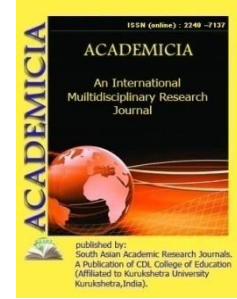


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DESIGNING A DYNAMIC MODEL OF INDUSTRIAL DEVELOPMENT STRATEGY IN WEST AZERBAIJAN PROVINCE OF IRAN

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ABSTRACT

The present strategy aims at designing a dynamic model of industrial development strategy in West Azerbaijan Province, Iran. Population of the study includes all private and government organizations related to industries and industrial development. A synthetic model of interviews and system dynamics is used here. The study considers industrial development a dynamic model and suggests that interventive variables transform over time. A total number of 10 scenarios for industrial development in the province is proposed. Results show that simultaneous improvement of experience transfer, use of foreign counsellors, promoting information and communication power is the most effective scenario. This contributes to a better understanding of industrial development as a multifaceted phenomenon with a series of determinants in the region.

KEYWORDS: *Development, Industry, Strategy, System Dynamics*

INTRODUCTION

Perspectives of Islamic Republic of Iran and national aspirations are a function of efficient leadership of competent and committed managers who run different organizations, particularly in private sector where industrial development is of greatest concern (Abolalaei, 2004). Sustainable development is bound to development of its sub-functional elements (Jilcha and kitaw, 2017). Industrialization is also a function of economic growth (Mohsenvand, 2015). Economic benefits from business activities improve the quality of life worldwide (Sullivan, 2017). Factors such as facilitating investment, training skilled workforce, applying economic scales, and implementing complementary projects can accelerate industrialization and promote productivity. Thus, national revenue as well as growth rate increase (Mohsenvand, 2015). Tafler asserts that the advent of industries inaugurated a new mode of life associated with certain experiences. Results of studies by Mousapoor et al. (2016), Tayet et al. (2008) show a strong correlation between values of GDP and manufacturing industries, i.e., the latter significantly influences the former. Optimal industrial development promotes quality of life. That is why industries, compared to other productive sectors, play a leading role in economics as they significantly influence means of production (Kim, 2011). Industrial development continuously promotes production factors and has an ascending trend because it is driven by emerging science and technology (Pak, 2015). Once a nation reaches a certain level of industrialization, material and spiritual needs of its population are satisfied and social work, as well as production, flourish. Consequently, national independence is reinforced, industrial products make a larger portion of exports, industrial productivity increases, means of production change and newer products are offered, population density in cities increase and rate of capital expenditures in income change (Rahmani, 2016).

Organizational strategies are designed to respond to environmental transformations in economics and industries (Farahmand, 2017). In today's highly competitive and complicated world, organizations, institutes, regions and countries that fail to realize their domestic capacities and environmental challenges or opportunities, will face difficulties (Zu et al., 2012). New concepts and theories by experts serve as effective mechanisms for organizations to survive against environmental transformations (Farahmand, 2017). West Azerbaijan Province faces many challenges in the region because the country is experiencing a period of draught and water shortage, and it shares borders with some countries, particularly Turkey as the gate to Europe. On the other hand, cultural, economic and political fluctuations pose greater burden on private and government organizations to adapt with new transformations. Innovations in marketplaces drive emerging businesses to maturity which may finally prosper or fail. This explains why some organizations, regions or countries cannot survive.

An appropriate strategic plan starts with identifying weaknesses and strengths, threats and opportunities, and addressing demands by organizations, customers and the population. Iran faces international pressures and new sanctions which impose great costs on national economy. This is intensified with climatic changes in the region which affect local economy, especially agriculture. Moreover, West Azerbaijan Province is located in a geopolitical place that shares borders with some countries, which adds to the importance of strategic planning. The present study examines the nature of industrialization in the region and proposes some ways to achieve this objective.

