SOCIO-ECONOMIC DEVELOPMENT PROJECTION OF MALATYA SUPPORTED BY EU (EUROPEAN UNION) REGIONAL DEVELOPMENT PROGRAMME: A SYSTEM DYNAMICS APPROACH

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Abstract

Socio-economic and regional development models are among the examples that encompass the aforementioned sophistication in their structure. Although outside interferences have certain impacts on the system, fundamental changes emerge within the internal structure of the socio-economic systems. These systems change over time and these changes have a tendency to be non-linear with regard to the developments within the system.

System dynamics is one of the best approaches in the development of socio-economic system models, hypothesize and the identification of policies that would provide improvement in the system. System dynamics approach offers easy access to possible outputs under different scenarios. System dynamics is an interdisciplinary approach and it uses the tools and models employed by the related disciplines.

Because of the aforementioned reasons, system dynamics approach will be used in the study the socio-economic structure of Malatya in TRB1 where is supported EU Regional Development Programme, will be put in a model in order to monitor certain developments and changes under different scenarios through 2008-2030. This study is supported by TUBITAK.

Key words: System Dynamics, Socioeconomic Development, Regional Development

1. Introduction

Globalization and the advancement in information technologies and tele-communication rendered the structure of the existing socio-economic systems much more complicated; and the continuously changing environment in today's world paved way to more sophisticated problems. The changes that we are facing nowadays, and the problems associated with it, are forcing us to develop new systems and solutions that would have a holistic perspective which would also involve using interdisciplinary techniques and methods.

The development phenomenon has a multi-dimensional genuine which captures the structural changes in social, political, cultural and similar institutions around the

country. While the growth expresses the increase of the GNP per capita; development beside the growth captures the whole social changes including structural and human development that can be measured(Dincer, 1996; 17).

Definitions of sustainable development require a multidiscipliner view for environment and population problems and necessitates compensation of the environment, population and sources(Toros,1997; 38).

Obtaining the economic and social development and increasing the welfare level of the society and the individuals are related to the efficient development and use of both nature and human sources. The high population ratio hinders the individuals to get more share from the welfare increase and the verification of the economic changing process faster and makes the sustainable growth efforts harder. It also increases the need to house, health, education and infrastructure. The city development strategies are the starting points of regional development strategies.

From the policy perspective, it is hard to understand environmental and social parameter changes. And it may necessitates both short term reactive steps and long term strategic plans. Short and long term policies require to understand the interrelations and the changes in structures affecting the development of the city (Button, 2002; 217-233).

Industrialization and urbanization are the important transformations of the last century. There is a strong relation between the urbanization and economic development level of a country.(Chakrabarty, 2001; 331-345) It is expected that the transformation will go on in the next century and it will bring about the development of new policies. As a consequence of use of land, raw material and energy will force the natural limits.

First of all, development differences must be determined. To this end State Planning Organization “DPT” has made some studies about socioeconomic comparison of provinces. The development plans aim to decrease the development discrepancies among the regions, to increase the welfare level of the population living in underdeveloped regions and to bring about compensation of migration in metropolises.

2. System Dynamics

In early 1960’s when control systems are applied to entities, important results were obtained. By using control systems in town planning, modelling the scenarios about the future of the world and socio-economic systems, a new approach had been created which is called “system dynamics approach”(Coyle,1996; 2).

System dynamics has the charecteristics of stating the relations that form systems, by the help of based figures, graphs and mathematical methods. Therefore managers, governers, economists, population experts and other many concerners may solve the problems they face by this approach.

Dynamic behaviors of the social systems can be represented by models. Since they are not linear and have complex structures, it is hard to solve them by using analytical methods. Therefore simulation is commonly used in solving social systems. As a dynamic simulation approach “system dynamics” can be used effectively for desicion making in social systems (Stave,2002; 139-167). System dynamics enable users to see the probable consequences of desicions before they are taken and applied in real world (Turan, 2001).

"System dynamics" is a technique which uses qualitative and quantitaive models in order to explain systems and determines the type of the feedback of information which forms the behavior and the structure of the feedback and control policy (Coyle,1996; 9).

System dynamics discipline has beeen used for a long time in various areas in order to build quantitative models for strategic problems. The aim is to determine appropriate policies to monitor the behavior of the system model and develop the system (Coyle, 1998; 343-365).

The stages of the system dynamics approach are ;

- Definition of the problem (reference model, paramaters, time horizon)
- Qualitative Analyses (Causal loop diagrams)
- Quantative Analyses (simulation model, level-ratio diagram)
- Test
- Policy design, selecting the policies

Wolstenholme has applied system dynamics to the modelling of the 5-year national development programme. The model is included land, population, food, money, natural resources and industrial capacity. (Wolstenholme, 1999;1133-1148).

Barney has developed Threshold 21 (T21) "sustainable development model". The earliest application of the model was in Bangladesh. The model has combined production, national accounts, agriculture, energy, health, education, nutrition and environment in one model (Barney, 2002; 123-136).

Radianti's model is focused to accommodate the proposed policy of the city's government, to develop the industrial sector in Semarang. The application to Semarang City is a case study, and a part of a larger project aiming at building a generic model for spatial planning for metropolitan areas in Indonesia (Radianti et al, 2003; 1-27).

Saeed has presented how experimentation with a system dynamics model may be used to determine the terms of trade for meeting long-term contentions for sustaining global economic relations and environment (Saeed, 1999; 107-128).

Fiddaman's model represents the global energy–economy system. Generation of economic output, investment, energy supply and demand, depletion, and energy technology development are tightly coupled to one another (Fiddaman, 2000;243-267).

Saysel, Barlas and Yenigun analysed the long-term environmental sustainability of an agricultural development Project (the South-eastern Anatolian Project–GAP), The system dynamics model GAPSIM serves as an experimental platform addressing the questions related to water resource development, land use, pollution, land degradation, production and population. (Saysel, Barlas and Yenigun, 2002; 247-260)

3. Building Socio-Economic Development Model by System Dynamics

The aim of the study is to build the socio-economic development projection of the province of Malatya stiuated in Eastern Anatolian Region of Turkey. Although it has reached a certain development level, the province is underdeveloped when

compared with the whole of the country. The cause of selection of Malatya is that, it is classified as polarized area by regional economists. It has a high industrial development level related to the other provinces in the region. The development of the city is expected to be a model for other provinces in the region.

The model is seperated into ten submodels;

1- Population
2- Life Expectancy, Birth Rate and Infant Death Rate
3- Migration Rates
4- Education and Literacy
5- Employment and Unemployment Rates
6- Public Investments
7- Agriculture
8- Industry
9- Service
10- Gross National Product (GNP) and GNP Per Capita

Socio-economic development models are so complex and include many feedback loops. In this study, the model also has a lot of feedback loops, so only some of these loops are given below in order to present a section from the model. (Figure 1)

Theoratical information and early data about the city are going to be used while building the socio-economic model. The time limits of the projection is determined as 1985-2030. Socio-economic data between 1985-2000 are used in the model.

Most of the data used in this study have been gathered from Turkish Statistics Institution's and State Planning Organization's publications. It is not possible to collect year to year data between 1985 and 2000 years, for instance, nation-wide population census had been realized in the years 1985,1990 and 2000. Thus, data related to other years has been calculated by the help of MATLAB interpolation tools.

