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Presentation a New Model to Measure National Power of the Countries

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Abstract: In this research, based on the assessment of previous models for the evaluation of national power, a new model is presented to measure national power; it is much better than previous models. Paying attention to all the aspects of national power (economical, social, cultural, political, military, astro-space, territorial, scientific and technological and transnational), paying attention to the usage of 87 factors, stressing the usage of new and strategically compatible variables to the current time are some of the benefits of this model. Also using the Delphi method and referring to the opinions of experts about determining the role and importance of variables affecting national power, the option of drawing out the global power structure are some the other advantages that this model has compared to previous ones.

Key words: National power, measurement of national power, geopolitics, global geo-political system, global power structure

INTRODUCTION

Calculating and measuring national power and designing a model with which we can compare States in a certain time and or the situation of one country in two different times has always been one of the challenges facing scientists in political geography, geo-politics, international relations and political science. In this respect, to measure the power of countries in all stages after war many efforts have been made especially in the 60's and 70's (Tellis *et al.*, 2000) pecialists and experts of different fields have attempted to invent methods with single variable and or multi variables to determine the countries' situation in the global system and also to compare them with each other. All of them have ranked and compared the countries from a multi or limited variable perspective but it has never reflected the countries complete and extensive power (Hafeznia, 2006).

Measuring the national power of different countries has always been one the biggest challenges facing political geographers, geo-political specialists and international relations. For example Peter Taylor, a political geographer, has stated this to be a big problem in political geography. He believes that because power is one of those definitions that cannot be directly measured, therefore measuring the power of countries has turned out to be a complication (Taylor, 1993). Some reasons have been the cause of not being able to design an extensive national power plan by scientists, for example:

Power is a term which is integrated with qualitative variables and indexes and measuring of them are difficult.

Because national power and ITS indexes are in different areas, so accessing a counterbalanced quantitative pattern and determining their quantitative co-efficient is hard (Hafeznia, 2006).

Despite this, many efforts are made to measure the national power of countries in the form of single or multi variable pattern.

Single variable approaches to measure national power: In the evaluation of national power some scientists, after assessing the effect of different indexes have emphasized on one index for measuring national power and have measured other countries based on that. military expenditures, the size of armed forces and gross national product are frequently used as indicators of national power in empirical studies (Jeffrey, 1976). In general one variable approaches to evaluating national power can be divided into two groups: The first group is specialists who recognize military indexes as symbols of power. Experts like Inis Claude and Karl Devteh who emphasized on military forces; Norman Alcock on military costs and George Modelski and William Thompson on measuring the navy as an important index to measure national power (Tellis *et al.*, 2000). The second group is experts who state that economical factors are more important and have recognized them as standards on which national power can be measured. Among these experts we can name

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Table 1: Single variable approaches to evaluating national power

Row	Name of index	Index type	Model designer
1	National income	Economical	Kingsley Davis
2	Gross National Production (GNP)	Economical	Charles Hitch and Ronal Mc Kean
3	Total fuel and energy consumption	Economical	Bruce Russett and Oscar Morgistern
4	Gross national production	Economical	Joshua Goldstein
5	Military force	Military	Inis Claud and Karl Devtech
6	Military costs and force	Military	Norman Alcock and Alan New Combe
7	Number of navy force	Military	George Modelski and William Thompson

Source: Zarghani (2007)

Table 2: Number and type of variables used in conceptual integrated models

No. of variables used in the model	Model designer	Year of presentation
26 variables: in the form of the 3 factors: economical capacity, demonstration qualification and motives of war	Claus Nour	1956
3 variables: gross national production, per capita and population density	Alcook and Newcombe	1970
6 variables: population, energy consumption, steel production and costs and number of military forces	David Singer	1972
6 variables: land area, population, government income, defense costs, capacity of international trade and number of armed forces	Weyne Ferris	1972
5 variables: area, population, still production, number of armed forces and number of transcontinental missiles	Richard	1975
10 variables: amount of savings, agricultural production, industrial production, percentage of research and development exports and Y	Saul	1991
Over 40 variables: in the three groups of: national resources, national performance and military capability	Tellis and Belly	2000
Over 50 variables: in the form of seven factors such as: economical, political, social, cultural	Aazami	2005

(Source: Zarghani, 2007)

Kingsley Davis, the demographer, specialized in political sciences that recognized national income as the most important factor in determining power (Gregory *et al.*, 2004). Also Joshua Goldstein who recognized Gross National Production (GNP) as the most important single variable factor in national power (Goldstein, 1999). Table 1 shows different specialists and the type of indexes used by them.