TABLE 1. THE LITERATURE ON INDUSTRIAL DEVELOPMENT

No	Researcher	Year	Field of study	Findings
1	Mehdipour	2011	Proposing an appropriate market strategy based on the position from SPACE matrix	First, internal market position was analyzed using four key strategic variables of corporate finance, corporate competitiveness, environmental stability, and industry growth potential. The resulting position from the matrix was then used to offer aggressive, conservative, defensive, or competitive strategies or a mix of them.
2	Rezaei	2009	Comparative analysis of methods of implementing strategy	Results indicate that implementing strategies in task-oriented organizations is futile, even though the company benefits from expert task-based sectors. To establish a macro business strategy, all activities need to be based on the relationship between processes.
3	YousefiRezaei	2007	Comparative analysis of methods of implementing strategy	Models for implementing a strategy in organizations have three functions. They translate the macro-strategy into an operational strategy and implement it in all organizational levels. Then, they measure the results and provide feedback for next steps.
4	Delghani	2005	Designing a strategic plan in poultry industries: a case study of Zarball company	The authors proposed long-term strategic plans. They used quantitative strategic planning matrix in decision-making phase and prioritized the strategies. Finally, they offered practical plans to implement and facilitate strategies.
5	Mehdipour	2005	Strategic planning models	A limited number of firms have established the essential chain between real organizational objectives and strategic sources, i.e. technology, production and people. Firms mainly focus on operation control and neglect financial outcomes of operations. This leads to neutralization of strategic management models.
6	Rashidi	2004	Designing an appropriate marketing strategy for SaderatBankin Yazd	The authors measured customer expectations and satisfaction through interviews with experts and bank managers and used planning committee of Saderat Bank and identified existing strengths, weaknesses, opportunities and threats to

find the position of the organization in the business market. Based on the results, they offered a synthetic developmental and customer-based strategy.

METHODOLOGY

The present study uses a synthetic model of interviews and system dynamics. Thematic analysis method includes six steps: becoming familiar with the data, generating initial codes, searching for themes, reviewing themes, defining themes, and write-up. Determinants of industrial development in the Province were identified. Then, variables with maximum positive effect on the model were identified and directed to authorities along with guidelines on their applicability. System dynamics model is extensively used for analysis and simulation of variables, factors and behaviors of phenomena in management (Sterman, 2000). Thus, it was adopted in the present study to analyze proposed scenarios for industrial development of West Azerbaijan Province in Iran. It is used for examining internal relationships between phenomena that influence the behavior of the system. By modifying model structure or parameters in the simulated environment, changes in system behavior are induced (Hamidizadeh, 2002). Results of simulations were used as guidelines for regional development.

This is an explorative analysis that uses field data collection method. A library method was used for data collection and a review of related literature. Moreover, open-ended interviews with experts for further enrichment of the subject. Data analysis was performed by Vensim through flowcharts and cause and effect diagram to examine effects of adopted policies on system behavior. Population of the study includes all private and government organizations related to industries and industrial development in West Azerbaijan Province, Iran. Apart from organizational documents, top managers and experts were interviewed through a questionnaire. Inclusion criteria for selecting expert were:

- 1) Ph.D. in management with 3 years of working experience, or M.A in management with 7 years of working experience, or B.A in management with 15 years of working experience.
- 2) Familiarity with industrial development in imports and exports
- 3) Willingness to participate in surveys, and semi-structured interviews

TABLE 2. STAGES OF DETERMINING ELEMENTS OF STRATEGIC OPERATIONAL MODEL IN THE PROVINCE

Stage	Agents	Measures
Setting objectives, mission and values	Top managers and deputies, Planning and Organization, and provincial authorities	Based on internal and external changes, Budget and measures were set by provincial authorities.
Determining strategic industrial goals in the province	Top managers and deputies, Planning and Organization, and provincial authorities	The researcher proposed a draft of strategic goals to be verified by provincial authorities and to be monitored for the next 3 years.