Socio-economic model referring to Malatya province and around has been made by combining interconnected sub-models. There is a correlative interaction among these sub-models.

Non-linear parameters are indicated by table functions. Data have been standardized by dividing actualised values between the years 1985 and 2000 to reference year values. Reference year has been taken as 2000. By using standardized values, parameters have been assigned to regression analyze in SPSS and these parameters have been used as input, while chart values are being formed. These effects have been determined by using the values as input in Vensim by the help of LOOKUP function.

Model has been explained with diagrams on Vensim software to make it easy to understand. Vensim also allows us to simulate and check alternative scenarios.

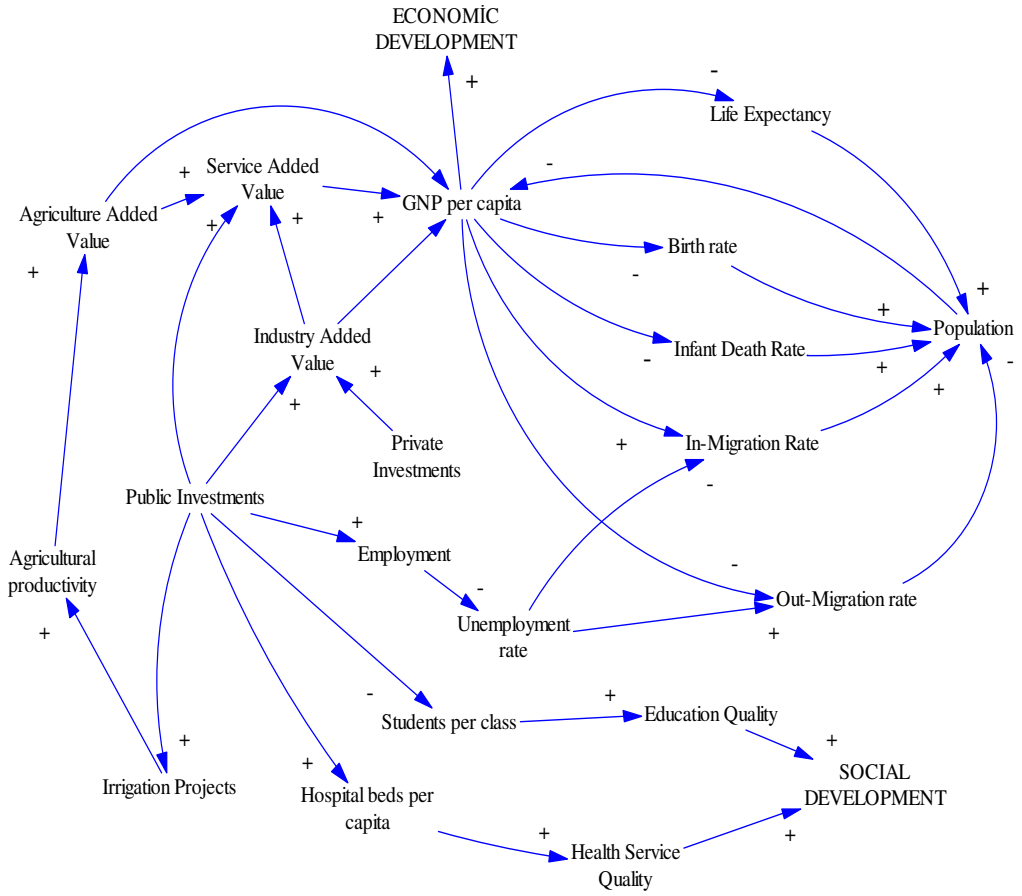

Figure 1. Some Relationships Socio-Economic Model of City

While population was being studied, it has been classified into two criteria.

a)According to settling area: Urban population and rural population

b) According to age: 0-6 years, 7-14 years, 15-49 years, 50-64 years and 65 years and over population.

Population differs in two positive and two negative ways. Positive changes are birth and in-migration, negative changes are consist of death and out-migration. In this study, life expectancy depends on efficiency of health services and changes of income level.

Probably, the more income level increase the more expected life time increases. Countries in which income level is high, expected life time is high as well. Life expectancy has been used while death rates have been determined. When death rates related to age segments were being calculated, change of death numbers by years in the stated age segment has been assigned. Increase in expected life time makes death rate decrease(Figure 2).

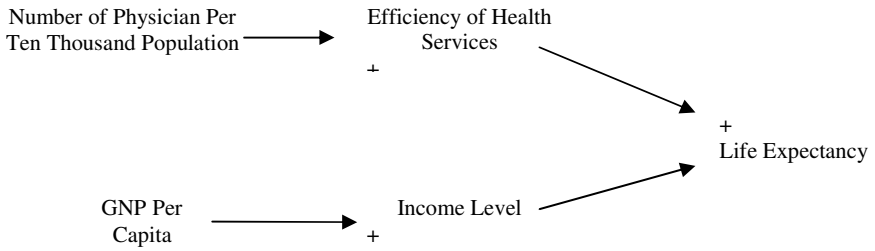

Figure 2. Life Expectancy

Fertility rate changes according to number of child desired and efficiency in birth control. Without a doubt, increase in rate of adult literacy will in turn, make number of children desired decrease. Literacy will raise awareness of birth control. Due to lack of data concerning efficiency of birth control, number of physician for each ten thousand people has been used as to indicate efficiency of birth control(Figure 3).

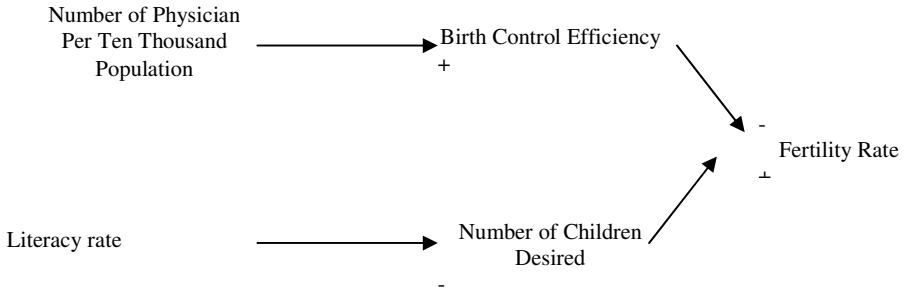

Figure 3. Birth Rate

Infant mortality rate is inversely proportional with adult literacy rate, per capita income, number of physician for each ten thousand people. When one of these variables decrases, infant mortality rate goes up(Figure 4).

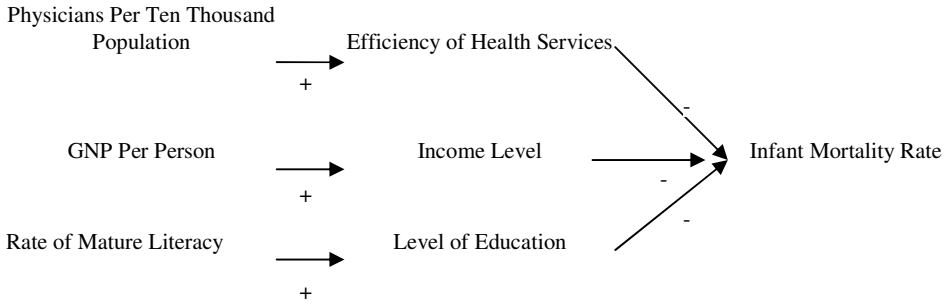

Figure 4. Infant Mortality Rate

Migration rate has been classified in six groups as following: urban in-migration rate, urban out-migration rate, migration rate from urban to rural, migration rate from rural to urban, rural out-migration rate, rural in-migration rate. As an example, structure of urban in-migration rate and is shown in Figure 5.