The most important criticism that can be accepted about single variable approaches are that these types of single variables have a limited outlook towards national power and cannot express the real national power of states and their real situation in the global geo-political system. In other words, national power has different economical, political, military, social, territorial and Y; therefore any index or model which only measures one certain aspect for example the military aspect or military power or has even measured them from one aspect is not realistic and can't be a suitable standard to measure national power. For example, even if oil income has increased the gross national production in countries like Saudi Arabia, Iran and Venezuela, there is no relationship between this index and other indexes of national power. Based on this we cannot measure the national power of countries by only evaluating this variable (Kadera, 2004).

Multi variable approaches to measure national power:
One of the other methods of measuring national power is by using multi variables and integrating them and designing a multi variable model. Designing integrated models (multi variable) by specialists is done in two

different types: mathematical models and conceptual ones. In integrated mathematical models, first of all the variables are chosen and then by designing a mathematical formula the type of relationship for the variable integration is determined. Finally, based on this mathematical model the national power of countries is measured. For example, we can observe models planned by Clifford German (Richard, 1975) and Fucks (Prescott, 1972). In the second type meaning conceptual models, a few variables are chosen by the designer as the most factors affecting national power and then the countries' power are placed in that group of variables based on their scores and therefore measured. In this method a certain mathematical formula, that shows the type of integration and relation is not presented. Among these models, which we can point out, are the models of Weyne Ferris (1972), Tellis *et al.* (2000), Richard (1975) and Saul (1994). Table 2 shows the most important conceptual integrated models

Mathematical integrated models and conceptual ones also have difficulties and faults which we will not attempt to measure in this research. Therefore, we will only mention the most important criticisms that are about integrated models (mathematical and conceptual) in the list below:

- Limited number of variables used in the models
- Lack of stability in the model based on variable variety and emphasizing on one certain power aspect
- Lack of proportion in the used variables with the strategically conformed variables in the current time

- The effect of opinions and personal viewpoints of the designer on the model (emphasis of economists on economical variables, military Strategists on military variables, geographers on natural variables)
- Using some qualitative variables without presenting methods to use them quantitatively
- Emphasis in using variables with positive role in power and not paying attention to variables with a negative role
- Lack of global data about all variables and states

Based on the findings obtained by evaluating previous national power measurement models, in this research, a new model is presented and efforts have been done for it not to have the faults above. Because the main purpose of this study is planning an integrated model for measurement of national power and this topic is the main subject of this study. Also the model tested and the states ranked according to the data of the year 2004-2005. The stages of model presentation are presented in the form of research methodology.

Research methodology and stages of model presentation: The details of the research methodology are explained in the 13 stages.

Explaining and criticizing theoretical foundations and statements related to power factors and variables: In this stage, theoretical topics like power definitions, national power, foundations and power sources and models to measure power were criticized and evaluated. The information in this stage was obtained from the library study methods and usage of books, magazines, quarterly periodicals and the internet.

Choosing a theoretical model as the main foundation for the model design: In this stage, 28 theoretical models, which were about foundations and sources of national power and were presented by national and international specialists, considered and evaluated (Fig. 1)