Forming SWOT matrix	Top managers and deputies, Planning and Budget Organization, and provincial authorities	The researcher analyzed internal and external environments to identify strengths, weaknesses, opportunities, and threats to from SWOT, EFE, and IFE matrixes.
Identifying key qualifications and critical success factors	Top managers and deputies, Planning and Budget Organization, and provincial authorities	Measures to deal with strengths, weaknesses, opportunities, and threats identified in the previous stage were determined.
Setting strategies	Top managers and deputies, Planning and Budget Organization, and provincial authorities, the researcher	Based on outcomes from the previous stage, four strategies (OS, OW, TS, TW) in SWOT matrix were determined.
Setting industrial guidelines for the province	Top managers and deputies, Planning and Budget Organization, and provincial authorities	Considering existing strategies and annual perspective of the organization, the blueprint of provincial guidelines was written.
Determining key processes	Experts and the researcher	Measures were set considering effects of industrial strategies on provincial processes.
Determining field-specific plans and strategies	Top managers and deputies, Planning and Budget Organization, and provincial authorities	Based on results from earlier stages, field-specific goals, strategies and plans were determined.

Data analysis was done in two steps using statistical and mathematical tests:

1. Determining relationship between variables: a questionnaire was used to determine the relationship between variables. Experts' ideas based on frequency were collected and valued as in Table 3. The qualitative numbers were then fed into the mathematical model.

TABLE 3. VALUATION SCALE

Five-point scale on effects of factors on industrial development					
scale	Very high	high	Medium	Low	Very low
value	5	4	3	2	1

2. system dynamism process. Five steps of system dynamics model were followed as in Figure 1.

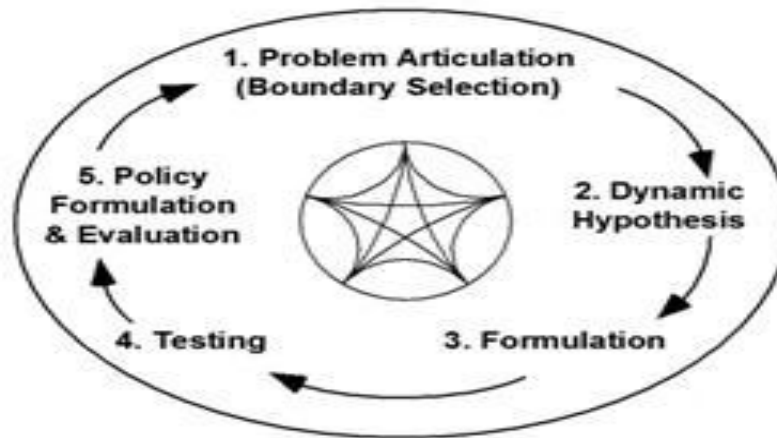


Fig 1. System dynamics model

FINDINGS

A 7-item questionnaire was handed to experts to identify the status of industrial development and its determinants in the region. Results of thematic analysis of data collected from questionnaires are summarized in Table 4. Once the system border and variable coefficients were determined, the process was simulated (Figure 2). Dynamics of variables of the study are given in Table 6. Also, a five-point Likert scale questionnaire with items that covered years 2007 to 2017 was used to create valuables of table-valued function.

TABLE 4. RESULTS OF OPEN-ENDED QUESTIONNAIRE

N o	Question	Response	Frequen cy
1	Does the province have a plan for strategic development?	1- yes	53.1%
		2- no	40.2%
		3- no answer	6.7%
2	If yes, how clearly is strategic development defined?	1- not much	61.5%
		2- to some extent	% 22 /2
		3- very well	17.3%
3	If not, why don't managers feel the necessity to design it?	They have a different perception of industrial development.	30.5%
		Industrial development is not a priority.	33.3%
		The required infrastructures are not ready.	36.2%
4	Is the province ready to implement industrial development strategy?	Industrial development is a key organizational principle.	17.2 %
		Long-term plans are needed.	51.2%
		Cultural backgrounds need to be established first.	32.6%
5	What are some measures taken by top managers to implement industrial development strategy in	Modeling successful countries	40%
		Incentives (financial and non-financial)	30.5%
		Training programs	29.5%

