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Optimization of Critical Sizes in the Turkish World and Higher Education

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RY Photonics

ABSTRACT
In this study, the Turkic World (T.W.) countries of Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan, Turkey and Turkmenistan's current population, income and the universities assessed. Higher education for the target of 2050 and within the framework of macroeconomics, 75% of human resources for production and other fields, 25% of resources for R&D employees and senior managers were optimized. "Model Based Engineering (MBE) and (2n+1) Geometric Ratio Technique (GRT)" utilized for socioeconomic planning. Vertical layers for the universities and horizontal layers for the macroeconomics used establishing the modelling. Turkey is taken as scale country while calculating the index data for the other countries of the Turkic World. Also new structure for the secondary education developed as a proposal while calculation index data.
The current population of the Turkic World is assessed as 154,4 million and the total number of universities is 448. It is calculated that one university is allocated per 346.000 student in Turkic World while the figure changes to 455.000 student in Turkey, 627.189 person for Organization for Islamic Cooperation Countries. And the number of faculty number estimated as 173.264. The total gross domestic product for Turkic World countries is $1144 billion where annual personal income is estimated as $5476. This income equal to that of USA (%5,582), Germany (%22,6), Japan (23,01), Russia (69,71) and Turkey (%134,43). Turkic World countries' population corresponds to 47% of USA, 186,38% of Germany, 107% of Russia and 121,80% of Japan. It also represents 3% of total number of states at United Nations and 1,43% of world trade. The population of Turkic World for 2050 predicted as 214,92 million. 1.433 University according to the 1/150.000 ratio. 1.433.000 faculty member and 8.059.000 critical human resource according to the ration of 1/23850 scientist, 7664 high level research group manager and 77.146 human resources for planning will be needed. It is predicted that 28% of total population will be graduated from a university by 2050. Horizonal structure within the economic area designed as nature/agriculture, health, social and engineering layer. Overall size of the nature/agriculture sector represents 23,32% macroeconomics. 50% of the agricultural layer consists of engineering fields directly. The other 25% consists of health and social areas. In total, 75% of agriculture consists of technical areas and the other 25% consists of social areas. The health sector consists of 38,46% engineering, 30,76% social field and the other 30.76% health sector. In total, 69,23% of the health sector consists of other areas outside the sector. Social layer consists of 27,27% engineering, 36,36% social and health. The overall economic structure consists of 4,68% engineering, 6,24% social and 6,24% health sectors.
In total, the economic layer consists of 12,29% health and social layers. The size of the engineering layer was determined as 14,06% in macroeconomics. Although the human resource size corresponds to 14,06%, the impact ratio in macroeconomics is 47,18% and the multiplier coefficient is 7,11. Engineering services are frequently used under different names in agriculture, health and social fields and have a multiplier effect in the development, enrichment and prosperity of the society. Vertical structuring for universities; engineering 25%, social areas 25%, health area 25% and doctorate, master's degree for all areas 18,75% and post-doctoral specialization areas, senior managers and planner are recommended to be trained 6,25% in total and 2,08% in each area. For the Turkic World 2050 targets, 1 technical university in the top 10 in the world universities ranking, 1 technical university in the top 20, the other from 1 health (medicine-pharmacy) and 2 from the top 50, 2 from health, 1 from the social field, there should at least 5 universities. It should have 8 qualified universities in the top 50 of the world's best university rankings. In order to increase the quality of education and raise the critical population rate, a. Those who produce high level theory, b. Very high level of experimental workers and those who turn theory into practical technology and product, c. There is a need for high-level faculty members who are both theory producing and high-level experimental staff. If these deficiencies are completed within the next 30 years and the proposed innovations are systematically completed

on time, per capita national income exceeds the nominal $ 45000 dollars. It would also be among the top 10 economies of the world as the Turkic World group in the science and technology race.

***KEYWORD**: University, Optimization, Model Base Engineering, Geometric Ratio Technique.*

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I. INTRODUCTION

"Cooperation Council of Turkic Speaking Countries (Turkish Council) is an international organization established on 3 October 2009 with the Istanbul-based "Nakhichevan Treaty". The aim of this organization is to develop multilateral cooperation between Turkish speaking countries by making the most of the historical and cultural accumulation of the Turkic World. The relevant institutions of the Turkish Council within this framework are: There are organizations of TURKSOY (International Turkish Culture Organization), TÜRKPA (Parliamentary Assembly of Turkic Speaking Countries), Turkish Business Council, Turkish Academy, Turkish Culture and Heritage Foundation" [1].

Turkish language speaking or briefly as Turkic World (T.W.) countries consists of Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan, Turkey and Turkmenistan. In addition, it is necessary to add the Turkish Republic of Northern Cyprus (TRNC). In fact, as the geography where Turkish is spoken, people living in a wide geography from the Balkans-Turkistan-Uighurs-Siberia where Turkish is spoken. In this geography, many large / small countries and countries with autonomy level can be included. However, the purpose here is not to discuss these areas but to analyze the situation of higher education in Turkic World countries. Turkic World countries are also members of the OIC (Organization of Islamic Cooperation, OIC). OIC consists of 57 countries and 6 of them are members of the Turkic World [2-5]. There are studies in which there are analyzes using different methods [6-8]. However, in this study, analyzes have been done by using "Model Based Engineering (MBE) and (2n+1) Geometric Ratio Technique (GRT)".

Turkic World countries show significant differences in terms of geography and demographic structures. However, it is united as a cultural and ancestry. More small countries benefit more from this situation. In this respect, as there are differences in the development problems of the 6 member countries, the common working area brings together unity in the solution methods of the problems. Other countries except Turkey are neighboring countries. However, there are countries that have a population as much as a large city. We think that the solutions of the problems of these small countries can be solved faster only when cooperation with large countries.

When the Turkic World countries reach the level of strong economies, science and technology producing countries, we also think this will contribute positively to the Turkish groups living in Asia, India, Pakistan, Afghanistan, Iran and the Balkans, Europe and Russia.

II. DEMOGRAPHY AND NATIONAL INCOME

Some of the economic indicators related to the Turkic World countries are taken from the website of the "T.C. Ministry of Foreign Affairs". Some calculations were made according to these indicators. For this reason, we accept that the data is correct because it is an official institution. Figure.1 shows the populations of Turkic World countries. Turkey is the most populous country with 82,3 million. With a total population of 154,7 million, it is larger than many countries and smaller than many countries such as China, India, USA and Indonesia. In today's world, there are many cities with a population of more than 15 million. For this reason, we think that some countries with a population less than big cities should be evaluated in different manner. Figure 2 shows the average human life in Turkic World countries. The world average is 72 years old [9]. Average life expectancy in countries outside of Turkey Turkic world is less than the world average. This should be investigated. The main reasons for this are the internal tensions in some countries, poverty, poor health care, healthy drinking water and nutritional deficiencies.

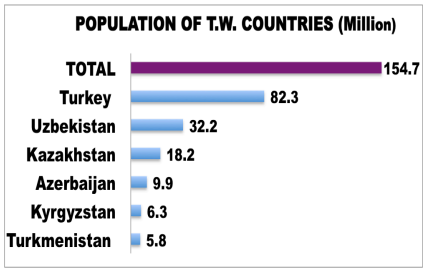


Figure 1. Population of the Turkic World countries [1].

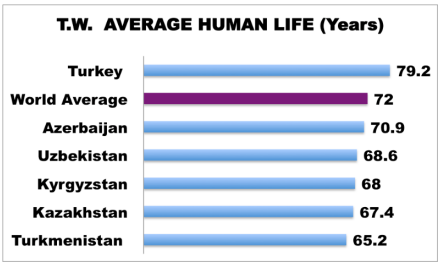


Figure.2. Average human life in Turkic world countries [9].

Figure.3 shows the average age of the Turkic World countries. The average age of these countries has been calculated as 29,3 [10]. Considering many developed countries of the world, it is seen that the average age is very low. For this reason, both education and employment of the young population can be seen as a serious problem. It is a serious source of labor force for countries with sufficient capital accumulation. However, considering the development of all Turkic World countries, they are not in a position to turn the low average age into an advantage. Countries have to add this young population to the active workforce. We think that this unemployment problem will be solved with the free movement of goods, capital and labor among the Turkic World countries. Fig.4. Literacy rates in Turkic World countries can be seen. literacy status of the other countries except Turkey are very good. Considering this situation, it is seen that there is no serious literacy problem. Here is the most problematic country is Turkey. It is seen that Turkey is still a serious problem, enrollment in secondary education. We think that this problem should be taken seriously and the problem should be solved quickly. There is also a quality problem in secondary education in all Turkic World countries. According to open sources, this is clearly seen in the 2018 PIZZA exam results. Figure 5 shows the GDP (Gross Domestic Product, GDP) national income of the Turkic World countries. No country exceeds one trillion US dollars among these national revenues. The total national income of Turkic World countries is 1144 billion USD. Among these Turkey ranks first with 851 billion dollars, or 74,38% of the total.

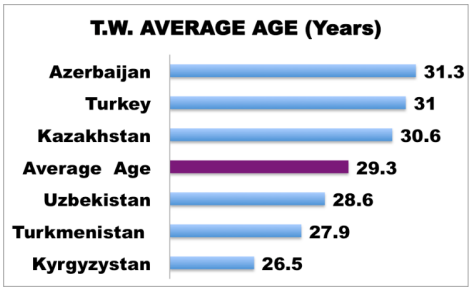


Fig. 3. Average age in Turkic World countries [10].