Then the theoretical model, presented by Hafeznia, which was based on a number and variety of variables, paying attention to different aspects of national power,
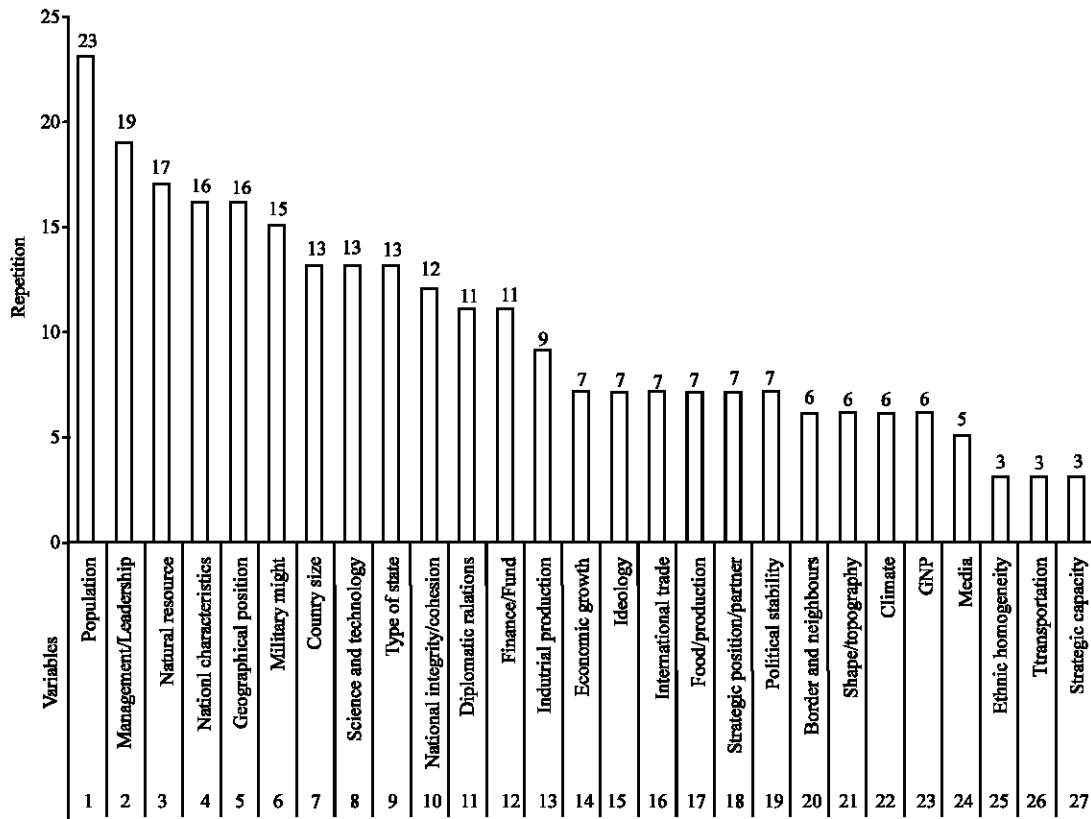

Fig. 1: Repetition of the national power variables in 28 variant theories (Zarghani, 2007)
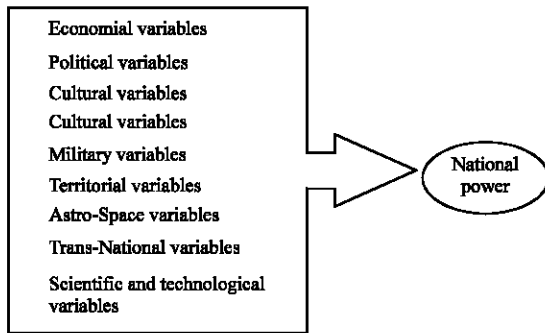
Fig. 2: Model with nine factors of national power

emphasis on negative and positive role of variables, emphasis on new aspects of power was selected as the foundation of designing a model for measurement of national power. Hafeznia in his theoretical model emphasizes on nine factors as the main sources of national power of the states (Fig. 2) as under.

Economical, territorial, political, scientific and technological, social, cultural, military, astro-space and trans- national factors (Hafeznia, 2006)

Gathering variables and indexes effective on national power: In this stage, a total of 280 variables and indexes effective on national power were gathered by referring to the four sources as below:

- Referring to 28 theories about foundations and elements of national power
- Referring to data banks of institutions and international institutions like the World Bank, UNESCO, Military Balance, The World Bank Year Book CD (2005), Barry (2003) and The Military Balance (2004-2005)
- Referring to internet sites related to the topic
- Using the suggestions of different experts and specialists by interview and survey

Sifting the variables: Based on the main purpose of the research namely designing a model to measure national power of states, the gathered variables were measured and sifted based on the three standards below:

- Standard and global data for them
- Quantitivity of variables or potential to change them to quantities
- Availability of variables

Based on this from 280 variables 130 variables were omitted. The 150 remaining variables were categorized in the form of theoretical model (nine factors). Economical, political, military, social, cultural and so.

Evaluating and determining the importance (measuring variables) based on the Delphi method: In this stage based on the Delphi method and to obtain the opinions of experts about the effect of variables and indexes on national power a survey was prepared based on the chosen variables (150 remaining variables). The survey was a closed survey with a multiple answer score in which, each of the nine factors affecting national power were presented separately and the experts taking the survey were asked to choose from among the answers of: Very little, little, average, a lot and very much. In the distribution of the survey, many efforts were done so that there would be proportion between the types of questions of each factor with the expertise of the specialists. For example, only professors of political geography, political sciences and international relations answered questions related to political factors.

