Full Length Research Paper

Designing dynamic model for measuring the effects of cultural values on Iran's economic growth

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In recent years, analytical frameworks and empirical tools of economic culture and outcomes using closed developments led to the identification of methods and mechanisms that are culturally based on the economy that can be tested and may lead to economic growth and development. Considering the relationship between culture and economic growth in modern societies, this paper investigated the cultural values of Iran's economic growth using the analytical hierarchy process (AHP) technique according to the VENSIM modeling software discussed in terms of dynamic and behavioral components of cultural values on economic growth in Iran. The results showed that of 100% criteria constituting the cultural value of Iran, there is 12.5% share of "individual values" and 87.5% share of "social values".

Key words: Cultural values, economic growth, modelling, analytical hierarchy process technique, Iran.

INTRODUCTION

The role of culture in today's economy is the major concern of economists and accordingly, it is believed that the culture of a country's economy is a useful tool for its development. In fact, many cultural assets such as skills and products promote the welfare of a society.

To understand the impact of culture on the economy, it is important to know the cultural values and norms of the system that exist between individuals and their economic activities. Given the importance of culture on an economy, it would be seen that culture has a direct effect on the economy of a country and vice versa. Social theory of Karl Max and Daniel Bell on economic development is: 'cutural change is comprehensive'. Another theory by Max Weber and Samuel Huntington is that the cultural values of a viable and independent society that influence the economic growth during the past fifty years cannot be an accidental change that corresponds relatively to independence (Thompson, 2001).

The economic contribution of culture in the economy is very important. Grondona (1999) proposes that the value of a tool for economic development is useful; however, what is more important for economic growth and sustainable development is the important values inherent in each culture. Thus, every nation with a sense of social and economic realities of its own can change, and if it has the right competencies to achieve economic growth and development and focuses on the correct values, it will be stabilized.

Many studies have been conducted by various researchers and at international conferences (such as Mexico City, UNESCO etc) on the impact of culture on economic growth in recent years. Countries also need to pay attention to this important issue that has been emphasized by the various researches. Some countries, governments and industrial sectors have completely developed new methods and ways to diversify their economies through cultural factors to meet new challenges (Nurse, 2006). The leading countries in the development of these opportunities have achieved significant economic growth.

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Granto et al. (1996) used the World Values Survey data of 1990 to measure the level of "motivation", acting on a set of 25 countries and showed that the key factor of the 1960 to 1989 period is economic growth which has a positive effect in these countries (Hanson, 2009).

Hanson (2009) estimated the effect of economic growth in 25 countries for the period of 1991 to 2007using ordinary least squares regression estimates motivation and proved that the cultural values of countries grow economically and statistically in a significant relationship. The coefficient of determination adjusted was 0.7 which indicates that its cultural value is 70% of the dependent variable (economic growth) .

METHODOLOGY

The study is a descriptive survey which leads to the implementation of a mathematical model. Weight of each of the components was calculated using AHP technique and the relative weight was determined. The final weight (global weight) is the addition of the relative weight and the individual weights of the components. A dynamic modeling was performed using the software VENSIM. With the AHP technique, each element of the surface element to a higher level was compared to pair and their weight was calculated. So what is the relative weight called? Then combined with the relative weights, the final weight is calculated for each option that calls it the global weight. All paired comparisons to be made are in contrast; one of the states recognizes the importance of i and j. The judge turned to the small amounts which are 1 to 9, as shown in Figure 1.

The scope of the research is a 15-year period from 2011 to 2025. The starting year in modeling is 2011 where the coefficients are calculated in the AHP technique; then for the next 2025 year forecasts have been made. The modeling, cultural values are considered as variable accumulation (stock) that influences two auxiliary variables (flow): personal and social values.

Data collection

Weighting the data collection requirements, the importance of each dimension, components and indicators, professors of the fields of economics and experts of planning and management of culture have been referred to. Questionnaires were distributed to 30 participants and a total of 25 returned were extracted and analyzed in terms of proper diagnosis.

THEORIES OF CULTURAL VALUES AND ECONOMIC GROWTH

Mariano Grondona, a prominent Argentine intellectual, in his book, "The Cultural Conditions of Economic Development", published in 1999, states the analysis of differences between cultures in favor of development (such as the U.S. and Canada) and resistance development (Latin America) deals.

He believes that when a country enters from one stage to another stage, the process of economic development is in crisis, that is, if a country will achieve development in the face of this temptation. Otherwise, only the short-term will succeed (Grondona, 2000). He raises the question that why are some countries rich and others poor. Two types of values and standards are raised: intrinsic and instrumental values. Intrinsic values those values that are, regardless of their benefits and harm. Value is patriotic but sometimes must be sacrificed for and the same value can be

harmful for the life of a man. Inversely, instrumental value is well worth it because its support is directly beneficial to us. Let us also assume that a country is dedicated to economic development and lays emphasis on employment, productivity and investment (Grondona, 2000).

His twenty cultural factors influencing growth and economic development are assessed and investigated; five of them are classified as follows (Grondona, 2000):

1. Work-related values and produce.
2. Values of the universe.
3. Personal values and beliefs.
4. Values about governance and the rule.
5. Religious values.

Between what a person believes that and how his life as has been, Asante values, norms, attitudes and beliefs of a society the organization of economic, political and social forms it and a general feeling about the development of hypnosis.

Michael McPherson argues that economics itself is part of a cultural realm. Realm of cultural activities and goals to a great extent makes economic sense and limits the opportunities to show people way of developing themselves. In addition to this theoretical discussion, a relative large number of experimental studies are claimed to have been conducted on the western and eastern sides, where there are economic growth and development, valuation and realization of people's beliefs and values (Symphorien, 2009).

Literature values of individuals refer to behaviors that can be experienced by people. According to Rostow (1960), the six approaches that can be effective in economic growth are: the personal nature of these six factors, where five factors have personal nature (Marini, 2004).

1. The development of fundamental knowledge and basic
2. Application of science in economics
3. Reception of facilities innovation
4. Search for raw materials with competitive advantage
5. Consumption of high value products
6. Birth control.

Fukuyama (1995), both in personal and social values as an important influence on economic growth, concluded that 80% of the capital and assets of a country are of social values and while 20% are related to personal values.

Harrison highlights what is important in economic development and growth and developing countries is culture. Other experts in this regard such as Putnam conclude that over the centuries, Italy demonstrates that cultural values have more influence than economic factors; and Grondona in the book, "Cultural and economic conditions" concludes that the culture of economics or politics is very powerful.

Abundance of evidence suggests that religious beliefs can affect a wide range of conduct raised (Iannaccone, 1998), and religious activities of the economic performance at the individual level or the national team affect at least in two ways (Noland, 2006).

Weber (2002), in the "protestant beliefs" and "spirit of capitalism", noted that the protestant reformation for capitalism believes the impact it had on critical systems. The starting point of Weber's analysis of conflicts between religious values and ethics was the world (Yang, 1964).

Weber argued that the Calvinist doctrine of determinism on tribute imagines calling for change and related trends in economic activity and wealth. Religion is an important aspect of culture. They are nearly related, due to the fact that religion provides a clear set of values that are high among their followers (Leiknes, 2009).