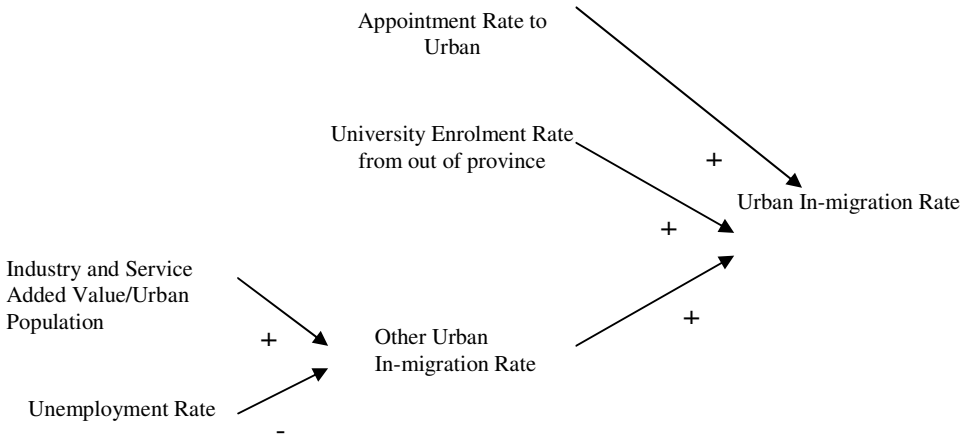

Figure 5. Urban In-migration Rate

Sub-models for education and literacy are included primary education, secondary education, literacy and university.

The new 8 years basis primary school system has been used while the model was being formed regarding number of students and teachers. Number of students those who were subject to 5 years primary school system has swifted to 8 years primary school basis with appropriate calculations. Students those who had left after primary education and who had continued to study secondary school also have been indicated in the model. By calculating number of teachers per student, education effectiveness and teacher deficiency have been attempted to be determined.

Within university students and academics model, number of university students has been classified under two categories as students those who have graduated on time and not on time.

University students are seperated into two categories: students who have begun university education in their own province (here, students who are already in Malatya and have begun at İnonu University) and students who have come to study from out of province. One of those who could be able to graduate on time will be out of system, others who could not be able to graduate will be added to number of students who could not graduate on time.

Unemployment rate is the rate of unemloyed people to total labor force. While total labor force was being calculated; number of students over 12, number of housewifes, number of retired people, and other people who are not included in labor

force have been deducted. Total employment consists of total number of people working in industry, service and agriculture sectors.

Public investments were investigated particularly in three main topics: agriculture, industry and service sectors. For significant sectors like education and health, their public investment expenses were analyzed in detail. Public investment expenses differ within years. Since it is not possible to obtain a uniform trend for the public investment expenses, real values were obtained with aid of functions.

The land productivity increases linearly with the amount of irrigated lands. The use of chemical fertilizer is the other factor. The nutritional components were supplied to soils by fertilizers to increase the productivity of land. Agrochemical utilization is another factor. The utilization of agrochemical drugs imparts clean and well qualified products.

The crop production credits enhance the use of fertilizers and pesticides. Since farmers have not enough financial sources in our country, they should be supported by credits (Figure 6).

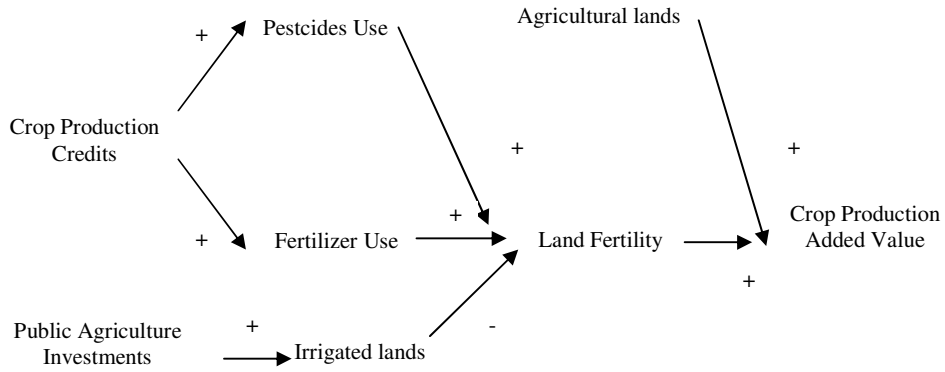

Figure 6. Crop Production

As the animal production model was investigated, bees and poultries are not accounted in the model because the supplementary values of these sectors are very low in Malatya. Besides the number of bovine animals, sheeps and goats, the adequate feeding of them is also directly effective on the production and added value.

Coob-Douglas production function is used for developing manufacturing industry model. Since the capital values of provinces are not determined statistically in Turkey, instead of those values total capacity of power equipment were used. The other variables are man-hours worked and technology level. For the calculation of total man-hours worked, manufacturing industry employments was multiplied by average man-hours worked per employee. The number of technical staff in manufacturing industry was used for measuring technology level. The exact measuring of technology use by number of technical person would not be accepted. On the other hand, since data that show the technology level of provinces our country does not exist, the number of technical person was used to show the technology level (Figure 7).

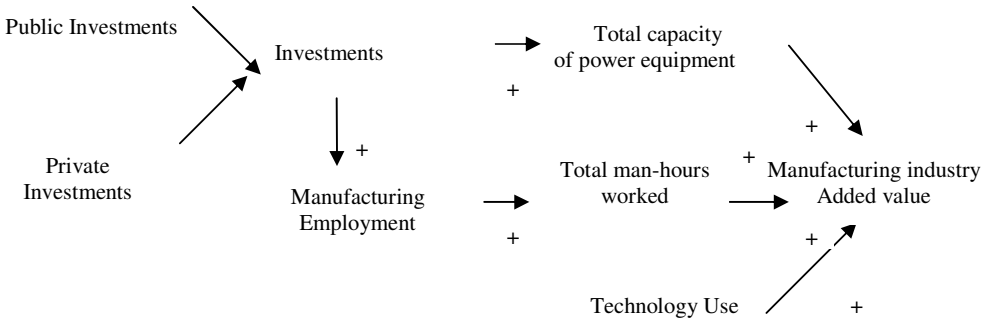

Figure 7. Manifacturing Industry

The added value of service sectors is the significant part of the total added value. The development in the service sector is dependent from the agricultural and industrial developments. The most important sectors for the added value of service sector are construction, trade, transportation and telecommunication. The sufficient data was obtained for the trade and construction sectors but the separate statistical data is not used for expression of added values of transportation and telecommunication, so they were combined as "added values of transportation and telecommunication". Except trade and construction added values, the other service sectors (government services, bank servives, free jobs and services) were evaluated in the same topic as "other sector added values". GNP is sum of all sectors added value. The most important indicator of economic development is GNP. Growth of per capita income has been considered as a measure of improving human development. However, empirical literature revealed that per capita income can not be a sole determinant of chieving human development; public spending on social sectors also has a significant role to play. (Chakraborty, 2003)

4. Socio-Economic Development Projections of Malatya

The change in the system dynamic model that describes the socio-economical system of Malatya comes from domestic sources. Besides this, external variables also are effective on the model. External variables for based scenario are Public investment, Municipal Expenses, Livestock and Fodder Credits, Incentive Certificated Investments, University Appropriations (Table 1.) the increments in the external variables enhance the socio-economic system of Malatya.