Statistical evaluation of the survey results: For a statistical evaluation of the survey results, also to categorize the variables, the (SPSS) and (SAS) statistical software's were used. In addition, to measure the data the descriptive and comprehensive statistical methods were used. In the comprehensive statistics, the three methods below were used:

(a) Using the alpha Crone Bach co-efficient to measure the reliability of the research survey (Negahban, 2003)
(b) Testing the validity of the questions by emphasizing on Factor Analysis
(c) Using the Factor Analysis method to choose superior variables

Choosing superior variables by using the factor analysis method: Because of the extensive research and large number of variables and effective indexes on national power in the form of nine factors and because of the positive usage of the experts suggestions who answered this survey, we used the Factor Analysis method to categorize and choose superior variables. In this method, the relations between a large numbers of variables are measured by a few random, unobservable qualities which are called factors and also Co-Variance (Johnson, 1999). From among 150 variables, 87 variables were chosen

based on data obtained from the Factor Analysis method in which they had the most effect on national power. The 87 variables were considered as the final variables used in the national power measurement model.

Designing the first model based on the matrix method: The chosen variables (by the Factor analysis method), were the foundations for designing the national power measurement model. The way to measure national power was by using the matrix method. In this method, two-dimensional charts were used. In one dimension were the names of the countries and in the other charts containing names of indexes and variables. Then, related amounts were placed in the chart and finally the numbers were added to each other by algebra method and the amount of national power for each state was determined (Hafeznia, 2006).

Entering gathered data of states in the matrix chart: The gathered data about 140 countries or states and 87 variables was entered in the matrix. The information about 140 countries was placed in the rows and the information related to the 87 variables in the columns. In order to calculate the countries' scores, faster and more precisely, the matrix was drawn in a computer by using the Excel software and the information about variables and countries was placed in nine separate boxes in the matrix. About the 87 variables and 140 countries, a chart with 12000 boxes was created and 12000 data was recorded in it.

Changing variable amounts to scores: One of the most important and at the same time most difficult stages in designing the national power measurement model, was the proportioning and in other words standardizing of scoring methods to variables and indexes. Because the components and variables were various and were placed in different fields and areas, accessing the quantitative counter balancing pattern and determining the amounts and quantitative co-efficient for them was very hard. Measuring all the power which is a product of all factors and various variables is in need of changing each of the variables to equal sizes and amounts so that there will be a chance for their integration (Hafeznia, 2006). If by any chance there is a small mistake in this stage, it can cause an unrealistic calculation and illogical increase or decrease of the countries' scores and in the end can cause big problems in comparing the national power of countries. In order to give scores to the variables and indexes, in this research the four different methods below were used.

The method of proportional percentage: In this method, the score of each country is based on its share in the overall amount of variables. For example: Total Nano-technological papers of the world published in the journals with ISI index at 2005 have been: 41665 and the number of such paper for Iran have been: 53, so the Proportional percentage of Iran has been equal to: 0.127.

Morris's index method: The second method is a method that is called the Index method in this research and it is derived from the World Bank's methods in creating indexes like human development index (Anonymous, 2005). The basis of this method is that in order to determine an index from a variable, we measure it's maximum and minimum amount and then based on each number related to each country and also the below formula, we calculate the number related to that variable by an index:

$$\text{Dimension index} = \frac{\text{Actual value} - \text{minimum value}}{\text{Maximum value} - \text{minimum value}}$$

Intentional method: In this method, which is about different variables and the average of that variable, a number is considered as the base and than the obtained number of countries about each variable is measured based on that. For example, about the per capita income of the countries, for every \$1000 of per capita income a positive score is considered and then the per capita income of countries is scored based on that.

Using the indexes own numbers as a score: The fourth method is usually used with indexes which have been used in the model. Because indexes like human development index or digital availability index are the achievements gained by experts throughout the years, therefore it seems as if it is better that each country's number about each index, be considered as that country's score for that index. For example, the number related to Iran about human development index is 0.732; so in this method 0.732 is considered as the score for Iran.

Designing a new matrix based on variable scores: After the amounts relating to variables and indexes are changed to scores by using the four previous methods, a new matrix is designed where scores of variables replace numbers of variables. Like the previous chart, this chart is also drawn in the computer by using the Excel software and the scores of 140 countries about 87 variables are recorded in it.

Table 3: Simple lineal model to measure national power

National power = EC+PL+CL+SC+MI+TR+ST+TN+AS

Factor name	Abbreviated sign
Economical factor	EC
Political factor	PL
Cultural factor	CL
Social factor	SC
Military factor	MI
Territorial factor	TR
Scientific and technological factor	ST
Trans-National factor	TN
Astro space factor	AS

Source: Zarghani, 2007

The algebraic addition of positive and negative scores of variables in each index and determining the total amount of scores in each index: By calculating the scores according to algebraic ways related to variables of each factor, the final scores of countries about each factor are determined. For example, by consideration of positive or negative role of variable in calculating (algebraic) the scores of the 12 economical variables, the total scores of all countries in the economical factor are determined:

Economical factor score = gross national production score + the score of attracting foreign investment + score of all financial sources B score of negative trade rate and Y.