Protestants do have a certain moral. That means they value Intrinsic values are those values that are regardless of
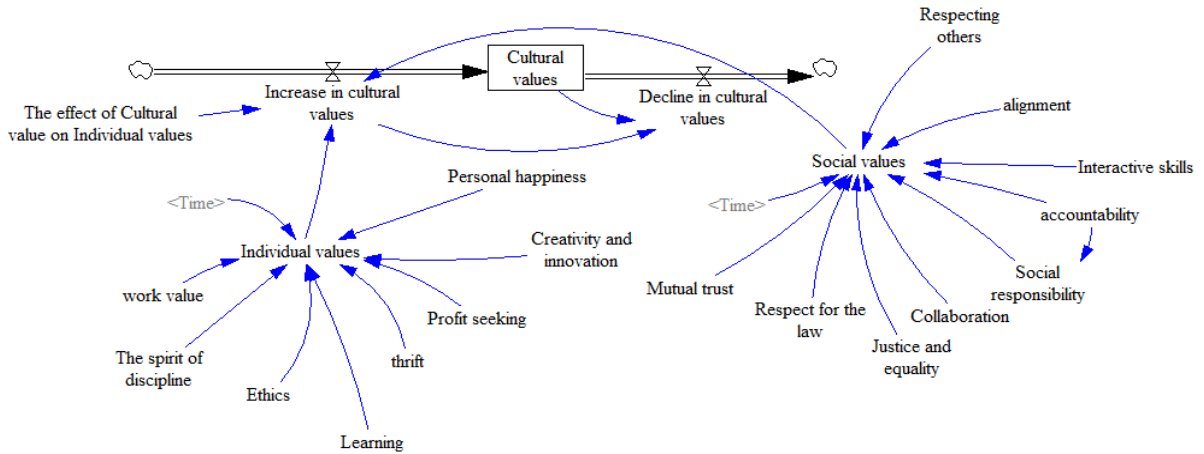
Figure 1. Simulated pattern of cultural value.

their work, as the only thing needed for achievement. According to Aristotelian-Catholic's idea, which was opposed to, a person should be able to acquire great wealth which is needed for better living. Moreover, he argued that protestant believers had high confidence and their affairs were delegated to someone outside the family unit. Thus, they were able to create organizations that did not rely on family relationships. In addition, protestant ethics of saving and investment ideas were catholics.

There are several empirical studies of religion and economic performance. In Barro and McClear (2003), the relationship between religion and economic growth variables for 59 countries were estimated. They concluded that the increase in church attendance reduces economic growth, while increase in some religious beliefs, such as heaven, hell and life after death will increase economic growth. They suggested reasons for these strong religious beliefs that would stimulate economic growth, because of certain behavior that increases productivity. Many attend church because of the influence of religion in the laws and regulations that affect economic behavior.

CONCEPTUAL MODEL (Figure 2 in Appendix)

The weight of criteria and sub-criteria of cultural values

The multi-criteria decision making procedure, analytical hierarchy process (AHP) is one of the methods that has applications in many different issues to be decided. Theoretically, it has a strong foundation. It is essentially a measure of the general theory of hierarchical analysis process.

The principles of psychology and mathematics mean that some of the abilities to solve complex problems in various fields are of quality and quantity. In this paper, we first used AHP technique, components and indicators of cultural values based on expert opinions and ratings are measured (Figure 1 in Appendix). After measuring the initial values by statistical software technique (VENSIM), design patterns and predicting behavior in a dynamic state variables are used until the end of the year 2025.

The weight of criteria cultural values

Experts noted 100 scores in the cultural values: 87.5 score to

"social values" and 12.5 score were for "individual values". Note that this analysis of the conflict rate is zero and less than 0.1. The weights are obtained at a high level of acceptability and are approved (Figure 3 in Appendix).

The weight of individual values components

There were 100 scores of total individual values; with "ethics" and "personal happiness" having the highest weight. Note that this analysis of the conflict rate is 0.04 and is less than 0.1. The weights are obtained at a high level of acceptability and are approved (Figure 4 in Appendix).

The weight of social values components

There were 100 scores of total social values, with "interactive skills" and "accountability" having the highest weight. Note that this analysis of the conflict rate is 0.04 and is less than 0.1. The weights are obtained at a high level of acceptability and are approved (Figure 5 and 6 in Appendix).

Model formulated

Model formulated includes maps of flow-stock and entering the mathematical equations. At this stage, the maps flow-stock in VENSIM PLE software have been plotted and entered inside mathematical equations (Figure 1).

The map of flow-stock of cultural value

The variables that affect stock and auxiliary variable, individual values and social values are located.

RESULTS

Simulation of the dynamic behavior of variables

This paper shows the simulation of dynamic systems from 2011 to 2025 time horizon which is a 15-year period,
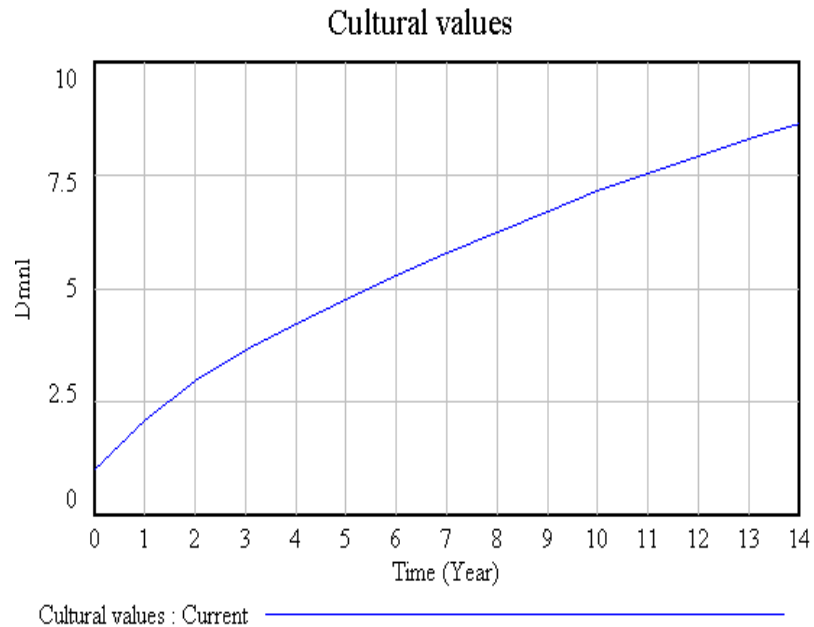
Cultural values

Cultural values : Current ————————

Figure 2. Simulated model of cultural value.

Economic growth

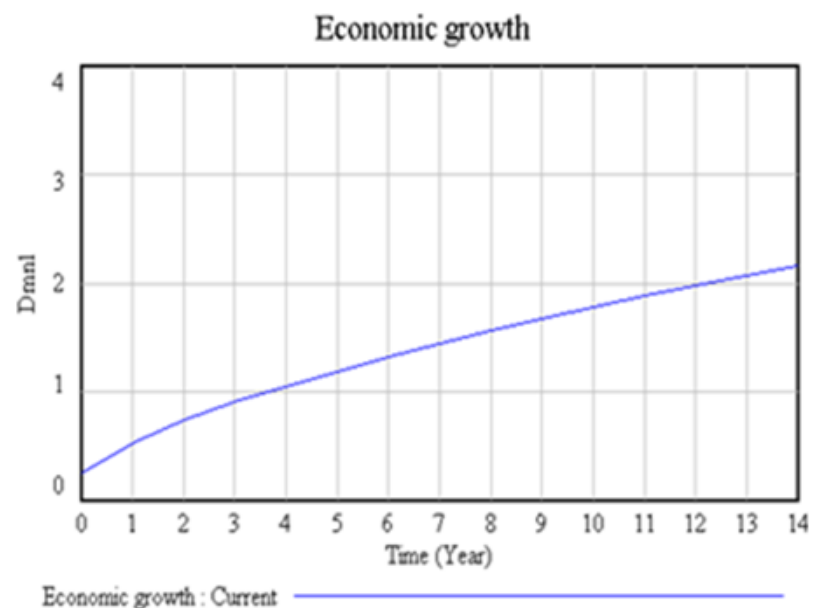Economic growth : Current ————————

Figure 3. Simulated model of economic growth.

the behavior of variable cultural value and economic growth is seen (Figures 2 and 3).

Sensitivity analysis and model policies

Sensitivity analysis, a mechanism to create certainty in analysis and policy-based model, is proposed. A model for analysis and policy recommendations should be aware of the changes resulting from the analysis.

