.175	0.481	0.904	1.698	/////	1.0098
	ESI								8.078

1-4 – Determination of priority attention area (Paa)s
The biggest synergic gap with attention to organizational conditions is a priority attention area. These areas are basis for auditing and site visit and enable auditors for determination of priority action areas.

1-5- Determination of Priority Action Area (PAA)s
In auditing process, Auditors are gathering data for per "paa". The result of data (document or verbal) analysis represent priority action area (PAA)s. PAA may be pathos that must be resolved or strength that must be promote.

2-Treatment
In this stage ESI method provide application solutions for resolve organizational pathos. These application solutions extract from interactions between HES model's criteria.
3-Reviewing
Organizations can use ESI method to take a feedback from treatment actions.

ESI* can be drawn per criteria in HES model as excellence frontier. It can then formulate HES model and it's algorithm in data envelopment analysis (D.E.A) technique.

Excellence measurement in TAVANIR Company by ESI method
In fact up to the year 1969 there was not an independent organization for management of electric affairs in Iran, the decisions in this respect was made by the authorities of the Ministry for interior affairs and the budget and planning, organization then it was instructed to the municipalities and private or public organizations who were in charge of electrical energy affairs in various cities.

As the demand for electricity has increased and generation and consumption of electricity have gone further than its previous limited utilization, particularly construction of Hydro electric power plant which has started in 1962, the Electric Power Industry has gained more momentum and need for establishment of an independent organization to handle electric power affairs in Iran became more pronounced.

Then in 1962 the Iran organization for electric power affairs was established. Rapid development of electric power industry in Iran has brought about the idea of establishing a Ministry for supply of water and electric power needed by the country and based on this idea the Ministry of water and power has been established on 1963.

In 1965, the Act of developing non governmental electric power organization has received the approval of Majles Shori-e-meli and Majles-e-Sena, the parliamentary system of that time.

Based on the second article of the law for establishment of Iran organization for electric power affairs, in 1967, the Ministry of water and power has been authorized to divide the country into several regions regardless of provincial divisions to accelerate the development of electric networks in the country.

Such a division then necessitated the establishment of Regional Electric Companies in Iran.

In 1979, Tavanir Company was also established to undertake the responsibility for development of electric power generation, Transmission facilities and bulk Transaction of electricity with the Regional Electric Companies and Large industries.

In 1974, the responsibility for comprehensive energy planning and coordination of energy affairs in the country was released to the Ministry of Water and Power and this Ministry then was renamed as the Ministry of Energy.

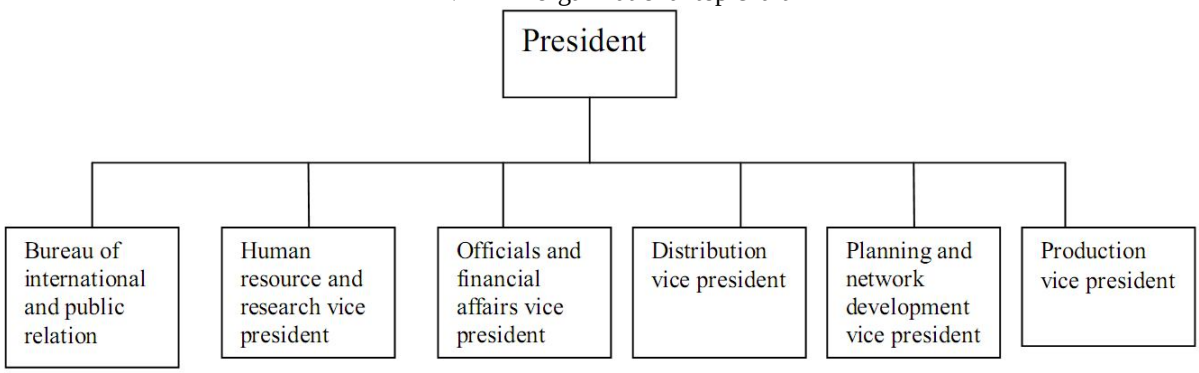
At the same year and the year after, there were some changes in the organizational mandate of Tavanir Company.

After Islamic Revolution of Iran, due to quantitative and qualitative changes of the Electric Power Industry, as a result of new situations and revolutionary expectations the restructuring in the Electric Power Industry has become once again the center of interest and then in 1989, Tavanir has been restructured and renamed under the name of Iran organization for Management of Electric Power Generation and Transmission (Tavanir) and the responsibilities of Deputy Minister for Power affairs has been put on this organization and the Managing Director of this new organization was in fact the Deputy Minister for Power affairs.