	organizational processes?		
6	Have these measures promoted industrial development system in the province?	1- yes	40%
		2- no	60%
7	What factors do you think influence industrial development in the province?	Employing internal and external experts, and engaging organizations related to industrial development	19.2%
		Supporting knowledge-based organizations, use of modern technology, promoting alterant industries	30.8%
		Promoting communications, quality, modelling, and external market development	50%

TABLE 5. VALUABLES OF TABLE-VALUED FUNCTION

Variables	year											
	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	
Developing internal markets	3.2	3.2	3.9	3.8	3.7	3.8	3.9	3.9	3.9	3.8	3.7	
Access to external markets of neighboring countries	2.7	2.5	2.6	2.6	3.7	3.5	3.5	3.4	3.3	3	2.6	
employing internal experts	2.6	2.7	2.6	2.6	2.4	2.4	2.3	2.6	2.3	2.2	2.1	
Strengthening alterant industries	3.1	3.5	3.6	3.7	3.7	3.8	2.9	2.7	2.5	2.5	2.5	
Use of modern technology	3.6	3.7	3.7	3.6	3.5	3.7	3.6	3.3	3.4	2.2	2.8	
Use of knowledge-based organizations	3.1	3.2	3.2	3.2	3.3	3.4	3.4	3.3	3.2	3.2	3.1	
Promoting Quality	1.8	1.9	2	2	2.1	2.1	2.2	2.3	2.2	2.1	2.1	
Promoting communications	3.8	3.7	3.6	3.5	3.5	3.4	2.9	2.6	2.5	2.4	2.5	

TABLE 6. STRUCTURAL FACTORS IN CAUSAL GRAPH

Item	Decription
Modelling	Successful Turkish industries can be used as a model for developing external markets. Counseling Turkish experts may boost access to markets of neighboring countries and expansion of internal markets.
Support	Government support is essential for using economic potentials in the region. Local experts can also reinforce these potentials.
Alterant industries	There are plenty of fruit garden in the province which can be optimized by using alterant industries.

Technology	Modern technologies, along with knowledge-based organizations, promote productivity and quality.
Communication	Transferring experience through knowledge management system promotes information infrastructure and help train expert staff, which boost communication capacities.

Fig 2. Flowchart of SD model

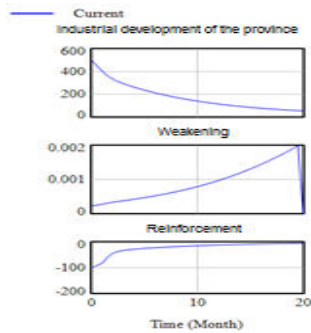
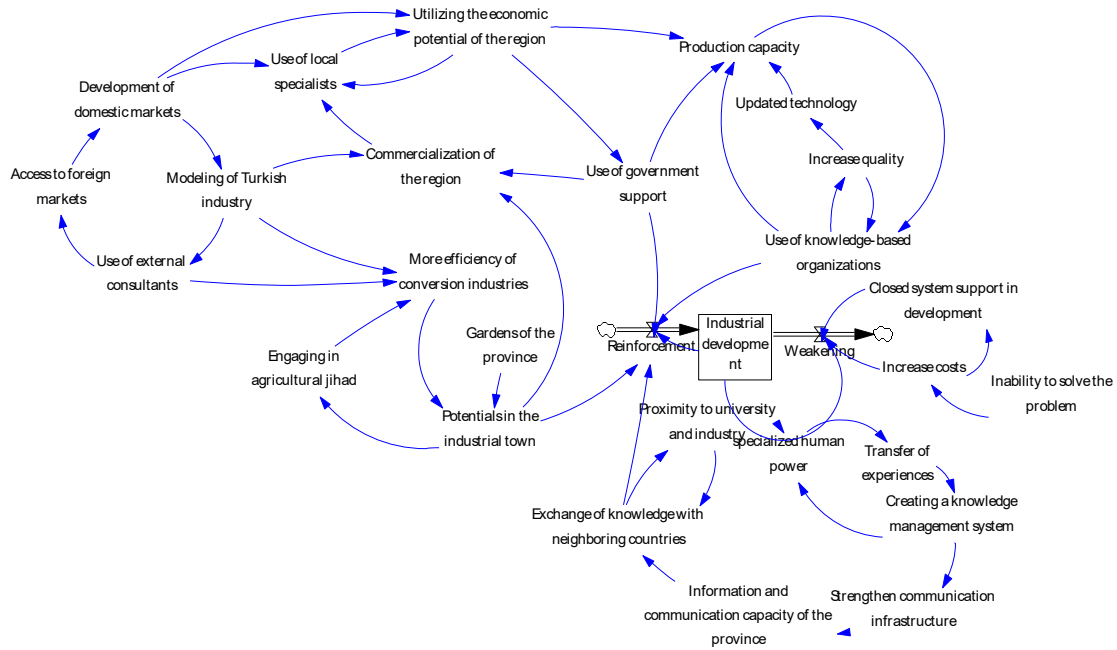