Calculating the nine factor scores and determining the national power of states: After determining the score of each country about each of the nine factors, the total score of countries in the nine factors is calculated, based on the simple lineal model below which is based on the algebraic addition of the nine factors (Table 3). Therefore, the number obtained by adding the nine factors shows the amount of the national power of countries. Based on this number we can construct a power structure for the world and compare the national power of countries in each of the factors separately or based on the total score of the nine factors (national power).

RESULTS

Here, the study's results are measured based on the national power measurement model about each factor.

Ranking national power based on scientific and technological factor: In the scientific and technological factor, 12 variables were chosen by the Factor Analysis method. It means that according to the experts answering in the survey, from among the 22 variables presented in the scientific factor, 12 variables have the most effect on the national power of countries. These 12 variables are:

Row	Name of variable
1	Researchers in R and D per million population
2	Technicians in R and D per million population
3	The score of digital accessibility index
4	Number of inventions recorded per million population
5	Scientific and technical journal articles per million population
6	Expenditure for R and D as % of GDP
7	The average amount of articles in the index of ISI
8	Number of nanotechnology articles in the index of ISI
9	Scientific and technical journal in the index of ISI
10	High-technology exports
11	Industrial share in the gross national production in percentage
12	Amount of nuclear electricity production

Table 4: Top ten powers in the scientific and technological factor

Rank	Country	Score
1	USA	100.00
2	Japan	50.51
3	Germany	46.88
4	United Kingdom	44.49
5	China	32.51
6	France	25.87
7	Russia	25.25
8	Canada	22.61
9	South Korea	22.02
10	Belgium	20.71

Based on the obtained scores in Scientific and Technological factor as has been shown in the Table 4: United States of America (USA) has the number one rank in the world with a score of 100 and the next ranks, respectively are: Japan, Germany, United Kingdom, China, France, Russia, Canada, South Korea and Belgium. Like most of the factors the difference between the countries in first and second ranks are a lot and approximately 2 times more.

Ranking the power of countries based on economical factor: The chosen economical indexes and variables, which are based on the Factor Analysis method, include:

Row	Name of variable
1	Gross national income per capita
2	Gross domestic product per capita
3	Foreign direct investment
4	Manufactures % of total export
5	Unemployment rate %
6	Food % of total import
7	Current negative account balance
8	Total international reserves
9	Gross domestic product average annual % growth
10	Proportion of GDP from all GDP of the world
11	The Score of freedom economic index

In the economical factor as has been shown in Table 5, the USA has the highest score (100) and China, Japan, Germany, England, Canada, France, Australia, Russia and Italy are the next top countries ranking 2 to 10.

Ranking the power of countries based on the social factor: The social factor consists of 11 variables, which

Table 5: Top ten powers in the economical factor

Rank	Country	Score
1	USA	100.00
2	China	84.78
3	Japan	71.70
4	Germany	42.12
5	United Kingdom	30.62
6	Canada	24.45
7	France	24.31
8	Australia	22.69
9	Russia	21.96
10	Italy	20.12

Table 6: Top ten powers in the social factor

Rank	Country	Score
1	USA	100.00
2	China	70.60
3	Germany	67.88
4	Italy	67.87
5	United Kingdom	63.46
6	Japan	61.21
7	Spain	60.69
8	Canada	59.40
9	Belgium	58.24
10	Australia	57.75

have been chosen from among 23 variables by using the Factor Analysis method. From among the final chosen variables, three variables have negative impact. These 11 variables include:

Row	Name of variable
1	Life expectancy at birth years
2	Under-five mortality rate per 1,000 population
3	Access to an improved water source % of population
4	Access to improved sanitation facilities % of population
5	Health expenditure per capita
6	Physicians per 1,000 population
7	population 15-64 years %
8	Maternal mortality rate per 100,000 live births
9	Gender educational equality (Ratio of female to male enrollments in primary and secondary school)
10	The score of human development index
11	Population

In the social factor as has been shown in Table 6, USA with 100 score has the first rank and the next ranks, respectively are: China, Germany, Italy, UK, Japan, Spain, Canada, Belgium and Australia.

