



**Global Economic Development:  
Context of Russian-Ukrainian War**

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**DISCRIMINANT ANALYSIS  
OF NATION BRANDS 2022 IN TERMS  
OF MILITARY INVASION  
OF RUSSIAN FEDERATION IN UKRAINE**

**Abstract**

To ensure effective competition for global resources, countries around the world are creating an international image (nation brands), on which their influence in the international arena depends. This brand is influenced by politics, governance and socio-economic development. The attractiveness of nation brands is a necessary condition for the competitiveness of the state. Based on the components of a significant measure of a country's positive reputation of the Global Soft Power Index (GSPI) 2022 for 120 countries, a discriminant model was built to determine the significant factors that affect the level of perception of the state's competitiveness and assess geopolitical risks.

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### **Key Words:**

nation brands; discriminant model; military invasion of the Russian Federation in Ukraine; soft power; hard power; geopolitical risks.

**JEL:** F51, D74, O57.

3 figures, 5 tables, 11 formulae, 25 references, 2 appendices.

### **Problem Statement**

According to *The Global Risks Report 2022*, geoeconomic confrontation is only the 10<sup>th</sup> most severe risk on a global scale over the next 10 years. Geopolitical tensions were not even seen as a critical threat to the world until 2024. In the 5-year perspective, the probability of geopolitical tensions was estimated at only 14.8% (World Economic Forum, 2022). The global confrontation caused by divergences in the world economy, increased competition for geopolitical dominance and external influence on the priorities of national strategies are serious challenges for international global cooperation. The main risks as of 2022 include global climate change that causes social, political and economic problems (Kovalchuk & Masonkova, 2019); cybercrime as a consequence of digitalization (Kovalchuk et al., 2020); migration crisis (Berezka & Kovalchuk, 2019); risks of commercialization and militarization of the space race World Economic Forum, 2022). All these challenges require the development of a new strategy for strengthening the national resilience of the world.

Increasing geopolitical differences, such as the US-China competition, strengthening alliances in the Pacific, Russia's militarized influence on other countries' domestic policies in violation of international law, and cybercrime create geopolitical tensions and pose a critical threat to the world. This geopolitical tension also affects the economic sphere, which is exacerbated by the COVID-19 pandemic. Thus, China expects the sale of vaccines to expand its economy by 8% annually (Brand Finance, 2022). Confrontation is growing in the field of so-

called *soft power*. Emerging tensions in global cooperation today need special attention. Growing rivalries and geo-economic conflicts are critical threats to the world and require immediate attention, as global risks ignore political boundaries and require a coordinated global response.

According to The Executive Opinion Survey, out of 124 countries, 65 consider geopolitical issues to be among the top five risks. Some among them stand out (Brand Finance, 2022):

- Collapse of a multilateral institution: non-compliance with environmental obligations, border disputes, migration crises, health emergencies, trade disputes, etc.
- Fracture of interstate relations: economic, political and technological rivalry between geopolitical states, leading to the severance of international ties and increasing tensions.
- Geoeconomic confrontations: use of economic influences, such as control of investment, trade, currency fluctuations by associations of countries or individual states to increase spheres of influence and hinder international economic relations.
- Geopolitical contestation of strategic resources: monopolization, exploitation and restriction of access to resources, knowledge, goods, services or technologies that are crucial for human development.
- Interstate conflict: military interstate conflicts with global consequences: the use of biological, chemical, nuclear weapons, cyberattacks, military intervention, etc.
- State collapse: disintegration of the state of global geopolitical significance as a result of internal conflict, non-compliance with the rule of law, destruction of institutions, military coup, regional or global instability.
- Terrorist attacks: terrorist attacks carried out for ideological, political or religious reasons that have resulted in the death of a person, grievous bodily harm or material damage.
- Weapons of mass destruction: the use of biological, chemical, nuclear, radiological or cyber weapons, resulting in deaths, destruction and international crisis.

In terms of modern geopolitical threats and exacerbation of interstate disputes, the concept of *national brand*, i.e. identification of the state – its recognizability, perception by other participants in the international arena, positive reputation, degree of trust in it, the degree of influence in all important spheres of social development (international social, political, economic, technological, etc.) – should become a reference point for global international cooperation.