Table 1. Based Scenarios Policies (thousand $)

	2010	2020	2030
Public Invesments	7300	9900	1250
Municipality Expenditures	5513	7375	9439
Crop Production Credits	3300	3900	4500
Livestock and Fodder Credits	8800	1040	1200
Incentive Certificated Invesments	2880	3440	4000
Universtiy Approprations	4703	5351	6000

Parallel to economical development of Turkey, public investments in Malatya were estimated as 60 and 125 million $ for the years 2005 and 2030 respectively. In based scenario, the percent distribution of public investments is 14, 62 and 24 % for industrial, service and agricultural sectors respectively. It was assumed that this distribution will not differ in 2003. In service investments, educational and health sectors' ratios were accepted as 33 and 40%, respectively. Municipal expenses would change with the population of province. In 2030, crop production, livestock and fodder credits will raise to 45 and 24 million $, respectively. It was assumed that there will be no reduction in the cost of electricity for the manufacturing industry. The university appropriations will increase linearly up to 60 million $ in 2030.

According to based scenario, population projections are given in Figure 8. Total population of Malatya will be 1.28 and 1.56 million in 2020 and 2030, respectively. The annual growth for total population is 2% and for urban population its value is 3%. Rural population will raise slowly and would be 383.000 in 2030. Since the rate of migration from rural to urban would be same, the increase in rural population will become slow.

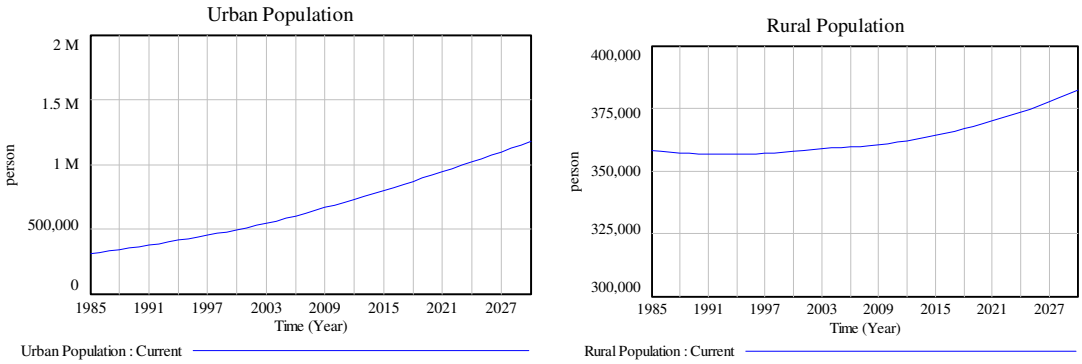

Figure 8. Based Scenario Urban and Rural Population

It is seen that the growth of 0-6 and 7-14 age population is slower than the growth of total population when the population projections have been seen. However the growth of old population (the population over 50-64 and 65 age) is more than the growth of total population. The main reason of this situation is the decrease of fertility and the increase of life expectation.

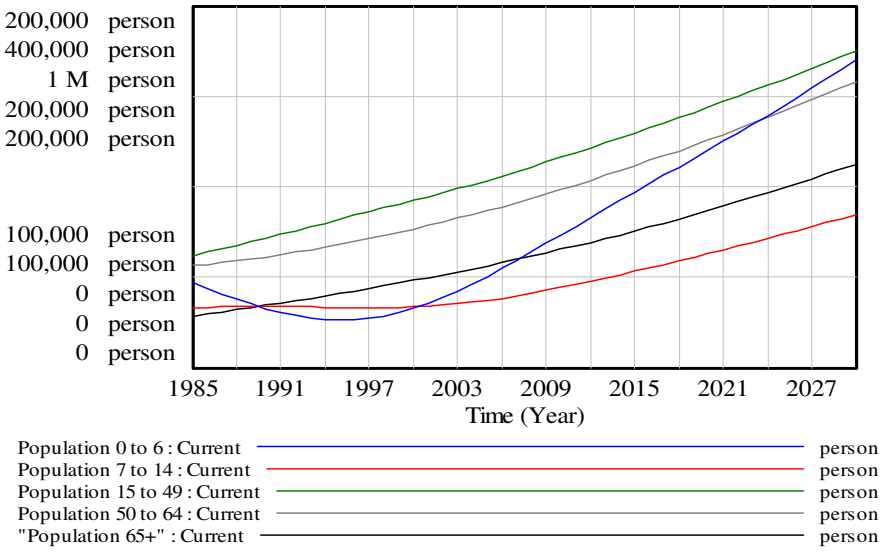

Figure 9. Based Scenario Population For Age

Life expectancy which is 67,75 in 2005 will rise to 68.82 level in 2030 withal health service and income level will regenerate. However, fertility rate will decrease to 0.079 level in 2030 while it was 0.090 in 2005. Infant mortality rate denotes new born childs' percentage who die before reached one year old. The reduction of infant mortality rate is the indicator of social improvement(Figure 10).

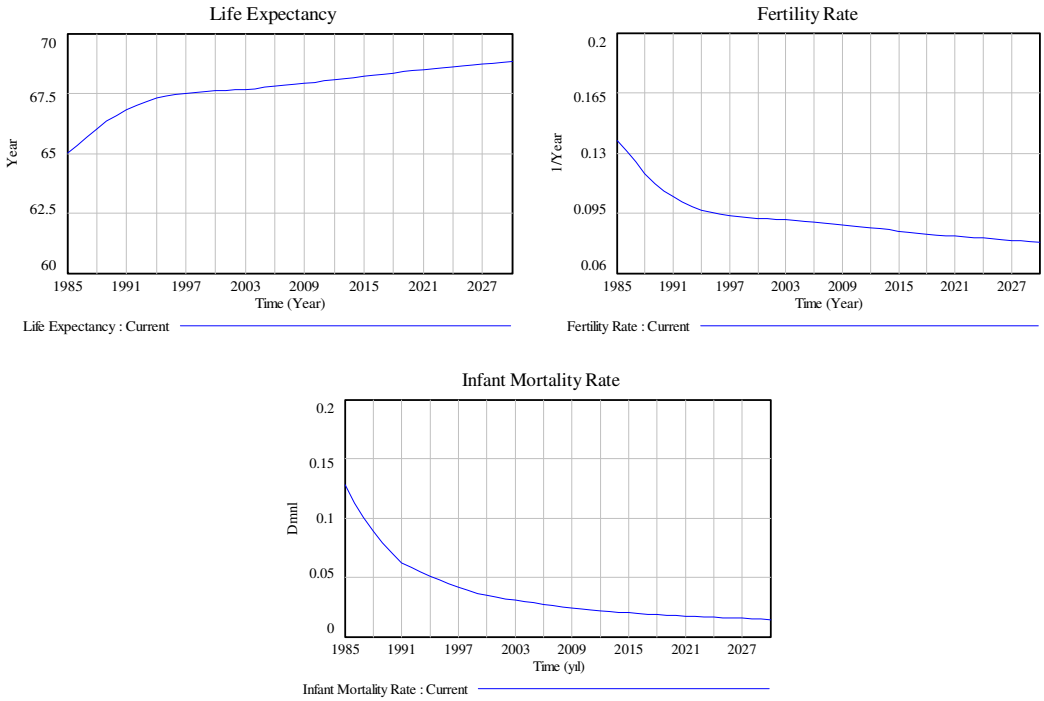

Figure 10. Based Scenario Life Expectancy, Fertility Rate and Infant Mortality Rate

Figure 11 displays the change of migration rates. The growth of the province population will continue between the years 1985 and 2000, despite the migration increase from the province to out, because the migration from out to the province is higher. While 2,2 % of the rural population migrates from the rural to out of the province in 2005, it is expected that this level will decreases 1,7% in 2030.