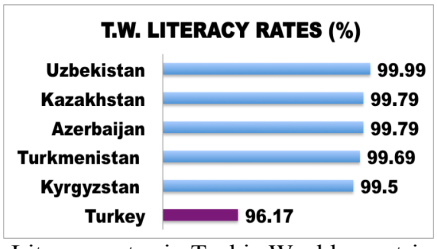


Fig.4. Literacy rates in Turkic World countries [11].

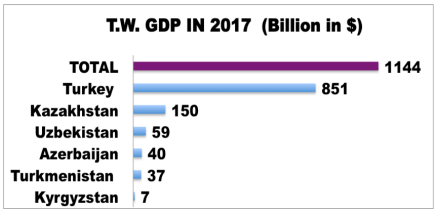


Fig.5. Turkic World countries GDP for 2017 [12, 13].

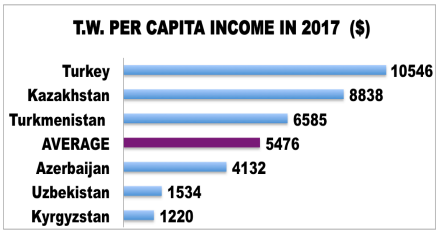


Figure 6. GDP nominal national income per capita of Turkic World countries [12, 13].

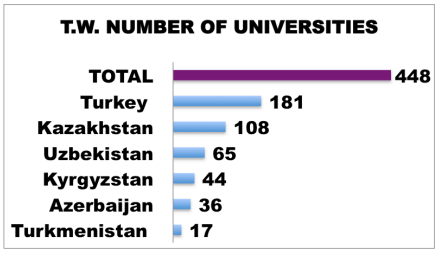


Fig.7. Number of universities in Turkic World countries [14].

Figure 6 shows the GDP per capita national income in Turkic World countries. Turkey is the country with the highest income of $ 10546 and Kyrgyzstan with lowest of $1220. The difference between them is approximately 8,644 times. Average per capita income is $5476. Three of the six countries which are below the average are Azerbaijan, Uzbekistan and Kyrgyzstan. Figure 7 shows the number of universities in Turkic World countries. The total population of Turkic World countries is determined as 154,7 million and the total number of universities is 448 [14]. In OIC countries, an average of 627.189 people is allocated per university [15] where in Turkic World countries, 346.000 people are allocated per university. These numerical values are far below developed countries. We think that there is a very serious human resource problem in Turkic World countries. The most important problem is that qualified lecturers are required in order to train qualified human resources. The other problem is the well-established university problem, where the qualified academic staff will work. These countries have to solve both problems. If the Turkic World countries do not have well-trained qualified human resources, they will have neither future nor nationality. Otherwise, their future will be worse than the situation they are in now or perhaps they will disappear from the earth.

III. CALCULATION OF NUMERICAL INDICATORS

In this study, Model Based Engineering (MBE) and (2n + 1) Geometric Ratio Technique (GRT) briefly, “MBE-GRT” [16] has been applied to higher education of Turkic World countries. The model would reach the goal with 75% in 30 years, 80% in 35 years and 100% in 35-50 years. The reason for this variance is related to the dynamic structure of the country's populations. “MBE-GRT” allows change in the country's development process due to the flexible structure of the model which where models success lies. Therefore, it is not a very strict model, but on the contrary, it is a very flexible planning and optimization model. It can be carried out and realized under any condition. If it is desired to reach the targets in a shorter time and if the university infrastructure is sufficient for this, the only thing to do is to import the trained human resource to reach the 75% target in 15 years. In this case, the economic situation of the investment should be seriously discussed and it will be more economical and rational to make temporary applications only for the areas that are in urgent need.

According to information received from the Turkish Republic Foreign Ministry Affairs and OIC sources, the total population of Turkic World countries calculated as 154,7 million [2]. The number of universities could not be obtained from Turkic World sources and the total number of universities from open sources was determined as 488.

In Figure 8, population / university ratio densities are seen in Turkic World countries according to the current situation. According to the obtained numerical values, a university has an average of 346.000 people. There are two countries that are above the average value which are Uzbekistan and Turkey. Other countries are below average. On the other hand, there is a university for 55.000 people in the USA [17]. According to the USA scale, the total number of universities in Turkic World countries should be 2812 universities. Or new 2325 universities are needed. This situation is only related to today's population. There is a university for approximately 455.000 students in Turkey who are registered 181 universities in 2018. The average of OIC countries corresponds to a university of 627.189 people [15]. Planning should also be made for each country, taking into account population growth.

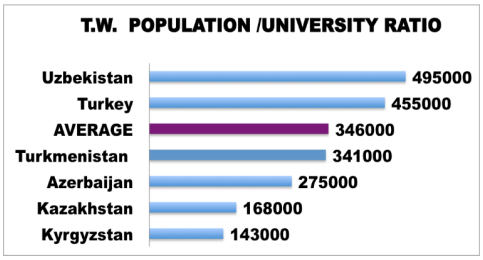


Figure.8. Population / university ratios in Turkic World countries.

Figure.9. The number of academicians in Turkic World countries has been calculated taking the university doctorate scholars as a scale in Turkey in 2019.

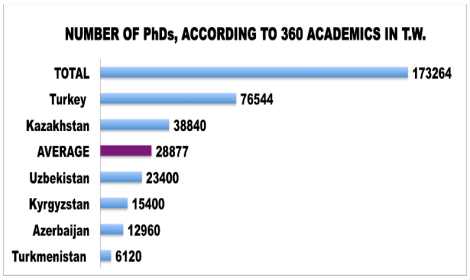


Figure 9. The number of scholars calculated according to (360) the average of Turkey.

In some countries, there may be more PhD students. While doing this study, the number of academicians with doctorate degrees could not be reached in Turkic World universities. Calculations made for other countries comparing them to scale of Turkey since we were able to obtain academic staff with PhD only for Turkey.

In Figure 10 the number of faculty members with doctorate degree was calculated for other countries according to the ratio of Turkey's population. Turkey is inadequate with respect to the number of university lecturers and. This calculation is made only for the predication purposes. It may be more or less than the numerical values calculated in some countries. Each country should plan on its own according to the actual numerical values.

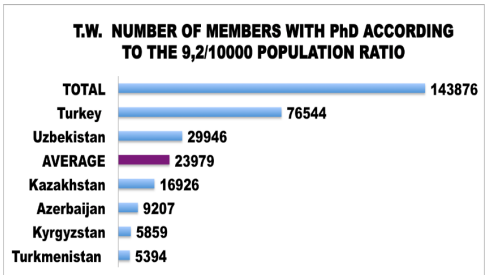


Figure 10. Number of academicians with doctoral degrees for Turkic World countries.

For the Turkic World countries, 1036 universities are needed in the calculation of the general current population with a university rate of 150,000 people. However, in current situation only 488 current universities are serving in the Turkic World. According to the USA scale, the total number of universities in Turkic World countries should be 2812 universities. Or new 2325 universities are needed. This is the reasons why Turkic World countries do not develop or cannot develop are clear.

In Figure.11, the number of universities is recommended according to the population of Turkic World countries. For the general population 150.000 person, 13.125 undergraduate students and based on the 1/15 (faculty member/student) ratio 875 academic staff recommended for ideal university. For countries with economic and financial strength, it may be suggested to establish a university for the population of 50.000 for general population. Or 300.000 for countries with economic difficulties, number of higher education undergraduate students for the general population 26.250 and universities with 1750 faculty members can also be established. Quality of universities are more important than the number of universities. The quality of the lecturer and the laboratory competencies in the infrastructure are the determinants of this quality.

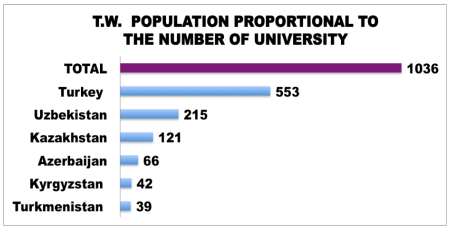
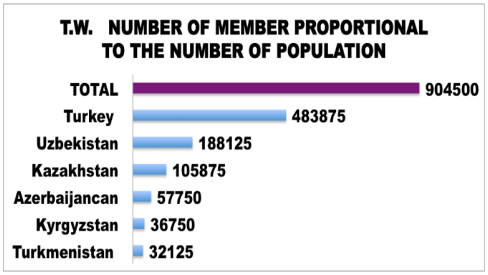


Figure.11. The number of universities proposed according to the current status of Turkic World.

Şekil.12. The number of faculty members in 1036 universities calculated based on the population of 150.000 is seen for Turkic World countries. There is a need for 904.500 faculty members who are required to be in Turkic World higher education system. At least half of them must be qualified in terms of quality and quantity. The most obvious measure that it is not sufficient in terms of quality is ratio of products with high added value in total exports or (kg/$) equivalents are evident indicator. With another approach, the analysis of imported products can easily be detected.



Şekil.12. Number of faculty members recommended for the Turkic World.

Human resources with doctoral degree are calculated based on the Turkey scale for the other Turkic countries. These numerical values give the trained human resources for countries. It also corresponds to some of this critical population rate. Therefore, it is a strategically important numerical value. It has a strategic meaning beyond the numerical size for the countries. For Turkey, this ratio 1,49/1000 correspond. But this numerical ratio is very poor.