The sensitivity analysis answer to the question, "how to change the values of model parameters?" revealed that little change in the structure of the model is sensitive. In this situation, one after the other model parameters are changed; and results related to the performance of some key variables are variables which are compared with the
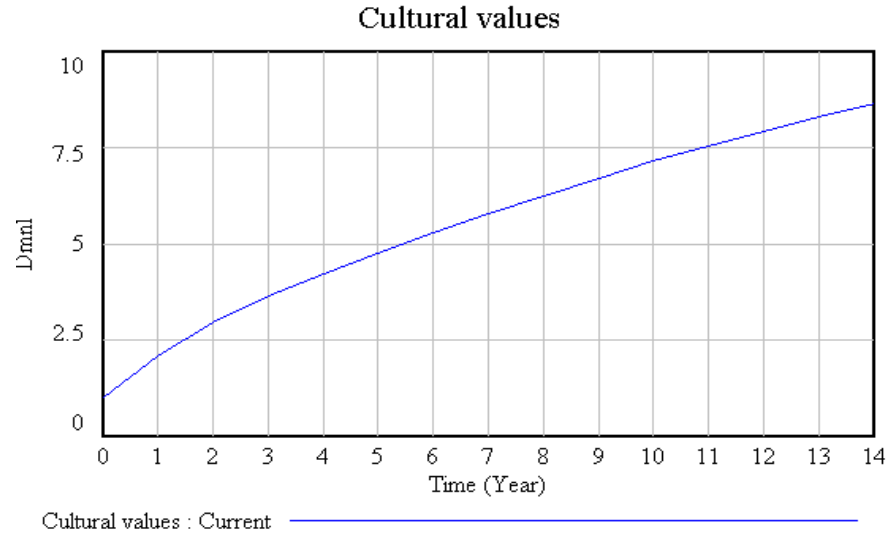
Cultural values

Cultural values : Current

Figure 4. Behavior of the cultural value.

Individual values
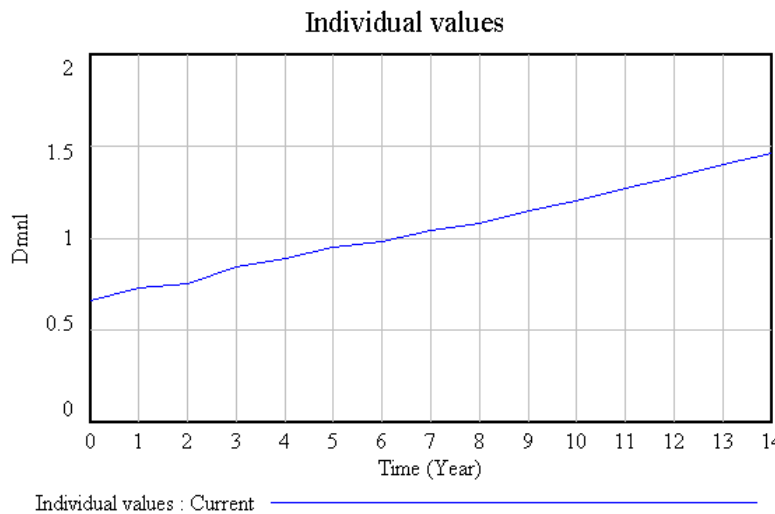

Individual values : Current

Figure 5. Behavior of the individual values.

baseline dynamic systems model of economic growth. It is going to change parameters affecting economic growth, and the sensitivity of this test is variable. Selected variables are:

1. Ethics
2. Accountability

The sensitivity analysis of ethics variable

In economic growth model, ethics is considered as 0.215. The value of this parameter decreased to 0.001 and the

implemented model and simulation model for the auxiliary variables are examined. Thereafter, the value increased to 0.9 and its effect on changing the cultural values and Individual values are reviewed (Figures 4 and 5).

Before the change in ethics parameters, the individual values of 0.66 units in 2011 will increase to 1.46 units in 2025 (Figures 6 and 7).

As can be seen with increasing rates of ethics 0.9, the individual values of 1.35 units in 2011 will increase to 2.15 units in 2025. The decrease in the rate of 0.001 to 0.45 units of individual values will be 1.25 units in 2025. The effect of this variable on the variable of cultural values can also be changed (Figures 8 and 9).
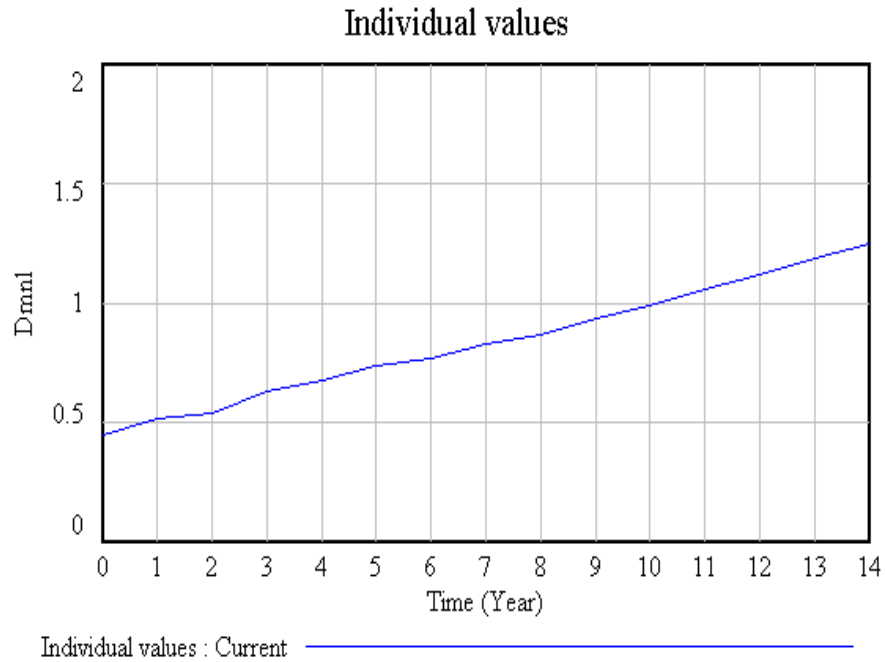
Individual values

Individual values : Current —————————————

Figure 6. The behavior or individual value by changing Ethics to 0.001.

Individual values

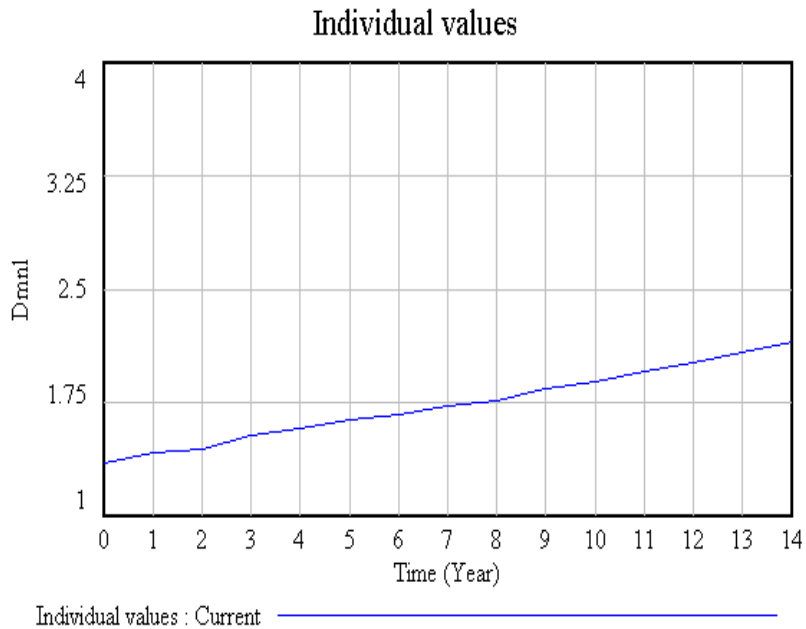Individual values : Current —————————————

Figure 7. The behavior or individual value by changing Ethics to 0.9.

Before the process, the cultural values were 1 unit to 8.66 units, as can be seen that the change rate increases ethics to 0.9; the cultural values of 1 unit in 2011 will be 10.7 units in 2025. The cultural values of a reduced rate to 0.001 unit will be 8.02 units in 2025.