Fig 5. Behavior of ratio variables

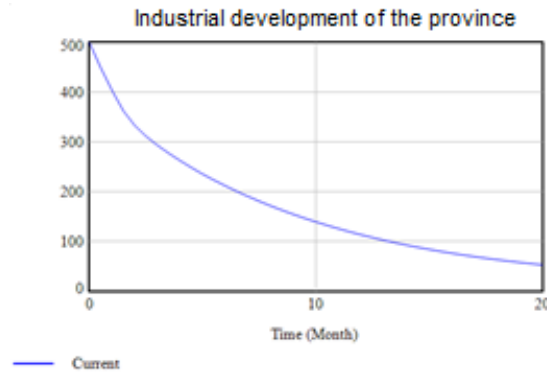


Fig 4. Behavior of SD model ofr industrial developmetn

TABLE 7.RESULTS OF SIMULATIONS AT TIME STAMP 0.5

Time (Month)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5
	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5
	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5
	17	17.5	18	18.5	19	19.5	20			

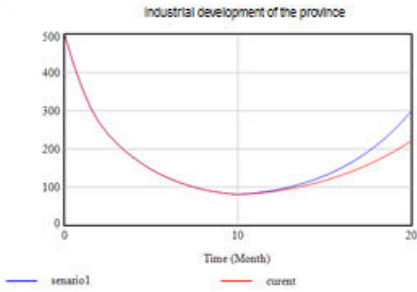


Fig 7. Behavior of SD model after promoting government support

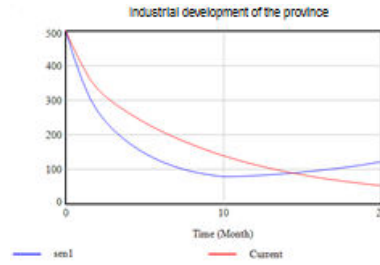


Fig 6. Behavior of SD model after promoting knowledge-based organizaitotns

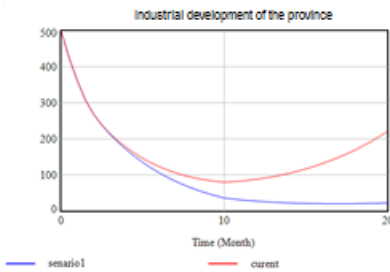


Fig 9. Behavior of SD model after promoting regional business

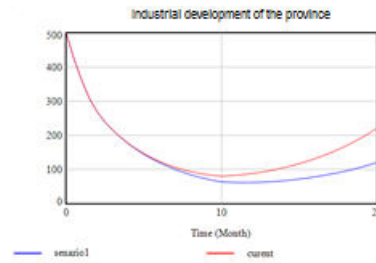


Fig 8. Behavior of SD model after promoting regional economic potentials

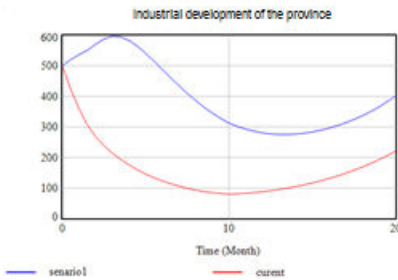


Fig 11. Behavior of SD model after modelling Turkish indstries

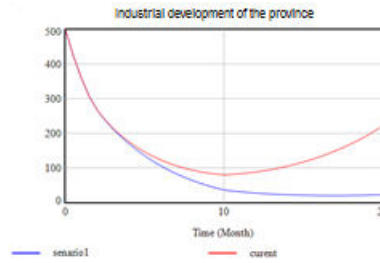


Fig 10. Behavior of SD model after increasing use of local experts

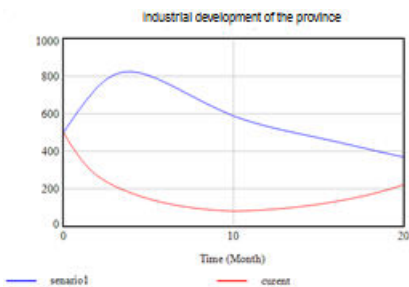


Fig 13. Behavior of SD model after promoting closed sysrtem support

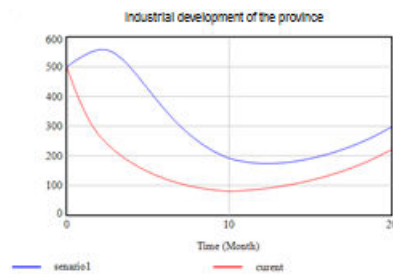


Fig 12. Behavior of SD model after promoting use of external counsellors

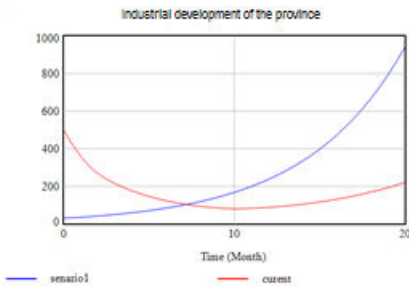


Fig 15. Behavior of SD model after simultaneous improvement of experience transfer, use of foreign counsellors, promoting information and communication power