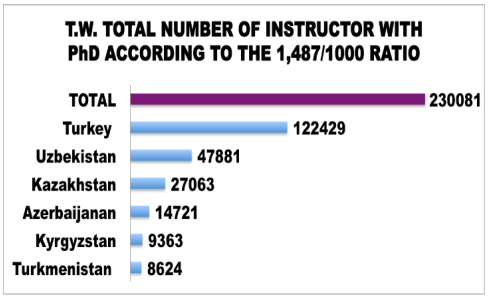


Figure 13. The total number of doctorates calculated according to the scale of Turkey.

Figure 14. The target should be to increase the population rate of Turkic World countries with a doctorate to 3,75% of the general population. Countries with 3,75% critical rate are unique for developing countries. This also corresponds to either 3,75% of the general population or 10,5% of the active workforce. This critical population should be evaluated as a qualified human resource which should be provided to every sector as the pioneer of any segment in a country. This population works in the manufacturing sector, in the field of R&D or as a manager. This population is the locomotive human resource of the countries. Qualified postdocs population in Turkey is very inadequate. In order to be sufficient, 3,75% of the general population (3.112.500) or an active employee equal to a minimum numerical value of 1.875.000 must be qualified human resources with PhD. Turkey's status of this numerical value is less than 1/25. However, the population with a doctorate in the USA is slightly more than 10% of the general population. In China, according to open sources, there are well-educated human resources with PhD between 80-100 million or more than 5% of the population. If your human resource is less than 3,75%, you are not capable of sustainable growth and technology production. You will only be a copycat country that adds to what others have done. The situation of some of the Turkic World countries today is worse than that. This is the fact that the development of technology and science is not by chance. The trained human resource is in fact more important than money.

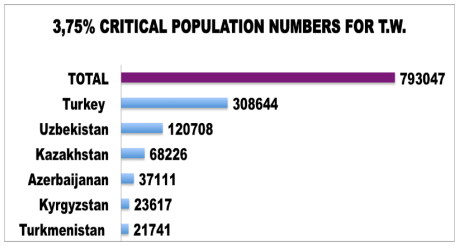


Figure 14. Critical population of 3,75% for Turkic World countries.

In Figure.15, the proportion of qualified 5/1000 researchers calculated in proportion to the populations of Turkic World countries. This population rate is a qualified human resource that will operate in all areas of the country. It consists of people who will manage institutions and organizations at the highest level, plan for the future. For example, executives of the major institutions in Turkey can be counted. These people should be the people who have the ability, skill and intelligence to perform all kinds of operations within the framework of their activities.

Another feature of the critical population is the intelligent communities that do not see the research as a boring job but see it more like a hobby. It consists of a human resource that can make all kinds of technological innovations in the industry, conduct efficient and qualified research in their fields, make new products, new ideas, new science and technology. According to open sources this human resources is in the US 1.450.000, in the European Union countries 1.650.000, in Japan 600.000 and in Germany 400.000. On the other side this figure is only 28.016 (this data obtained from website of the Turkish Republic Ministry of Industry and Technology in 2018). The existence of this kind of human resource is unique to countries which has completed its industrialization, developed and looking for finding and producing IT, new science and technologies. There are new scientific and technological researches fields that states encourage and direct. These can be in any advanced level. For example, new types of energy resource research, new generation passenger and warplane research, new research in medicine, bio photonics, application of quantum physics and the production of organic artificial organs in biology are just a few of them. Another important scale is the lack of talent to manage a billion-dollar R&D project in the Turkic World. One can find at least 10.000 people suits this task in the US.

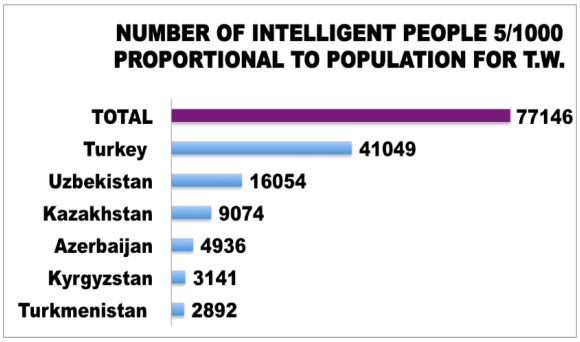


Figure 15. Number of researchers for Turkic World countries based on the 5/1000

In Figure.16, the numerical values of 1/20.000 potential scientist candidates from one generation were calculated in proportion to the populations of Turkic World countries. These rates are directly proportional to the population of the countries. Although it consists of specialized human resources in its fields, which completed its doctorate and is the highest-level of 1/20.000 higher education. These human resources are groups with characteristics that can change the fate of all countries in a positive way. For example, the scientist who transforms the energy of gravity, which is outside the classical energy or transforms its energy into technology, and who will make the computer system design that artificially imitates all the features of the human brain that produces 100% artificially organs of people.

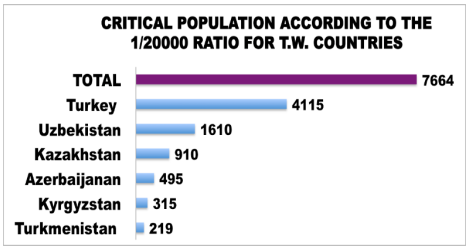


Figure 16. Numbers of potential scientists proportional to their population based on the 1/20000

Today, developed countries attract human resources from all over the world under different names. On the other side undeveloped countries often devalue such human resources. They cannot develop further because of this problem. In fact, such countries do not have any concerns or efforts like development. Because of the mismanagement, lack of human rights, unfair administration, unfair legal system, favoritism. Therefore, such countries drain their trained human resources. Or, when skilled human resources are still very young, skill hunters notice such people and attract them to their countries with scholarships, doctorates or attractive salaries. In addition, skilled human resources from internally turmoil countries attracted to developed countries.

In Figure 17 Turkey's higher education graduates represents only 11% of general population according to the Turkish Statistical Institute (TUIK). The number of actual academicians with PhD is around 80,000. Among them, the number of doctorate researchers in the field of engineering is at 11.139 [17]. The real source of why Turkic World countries could not be developed is the lack of trained or educated human resources. The main reason is never lack of money. As a result of devaluation of science, scientist, universities, poorly managed institutions, people and lack of prioritization cause Turkic World countries to be unsuccessful.

In the Turkic World, there should be 850 scientists in proportion to its total population. But where are they? If there were 850 real scientists, would the Turkic World be in such misery today? We have either lost our human resources, or they migrated to other countries. Regardless of the outcome, we don't currently have 850 scientists. For this reason, the Turkic World countries have to develop a common research culture. How this will be done? It is the job of states and governments to solve this problem.

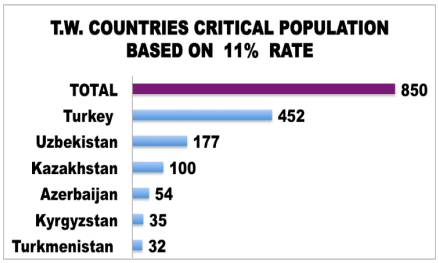


Figure 17. Number of scientists in Turkey based on the 11% of university graduate's ratio

In the Figure 18. the number of full-time researchers from countries taken from OIC sources is given. The total number of researchers here is 95.161. The number of full-time researchers, however, should be around 750.000 on the US and EU scales. Because human resources should be evaluated in proportion to the population.

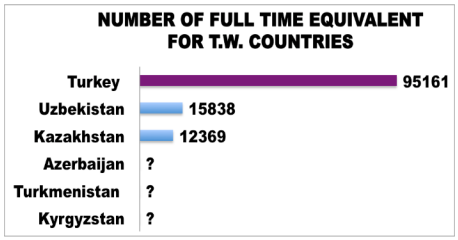


Figure.18. Number of full-time researchers [18].

We also think that these researchers, in our opinion, have a problem of quality. For example, the number of researchers indicated from the Ministry of Industry and Technology of Turkey is 28.016. Among these, 910 PhDs and about 6500 masters completed, and others are researchers made up of undergraduate degrees. In Turkic World and OIC countries, it is understood that there is a quality and quantity problem. The average budget of a researcher in Turkey is $41.600 is equivalent to the US dollar according to our research.

61,5% of this budget is reserved for personnel expenses. According to a research conducted in the same year in the USA, the average budget amount is close to 10 million USD. Approximately 3-6% of this budget is allocated to personnel expenses. According to OIC data, which constitutes a source for Turkic World countries, the number of FTE may be correct, but it is an inaccurate result in terms of quality and quantity. This number of researchers is a very large human resource. If this researcher's numerical values are correct then Turkic World countries should not be in this situation.

In Figure 19. the number of HC researchers in Turkic World countries was calculated as 190.784. There are almost twice the number of researchers in Fig. 18. Again, we think that the basic question should be evaluated in terms of quality and quantity of researchers. As a simple example of this, we think that the value of goods (kg/$) other than hydrocarbon derivatives in the exports of Turkic World countries should be considered. These products explain the real situation related to respective country.

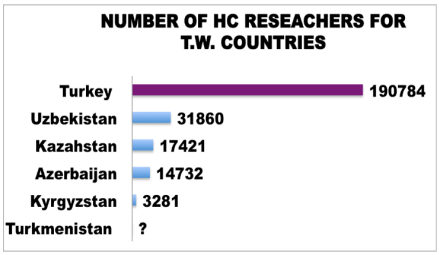


Figure 19. Number of HC researchers [18].