The aim of this paper is to identify significant factors influencing the perception of the national brand and competitiveness of the state in the international arena and identify risks of misjudging the soft power of the state and its reputation that affect global security in the context of full-scale Russian invasion of Ukraine. Many scientific studies have been devoted to the evaluation of national brands and soft power, but applied analysis using econometric and multidimensional approaches has not been conducted.

### **Global Soft Power Index for Evaluation of National Soft Power**

High technology, globalization and democratization are indicative of the development of modern society. The notions of national identity and reputation of the state on the international arena are gaining special significance today. Since 2004, Brand Finance annually evaluates the Global Soft Power Index to measure the growth strategies of the world's countries. The index can provide basic vectors for politicians, managers, investors and financiers. National soft power is an indicator of the state's ability to attract investment and develop international trade in both goods and services. Brand Finance views soft power as the ability of a nation to shape the commitment and behavior of various actors in the international arena (community, country, corporation, etc.) precisely through engagement or persuasion, not imposition or coercion. A nation's soft power is the ability not to force, but to motivate states to make the right decision by proving common values and norms. This national force is based on culture, political values, foreign policy, technology, education, science, growth economics, quality of life and the rule of law. In 2022, this rating covered 120 countries (Brand Finance, 2022).

Global Soft Power Index 2022 takes into account assessments of positive or negative perception of the national brand based on analysis of various aspects of international relations, national governance, business and trade, culture and heritage, independent media and communication, education and science, human values. Soft power is an extremely complex and changing assessment, due to new fleeting challenges, management and policy decisions. International relations and environmental protection remain important indicators, which form a positive general perception and image of the national brand through soft power. In forming the ranking of countries according to the Global Soft Power Index 2022, the following components of the assessment that take into account the national brand of the world were taken into account (Brand Finance, 2022):

- Familiarity (recognizable national brands that are perceived at the mental level);

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- Influence Global Rank (the degree of influence of the nation in the international arena);
  - Reputation Global Rank (a measure of strength and positive reputation worldwide);
  - Business & Trade Global Rank (ease of doing business, a stable economy, world-famous brands, the opportunity for future growth);
  - Governance (respect of state leaders for international standards, political stability and good governance, high ethical standards, security, observance of laws and human rights).
  - International Relations Global Rank (diplomatic influence, international assistance, respect for the environment, comradely relations with other countries);
  - Culture & Heritage Global Rank (recognition in the field of arts and entertainment, world-famous cuisine, attractiveness to visit, rich heritage, dignified lifestyle, leadership in sports);
  - Media & Communication Global Rank (free and easy communication, influential and reliable media);
  - Education & Science Global Rank (leadership in science, the importance of educational systems and the innovativeness of educational technologies);
  - People & Values (friendliness, friendship, tolerance, reliability and inclusiveness);
  - COVID-19 Response Global Rank (effectiveness in combating a pandemic COVID-19: supporting economic recovery, health & wellbeing including vaccinations).

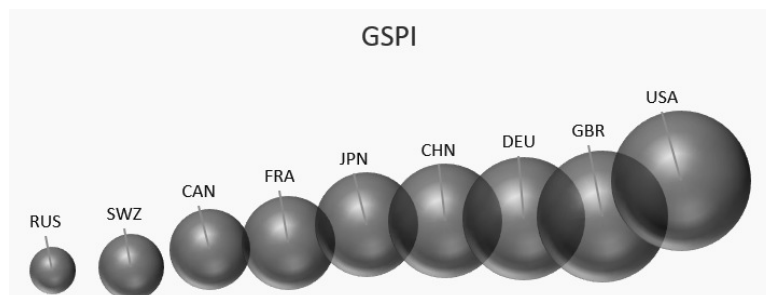
National soft power is an indicator of the nation's internal development, its influence and legitimacy as a player in the international arena. These are communications in accordance with accepted international norms and values through which the foreign policy of other states is influenced. States, like people, are more likely to trust those with whom they share common interests and ideals.

Brand Finance estimates that the Global Soft Power Index 2020 for 120 countries ranges from 25.3 to 70.7 (Brand Finance, 2022). We have divided countries into three groups according to GSPI levels: (1) high – GSPI > 55; (2) middle – GSPI > 40 and GSPI < 55; and (3) low – GSPI < 40.