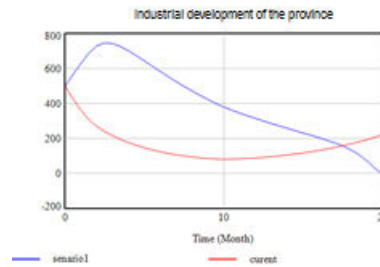


Fig 14. Behavior of SD model after promoting participation of Ministry of Agriculture Jihad

MODEL SIMULATION

Figure 4 depicts long-term status of industrial development in the Province. if other variables are considered to be fixed, it is estimated that, in the next 20 years, industrial development in the region will decrease with a slight slope. Weakening and strengthening rates of developing human resources are given in Figure 5. Since strengthening rate is greater than weakening rate, it is predicted that development will drop in the future. This is a negative trend, though there are many other factors like sanctions that exacerbate the problem. However, implementing appropriate domestic mechanisms and adopting cross-country perspectives can alleviate the problem to a great extent.

DISCUSSION

The literature shows that West Azerbaijan Province is among the least developed provinces in Iran, and annual patterns show a declining trend (Bakhtiary, 1994-2014). Our results are in line with findings of Bakhtiary (2002) and Sarvar (2013). Results of industrial development strategies show a declining trend in the next 20 years. Considering the rapid growth rate of neighboring provinces and countries, this is a negative point and call for immediate action. Therefore, the present study proposes some scenarios to promote industrial development in the region.