Sensitivity analysis of accountability variable

In economic growth model, accountability is considered 0.130, the value of this parameter decreased to 0.001 and the implemented model and simulation model for the
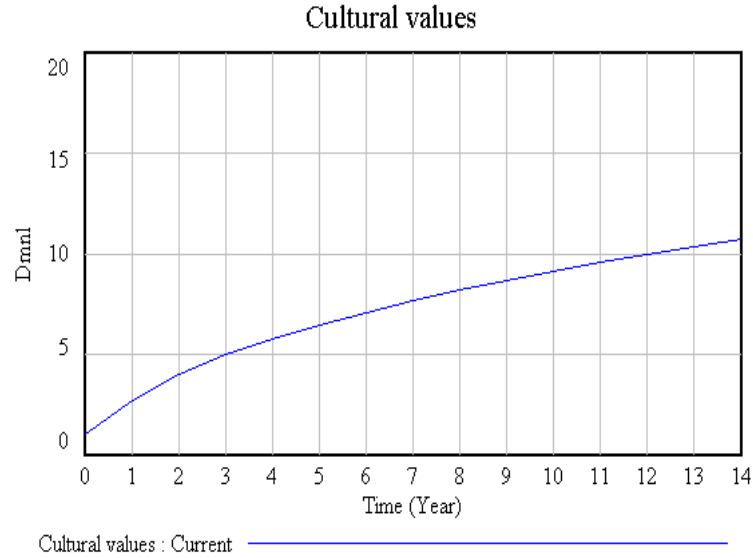
Cultural values

Figure 8. The behavior of cultural value by changing Ethics to 0.001.
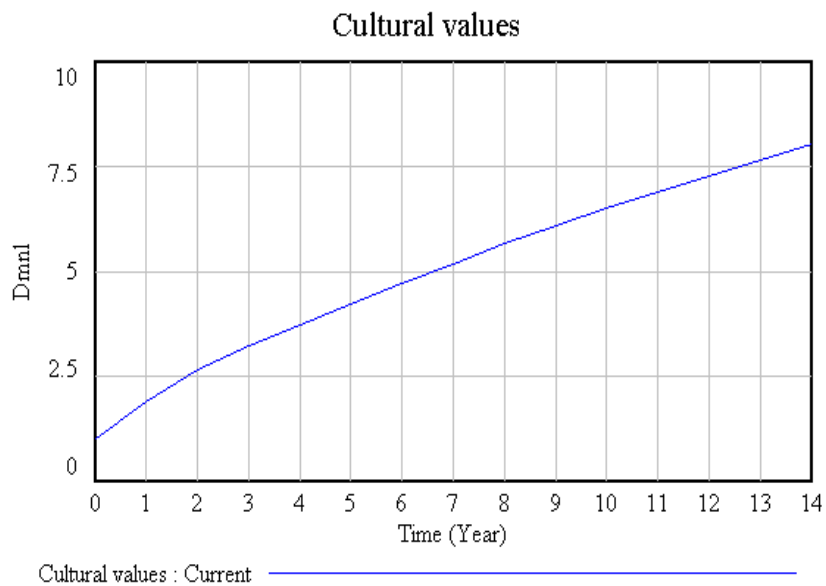
Cultural values

Figure 9. The behavior of cultural value by changing Ethics to 0.9.

auxiliary variables were examined. Then the value increased to 0.9 and its impact on accountability variable and the cultural values are considered (Figures 10 and 11).

Before changing the parameters of accountability, social values of 0.84 units in 2011 to 1.74 unit in 2025 will increase (Figures 12 and 13).

By increasing the rate of accountability to 0.9, the social values of 2.34 units in 2011 will increase to 3.25

units in 2025. The decrease in the rate to 0.001 of 0.59 units of intangible assets will be 1.50 units in 2025. The effect of this variable on the variable of cultural values can also be changed (Figures 14 and 15).

Before the process, cultural values were 1 unit to 8.66 units; but after the accountability change, by increasing the rate to 0.9, the cultural values of 1 unit in 2011 will reach 13.26 units in 2025. The reduction rate is 0.001; the cultural values from 1unit will be to 7.88 unit in 2025.
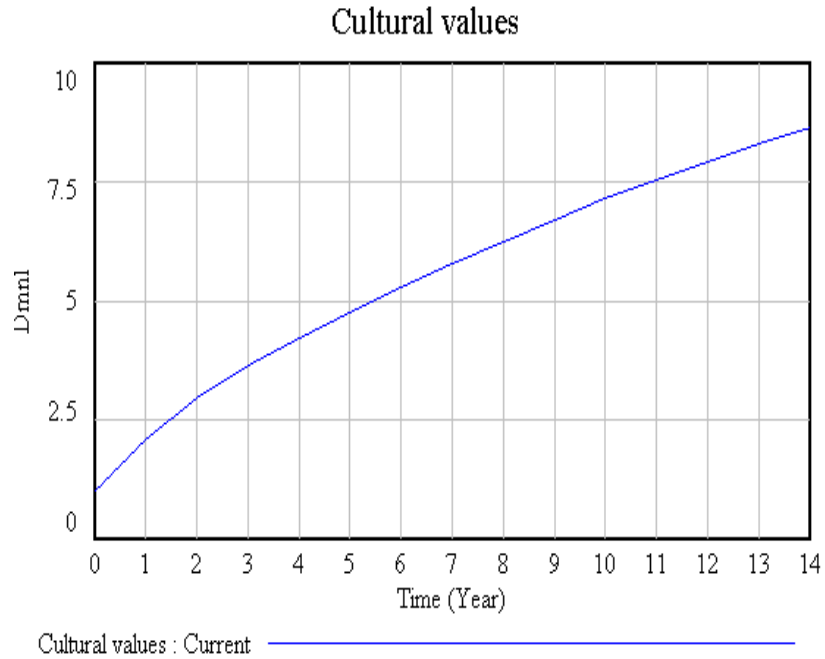
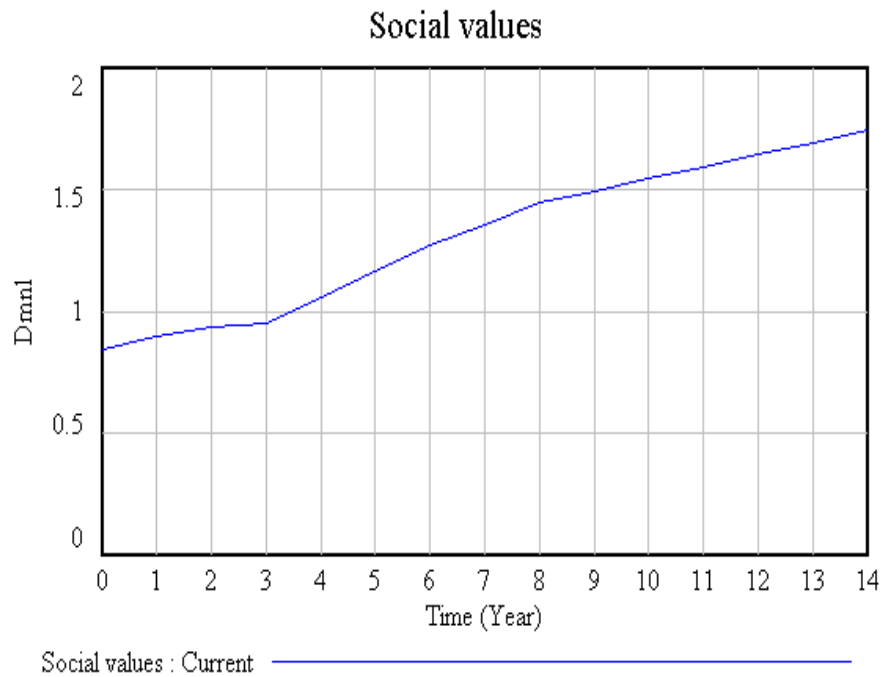**Figure 10.** Behavior of the cultural values.

Figure 11. Behavior of the social values.

Scenario building: Best and worst strategies

Policy parameter for valid model structure was improved,

after performing a sensitivity analysis. It can thus be used to develop scenarios for future use.