The smallest group with a high level of the Global Soft Power Index, which has a really strong reputation, includes only 9 countries: the United States, the United Kingdom, Germany, China, Japan, France, Canada, Switzerland and the Russian Federation (Fig. 1).

Figure 1

## Plot of Global Soft Power Index 2020; high level



The Russian Federation has the least importance among these countries, but it is still in the group with a high level of GSPI, despite the demonstration of its hard power: civil war in Georgia or South Ossetian war, war in South Abkhazia, armed conflict in Transnistria, civil war in Tajikistan, First Chechen war, Second Chechen war, armed conflict in South Ossetia (Samachablo) and Russian-Georgian war, annexation of Crimea, war in Donbas, Russian military operation Syria, Russian full-scale war against Ukraine (Opryshchenko, 2022), Smolensk plane crash in 2010 (TVP WORLD, 2022), the downing of a Boeing 777 civilian passenger plane in 2014 (Zadorozhnyj, 2016), interference in the US presidential election and Brexit (Kovalchuk & Masonkova, 2018), hacker attacks (Tidy, 2022), nuclear threats to the world community (Taylor & Neff, 2022). RF certainly has a high degree of influence in the international arena, not because of its positive reputation around the world but rather the demonstration of hard power. It is symbolic that the Kremlin by no means calls war a war, only a «military operation». And every time they fight insidiously, using forbidden methods and weapons, deliberately killing civilians. And they always justify their criminal actions with the mythical «salvation of the Russian-speaking population», although the Russian Federation itself includes many nationalities, not all of whom speak Russian, yet no one cares about their rights.

Having launched a military invasion of Ukraine on February 24, 2022, the Russian Federation leveled its assessments of all meters Global Soft Power Index.

**First.** Familiarity – a powerful country that has always positioned itself as economically developed and has the «second best army in the world», and today is perceived by most countries as a terrorist state that does not fulfill its international obligations and threatens democracy, with an army of rapists and looters capable of fighting only the civilian unarmed population (Ministry of Foreign Affairs of Ukraine & Ministry of Internal Affairs of Ukraine, 2022).

**Second.** Influence Global Rank – the world community recognizes the Russian Federation as an aggressor country that uses the technology of genocide; as of early April 2022, the EU has imposed five major sanctions packages against it, and a number of countries have closed their airspace, ports, railways and roadways. Russia has become an exile for most of the civilized world (Bown, 2022).

**Third.** Reputation Global Rank – Russia has demonstrated its real monopolistic interests over other independent states and has lost all its dubious reputation for hard power and has retained its authority only in countries that are supported or are economically dependent on its terrorist activities, usually oil and gas supplies (Al Jazeera, 2022).

**Fourth.** Business & Global Rank – most countries of the world withdrew their business from the Russian Federation and terminated any trade and economic relations with the aggressor country; some countries have imposed an oil and gas embargo or reduced Russian gas consumption (Pestova et al., 2022).

**Fifth.** Governance – Russia traditionally uses technologies to intimidate the use of prohibited weapons and direct military invasion of countries that support Ukraine, shows contempt for universal values and people's lives, violates human rights, laws and customs of war (Ministry of Foreign Affairs of Ukraine & Ministry of Internal Affairs of Ukraine, 2022).

**Sixth.** International Relations Global Rank – at the beginning of April 2022, more than 330 Russian diplomats were expelled from European countries as a result of the Kremlin's war against Ukraine; the Russian Federation is taken out of the perimeter of civilization (Kiyagan, 2022).

**Seventh.** Culture & Heritage Global Rank – in just two months of Russia's military aggression in Ukraine, about 250 episodes of Russian war crimes against Ukraine's cultural heritage have been recorded; Russia has been excluded from most art competitions and festivals, deprived of the right to participate in sports competitions (Létourneau, 2022).

**Eighth.** Media & Communication Global Rank – Russian disinformation campaigns promoting mythical Nazi symbolism continue to try to spread fake news and stage productions in the occupied territories to hide the horrors of Russian military war crimes in Ukraine; lie to the whole world and to their own citizens (Pankiev, 2022).