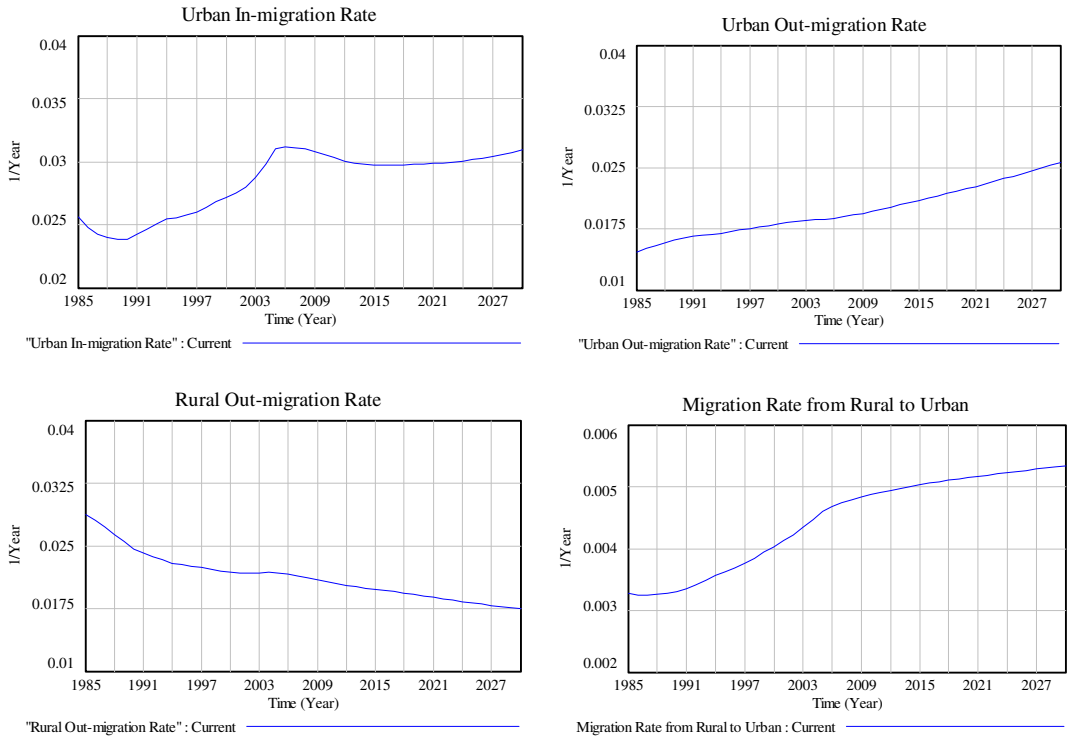

Figure 11. Based Scenario Migration Rate Projections

In the based scenario, the number of secondary education students will be approximately 85.000 in 2030. The number of primary education students comes near to 200.000 in 2030.

The number of students per teacher is one of the important indicators for the purpose of having an idea about education quality. It is expected that if the number of the teachers increases similarly, the number of students per teacher decreases. The decrease of the number of students per teacher facilitates to efficient and effective training. The number of students per classroom is an indicator of education quality. New schools and classrooms are necessary in order to supply the need.

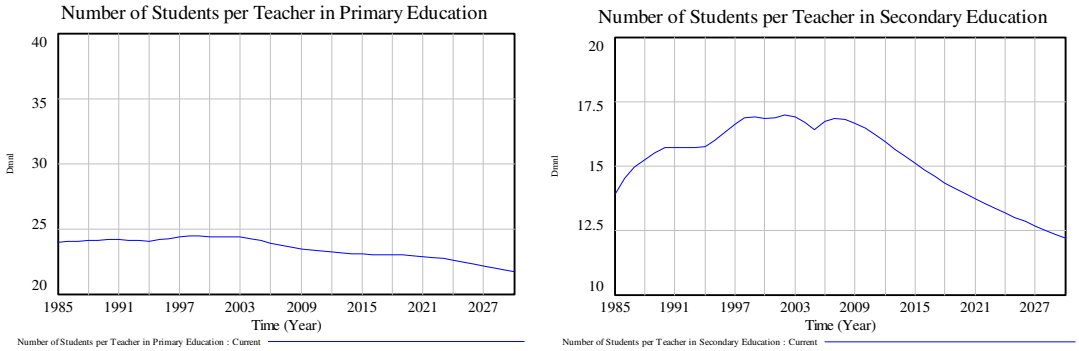

Figure 12. Based Scenario Students per Teacher in Primary and Secondary Education

From 2005 to 2030 industrial employment will be 71%, and service employment will be 105%. Compared to the other sectors growth of employment at the agricultural sector will be at lower levels. This is a consequence of industrialization and economical development. The employment at the developed countries has been intensified in the industry and service sectors. As well as it differs time to time, the rate of unemployment will rise to 9% in 2030 (Figure 13).

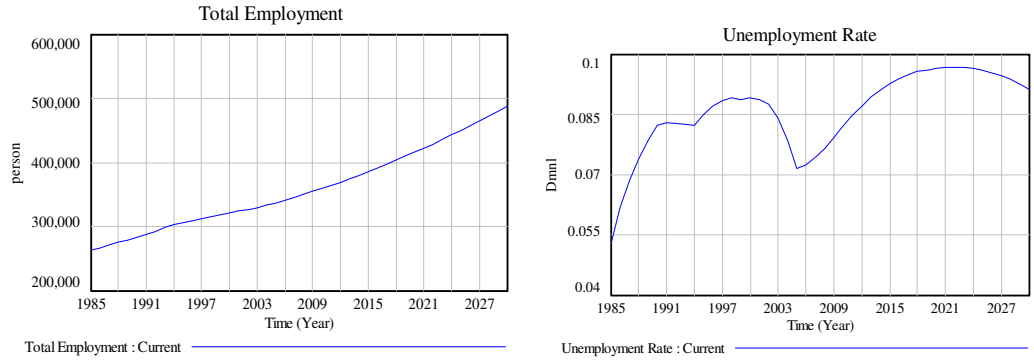

Figure 13. Based ScenarioTotal Employment and Unemployment Rate

The added value of agricultural sector has grown approximately 50% within 25 years. However, the annual growth of agricultural added value is 1,17%. The most important growth has been caught in the industrial sector. The added value of production industry will rise approximately 4 billion $ level with 460% growth rate in 2030. The development of service sectors depends on the development of others (agriculture and industry). As increasing in service added value with 334% will just about get at 5 billion $ levels. The annual growth rate in GNP will come true as 6,1%. It is expected that GNP per capita will be annual 4% growth and 6225 $ in the year of 2030 (Figure 14).