Ranking the power of countries based on the territorial factor: The territorial factor consists of 11 variables which, based on the experts who answered the survey had the most effect on national power and were chosen based on the Factor Analysis method. These are as under:

Row	Name of variable
1	Surface area km^2
2	Coastline (km)
3	Renewable internal freshwater resources
4	The score of food production index
5	Paved roads % total road network
6	The score of environmental sustainability Index

Continued

Row	Name of variable
7	Rail lines total (km)
8	Strategic mines resources such as (bauxite, uranium, cobalt, gold, copper, etc.)
9	Airports and international port
10	Oil - proved reserves (bbl)
11	Electricity production by Hydroelectric

In the territorial factor as has been shown in Table 7, the US stands in the highest position with a score of 100 Countries like Russia, Canada, Australia, china, Brazil, Kazakhstan, India, Norway and Iran are the countries ranking two to nine.

Ranking the power of countries based on the cultural factor: The cultural factor consists of 10 variables:

Row	Name of variable
1	Properties cultural included in the World Heritage list
2	Television per 1000 population
3	Daily newspapers (daily circulation per thousand people)
4	Personal computers per 1000 people
5	Daily newspapers per 1000 people
6	The oldness of the state
7	Public expenditure on education % of GDP
8	Literacy (%) age 15 and over
9	Literacy female (%)
10	International broadcasting agencies

As has been shown in Table 8, in the cultural factor ranking the powers is in such a way that the US stands at the highest position with a score of 100 and countries like UK, France, Spain, Japan, Germany, Italy, China, Russia and Sweden are the next top ten countries. The score difference between the first country and the next top ten countries is very little.

Ranking the power of countries based on the political factor: The political factor consists of 10 variables as under:

Row	Name of variable
1	Number coup
2	The score of Freedom index
3	National cohesion
4	International commitments
5	The score of Press Freedom index
6	Ratification and participation in United Nations Human Rights Conventions (6 Conventions)
7	Refugees by country of origin per thousands
8	The score of Government Effectiveness index
9	The score of Corruption Index
10	Democracy and elections

In the political factor as has been shown in Table 9: Finland is in the first position with a score of 100 and Denmark, Sweden, Norway, Switzerland, Netherlands, Australia, Austria, New Zealand and England are, respectively in the next ten positions.

Table 7: Top ten powers in the Territorial factor

Rank	Country	Score
1	USA	100.0
2	Russia	81.1
3	Canada	65.8
4	Australia	64.7
5	China	66.1
6	Brazil	55.6
7	Kazakhstan	55.6
8	India	51.8
9	Norway	51.3
10	Iran	48.9

Table 8: Top ten powers in the cultural factor

Rank	Country	Score
1	USA	100.00
2	United Kingdom	90.14
3	France	89.61
4	Spain	77.50
5	Japan	75.76
6	Germany	74.06
7	Italy	70.21
8	China	69.66
9	Russia	66.87
10	Sweden	63.75

Table 9: Top ten powers in the political factor

Rank	Country	Score
1	Finland	100.0
2	Denmark	98.1
3	Sweden	96.3
4	Norway	95.5
5	Switzerland	95.2
6	Netherlands	93.9
7	Australia	93.6
8	Austria	92.6
9	New Zealand	91.4
10	United Kingdom	90.8

Table 10: Top ten powers in the Trans-national factor

Rank	Country	Score
1	USA	100.00
2	China	55.96
3	France	53.30
4	United Kingdom	44.04
5	Russia	40.57
6	Germany	31.18
7	Japan	27.38
8	Canada	25.02
9	Italy	25.12
10	Spain	19.39

Table 11: Top ten powers in the Astro-space factor

Rank	Country	Score
1	USA	100.00
2	Russia	33.25
3	Japan	10.44
4	China	10.43
5	France	4.61
6	United Kingdom	4.21
7	India	4.27
8	Canada	4.20
9	Brazil	2.35
10	Germany	2.01

Table 12: Top ten powers in the military factor

Rank	Country	Score
1	USA	100.00
2	Russia	62.10
3	China	37.76
4	United Kingdom	33.63
5	France	18.25
6	Germany	10.27
7	India	10.08
8	Turkey	9.01
9	Japan	8.44
10	South Korea	8.01

Ranking the power of countries based on the trans-national factor: The trans-national factor has 10 variables. The method used to score this factor is mainly based on the Proportional Percentage method. This variable includes:

Row	Name of variable
1	Exports B partners
2	Percent of total population foreign born % of total
3	Outgoing international telephone calls (minutes per person)
4	Permanent member of the Security Council (U-N)
5	temporary member of the Security Council (U-N)
6	participation in international organizations
7	Number Olympic medals
8	Entered tourists from abroad
9	Departure of passengers to abroad (per 100 people)
10	Aircraft departures

As it is shown in Table 10, in this factor, the US stands in the first position with a score of 100 and China, France, UK, Russia, Germany, Japan, Canada, Italy and Spain stand, respectively in the positions ranking 2 to 10.