Eventually in 2001, based on the proposal of the Minister of Energy and approval of the organization for Management and planning of the country and the Ministry of Assets and economy affairs, Tavanir organization has undergone another restructuring process and its organizational mandate has experienced some alteration to promote it to its present organizational level known as specialized holding company responsible for Management of Generation, Transmission and Distribution of Electric Power in Iran (Tavanir).

The company has 6090 employees who most of them woks in regions.
There are only 821 people work in the central headquarter and the rest work in the executive units around the country.

TAVANIR organizational top chart



We apply ESI for excellence measurement and organizational pathology in TAVANIR Company of Iran. This study takes 5 month for questionnaires gathering and analysis; tables 5, 6 show the results.

Table 5. HES model scores in TAVANIR Company

Criteria	leadership	people	Creative organizational culture	Service quality	Service strategy	Customer orientation	Information management	Organizational structure	score
leadership	////	4.99	4.05	4.96	5.44	4.93	5.28	4.93	34.58
people	3.63	////	4.13	4.37	3.46	4.49	4.30	4.12	28.49
Creative organizational culture	3.75	4.42	////	3.94	4.41	4.81	4.04	3.02	28.39
Service quality	3.20	4.50	4.18	/////	4.17	4.33	4.12	2.38	26.88
Service strategy	2.61	4.53	3.16	4.19	/////	4.51	3.12	3.77	25.90
Customer orientation	3.47	4.56	3.42	4.67	4.31	/////	3.67	2.80	26.90
Information management	3.97	5.46	3.32	3.54	3.69	4.39	/////	3.26	27.63
Organizational structure	3.59	5.22	3.89	3.75	3.70	3.42	4.12	/////	27.71
Total	24.22	33.69	26.16	29.42	29.17	30.89	28.66	24.27	226.47

Table 6. Synergic scores

Criteria	leadership	people	Creative organizational culture	Service quality	Service strategy	Customer orientation	Information management	Organizational structure	ESIi
leadership	////	1.3758	1.078	1.55	2.0835	1.4212	1.33	1.3752	1.42787
people	0.7268	////	0.9354	0.9702	0.7633	0.9847	0.7872	0.7871	0.8457
Creative organizational culture	0.9276	1.069	////	0.9414	1.3933	1.4056	1.217	0.7765	1.0852
Service quality	0.6452	1.0307	1.062	/////	0.9938	0.9284	1.1635	0.63341	0.9137
Service strategy	0.480	1.3101	0.7177	1.0062	/////	1.0452	0.8476	1.0178	0.9087
Customer orientation	0.7036	1.0155	0.7114	1.0771	0.9568	/////	0.8347	0.8175	0.8945
Information management	0.7519	1.2703	0.8217	0.8595	1.1798	1.1980	/////	0.7893	0.9641
Organizational structure	0.7272	1.2705	1.289	1.5788	0.9825	1.3222	1.2669	/////	1.1419
	ESI								8.078

As shown above tables, excellence scores of TAVANIR company is 283.1003 .Although this score is good but determine a gap equal to 97.1897. Score gaps, synergic gaps and pririty attention area (paa) show in table No.7.

Table 7 .score and synergic gaps in TAVANIR company

Criteria	Score gap	Rate	Synergic gap	paa
leadership	12.6874	4	0.0801	1
people	11.8635	5	(0.0307)	*
Creative organizational culture	10.8693	6	(0.0216)	*
Service quality	10.1045	8	(0.0761)	2
Service strategy	14.2029	1	0.0512	3
Customer orientation	13.6016	2	0.0009	*
Information management	13.3914	3	0.0254	*
Organizational structure	10.4691	7	(0.0289)	*
Total	97.1897			

*No significance difference

As shown in above table the most important paas are:

1- leadership
2- service quality
3- service strategy

Auditors do site visit in base of paas and determine 27 priority action areas (PAA). These PAAs are organizational pathos and ESI method provides treatment approaches for TAVANIR Company. Since TAVANIR company is one of governmental organization therefore organizational pathos learnt in the company useful for other governmental organizations.

CONCLUSIONS

Application of concept mapping method reveals that there is an emphasis on 1)leadership, 2)people, 3)creative organizational culture ,4)service quality, 5)service strategy, 6) information management ,7)customer-orientation and 8) organizational culture; by Iranian experts for developing an appropriate business excellence model, which can be used in Iranian service enterprises.

HES model is a causal model with 8 criteria and 432 sub criteria.

The ESI method in base of HES model is capable of determining any service business excellence or performance level. Furthermore, it can calculate Excellence Synergic Index through causal and mutual relations analysis of performance criteria for performance appraisal and organizational pathology. 3 stages of ESI are: diagnosis, treatment and review.

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