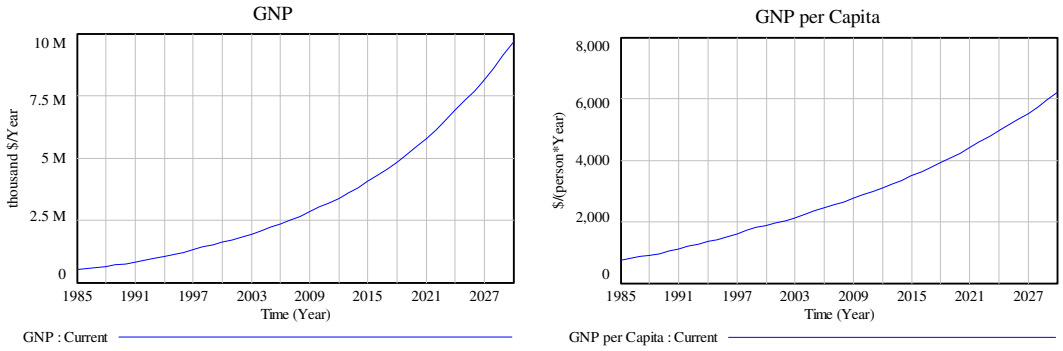

Figure 14. Based Scenario GNP and GNP PER Capita

Before discussing the possible scenarios; it would be more useful to determine the basic problems on the basis of the based scenario. According to based scenario; main problems are as follows;

1. Since the population increase; employment gap can not be solved. As a result of economic improvement in urban life, migration to urban will cause unemployment and poverty will cause lots of social problems. Government must support new employment opportunities.

2.As a result of increase of the number of the students at primary and secondary schools, problems will occur in education. According to based scenario; students per classroom and students per teacher seems to be better. However, education systems bring new expenditures by itself. Computers had been the machines that we can not give up to use; new computer labs will be needed to set up to all schools. Lots of colleges do not have enough sport saloons. Class population still could not be decreased to desired level. Pre-school education must be assesed as a very important problem and colleges that focus on training and on-job training must be supported with new media and resources. Thus; solution to these problems need additional wealth transfer.

3. In based scenario, basic health services support is not at the desired level. In 2005;bed number for 10000 people was 17 and it is forecasted that it will decrease to 16.25 in 2030. Health expenditures will be insufficient to maintain health services that were discussed in based scenario. Medical equipment deficit in hospitals and human resource deficit must be solved. Improving health conditions will cause positive effect on socio-economic structure on society. Hence; public investments to health services must be increased.

4. According to based scenario, sufficient improvement on income level on rural life will not be maintained. Certainly, province and rural income level can not be forecasted to be equal; however in 2030 it would not be acceptable situation that the income of rural life is below the level of poverty. By the way of increasing the support to agriculture, it is a way to increase the income level in rural life.

5.New advantages and supports must be realized in order to attract the entrepreneurship to set up new businesses in Malatya. Developing of the industry will cause other sectors to improve.

6. It doesn't seem possible for Malatya to reach the avarege GNP per capita of Turkey. The growth of annual GNP for Malatya is 6,1% in the based scenario. Since the forecasted annual growth rate of Malatya is 6%, the province has to reach a higher growth rate than 6,1% in order to catch the avarege GNP of the cuntry. This growth can be achieved by the increase of added value in agriculture, indusrty and service.

7. Universities bring on important improvements on social structure and economy to their neighborhoods. Because of this, universities must be seen as important, lecturer gap must be solved and university appropriation must be increased.

As a purpose of finding solutions to main problems explained above, the scenarios are discussed as follows below. First four scenarios forecast improvement of specific areas. Scenario 5 is the combination of first four scenarios and focuses on better in whole sectors.

Scenario 1 is related with increasing the number of investments step by step in living standards in province. As a result of getting the government investments to higher level, improvement in education and health services is possible. Also new investments will cause new human resource and unemployment rate to decrease.

Scenario 2 is related with policies which can be initiated to increase the income level of rural population who gains his life from agriculture. In this scenario, it is foreseen that crop production credits, stock and fodder credits are increased. The increase in crop production credits will raise the use of fertilizers and cure, so increase of efficiency on crop production will be provided. By the same token, increase on livestock and fodder credits will provide the development of livestock sector.

In scenario 3, raise of incentives given to manufacturing industry and improvement of promoted actions will be intended.

Universities affect the socio-economic structure of regions in which they are stated significantly. Increasing of the university appropriation will develop the university and the the urban.

Scenario 5 has been developed with the composition of four scenarios given before. While the anterior scenarios provide improvement on specific issues, in Scenario 5, it is aimed to raise the level of social development and also to raise the level of economic development at the same time. Increase of public incentives in Scenario 5 is lower than in Scenario 1 because of limited resources and the government must determine the suitable policy to provide the development all around the country.

Six important indicators are selected so as to compare the scenarios. These are the percentage of agricultural added value to rural population, percentage of industrial service added value to total provinces' population, GNP per capita, student number per classroom, hospital bed number per ten thousand people, and unemployment ratio.

Figure 15. shows agriculture added value rural population rate (AAVRPR) that indicates the income level of rural area. The scenarios that gives the most increase in income level of rural is the Scenario 2 and Scenario 5. Although the Scenario 1 increases agricultural production, it doesn't increse the income level of rural population as Scenario 2 and Scenario 5. The contribution of Scenario 1 to agricultural production is provided by enlargement of irrigated lands by public projects. Credit supports for the rural, signaficiantly contribute the agricultural production.

In rural the income per capita by 2030 will increase to 1325$ in Scenario 1, 1436$ in Scenario 2 and 1453$ in Scenario 5, which will be approximately 1200$ for based scenario, Scenario 3 and Scenario 4.

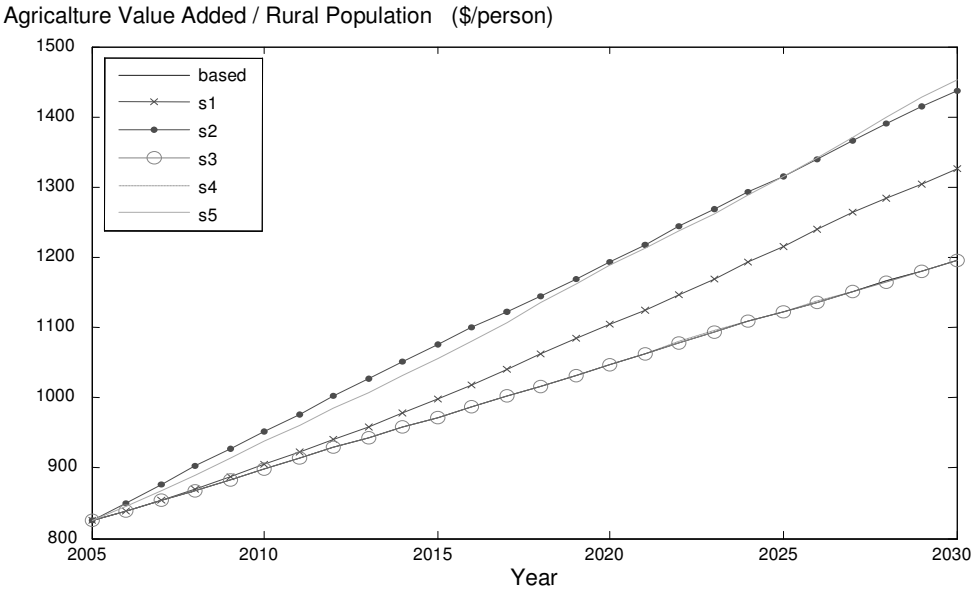

Figure 15. Scenarios Comparisons for Agricalture Value Added / Rural Population

Figure 16. shows the comparison of the scenarios for the ratio of total industry service added value to urban population (RISAVCP) that presents income level in urban. RISAVCP is under the based scenario, in Scenario 1 and Scenario 4. According to Scenario 1, industry and service added value is above the based scenario.