In Figure 20. Economic Complexity Index (ECI) of the Turkic World countries and some selected countries is given [19]. This assessment roughly corresponds to the variety of goods produced by countries. In other words, it gives the variety of goods in the manufacturing sector. This means that the products are produced independently of the country's natural resources. Or the rate of wealth from production excluding the influence of natural resources in the country corresponds to 73%. In other words, in a country, natural wealth means that countries can be enriched with the variety of goods in the manufacturing sector. Turkey is the country with the best situation in the countries of the Turkic World by this situation. Although it is the 17th largest economy in the world, it is 52'nd in the ECI ranking. Other Turkic World countries are in different ranks between 52-112. The diversity in the manufacturing sector is extremely low and the variety of goods is very limited or they export their natural resources in the form of raw materials. Almost all of the national income of these countries is obtained from domestic consumption and natural resources in the country. This situation also affects competitive exports. Turkey derive 20% of annual national income from exports approximately. The current account deficit in total trade imbalance is the most obvious measure of this. As a result, poverty becomes the destiny for these countries.

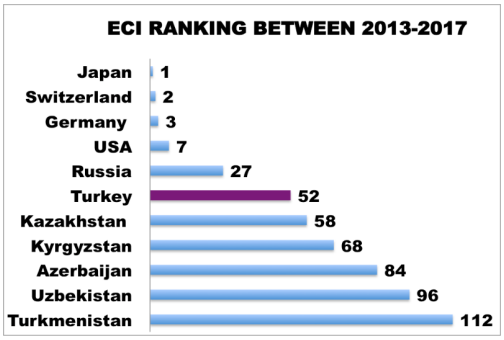


Figure.20. Comparative World "Economic Complexity index (ECI)" ranking [19].

More than 60% of the future needs of countries selected by OECD will be information technology and engineering [20]. Technologies produced from basic sciences will lead the future. Classic known technologies will not bring leadership for countries in the future. On the contrary, science and technologies that are not even known today will bring leadership. Countries that undertake intensive research in the field of engineering based on the future basic natural sciences will become leaders in the future.

Fig. 21 shows the estimated population of the Turkic World in 2050. According to these calculations, the population of the Turkic World is estimated to be around 215 million. According to the statistical open sources of Kazakhstan, population growth rate is given as 1,3%. According to this speed, the population exceeds 27 million. Again, considering migrants in Turkey, the actual population living in Turkey exceeds 94 million.

This population; consists of the population from Syria, Iraq, Iran and Asia, Africa and the Balkans. This population excludes those who buy and live real estate.

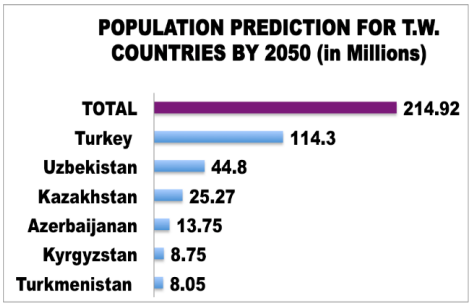


Figure. 21. Population prediction for Turkic World in 2050.

Figure 22. illustrates the current population of Turkic World as 154.7 million and number of universities as 448. The Turkic World 2050 population is estimated to be 214,92 million and the number of universities as 1433.

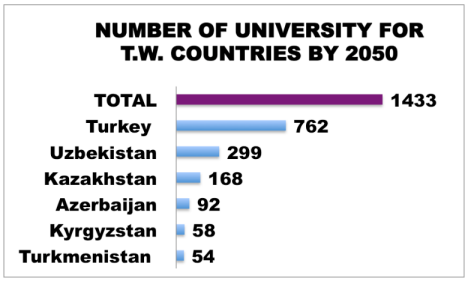


Figure 22. Estimated number of universities for Turkic World in 2050

Until 2050, 995 new universities are needed in Turkic World countries. According to the current population/university ratio of the USA, there should be 4300 universities. 3852 new universities should be established in proportion to the population growth by 2050. More important than the number of these universities, its quality and level of education which should be high. According to another assessment, in the ranking of world universities, there should be 1 technical university in the top 10, 1 technical university in the top 20, and at least 5 universities in the top 50, 2 technical, 2 health, and 1 in social field. In other words, there should be 8 qualified universities in the top 50 of the best universities in the world. This should be set as a goal and all possibilities should be used to make it happen. If this happens, the average annual per capita annual income exceeds the nominal $ 45,000 per year. ECI indices of the Turkic World countries will be higher.

In Figure 23. the number of faculty members required for 1433 universities calculated. For each university, 1000 faculty members and 13.125 undergraduate students for each university calculated.

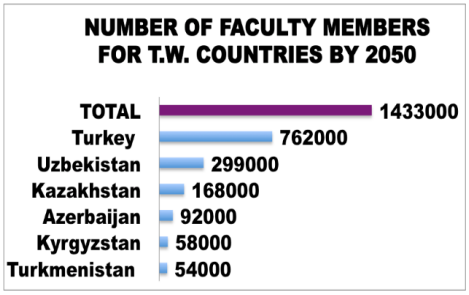


Figure. 23. Number of faculty members in the universities of Turkic World by 2050.

For undergraduate students, for the ratio of 1/13 student is calculated, and for graduate and doctorate students, 10 students per faculty member is calculated as 1/23 faculty student ratio. The ratio of students at the university (master's degree + doctorate / bachelor's degree) corresponds to 76,92%. In this case, the total number of students of the university exceeds 23.000. It is not necessary for all universities in the country to have the same rate. The percentage of student moving from undergraduate to graduate studies is less than 16% in Turkey. The rate of those who enter and complete the doctorate is less than 10%. Turkey and Uzbekistan are two

countries which is most understaffed academically. Both the population of these two countries are crowded and the number of universities and academic staff is very insufficient. In Figure 24. the critical 3,75% population rate for Turkic World estimated by 2050. The critical population is very important for the development of each country. It is not possible for a country to have a voice in the world economy with critical population lower than 3.75% rate. In addition, it is not possible to progress or develop new technological products. If we remember the history, Japan was making completely imitation and assembly industry products before 1980. Now, it is the best technology and science producing country in the world with its human resources. Again, China is the country that imitates everything. But now it is the center of the world that produces more than 60% goods. Many international companies produce in this country very cheaply by giving their know-how. Production made in China very cheaply, but also this way China attracts technology transfer very cheaply. Chinese firms could not go beyond imitation. Now the critical population ratio has exceeded 3,75%, and in some areas it has become capable of producing science and technology. Today, the USA, Canada, Germany, England, China, South Korea, and Japan are some other small countries that produce their own technologies and science. All of these countries have exceeded the critical population rate of 3,75%. Therefore, Turkic World has to exceed this this threshold. For this, it has to establish qualified universities and other institutions. Building a building is not enough, the main thing is appreciating and taking care of these scientists working in hese institutions.

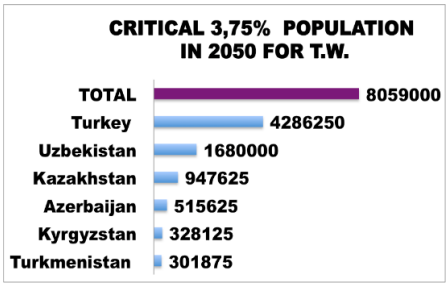


Figure 24. Critical population for Turkic World by 2050

If the number of university graduates in Turkic World countries continues with the current trend, the ratio in the general population reaches 28% in 2050. Europe's current university graduate average is 37% according to open sources. It is not sufficient for the number of universities and faculty members recommended for the Turkic World to be 28% of university graduates, even after 30 years. In another assessment, 72% of the population is still a high school graduate. For this, especially vocational high schools have great task to overcome. At least half of the vocational high school graduates must have graduated from a two-year vocational school. This will contribute to the increase of qualified human resources. This numerical value is very low for 2050. However, if this population is raised qualified, a lot can change.

Turkic World can solve their urgent problems together with incubation university system [17]. They can easily overcome these problems by determining the priority areas and establishing partner universities, research/application centers and joint research groups. For this, only the political will of the states is required. Thus, the problem of training human resources can be solved and research and development projects carried out for the development of respective countries. They can develop trade among themselves to improve the relations between the Turkic World countries. We think that if the duty-free circulation of the co-produced goods in the common working areas is done, the market problem will be solved for a while.

IV. RECONSTRUCTION OF UNIVERSITIES FOR SOLUTIONS OF COMMON PROBLEMS

4.1 VERTICAL STRUCTURE

Universities' undergraduate programs are formal education that educates technicians in every field. The reason why it is defined as a technician is that it is about giving standardized information to undergraduate students and teaching how to utilize the information. Whenever anyone who has a bachelor's degree has developed scientific, philosophical thought and applied, then he or she is the person who embarks to become a scientist. The basic philosophy of higher education is not aimed at educating all of its students as scientists. Those who want to become scientists are shaped as a result of graduate and doctorate education depending on their success.

There is science, health sciences and social sciences institutes in universities apart from discipliner departments for masters and doctorates. Separate from this general institutional structure, there may also be special purpose institutes. For example, defense institutes for soldiers, institutes for police and music institutes. The numbers of these institutions and students can be very limited compared to others.

Figure 25. shows the vertical structuring of universities for undergraduate, graduate and post-graduate studies. This vertical construction is planned from bottom to top. Qualified human resources at all levels are determined in this model. This human resource planning structure represents all kind of human resource that directs, implements all kinds of planning, production and management of countries from bottom to top.