Several management options can be considered in the

Social values

Social values : Current
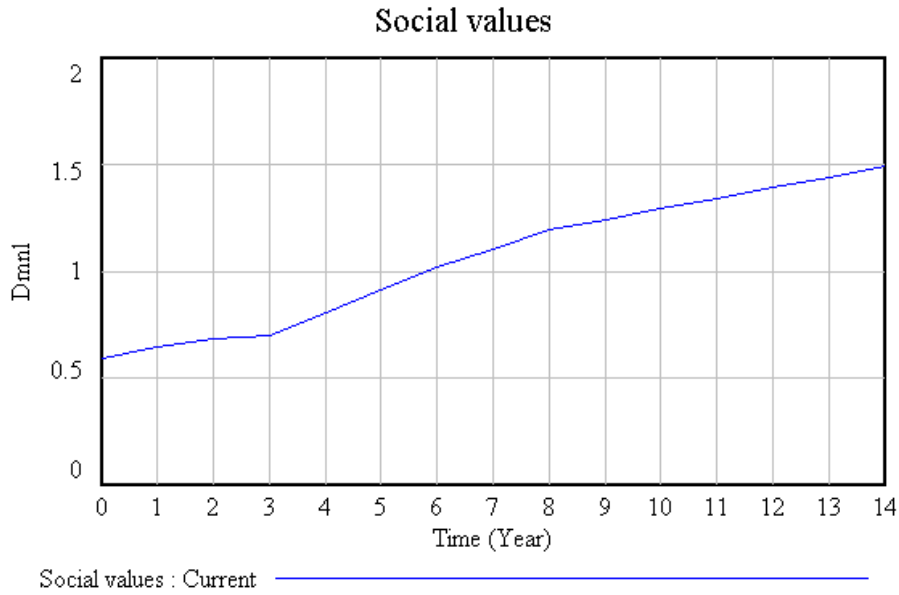
Figure 12. The behavior of social value by changing Accountability to 0.001.

Social values

Social values : Current
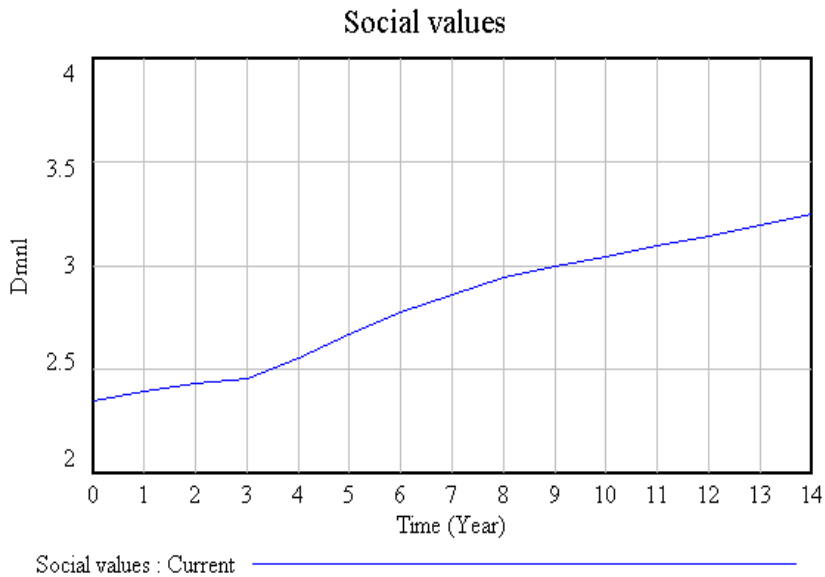
Figure 13. The behavior of social value by changing Accountability to 0.9.

policy parameters of the system considered options, and their impact on the dynamic response of the model to be considered as scenarios for future.

This article, the optimistic scenario (best) and pessimistic (worst) to the plausible range of parameters using sensitivity analysis, provides two new scenarios; and this compared with the baseline scenario has been addressed.

Baseline scenario

In this scenario parameters and coefficients are as follows:

1. work value, 0.230
2. Creativity and innovation, 0.09
3. Thrift, 0.022

Cultural values

Cultural values : Current
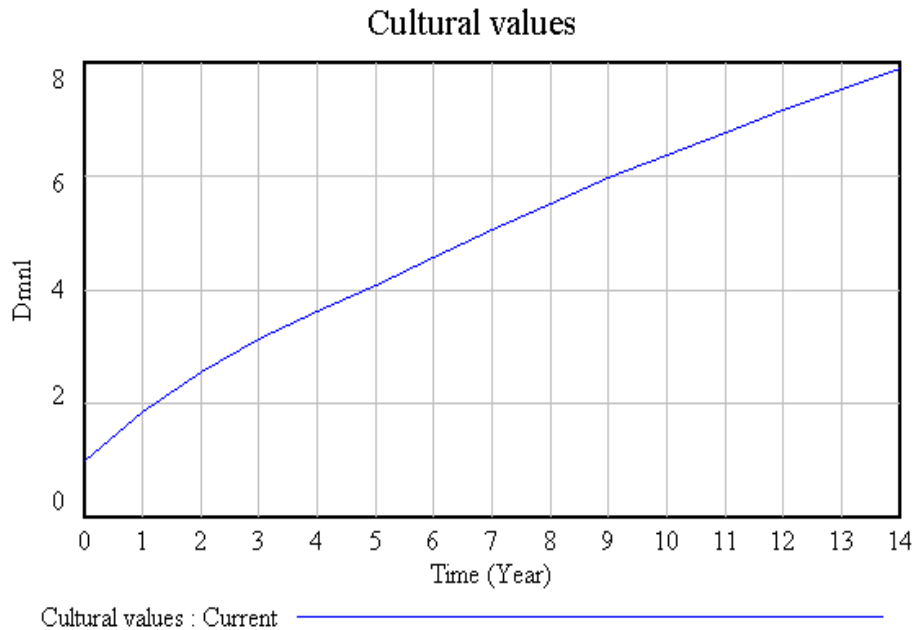
Figure 14. The behavior of cultural value by changing Accountability to 0.001.

Cultural values

Cultural values : Current
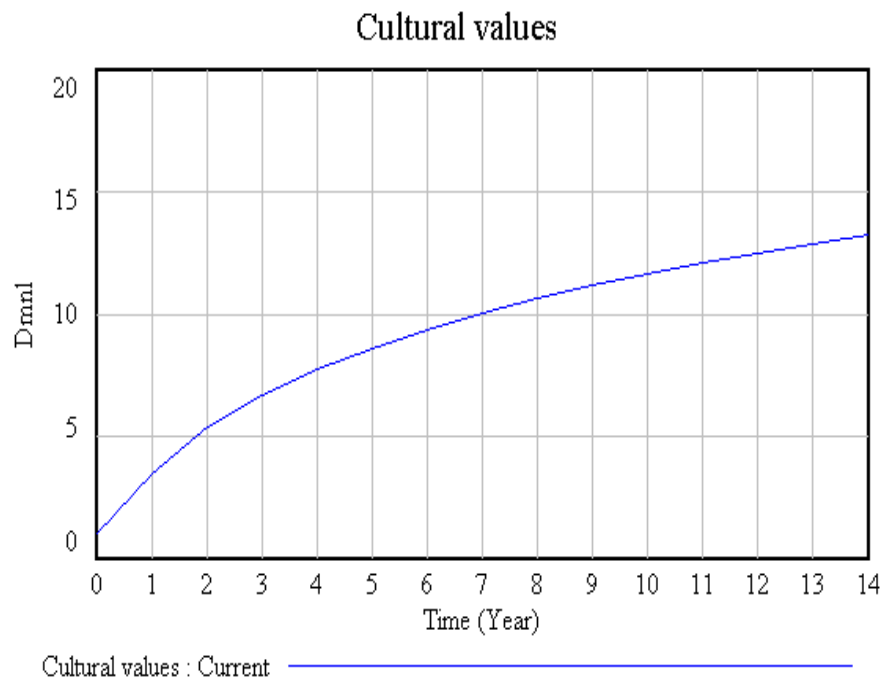
Figure 15. The behavior of cultural value by changing Accountability to 0.9.

4. Personal happiness, 0.130
5. Ethics, 0.215
6. The spirit of discipline, 0.039

7. Profit seeking, 0.041
8. Learning, 0.232
9. Mutual trust, 0.064

Table 1. The best case economic growth compared with the baseline.