A considerable increase in RISAVCP comes out in Scenario 3 and Scenario 5. Scenario 3's RISAVCP value in 2030 is calculated as 8578 $, while Scenario 5's is calculated as 8206 $. Scenario 3 only results by the economic development. On the other hand Scenario 5 not only results by economic development but also social development.

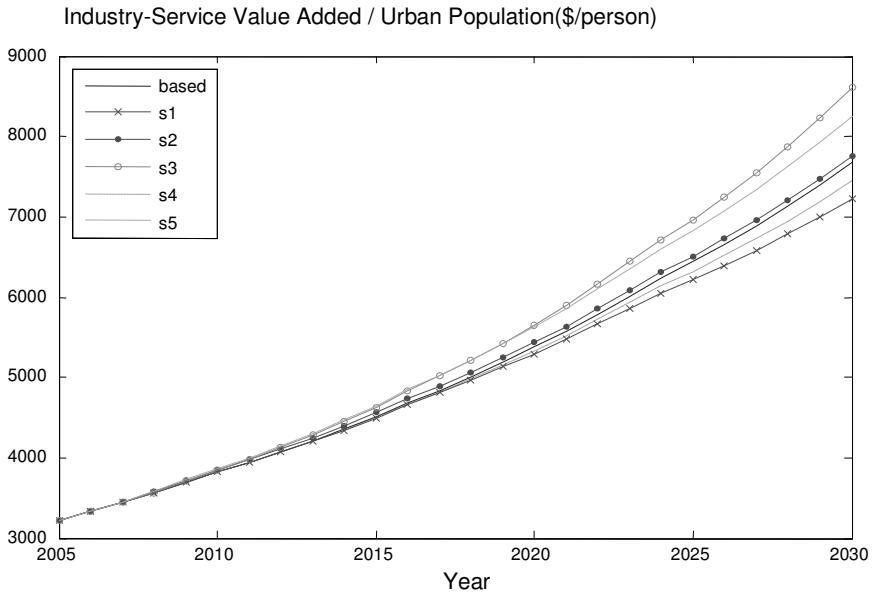

Figure 16. Scenarios Comparisons for Industry-Service Added Value / Urban Population

Figure 17. shows the comparisons on GNP per capita in different scenarios. When the province is thought as a whole, GNP per capita is a meaningful indicator to show the economic position in the province. In Scenario 3 and 5 there will be a considerable increase on GNP per capita. In Scenario 3, the GNP per capita will be 6932$ and in Scenario 5, GNP per capita will be 6795$.

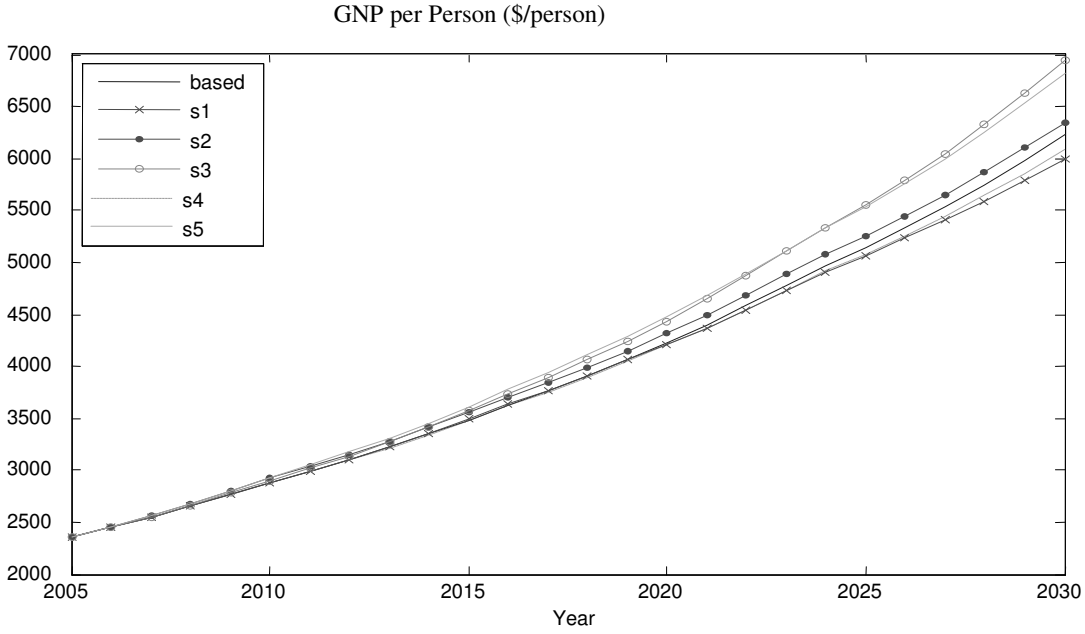

Figure 17. Scenarios Comparisons for GNP per Person ($/person)

Number of students per classroom (NSPC) shown in Figure 18. is an important indicator which determines the education quality. Number of students per classroom do not change in Scenario 2, Scenario 3, and Scenario 4. Number of students per classroom decrease in Scenario 1 and Scenario 5. This means that these scenarios will contribute to the improvement of education services. In 2030, while the student number per classroom is 19.71 (student/class) in based scenario, this value will be 18.27 (student/class) in Scenario 1 and 17.01 (student/class) in Scenario 5.

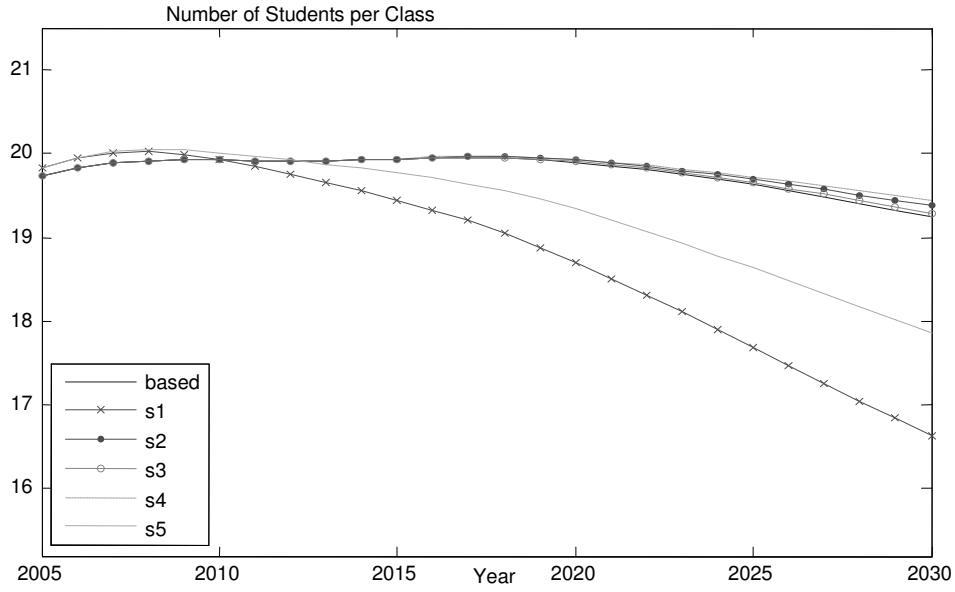

Figure 18. Scenarios Comparisons for Number of Students per Class

In order to determine the effectiveness of health services, hospital bed capacity per ten thousand people (HBCPTTP) has been chosen (Figure 19). Scenario 2, Scenario 3 and Scenario 4 do not have a significant impact on HBCPTTP. Two scenarios that provide an increase on HBCPTTP are Scenario 1 and Scenario 5.