**Ninth.** Education & Science Global Rank – in response to Russia's military invasion of Ukraine, many Western countries have suspended economic support for Russia's research projects and severed partnerships between scientific organizations and educational institutions; Russia is excluded from the Bologna process, a number of countries around the world do not recognize the diplomas of Russian universities and stopped cooperating with Russian scientists (Dickie & Afanasieva, 2022).

**Tenth.** People & Values – Russia has violated the laws and regulations of warfare, the Geneva Conventions; actions of the Russian army have previously been qualified as genocide of the Ukrainian people, in addition, the attitude to life and health of their own military is not tolerant (Ministry of Foreign Affairs of Ukraine, & Ministry of Internal Affairs of Ukraine, 2022).

**Eleventh.** COVID-19 Response Global Rank – Russia’s war against Ukraine has exacerbated the situation with COVID-19 in Ukraine due to the inability to receive medical care in areas where hostilities are taking place (Chumachenko & Chumachenko, 2022).

In our opinion, the methodology for estimating the next Global Soft Power Index needs to undergo significant changes. Soft power must be measured on the basis of a truly positive reputation of the nation, even mentality, and not threats of brute force to the whole world. The perception of the state by the global society should be assessed by the degree of observance of democratic principles, laws of honor and conscience, observance of guarantees of international security and democratic principles, degree of trust and ability to fulfill its international obligations.

### **Literature Review**

For comparative studies of countries, scientists use multidimensional modeling methods and econometric methods as an effective tool. To analyze the significant dimensions of sustainable development of the world we use cluster, factor, canonical, and discriminant analysis (Kovalchuk, 2017). J. Batóg and K. Dmytrów (2018) used econometric methods for analysis of capital productivity in the member countries of the European Union. A. Stanimir (2020a) selected Hellwig’s and TOPSIS methods, as well as twostep cluster analysis to study the attitude of residents of individual EU countries to the balance between personal life and work. Same author used multivariate analysis of non-metric data in evaluating the generational perception of social characteristics (Stanimir, 2020b). K. Berezka and O. Kovalchuk (2019) used factor analysis and principal components analysis to study the causal links of modern global migration processes with basic socio-economic and security indicators for the world. P. Boedeker and N. T. Kearns (2019) investigated predictive classification and found that in some cases linear discriminant analysis works better than other prediction methods.



## Research Methodology

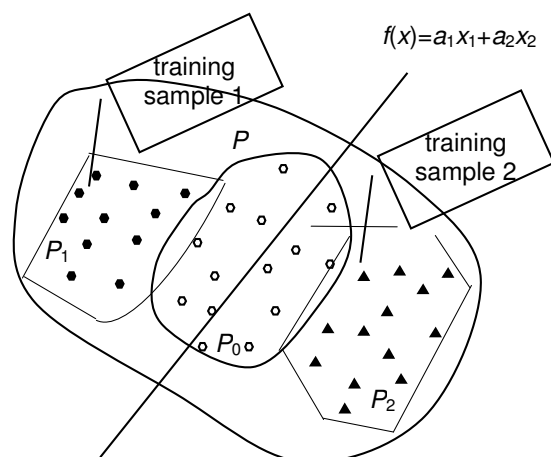
### Mathematical description of the problem of discriminant analysis (DA)

Consider the set  $P$ , which consists of  $n$  objects of observation. Each  $i$ -th object of the set  $P$  describes a set of  $m$  values of discriminant variables (features)  $x_j$  ( $i = \overline{1, n}$ ,  $j = \overline{1, m}$ ). Moreover, the set of objects  $P$  includes  $q$  ( $q \geq 2$ ) training subsets  $P_k$  of dimension  $n_k$  each and subset  $P_0$  of objects subject to discrimination,  $k$  ( $k = \overline{1, q}$ ) is the subset number.

It is necessary to determine the rule (linear or nonlinear discriminant function  $f(x)$ ) of the distribution  $m$  of objects of the subset  $P_0$  with the corresponding features over the subsets  $P_k$ . The choice of the form of the discriminant function  $f(x)$  depends on the geometric location of the separating classes in the space of discriminant variables. The geometric interpretation of the statement of the DA problem on the example of two training subsets  $P_1$  and  $P_2$  ( $q = 2$ ) is presented in Fig. 2.