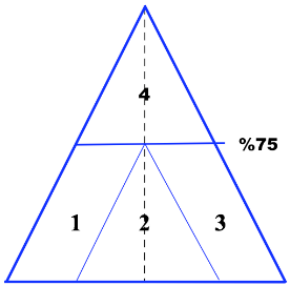


Figure 25. The basic vertical structuring at the university. It represents the fields of 1. Health, 2. Engineering and basic sciences, 3. Social sciences, 4. Doctorate, master and specialization. The size of all areas consists of 25% [21].

Three main areas chosen in the undergraduate vertical structuring of universities. The size of these equal to 25%. These areas are:

1. Health: The size of this layer is 25%. It is the layer where all kinds of health-related human resources are trained. This layer includes not only human, but also animals and plants. The main areas of this layer are: Medicine, Pharmacy, Dentistry, Veterinary, Environmental experts, Nursing and health officer and other fields.

2. Engineering and basic sciences: Electric-Electronic, Computer, Machinery, Chemistry, Building (Construction, Architecture, Geology, Map), Mine, Basic sciences (physics, chemistry, biology, mathematics) and others.

3. Social areas: Economics, Business, Finance, Finance and Banking, Law, Education and sciences, Theology, Literature, History, Language, Art and others.
This configuration called vertical structuring. The size of this structure is equal to 75% of the total. For this reason, 75% of university graduates are planned to work in the fields of production and industry.

4. Master, doctorate and post doctorate: The other 25% is planned for human resources to work outside industry and manufacturing. In other words, R&D is a human skill that will work as a senior manager and planner. These are of equal weight in health, engineering and social fields. There is a total of 18,75% for master's and 6,25% for each field. There is a 6,25% rate for the total doctorate. In this area, it is planned to be 1,56% for each field of master and 4,68% in total. 1,56% planning was made for post-doctoral specialization. At least 25% of undergraduate should continue to graduate studies. These areas are planned for the human resource that should be trained for master, doctorate and post-doctoral studies. The critical population size is determined as 3,75% and it is the most important and skilled human resource for all countries. This resource makes all kinds of planning, implementation and high-level management of the country. The horizontal layers represent human resources graduated from studies related to economy, and skilled human resource that would be employed in area of the macroeconomics. Vertical layers, on the other hand, represent human resources that should be trained in universities to educate human resources for the needs of horizontal layers. Thus, it is recommended that the human resources should be trained according to the needs of the real economy. In this case, both financial resources and university graduate human resources are optimized together. As a result, all resources are considered holistically.

For sustainable development, we suggest that the state should be restructured first and universities and other investments for economic industrialization should be reconstructed together. The implementation of this model is normally reached within a 35-year period, reaching 2,812% of the general population's target of 3,752% or 75% of the general target. This rate corresponds to the annual (8,035 /10.000) increase value in the general population. 36-50 years of time is needed for the other 25%. The reason for this is that the population structure is dynamic. The development of the country will be even faster if the 3,75%, which is accepted as the critical threshold value, is reached less than 35 years. This is a critical proportion of the population by more than 10% in the USA, China (5,92 to 7,40%) and Turkey is between (1,49 /1000) correspond to general population rates. Human resources trained for development are inadequate. The most obvious scale to this situation is the

number of annual national and international patents in the country, the competitive coefficient of the products exported, the equivalent of exports ($/Kg).

World university ranking's first 20 universities for 2019-2020: USA:17, UK:2 and Japan:1 university. The top 50 are USA:34, UK:5, Japan:2, Canada:2, France:3, Switzerland:1, Denmark:1, Sweden:1 and S.Korea:1. Among the top 100 universities; USA:54, UK:8, Japan: 3, Canada:4, France:5, Switzerland:3, Denmark: 2, Netherlands:4, Sweden:1 and S. Korea:1, China: 3, Germany:3, Israel:2, Singapore:1, Norway:1, Taiwan:1, Australia:2 are available [22]. Successes in science and technology cannot be a coincidence. It is a trained and skilled human resource that does everything. Everything should be done for the comfort and peace of the people.

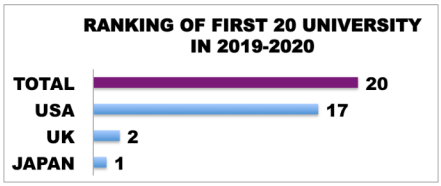


Figure. 26. Distribution of the world's top 20 universities in 2019-2020 [22].

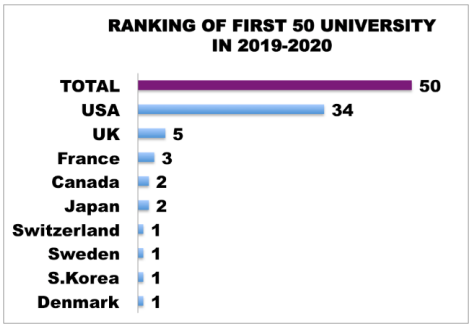


Figure. 27. Distribution of the world's top 50 universities in 2019-2020 [22].

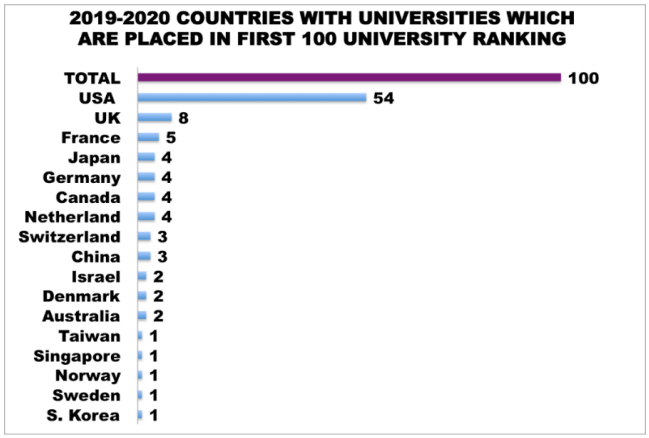


Figure 28. World university rankings for 2019-2020 [22].

4.2. HORIZONTAL STRUCTURE

4.2.1. ANALYSIS OF HORIZONTAL LAYERS

The sectoral layers in macroeconomics can be seen in Figure.29. In these layers, a general classification has been made for 75% production and 25% R&D and senior manager. Sectoral needs were determined by matching the horizontal layers with the vertical structuring at universities. Thus, university graduates will not be left unemployed by conducting parallel to qualified human resources for the needs of the sector. In addition, the sector will not have trouble finding qualified personnel. We think that the sectoral distribution within this horizontal structure macroeconomics is important.

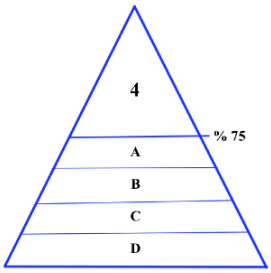


Figure 29. Sectoral horizontal layer structuring within macro economy. 4: R&D and senior management layer, A: Engineering layer and size (14,06%), B: Social layer and size (17,18%), C: Health layer and size (20,31%), and D: Agriculture layer and size (23,31%) [21].

4.2.2. NATURE / AGRICULTURAL LAYER (23.31%)

The nature / agriculture layer represents the production, industry and service of all products originating from nature and agriculture. These include the production of agricultural products, converting them into industrial products, moving to the market, sales, institutions and organizations, in short, all nature / agriculture-based sectors. Therefore, it is the largest layer and is the layer that provides the basic conditions for all living things. In this context, if there is no agriculture, it means that there is no life. The absence of other layers does not directly affect living creatures. Or even if there are no other three layers, its life continues under natural conditions. But if there is no agricultural layer, the others do not matter.

The total size of the nature/agriculture layer is 23,31%. It is the largest economic size that it affects directly or indirectly macroeconomics. For this reason, it directly affects every sector and purchases services from every sector.

In Figure 30. 50% of the agricultural layer purchases services directly from engineering fields. Or 50% of the agricultural layer is directly connected to the engineering layer. The engineering effect and contribution in agriculture is 50%. Today, mechanized agriculture sector, which is called modern agricultural practices, uses engineering applications intensively. The other 25% consists of health and social areas. In other words, 75% of agriculture consists of technology and the other 25% consists of social content areas. The main areas of engineering in this system are; energy, machinery, construction, electricity, electronics, computers, chemistry, bio-technology, food, veterinary, pharmacy, mining, agriculture, water etc. It consists of many engineering fields.

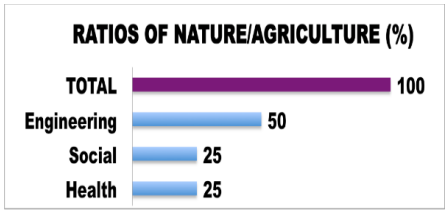


Figure 30. Nature / agriculture layer structure and proportions.

Among the undeveloped countries, the agricultural layer is the business area where employment is greatest. In particular, it is seen as a source of employment for countries with national income below $5000. It puts the national income in the transition countries, which are close to $10.000 and slightly above the transition countries. Turkey is the most typical example of this. These countries neglect agriculture first, and then they realize that they will not be without agriculture such as Turkey.

Another important problem is the food, which is developed due to the lack of agricultural lands or insufficient agricultural lands, especially in the oil-rich gulf countries. In some African countries, although there is enough land suitable for agriculture, famine, starvation to death are observed. The most important work to be done in this is regional joint production, joint education, and joint education should be applied directly.