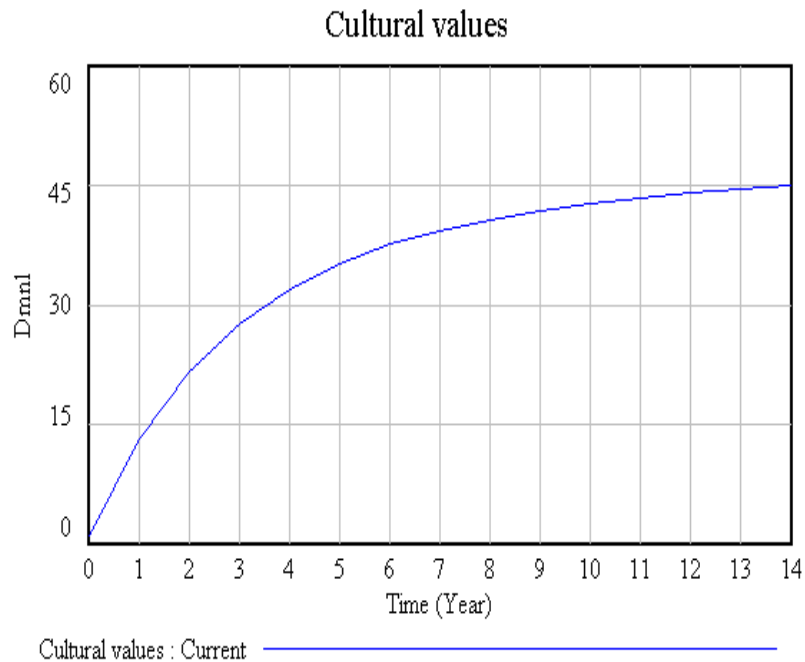| Time	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Baseline	0.25	0.52	0.74	0.9	1.05	1.18	1.32	1.44	1.56	1.68	1.78	1.84	1.98	2.07	2.16
Best case	0.25	3.27	5.40	6.92	8.0	8.8	9.39	9.84	10.18	10.45	10.67	10.84	10.94	11.12	11.25

Figure 16. The behavior of cultural value in best scenario.

10. Justice and equality, 0.125
11. Social responsibility, 0.123
12. Collaboration, 0.1
13. Interactive skills, 0.157
14. Accountability, 0.13
15. Alignment, 0.078
16. Respect for the law, 0.096
17. Respecting others, 0.127

Considering the critical parameters in the baseline scenario and the results of sensitivity analysis, best scenarios for developing the best parameters to 0.9 and worst scenarios for setting the parameters which changed to 0.001 and behavior cultural values and economic growth in both cases are compared.

Best scenario

Table 1 and graph of values (Figures 16 and 17) of the best case of economic growth were compared with the baseline.

Worst scenario

Table 2 and graph of values (Figures 18 and 19) of the worst case of economic growth were compared with the baseline

Conclusion

With AHP technique, first components, and cultural values indicators based on expert opinions and ratings were measured and found.

Out of 100% of criteria constituting the cultural value, 12.5% share of "individual values" and 87.5% share of the "social values" are formed. The indicators relating to individual values, the highest share of "ethics" and "personal happiness" were in indicators and social values; "interactive skills" and "accountability" had the largest share and share of components of individual values, respectively: work value, 23%; creativity and innovation, 9%; thrift, 2%; personal happiness, 13%; the spirit of discipline, 3.9%; profit seeking, 4.1% and
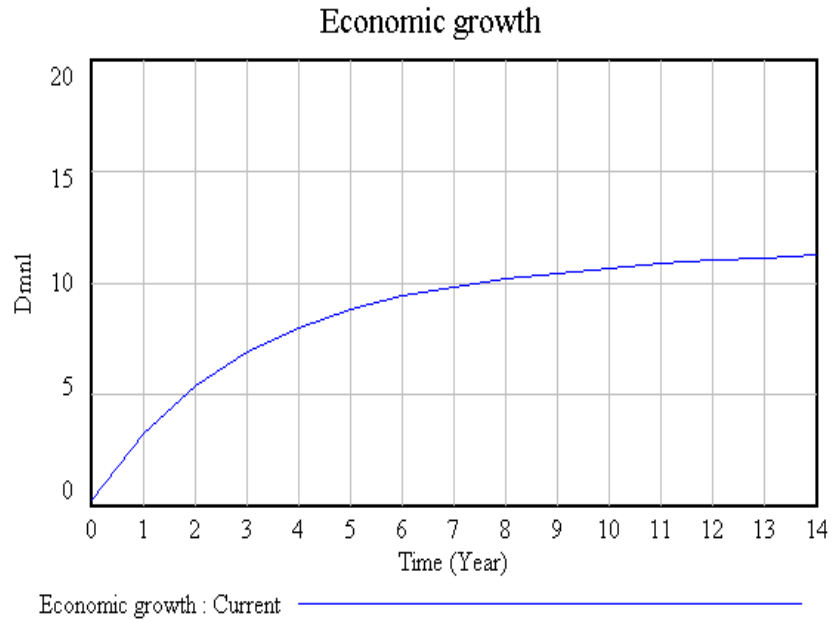
Figure 17. The behavior of economic growth in best scenario.

Table 2. The worst case economic growth compared with the baseline.

Time	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Baseline	0.25	0.52	0.74	0.9	1.05	1.18	1.32	1.44	1.56	1.68	1.78	1.84	1.98	2.07	2.16
Best case	0.25	0.18	0.16	0.15	0.18	0.23	0.3	0.4	0.48	0.58	0.67	0.76	0.85	0.94	1.03
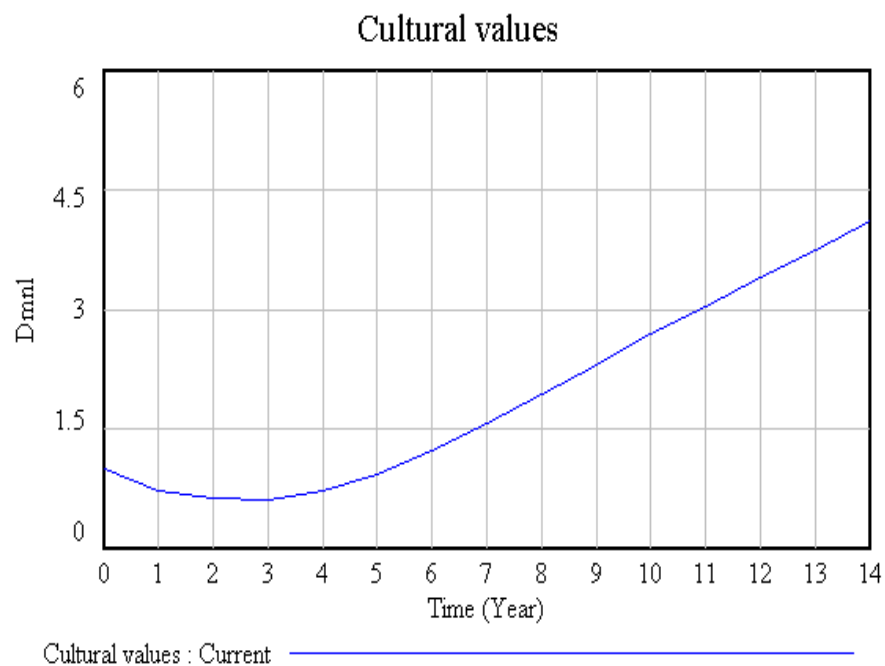
Figure 18. The behavior of Cultural Value in worst scenario.
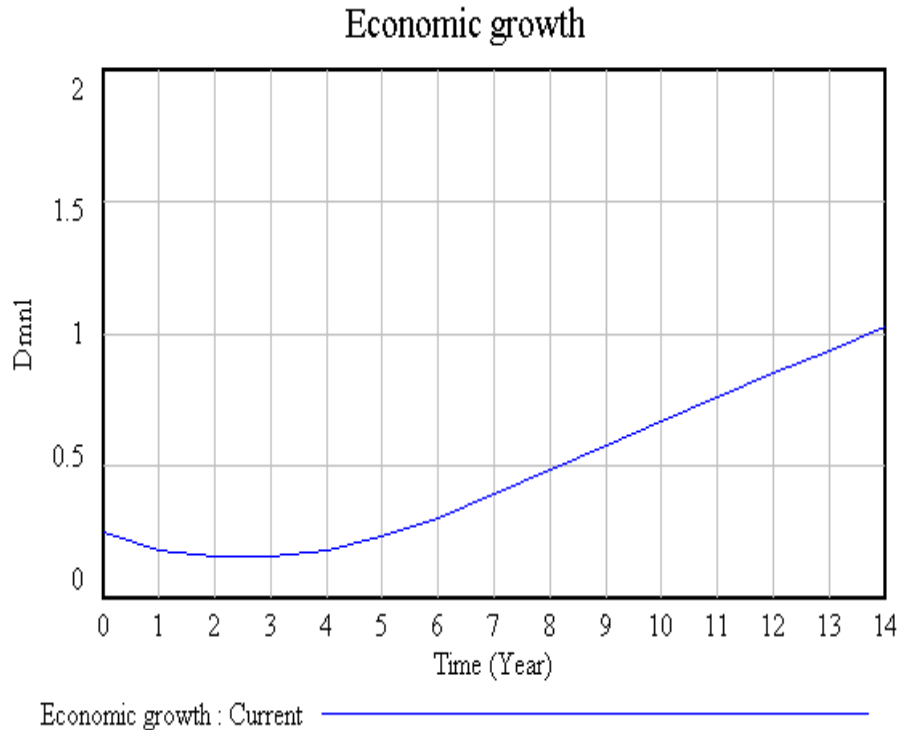
Economic growth