Figure 2

Geometric illustration of problem statement DA ( $q = 2$ )



The linear form of the discriminant function is most often used, which is represented as a scalar product of the vector of discriminant factors  $A = (a_1, a_2, \dots, a_m)$  and the vector of discriminant variables  $X'_i = (x_{i1}, x_{i2}, \dots, x_{im})$

$$F_i = AX'_i$$

or

$$F_i = a_1x_{i1} + a_2x_{i2} + \dots + a_mx_{im}$$

where  $X'_i$  is the transposed vector of discriminant variables  $x_j$  (values of  $j$ -th features in the  $i$ -th object of observations).

### Criteria for comparing samples on several grounds

The first criterion for comparing samples is the **coefficient of determination**. For several groups, the total variance of the feature can be represented as the sum of intergroup and intragroup variances. Then, the measure of variability will be the sum of the deviation squares of the observations from the corresponding averages:

$$SS_x = SS_u + SS_e, \quad (1)$$

where  $SS_x$  is the sum of the deviation squares of the observations from the general average, which characterizes the general variability;

$SS_u$  – intergroup variance (sum of deviation squares of group averages from the general average), characterizes the variability between groups;

$SS_e$  – intragroup variance (sum of deviation squares of observations from group averages), characterizes the variability within groups.

Let's divide both parts of equation (1) by  $SS_x$

$$1 = \frac{SS_u}{SS_x} + \frac{SS_e}{SS_x}. \quad (2)$$

The relation  $\frac{SS_u}{SS_x}$  is called the coefficient of determination and denotes  $\eta^2$ . It shows how many times the variability of observations between groups exceeds the total variability.

The value of this coefficient can be in the range of  $0 \leq \eta^2 \leq 1$ . If all group averages are equal to the general average,  $SS_u = 0$  and  $\eta^2 = 0$  (group averages of  $x$  in groups are the same). If there is no variability within the groups,  $SS_e = 0$  and  $\eta^2 = 1$ , which means that different values of the variable  $x$  correspond to different classes. The closer  $\eta^2$  is to unity, the better the discriminative ability of the variable  $x$ .

The square root of the coefficient of determination is called the empirical correlation ratio.

The second criterion is the characteristic  $\lambda$  (eigenvalue). It shows how many times the variability between groups exceeds the variability within groups:

$$\lambda = \frac{SS_u}{SS_e}$$

$\lambda$  characterizes the share of variance of estimates of the discriminant function, which is not due to differences between groups. If the averages for all groups are equal, then  $\lambda = 1$  and decreases with increasing differences in averages. The larger  $\lambda$ , the better the discriminant function chosen.

Both criteria are connected by the relation:

$$\eta = \frac{\lambda}{1 + \lambda}$$

The quality of classification in canonical discriminant analysis is assessed by one of the following characteristics.

First, **the relative percentage** shows how many percent this function is

weaker than others  $\frac{\lambda_i}{\sum_{j=1}^p \lambda_j}$ .

Second, **the canonical correlation coefficient** shows what part of the total variability of the discriminant function is explained by the difference between

the groups  $\eta_i = \sqrt{\frac{\lambda_i}{1 + \lambda_i}}$ .

Third, **Fisher criterion** is calculated as  $F = \lambda \frac{n - q}{q - 1}$  and compares with the tabular values  $F_{\alpha, q-1, n-q}$  at the selected level of significance  $\alpha$  (usually

$\alpha = 0,01$  or  $0,05$ ) with the number of degrees of freedom  $q - 1$  and  $n - q$  ( $p$  – the number of variables,  $q$  – the number of classes) or evaluates the level of significance  $\alpha$ .

Significance levels characterize the probability that differences between groups are random. The discriminant function is considered significant at a given significance level  $\alpha$  with the number of degrees of freedom  $\nu$ , if the actual values of the criterion  $\chi^2$  for it exceed the tabular  $\chi_{\alpha,\nu}^2$ . Instead, you can use the level of significance – the probability that statistic  $\chi^2$  under the null hypothesis (insignificance of the discriminant function) accidentally reaches the calculated level.

Fourth, **Wilks statistic** – the variable that at this step has the smallest  $\Lambda$ -statistic is included in the analysis. This selection criterion is considered the best. It estimates the relative contribution of the residual variance. Its advantage is that the criterion takes into account not only the differences between classes, but also the homogeneity of each class (the degree of accumulation of objects around centroids).