Real agriculture consists of 50% engineering services. While only sowing, harvesting or harvesting plant seeds can be seen in the field, agriculture uses every field of engineering to grow products. The rate of engineering in higher education in the structuring of higher education and the training of human resources is more than 40% in developed countries today. The other 50% of the agriculture layer is related to 25% health and 25% social area. Among them, especially 25% of health is the second most important sector for agriculture. Finally, they are the third-degree social areas. This area shows more effect after healthy agricultural production. The other two areas are human resources, which are important for production in agriculture. The main ones are veterinarians, food engineers, pharmacy or pharmaceutical industry, etc. can be counted in such areas.

The other section is the social area of agriculture. Its size in this field is 25%. In other words, it is the department where the human resources that will contribute to the production, marketing, storage, and commercialization of agriculture in an economical dimension are made. This section is important for sustainable agriculture. While other engineering and health fields are related to the production of agriculture, this section is related to the management of agriculture and its economical sustainability. It serves all kinds of social structures and also contributes to the formation of social layers. As for employment, it contributes to seriously preventing unemployment. Apart from this, it also contributes seriously to the formation of large and small family businesses.

Agricultural sector represents 23,31% of the total macroeconomics. Human resources are expected to be the same size. For this reason, 11,65% in engineering, 5,82% in health and 5,82% in social area related resources should be trained from higher education for this layer. These should be seen as trained human resource stock for the country. Although the agricultural sector seems to be pure agriculture, the effect of engineering in agriculture or engineering services is more than 50%. The total of technical fields in agriculture is over 75%. Although the agricultural sector looks like a sector using simple technology, it is the production made using 75% technical services for production. For this reason, today's agriculture is a technology dependent sector.

4.2.3. HEALTH LAYER AND SIZE 20,31%

The health layer represents all kinds of health services in a country. This layer includes health, medicine, food, agriculture and environmental problems of the public and private sectors. Production, inspection, distribution, food safety and health conditions are considered within this scope. It also includes the treatment of diseases of all kinds of plants and living things, drug production and other health engineering. Therefore, it includes wide range of coverage in the society. It is important at every stage of life. It includes all kinds of institutions and organizations related to health. In fact, even though it may seem like the service sector on the basis of this layer, it is a very important service application completely in the technical sector.

In Figure 31. 38,46% of this sector consists of engineering services, 30,76% of them are from social services and the other 30.76% are from the health sector. The 69,23% of the health sector consists of technical services and support from other sectors outside the health sector. The weight of the general economic structure is 7,69% engineering, 6,15% social and 6,76% health sector. In total, 13,84% is the economic layer consisting of layers outside the health sector.

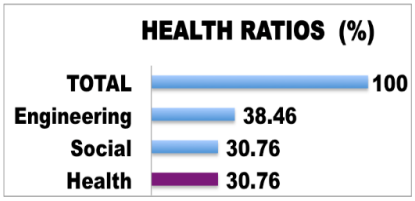


Figure 31. Health layer structure and rates.

4.2.4. SOCIAL LAYER AND SIZE 17,18%

The social layer represents the layer of the social professions of the society as well as the layer formed by the occupational groups. Another important aspect of this layer covers all of the social areas of universities. It also represents the structuring of universities. The size of this layer is only technically calculated.

In Figure.32 this layer consists of 27,27% engineering, 36.36% social and health. If it is included in the health and technical field other than itself, there is 63,63% technical area. Or if we consider the health sector as a service sector, engineering is 36,36% and the other areas are 72,72%. For this reason, it would be more accurate to consider the sector with the least technical field. However, it develops and grows with the contribution of technical fields in the social field. The overall economic structure consists of 4.68% engineering, 6,24% social and 6,24% health sectors. In total, it is the economic layer consisting of 12,29% health and social layers.

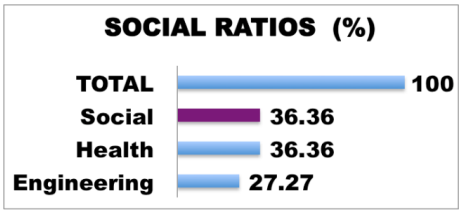


Figure.32. Social layer structure and rates.

4.2.5. ENGINEERING LAYER AND SIZE 14,06%

This layer is located at upper side of the horizontal layers. Its size 14,06% and the multiplier force 7,11 affects all other layers. This layer is the layer that provides all kinds of engineering services to itself and all other layers. This layer meets all the technical services provided to the people of the states and any simple or complex industrial products that people buy. Therefore, it has a locomotive effect for all developed and developing countries.

The size of this layer was determined as 14.06% in macroeconomics. In other words, although 14,06% corresponds to the size of human resources, the impact ratio in macroeconomics is 47,18% and the factor is 7,11. This means that 47 of every hundred people who will graduate from the university should be trained directly in relation to engineering, basic sciences and production. In other words, at least 47% of the students who will be admitted to the university must be in engineering and basic sciences. Engineering services are frequently used under different names in other agriculture, health and social fields. These services sometimes represent unseen aspects of the purchase of goods or services. Therefore, it has a multiplier effect on the development, enrichment and prosperity of the society.

In Figure 33. the total area planning of the universities is given. Proportional values of each area were determined.

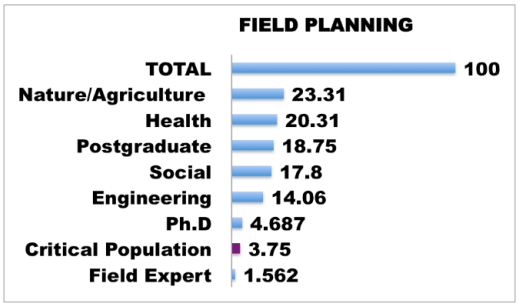


Figure. 33. Field planning at universities

V. RESTRUCTURING OF SECONDARY AND HIGH SCHOOL EDUCATION

Only 28% of the total population (214,92 million) will be university graduates in the planning for 2050. The other 72% will be high school graduates with the best chance. Here the main problem begins. How and where will this 72% high school graduate employ? This is a big problem today and will be a big problem tomorrow. Therefore, it is imperative to solve the middle and high school problem before the university problem. Many employers cannot find workers in the country and yet unemployment rate in Turkey exceeded 40% according to open sources. The main reason for this is the wrong structuring in high schools. Unless this situation is corrected, universities cannot go beyond just delivering diplomas. In this case, the current situation is not the fault of the universities but governments.

Skilled vocational high school graduate problem exists in other Turkic World countries also. Vocational high schools are almost non-existent in these countries. There is no craftsman in many fields. While unemployment is at the top, many high school graduates and skilled craftsmen are brought from abroad. This is actually a contradiction. There is also the same paradoxical situation in Turkey. For this reason, it is essential for all Turkic World countries to solve this problem jointly. To solve this problem, it is necessary to restructure the high schools with common planning. States have no survivors for the future unless the problem of vocational and technical high schools is resolved.

Our suggestions for this;

75% of the student population should be vocational high schools. The other 10% should be directed to general academic high school and 15% in science and special purpose high schools.

The structuring of vocational high schools should be in accordance with general purposes. Apart from very special occupations, people should be trained in basic occupations. The reasons for this are that professions are changing rapidly and some professions are losing their influence. For this reason, very general sections should be opened for those other than special conditions.

Vocational technical high schools should be opened for successful students in vocational high schools. Students should be prepared for higher education here. For example, for the machinery department of vocational technical high schools: departments of vocational high schools such as turning-leveling, motor, metal can be the source. For electrical, electronic, computer and similar departments, vocational technical high schools such as electricity-electronics. The other one can be taken to the construction department of vocational technical high schools in all departments such as construction, interior decoration, installation. These are just an example.

Thus, vocational technical high school graduates should be encouraged to attend universities to cover 50% of vocational high school students. According to the OECD 2017 report, Turkey reported that 39% of graduates of vocational high schools in Turkey were determined to choose their own field. Thus, universities would train more qualified people. We believe that these university graduates will be more qualified because they are trained from the source.

Elimination procedure should be introduced to the undergraduate departments of universities. In the first two years, undergraduate diploma should be given to students whose average is below 70%. In addition, the two-year associate degree students in the same institution should continue their undergraduate degree for graduates of 80% or take the ÖSYM exam and continue in the department and university they want. Thus, quality is increased automatically by introducing the screening method in higher education. This application should be limited initially. Nobody should be admitted to a two-year college without an examination. The number and quota of two-year schools should not be much, but rather less. Qualified people should be trained.
Turkic World countries can create a ground for the formation of standard quality by conducting academic staff and student mobility among themselves.
10% of the number of high schools or students should be directed to high schools established for special purposes.

a. Biology science high school (1%): Graduates should prefer preferentially in every technical field of medicine, dentistry, pharmacy and health sector. Everything will be moved to an organic structure in the next 50 years. Even today's building materials will be organic. For this reason, human resources should be raised already. The top 10 universities in the world in biology are the USA and the UK. Pharmaceuticals, health and biotechnology are also in these countries. Could it be coincidence?

b. Physics science high school (2%): Graduates should enter preferential fields in machinery, construction, electrical, electronic engineering and other related fields and departments. It is a very important part for the future.

c. Chemistry science high school (1%): Graduates should prefer preferentially in chemical engineering, chemistry, pharmacy earth sciences and other related fields and departments. Organic molecular chemistry will be extremely important for the future.

d. Mathematics science high school (3%): Graduates should enter the fields and departments of computer engineering, computer software engineering, mathematics engineering and accounting expertise. Mathematics is important for every field of science.

e. Computer/informatics science high school (3%): They should be able to enter any field related to computer software engineering, mathematics engineering, accounting expertise, computer and informatics. For the future, it is especially important for cyber physical systems and integrated systems (Hybrid systems).

f. General science high school (5%): Graduates should be able to choose any field. Because qualified human resources are needed in every field. Therefore, it is the basic human resource.
The other 10% of the student population must finish general high schools. Vocational technical high schools and science high schools enter the university with additional points, while general high school graduates should enter with no additional points and limited quota. Thus, an advantage should be provided for students.