Figure 19. The behavior of economic growth in worst scenario.

learning, 23%.

And also share of components of social values, respectively are: mutual trust, 6.4%; justice and equality, 12.5%; social responsibility, 12.3%; collaboration, 1%; interactive skills, 15.7%; accountability, 13%; alignment, 7.8%; respect for the law, 9.6% and respecting others, 12.7%. Cultural value in 2011 started to climb from 1 unit and will be 8.66 units in 2025.

After the initial values using AHP technique, of statistical software VENSIM to design patterns in a dynamic situation, it was determined that the operation was:

(i) With the increasing rates of "Ethics" to 0.9 units, the "Individual Values" of 1.35 units in 2011 to 2.15 units in 2025 will increase; the reduction of this rate to 0.001 "Individual Values" of 0.45 units to 1.25 units in 2025 will be reached.

(ii) Before the change, the cultural values were 1 unit to 8.66 units, after which the ethics rate increased to 0.9. The cultural values of 1 unit in 2011 will be 10.7 unit in 2025 . The cultural value of a reduced rate to 0.001 will be 8.02 units.

(iii) With the increasing rate of "Accountability" to 0.9 units, the "Social Values" of 2.34 units in 2011 to 3.25 units in 2025 will increase, The reduction of this rate to 0.001 "Social Values" of 0.59 units to 1.50 units in 2025 will be reached.

(iii) With the increasing rate of "Accountability" to 0.9, the cultural values of 1 unit in 2011 will reach 13.26 units in 2025 .The reduction rate is 0.001. The cultural values of 1 unit will get to 7.88 units.

(iv) In Best case, the increased amount of initial cultural values variables is 0.9. There will be an economic growth for 15 years till the end of 2025. The average annual growth is 293.4%, while in the Base case, the average annual growth is 50.9%. By comparing the two modes, one can conclude that economic growth in the Best case is 5.8 times better than in the Base case.

(v) In Worst case, the receded amount of cultural values variables is 0.001. There will be an economic growth for 15 years till the end of 2025. The average annual growth is 20.8%, while in the base case, the average annual growth is 50.9%. By comparing the two modes, one can conclude that economic growth in the Worst case is about 2.5 times less than in the Base case.

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Appendix

Value	Preference
9	**Extremely preferred**
7	**Very strongly preferred**
5	**Strongly preferred**
3	**Moderately preferred**
1	**Equally preferred**
8 , 6, 4 , 2	**Preferences between the intervals**

Figure 1. The Value of Preferences in AHP technique.

Cultural Values

Individual values
work value
Creativity and innovation
Thrift
Personal happiness
Ethics
The spirit of discipline
Profit seeking
Learning

Social values
Mutual trust
Justice and equality
Social responsibility
Collaboration
Interactive skills
Accountability
Alignment
Respect for the law
Respecting others
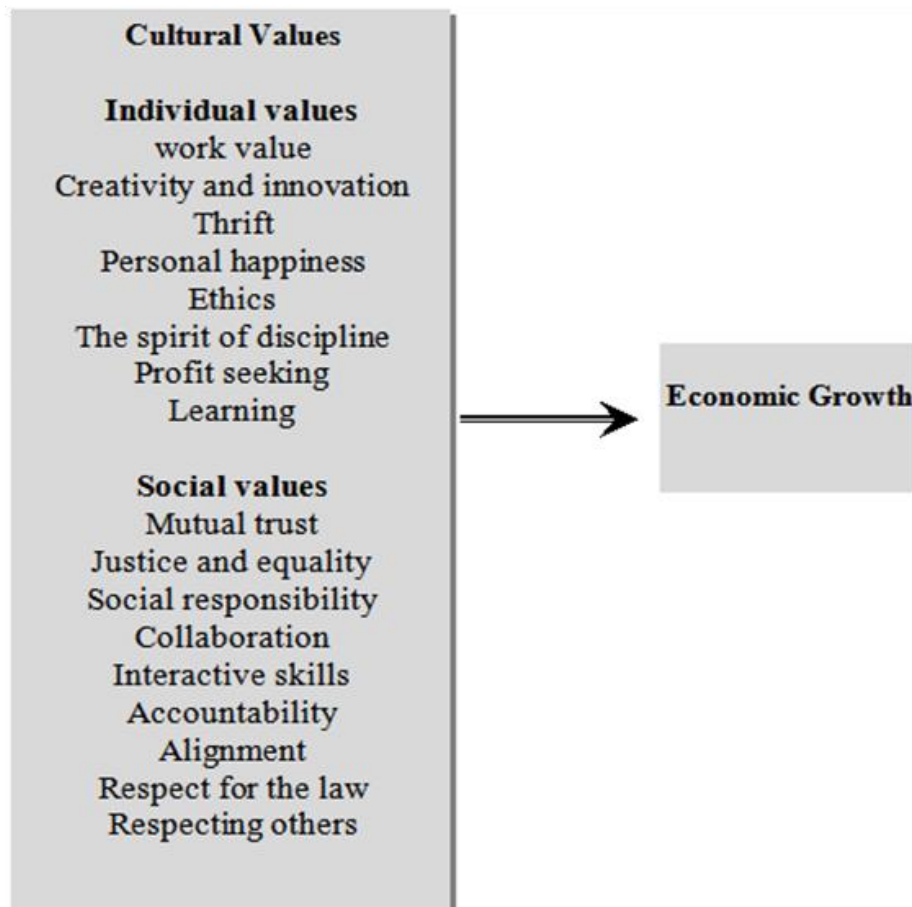
→ **Economic Growth**

Figure 2. Conceptual Model of Cultural Value and Economic Growth

Model Name: cv

Priorities with respect to:
Goal: Economic growth
    >Cultural values

Individual values	0.125
Social values	0.875

Inconsistency = 0.
    with 0 missing judgments.
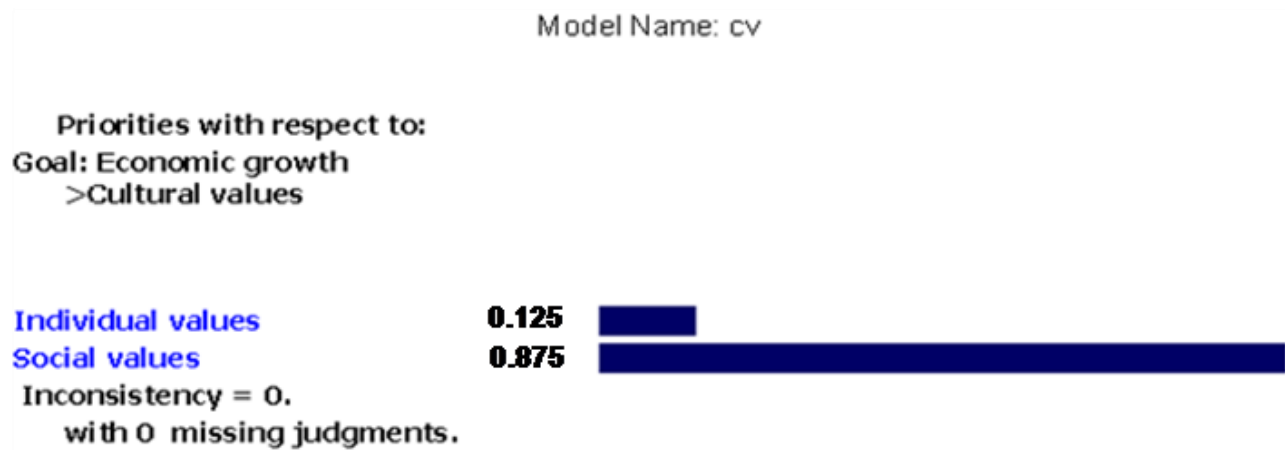
Figure 3. The weight of criteria cultural values.