Estimating the information content of the indicator after the Wilks statistics is similar to assessing the significance of the members of the regression model using partial correlation coefficients.

If  $l$  is the total number of discriminant functions with nonzero  $\lambda_l$ , then  $\Lambda_0 = \frac{1}{1 + \lambda_1} \cdot \frac{1}{1 + \lambda_2} \cdot \frac{1}{1 + \lambda_3} \cdots \frac{1}{1 + \lambda_l}$  is a measure of residual variability, taking into account all discriminant functions, i.e.  $\Lambda_0$  evaluates the discrimination ability of the whole system of functions.

Next, the discriminatory ability of the system without the first, most important function is assessed as  $\Lambda_1 = \frac{1}{1 + \lambda_2} \cdot \frac{1}{1 + \lambda_3} \cdots \frac{1}{1 + \lambda_l}$ .

This value is already greater than  $\Lambda_0$ . The closer  $\Lambda_1$  is to one, the lower the discriminative power of the remaining system of functions.

Then calculate  $\Lambda_2 = \frac{1}{1 + \lambda_3} \cdots \frac{1}{1 + \lambda_l}$  and so on until  $\Lambda_{l-1}$ .

$\Lambda_j$  is evaluated sequentially by Pearson's test  $\chi_j^2 = -\left(n - 1 - \frac{p + q}{2}\right) \ln \Lambda_j$ ,

which is compared with the tabular value  $\chi_{\alpha,\nu}^2$ . Where  $n$  – the number of obser-

vations,  $p$  – the number of variables,  $q$  – the number of classes,  $\nu = (p - j)(q - j - 1)$  – the number of degrees of freedom.

Sequential selection of variables makes it possible to find the optimal number of indicators that have the same (or better) discriminant capabilities as the full set of initial variables. The fewer indicators, the easier it is to interpret the results of the analysis.

Since the variables selected in the model are strong discriminators and can correlate with each other (carry the same information), after each exclusion (inclusion) of variables, the Wilks  $\Lambda$ -statistics are listed and the significance of changes in this characteristic is assessed. Due to the fact that the Wilks  $\Lambda$ -statistic is a measure of the residual of the model (a measure of uncertainty), it is desirable that it acquire the smallest value.

### **Data and Empirical Findings**

Dataset of empirical research was based on the values of the Global Soft Power Index 2022, and its components (Familiarity, Reputation Global Rank, Influence Global Rank, Business & Trade Global Rank, Governance, International Relations Global Rank, Culture & Heritage Global Rank, Media & Communication Global Rank, Education & Science Global Rank, People & Values, COVID-19 Response Global Rank) for 120 countries (Brand Finance, 2022).

To conduct a discriminant analysis of the Global Soft Power Index on pre-selected groups (high, middle, low) we used the following variables: grouping variable – Global Soft Power Index; independent variables (F – Familiarity; RGR – Reputation Global Rank; IGF – Influence Global Rank; BTGR – Business & Trade Global Rank; G – Governance; IRGR – International Relations Global Rank; IRGR – Culture & Heritage Global Rank; MCGR – Media & Communication Global Rank; ESGR – Education & Science Global Rank; PV – People & Values; CRGR – COVID-19 Response Global Rank).

## Results and Discussion

A discriminant analysis was conducted to establish significant measures of the Global Soft Power Index that affect the distribution of countries around the world by groups (high, medium, low). The empirical research was performed using the Statistica 10 software.

One of the conditions for the sound application of discriminant analysis is the normal distribution of all independent variables by levels of grouping variable. We constructed Normal Probability Plots of all independent variables included in the analysis categorized by the Global Soft Power Index. Visual analysis of the obtained results gives grounds to conclude that each of the analyzed variables corresponds to Normal Probability at the levels selected at the previous stage (high, medium, low) of the Global Soft Power Index (Appendix 1). Therefore, the basic assumption for discriminant analysis is fulfilled. From the scatter plot (Appendix 2) it is obvious that for each of the pairs of analyzed variables no separate groups of points were selected, which confirms the accuracy of the observations to the selected levels of the Global Soft Power Index.