In Fig. 34, the proportional values of the structuring of high schools are given. The rate of secondary school leavers finish well or who do not attend school in Turkey 17,2% d. In other words, it means that 82,8% of the generals who completed secondary school will continue. Apprenticeship schools should be opened for students who do not attend or leave high school and a profession should be made for them. 12 years of compulsory education should be abandoned to ensure that all of these occur. Instead, only 5-year primary school and 4-year secondary school should be made compulsory. In other words, 9 years of compulsory education should be introduced. The student, who also wants a four-year secondary school, should be able to attend a two-year apprenticeship school from grade 3. In other words, while graduating from secondary school, he or she should also graduate from apprenticeship vocational school. These students should be allowed to attend either high school or university. After graduating from high school, student should be able to continue college.

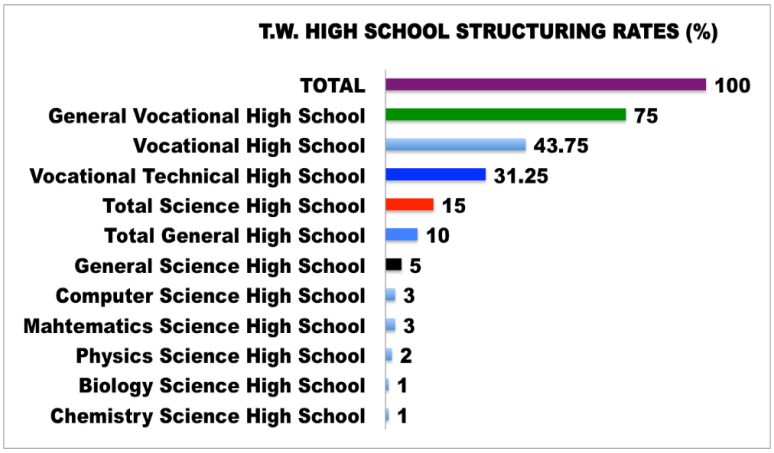


Figure. 34. Proportional structuring of high schools as diversity.

A numerical example is given for the secondary school graduate and after in Figure 35. The total of these students is 1.200.000. Their numerical distribution can be seen in Figure 35. Here, the proportional value of only those who have not completed high school and who will continue open high school is not given. The reason for this is that open high school is not in this planning. Those who do not graduate from high school are in middle school graduate.

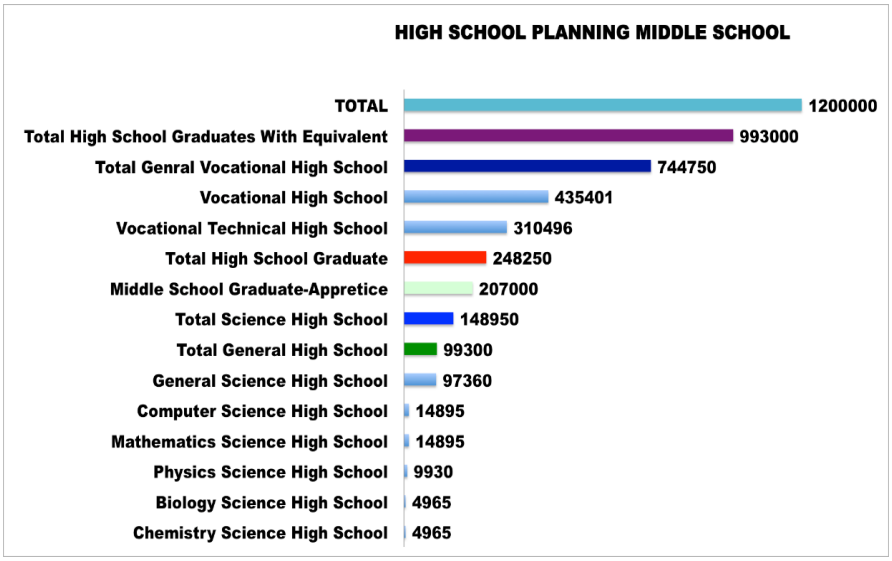


Figure. 35. Proportional distribution of secondary and high school graduates.

It is not possible to achieve success in higher education unless the problems of apprenticeship, secondary and high school education are systematically resolved in a country. Apart from primary and secondary school levels, there is no 100% school success and compulsory education in any country in the world. High school education should not be compulsory. According to OECD indicators employers prefer high school graduates rather than university graduates in Turkey [22]. Considering this situation, high schools should be planned more carefully.

Another main problem is related to the question of why do high school graduates have to go to university? Why do late graduates who finish high school feel obliged to finish university? The state must basically investigate the rationale for these questions, identify the problem and solve it. The state should find a permanent solution for such basic problems. So far, only numerical values and statistical ratios have been analyzed. For this reason, a permanent solution could not be found or the solutions found were not permanent. The state's secondary, high school and university graduates should also make arrangements to eliminate the serious income gap between them. One of the most important regulations that the government should make is related to the encouragement of graduates of technical departments, vocational high schools and vocational technical high schools to establish a company or a business place, rather than being a civil servant or briefly public employee. These companies or businesses should be encouraged to start a business by providing free

consultancy and tax exemption for a period of five years, until their production, marketing status becomes regular. All kinds of legal arrangements should be made in this.

Turkey's mistakes related to the higher and secondary education recorded in OECD report [23]. Turkey still continues to make these mistakes. A few of these inaccuracies outlined in the OECD report;

1. Graduates such as business and law are employed below average.

2.Turkey still are placed at the lowest among OECD countries in terms of spending on education.

3. Turkey is not allocating enough funding for compulsory primary, middle and high school.

4. Turkey is one of the countries with the largest disparity between learning environments in public and private educational institutions.

5. Students enter university exams with unfair learning outcomes.

6. The ratio of public students to teachers is equal to half of private schools. Class size in public schools is twice that of private schools.

7. Graduates from a higher education in Turkey earn more revenue and still has advantage.

8. In Turkey, 39% of vocational school graduates in engineering, manufacturing and construction related. In OECD countries, it is 34% on average.

9. 27% of students prefer entering higher education in Turkey for the disciplines of science, technology, engineering and math.

10. 73% of business, management and law graduates are not able to work,

11. 43% of the population aged 25-64 in Turkey are primary school graduates. This rate is the first place shared with Indonesia.

12. 45% of young people graduated from secondary school in Turkey.
In 13 article Turkey’s shortcomings are summarized. It is expected that Turkic World countries would not make the same mistakes.

If a country does not plan for secondary education, especially for post-secondary education, the structure at the high school would not objectively plan. If it is sacrificed for the sake of political fortunes, it would be a futile expectation to see well trained human resource with higher quality, and quantity from higher education.

China made radical changes for education in 1980, it reorganized secondary, high school and higher education. Especially by investing in schools in middle income and poor regions, it paved the way for smart kids to enter university. Instead of training them to be regular workers, these intelligent children trained to become engineers and later engineers with PhDs. This ambitious created an opportunity for low income children. Thus, China also managed to make the best use of human resources. Turkey has yet to do so. It still invests heavily in city centers. Even between schools in the centers of cities and schools in the suburbs, there are large gaps and inequality in learning. Thus, the determined suburban children have trouble entering the university. On the other hand, family children who grow up in centers who want to work constantly, such as scientists and researchers, do not usually choose because they have good financial conditions. The government should open doors to the determined children to work in this and invest in this segment. This mistake needs to be corrected urgently. The state should strive for the selection of intelligent children in the provinces and suburbs. Political parties should not destroy these national fortunes for their fortunes. These children are more valuable than money. Governments should understand this now. The lack of a well-trained human resource or the number of unqualified populations is at the root of all the troubles suffered today.

VI. CONCLUSION AND EVALUATION

Calculations for this work made according to the scale of Turkey. The reason for this is that data in other countries cannot be obtained explicitly. Both, Turkey's 11% university graduates' rate and population of respective countries were taken into consideration for the technical calculations. The plan made to train 75% for production and 25% for R&D and senior managers from the general human resources.

We recommend establishment of a university for 13.125 undergraduate and 10.000 graduate (total 23.123) per 150.000 person of the general population. In this case establishment of 1433 university required for ratio of 1/150000 and 1000 faculty member, for the ration of 1/23 (faculty member/student) which would be add up to 1.433.000 faculty member required. Under these conditions, it is estimated that the average population of the general university graduates will increase to 28% by 2050.

In order to increase the quality of education in universities and train the critical population rate, classifications should be made in the faculty member. These classifications:

a. Those who create high level theory,

b. Those who turn theory into practical technology, product who work in high level of experimental fields.

c. Those who develop highly level theory and implement high level experimental research. The number of such faculty members is very few in all universities around the world.

In order to increase the education level of universities, especially the technical and applied fields, the types of faculty members mentioned above are needed. Thanks to such faculty members, new theorems, inventions, science and technology will be produced by corporate work, not by individual work.