Model Name: cv

Priorities with respect to:
Goal: Economic growth
    >Cultural values
        >Individual values

Work Value	0.230
Creativity and Innovation	0.090
Thrift	0.022
Personal happiness	0.130
Ethics	0.215
The spirit of discipline	0.039
Profit -seeking	0.041
Learning	0.232

Inconsistency = 0.04
    with 0 missing judgments.
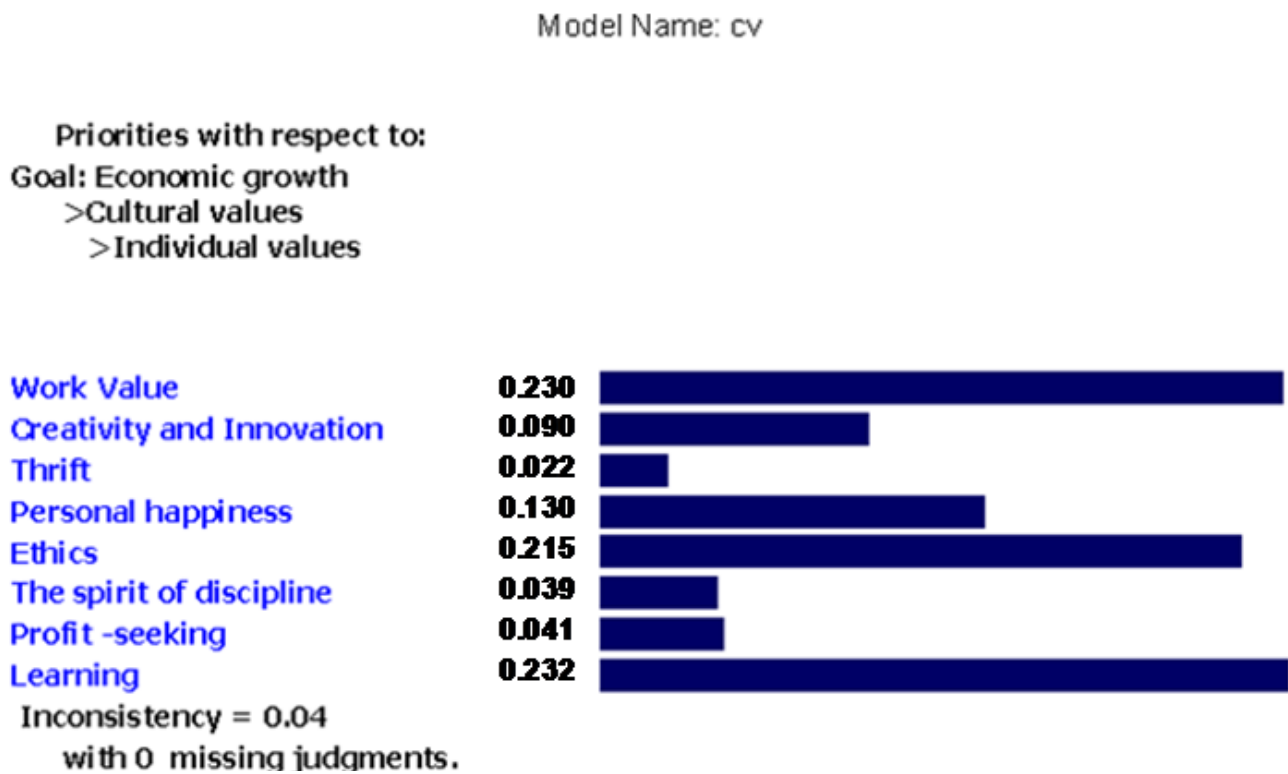
Figure 4. The Weight of social values components.

Model Name: cv

Priorities with respect to:
Goal: Economic growth
    >Cultural values
        >Social values

Mutual trust	0.064	
Justice and Equality	0.125	
Social Responsibility	0.123	
collaboration	0.100	
Accountability	0.130	
Interactive skills	0.157	
Alignment	0.078	
Respect for the law	0.096	
Respecting others	0.127	

Inconsistency = 0.04
    with 0 missing judgments.

Figure 5. The weight of social values components.

Goal: Economic growth
  Cultural values
    Individual values (L: 0.125)
      Work Value (L: 0.230)
      Creativity and Innovation (L: 0.090)
      Thrift (L: 0.022)
      Personal happiness (L: 0.130)
      Ethics (L: 0.215)
      The spirit of discipline (L: 0.390)
      Profit -seeking (L: 0.041)
      Learning (L: 0.232)
    Social values (L: 0.875)
      Mutual trust (L: 0.064)
      Justice and Equality (L: 0.125)
      Social Responsibility (L: 0.123)
      collaboration (L: 0.100)
      Accountability (L: 0.130)
      Interactive skills (L: 0.157)
      Alignment (L: 0.078)
      Respect for the law (L: 0.096)
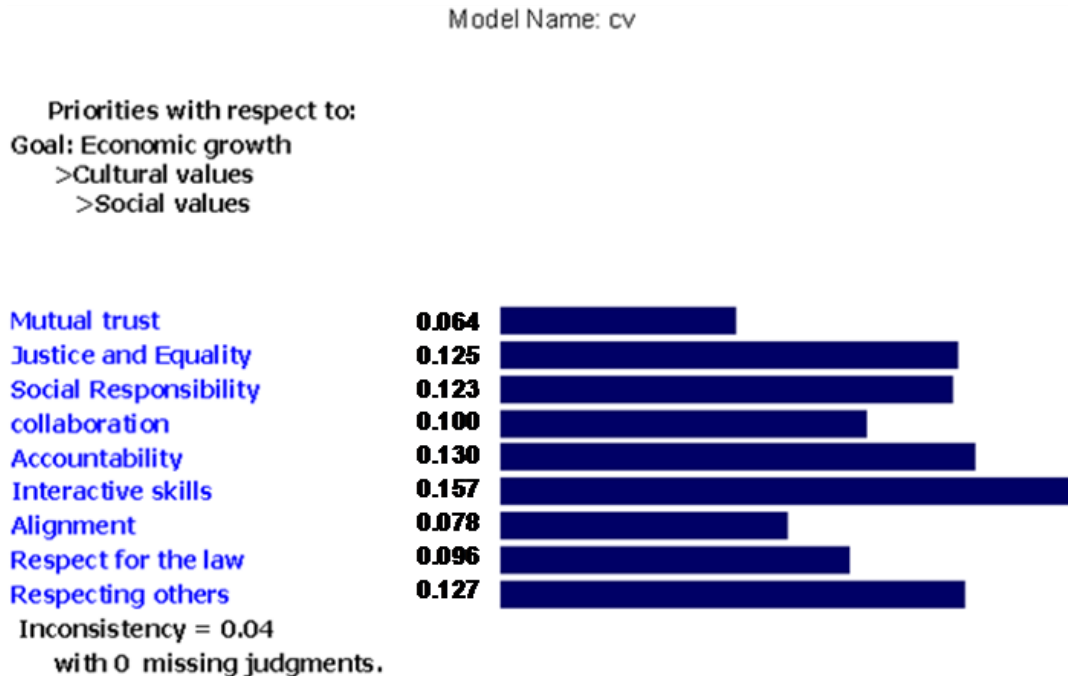   Respecting others (L: 0.127)

Figure 6. The chart of the cultural value variables weights