Another indicator used in comparison among scenarios is unemployment rate (UNER) Unemployment rates for the scenarios are shown in Figure 20. Besides, unemployment rate is perceived as an economic indicator, it has effect on many social factors. Unemployment rate has undergone a little change in Scenario 2, Scenario 3 and Scenario 4. In 2030 unemployment rate is 9 % in the based scenario and this ratio will be decreased to 5 % in Scenario 1 and 6.6 % in Scenario 5. The most important reason of decrease of unemployment rate is increase of public investments. Public investments increase the number of employees especially on service sector. The portion of industry inside the total area of employment is low and along with the technological development, machines are used instead of manpower. So, industrial development have a significiant effect on unemployment. Agricultural employing does not change any of the scenarios significantly.

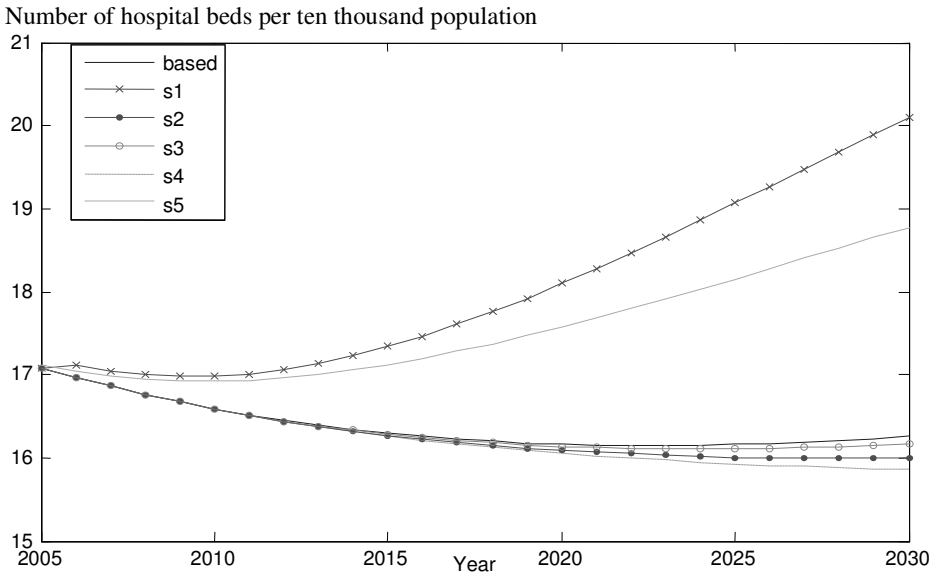

Figure 19. Scenarios Comparisons for Number of hospital beds per ten thousand People

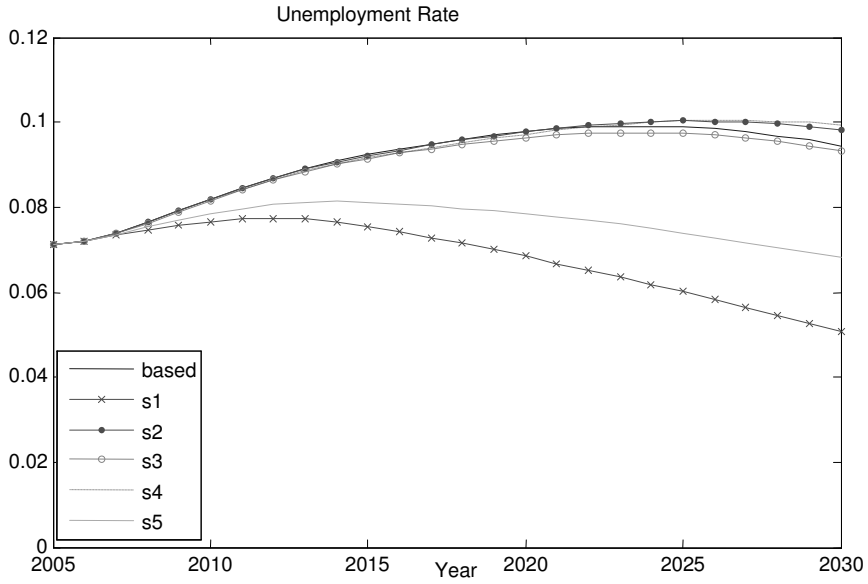

Figure 20. Scenarios Comparisons for Unemployment Rate

5. Conclusion

Since Scenario 1 will increase the migration to the urban and decrease the migration from the urban population will increase so, economical indicator values measured per capita will be lower. Scenario 2 predicts the increase of support on

agriculture. Together with providing economical improvement, the contribution of Scenario 2's on the social indicators is negligible. In scenario 3, increase of investments made especially on industrial sector, is aimed. Scenario 3 provides significant increase on GNP and GNP per capita but has a little effect on social indicators. Scenario 4 presents only the rise of importance given to the university. This scenario has an indirect effect on the other socio-economic indicators. Scenario 5 is combination of the other 4 scenarios. In Scenario 5, the values considered that will carry heavy costs to the government has been drawn down to fair levels.

The purpose of the this study is to provide socio-economic improvement at all. Scenario which will provide the most improvement on socio-economic structure of Malatya at all, is Scenario 5.

The socio-economic improvement projection model of Malatya is model of general town development projection and this model can be applied for other provinces of Turkey, too. Model can be converted to regional socio-economic improvement model with some changes

In the event of affiliation of our country to the European Union, as all around the country, some changes will come to Malatya and neighborhood. Model does not include these possible changes. While finding the parameters inside the model, the period of 1985 - 2000 was used. When the new data is supplied, model can be revised. Because of the model handles the all sectors, the details are leaved out to provide better understanding of the model and to prevent the confusion. When focused on one sector only, a detailed analysis can be made.

Migration to Malatya provides important contributions to the country. When it is considered that the level of socio-economic development of the area is low and Malatya is one of the most developed provinces in the area, it is clear that the province will be an attraction center and will make contribution to level of socio-economic development of the area. On the other side, this will decrease the migration to Istanbul, Ankara, Izmir and any other metropolis and prevent the growing infrastructure problems of metropolis.

Effectiveness of health services has effect on anticipation of life, fertility rate and infant mortality rate. To improve the based health services will provide increased anticipation of life, decrease of infant death and being conscious about birth control.

To supply significant data to the province governors and concerned government divisions about how the acceleration of socio-economic improvement of Malatya will be in the following 25 years, and to help on determination of policies about to expedite the socio-economic improvement of Malatya will have provided to reach the actual target of this study.

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