Since the developed countries have these three types faculty members, they are constantly developing and producing science and technology. On the other hand, although the developing countries do not produce new theory and science, they make production by applying the existing technology in different fields. Thus, they obtain product variety and export new competing products. For example, smart homes, some of the patents, utility models and many other productions can be counted. In underdeveloped countries, most of the faculty members do not know the theory in detail or know the application. They only have classic license information. As a result, only diplomas are distributed from universities. This is the real situation of universities. Therefore, human resources, which cannot work and practice experimentally, has neither theory nor practice, is poorest. This is the most important problem of universities and R&D institutions. In order to overcome these problems, the most basic problem should be solved related to the infrastructure, laboratory deficiencies at the undergraduate and graduate level. Then realistic planning of the academic staff of the faculty must take place. Academic staff should stay away from daily political policies. Politicians should never force these institutions for political gains but these institutions provide consultancy services. Otherwise, universities only distribute diplomas like today. Academic community is not responsible for this outcome but the politics which desire to shape the academic community for political gains. Unfortunately, this is the bleeding wound of third world countries. Whenever politicians respect science, truths and apply the thoughts of real scientists in accordance with the conditions of the country, then the countries will develop and the welfare society will be formed as a result.

National income distributions, populations and developments of Turkic World countries are different. First, the nutrition, agriculture and food problems of the Turkic World countries should be solved permanently. The second, health problems should be solved. Priority areas should be solved by working in close cooperation. Problems in social and engineering fields should be started after the people are satisfied and healthy. People should no longer die from starvation and epidemic diseases. People should be kept alive and under healthy conditions. Outbreak disease problems should be resolved first and joint measures should be taken. For this reason, all kinds of human and funding resources should be used in the Turkic World. In other words, based on the strengths and weakness of respective country, one country may contribute more with funding, other might offer land for agriculture and next may contribute with training for highly skilled faculty members. If this is not done, the Turkic World countries will remain under the current conditions as a group that has no effective power in the world. The only way to be effective and effective is to be strong by combining all kinds of resources.

In Fig 36. Date obtained from educational resources of OECD. According to this source, the number of PhD graduates of the Turkic World countries are the predicted numerical values which estimated separately from regular the OECD format [23]. Because the annual number of PhD graduates of Turkic World countries could not be obtained. For this reason, an estimate of numerical information on doctoral human resources in Turkic World countries used.

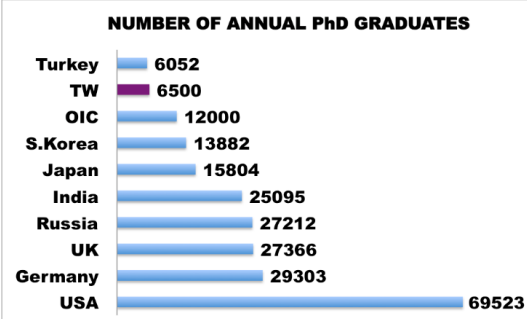


Figure 36. Comparison of Turkic World countries with other selected countries for annual doctoral graduates, according to OECD sources. (OIC and T.D estimate is calculation) [24].

According to IMF and OECD sources in Figure.37 and Figure.38, the population and economic indicators of Turkic World countries are compared. GDP, total annual income of the Turkic World countries corresponds 5,582% of US, 28,6% of Germany, 23,01% of Japan, 69,71% of Russia, and 134,43% of Turkey are equal. The economic size of the Turkic World countries is not effective in the World. These economies are strong, the US population is nearly twice, Germany is half and Russia is close to the sum and Japan's population is 4/5.

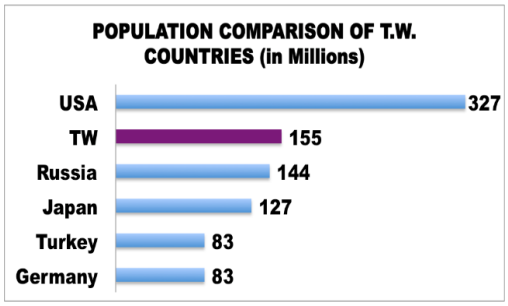


Figure 37. Comparison of the Turkic World population with some selected countries.

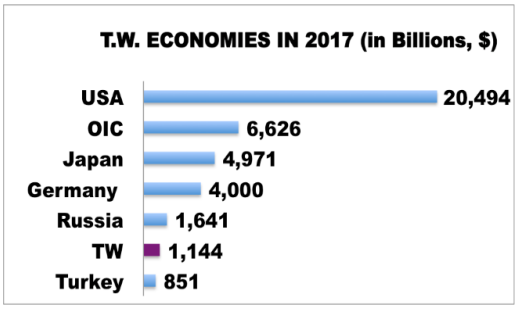


Figure 38. Comparing GDP annual revenues of Turkic World countries with other countries (TW and OIC calculated) according to the data of OECD and IMF.

The current population of the Turkic World predicted as 154,7 million and the number of universities as 448. The estimated population of the Turkic World is 214.92 million in 2050 and the number of universities as1433. Until 2050, 995 new universities are needed in Turkic World countries. This is only the number of universities proposed. More important than the number of these universities, the level of quality and quality of education. 1 technical university in the top 10, 1 technical university and 1 health (medicine or pharmacy) university in the top 20 and at least 5 in the top 50, 2 technical, 2 health and 1 in social area should place of the top world universities ranking. In other words, 8 qualified universities of the Turkic World should be placed in the top 50 of the world's best universities. This should be set as a goal and all opportunities should be used to achieve it in the next 30 years. The 2019-2020 World university ranking, the top 100 countries and the number of universities are given above. Here, 3,75% critical population size is trained in these universities. On the other hand, if you do not have 4 universities in the top 100 universities in the world, it means that you have no say in the world. Achievements in science and technology are not accidental and cannot be accidental.

Priorities for the Turkic World, every country in every field of agriculture should be self-sufficient. Product circulation, joint production should be done freely by duty free trade. In addition, the surplus products should be exported to other countries with partner companies which should be established. For example, Turkey which has extensive experience in greenhouse cultivation can contribute to countries for fruit and vegetable production near the Caspian Sea coast. All kinds of practical cooperation can be done here. Greenhouse cultivation, fruit growing and vegetable growing can be taught practically to those living in these regions. Turkey can also barter goods in exchange for red meat since it has deficiencies in this sector. Turkey, Azerbaijan, Kazakhstan, Uzbekistan, Turkmenistan and Kyrgyzstan should become sufficient in agriculture. Duty free trade should be carried out amongst themselves in the sector of agriculture. Afterwards, duty free circulation of all agricultural / nature products should be ensured. Moreover, partnerships should be made in the field of energy. This will reduce the dependence of Turkic World countries on foreign currency. It will strengthen their economies. Foreign exchange rates to the economy will not be affected by interventions, and they will have sound economies rather than a fragile economy.

All countries should share their experiences in the field of health. They should switch to standard higher education among themselves. Standard highly specialized institutes should be established in each country. Exchange of faculty and health personnel in every field from every country should be implemented. Employee replacement and circulation should be free.

The other area is drug studies. Countries must be united to establish joint public companies, public-private sector or mixed-economy model, or only the public joint investment of each country, and vital drugs must be produced. Foreign dependency should be minimized. The use of domestic and national resources should be a priority.

The other aspect of the health field related to structures, regulations and boards that should comply with common health standards at every stage of food production to consumption. Afterwards, joint institutes should be established and experts should be trained to check their compliance with conditions. Priority should be given to the establishment of a permanent system and, in particular, to the development of human resources.

Cooperation can be made in 4 basic areas for the solution of common problems of the Turkic World. These;
1. Joint reconstruction secondary education,
2. Joint restructuring of universities,
3. Exchange of faculty members between universities.
4. Establishment partner institutes to:
a. Train common human resources,
b. Conduct research via joint research projects,
c. Share experiences to solve current problems.

These consist of the structuring of the relevant institutions and organizations of the states in accordance with their conditions. Each country should implement the same project on its own terms. As a result, development should take in all countries. If the problems of restructuring of educational institutions are not resolved permanently, then, it is futile to expect qualified and quantitative human resources from higher education to conduct successful research. The problems of higher education cannot be solved permanently under these conditions.

Although the size of the engineering layer corresponds to 14,06% in macroeconomics, the impact rate in macroeconomics is 47,18% and its factor is 7,11. This means that 47 of every hundred people who will graduate from the university should be trained directly in relation to engineering, basic sciences and production. In other words, at least 47% of the students should be educated to work in engineering and basic sciences.

The obvious or hidden reasons for the unsustainability of scientific research are the lack of necessary and sufficient climate. These poor climatic conditions are lack of trained human resources, setting priorities wrong, lack merit-based promotion, devaluation of science and scientists, lack of financial support of universities or R&D institutions, the insecurity of justice, weak legal system, not respecting the freedom of speech, idea, democratic rights and freedoms. In any country that cannot solve these problems, scientific and technological developments will not be sustainable and permanent.

Turkey and other Turkic world countries can take advantage of the "Belt and Road initiative" of China which developed in recent years. Turkic World countries are on this road. All kinds of commodities can be traded jointly; traders can establish huge businesses by establishing partner companies. In particular, they can turn the silk road into an opportunity by exporting the surplus of agriculture products to China.

Same race, same ethnic background, same belief, same language, and geographic closeness will not yield any result as long as these countries does not develop close relations, increase trade.

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