Ranking the power of countries based on the astro-space factor: In general, the Astro-space factor has 4 variables.

Because of the limited number of Astro space variables; There is no need to use the Factor Analysis method. These variables include:

Row	Name of variable
1	Total number of Satellites in space
2	Number of Communications -Earth Science and Research Satellites
3	Number of Military Satellites

In the Astro-space factor, only 39 countries have the capability and the other countries have not scored any point in this factor. Among these 39 countries as it has been shown in Table 11, United State has the highest rank with a score of 100. After USA, Russia (33), Japan (10), China (10), France (5), UK (4), India (4), Canada (4), Brazil (2) and Germany (2) stand in the next positions. The number of satellites that the US has is two times as much as all the satellites of the other countries put together. The US has 423 satellites while the other nine countries have 242 satellites put together.

Ranking the power of countries based on the military factor: In the military index, eight variables were chosen as under (The Military Balance, 2004-2005):

Row	Name of variable
1	Number of military aircrafts
2	Armed forces personnel % of total population
3	Total of military expenditures
4	Military expenditures - percent of GDP (%)
5	Arms exports
6	Navy personnel
7	Air force personnel
8	Number of military submarines

According to this factor as has been shown in Table 12, USA has the first position in the world. In the next position, respectively are: Russia, China, UK, France, Germany, India, Turkey, Japan and South Korea.

DISCUSSION

After the countries' scores were determined about the nine factors, with algebraic method, the scores of the nine factors are considered as the final scores of states which show the national power of the countries. According to these outcomes a global geo-political structure can be drawn. In addition, the geopolitical structure can be drawn in each of the geographical regions. Drawing the global and Territorial power structure can be based on one or a few factors. For example, based on the economical index, we can recognize the superior economical powers in the world. In addition, we can rank the geo-political effect of the states in the world or in the regions.

According to this method and as has been shown in Fig. 3 and 4 the first power of the world for the year 2005, is United State with 882 scores, the next nine position of the global power, respectively belong to: China (462), Russia (458), United, Kingdom (440), Japan (424), Germany (402), France (391), Canada (366), Australia (324) and Spain (319).
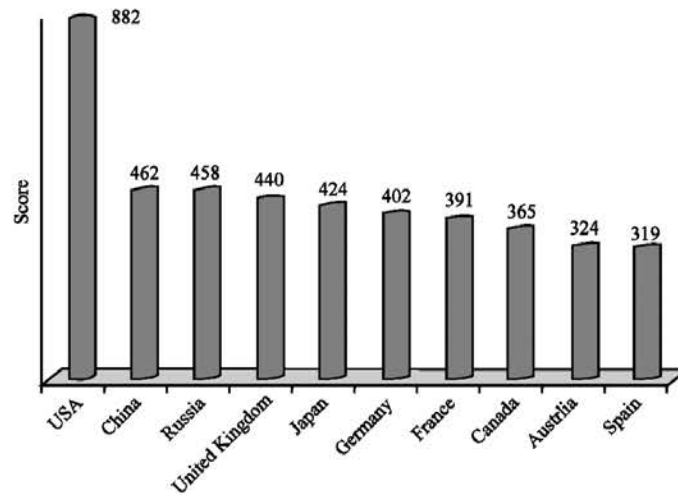