Scenario 1: promoting knowledge-based organizations contributes to industrial development in the region. Accordingly, rate of refence to knowledge-based organizations increased from 0.22 to 0.42. This will prove beneficial in the long run. As predicted, the scenario will have a decreasing trend in the first 17 years but will significantly rise after that. Results are given in Figure 6.

Scenario 2. Government support programs will boost industrial development in the region. Accordingly, rate of government support increased from 0.31 to 0.51. This scenario will also prove beneficial in the long run, and shows greater growth rate than the first scenario. Results are given in Figure 7.

Scenario 3. Use of potential local economies will boost industrial development in the region. Accordingly, rate of using potential local economies increased from 0.12 to 0.22. However, the scenario may have reverse effects after 7 years. That is to say, industrial development will once again decline after 7 years. Results are given in Figure 8.

Scenario 4. Commercialization of the region helps boost industrial development in the province. Accordingly, rate of commercialization increased from 0.35 to 0.55 in the model. However, the scenario showed no increase after 5 years, and showed negative growth rate after that. Results are given in Figure 9. This may be because of unplanned decisions in commercialization process. Other factors such as unawareness of local people and authorities of the importance of industrial development and lack of strong regional potentials contribute to this failure. Development plans rely mostly on a strong communal readiness and willingness to be initiated and realized.

Scenario 5. Use of experts will boost industrial development in the region. Accordingly, rate of expert use increased from 0.12 to 0.22. This scenario showed no noticeable potential for regional development. Results are given in Figure 10.

Scenario 6. Benchmarking Turkish industrial development pattern will boost industrial development in the region. Accordingly, rate of benchmarking increased from 0.1 to 0.2. This scenario promises an ascending trend within first 4 years, but recesses to its current status. This is because Turkish model proves effective in the short term but is not strong because of cultural differences and defective benchmarking techniques. Results are given in Figure 11.

Scenario 7. Use of foreign counsellors will boost industrial development in the region. Accordingly, rate of foreign counsellors increased from 0.18 to 0.28. This scenario showed no noticeable potential for regional development in the long run. Results are given in Figure 12.

Scenario 8: supporting closed systems contributes to industrial development in the region. Accordingly, rate of closed system support increased from 0.58 to 0.78. Results are given in Figure 13. This scenario also shows an ascending trend within first 4 years, but weakens the trend at a steep slope. Because of rapid environmental changes and demand patterns in the region, supporting the closed system significantly deteriorates flexibility and causes irreversible damages to provincial development.

Scenario 9. Involving local farmers in regional economy will boost industrial development in the region. Accordingly, rate of involvement increased from 0.41 to 0.61. This scenario proved effective for short-term regional development but showed no potential in the long run. Results are given in Figure 14.

Scenario 10. Simultaneous improvement of experience transfer, use of foreign counsellors, promoting information and communication power will boost industrial development in the region. Accordingly, these variables were increased by 0.2. Results are given in Figure 15. Our results showed that the synthetic model yields the most optimal outcome in promoting industrial development. It has incremental effect and proves effective in the long run. In traditional models, people and organizations showed no interest in transferring their knowledge to other. For them, knowledge was not a scientific capital to pass on to other. Rather, it was a power leverage that guaranteed job security and promotion (Rock et al., 2015). Thus, organizations that support the spirit of information sharing and cocreation are successful in establishing effective operating processes and can promote their performance. Foreign counsellors play a significant role in this regard. Sharing knowledge and experience becomes fruitful when it is coupled with expert ideas of foreign counsellors from successful countries. Our results show that sharing knowledge and experience, and use of foreign experts' ideas can be helpful when communication infrastructures are provided. This includes software and hardware, data transfer and analysis, data organization and preservation, information interpretation and transfer, and use of computers for data

processing. Our findings indicate that all collected data are valuable and can turn to competitive advantages of the region, if processed with care.

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