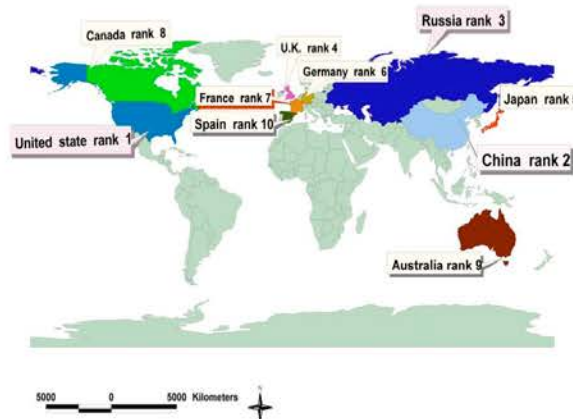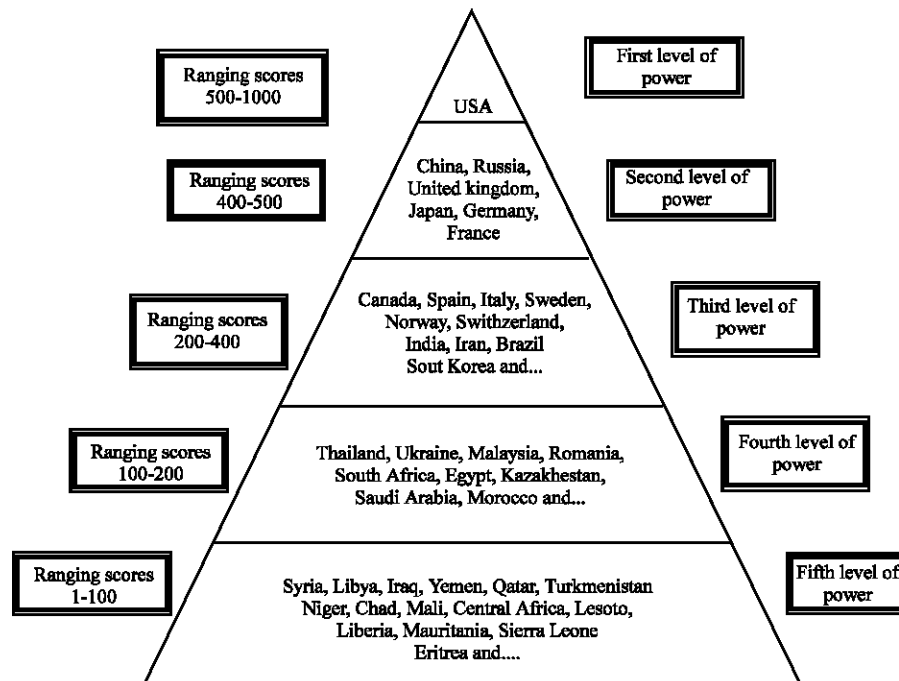Fig. 3: Top ten powers in the all factors (national power)

Fig. 4: The first ten global powers

(Source: Zarghani, 2007)

Fig. 5: Global Geopolitical Structure (Power levels based on the scale of National power)

As it has been said, after determining the countries scores in the factors, a global power structure can be drawn out. Based on this, as shown in Fig. 4, the power level of countries is determined and based on that the global geo-political structure is drawn. It must be said that the power levels are done in two ways: Polar (with a vertical structure) and systematically. In this research the power levels are determined and based on the countries scores (500 to 1000, 400 to 500 and …), the global power structure can be drawn out.

According to the Fig. 5 of global geopolitical structure, there are five levels of the powers as under:

First level: With ranging scores of 500-1000. Only USA with 882 scores is the first global power.

Second level: With ranging scores of 400-500 including: Russia, China, UK, Japan, Germany and France.

Third level: With ranging scores of 200-400, including: Canada, Spain, Italy, Sweden, Norway, Switzerland, India, Iran, Brazil, South Korea and …

Fourth level: With ranging scores of 100-200, including: Thailand, Ukraine, Malaysia, Romania, South Africa, Egypt, Kazakhstan, Saudi Arabia, Morocco and … .

Fifth level: With ranging scores of 1-100, including: Syria Libya. Iraq, Yemen, Qatar, Turkmenistan, Niger, Chad,

Mali, Central Africa, Lesotho, Liberia, Mauritania, Sierra, Leone, Eritrea and … .

CONCLUSIONS

Measuring national power of the states to determine the country's status in the global geo-political structure and comparing countries' powers has always been one of the main concerns of political geographers, scientists of political science and international relations. From this aspect, many specialists attempted many efforts to measure national power by means of creating methods by single variable and limited multi-variable models, whereas all of them have been insufficient for measurement of national power. In this research, based on criticizing and assessment of previous models for the evaluation of national power, a new model is being presented to measure national power of the states. it is much better than previous models based on working method, number and integration of indexes and variables affecting national power. We can even state that the designing of such a model and at a such an extensive scale, has been done for the first time. The advantages of this model are:

- Paying attention to all different aspects of power in the form of these nine components: economical, political, military, trans-national, astro space, territorial, social, scientific and technological and cultural

- The number and variety of the variables used in the model; in this model approximately 90 variables in different aspects were used
- Using the Delphi method and referring to suggestions made by the experts to measure the role and importance of variables on national power
- Drawing the global geopolitical structure based on the national power of the countries and determining countries position and situation in the world power system
- The possibility of comparing country's power in the geographical regions and drawing a regional geopolitical structure and evaluate the position and situation of the states in the regional power systems.
- The model is flexible and can develop and improve to come better. Also it has capability for measurement of national power of the states annually

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