Table 1 shows the significance of the discriminant function and the significance of dimensions in independent variable classification. The value of Wilks' Lambda statistics is 0.072 and lies in the range [0; 1]. This value is close to 0, which indicates good discrimination. The value of the F-criterion  $F_{0.01}(22,214) = 26.61$  (Table 1), which is greater than the tabular value of the F-distribution:  $F_{0.01}(22,214) = 1.57$ . We reject the null hypothesis that the observations belong to the same class. Discriminant analysis is possible. It can be concluded that the classification is correct. Familiarity, Influence, Education & Science, COVID-19 Response variables were the most significant in the distribution of Global Soft Power Index values into groups (high, middle, low). The variables Influence and Familiarity have the greatest weight in discrimination, as Wilks' Lambda is the largest.

A classification matrix was built to check the correctness of the training samples (Table 2).

From the obtained classification matrix, it can be concluded that only 2 out of 120 countries (Canada and Portugal) were erroneously assigned to the selected groups of the Global Soft Power Index. However, Squared Mahalanobis Distances of «Canada» to the «high» group (to which it belongs) is smaller than the centers of the other groups, as is Squared Mahalanobis Distances from «Portugal» to the center of gravity of the «middle» group, to which it is assigned (Table 3). Therefore, the classification of Canada and Portugal into the previously selected Global Soft Power Index groups cannot be considered erroneous, i.e., there is no reason to exclude these objects from the sample.

Table 1

**Discriminant Function Analysis Summary**

N=120	Discriminant Function Analysis Summary Step 0, N of vars in model: 11; Grouping: GSPI_Rank (3 grps) Wilks' Lambda: ,07166 approx. F (22,214)=26,609 p<0,0000					
	Wilks' Lambda	Partial Lambda	F-remove (2,107)	p-value	Toler.	1-Toler. (R-Sqr.)
<b>Familiarity</b>	0,077945	0.919402	4.689980	0.011157	0.398230	0.601770
Reputation	0.071666	0.999955	2.172392	0.141611	0.243974	0.756026
Influence	0.078045	0.918229	4.764312	0.010420	0.157597	0.842403
Business & Trade	0.075446	0.949859	2.824146	0.063792	0.164861	0.835138
Governance	0.074349	0.963878	2.124963	0.131693	0.093758	0.906242
International Relations	0.073837	0.970552	2.623245	0.122077	0.113643	0.886356
Culture & Heritage	0.071841	0.997520	2.875992	0.125620	0.342789	0.657211
Media & Communication	0.074846	0.957477	2.375992	0.097809	0.248790	0.751210
Education & Science	0.076516	0.936580	3.622704	0.030037	0.324066	0.675934
People & Values	0.072197	0.992602	2.698727	0.672167	0.163345	0.836655
COVID-19 Response	0.076175	0.940772	3.368170	0.038144	0.264555	0.735445

Table 2

**Classification Matrix**

Group	Classification Matrix (data) Rows: Observed classifications Columns: Predicted classifications			
	Percent Correct	Low p=,70833	Middle p=,21667	High p=,07500
<b>Low</b>	100.0000	85	0	0
Middle	96.1539	1	25	0
High	88.8889	0	1	8
Total	98.3333	86	26	8

Table 3

**Fragment of the results of the Squared Mahalanobis Distances from Group Centroids**

Case	Observed Classif.	High p=,07500	Low p=,70833	Middle p=,21667
* Canada	High	26.4953	77.4832	28.4241
Chile	Low	104.0059	3.5551	17.4194
China	High	42.9919	162.8113	102.6294
Colombia	Low	96.3634	16.1974	22.0090
* Portugal	Middle	79.5294	17.9316	17.2224

Based on the received training samples, it is possible to re-classify those objects that did not fall into the training samples and any other objects that are subject to grouping.

Table 4 shows the significance and eigenvalue of the discriminant function. The value of Wilks Lambda (0.07) indicates the difference between the groups. The value of the canonical correlation coefficient R (0.94) and the value of the criterion  $\chi^2(22) = 295.2$  for  $p < 0.01$  more than the tabular value  $\chi^2(22) = 3.8$  indicates a close relationship between the discriminant function and the selected groups.

Table 4

**Chi-Square Test**

Eigen-value	Canonical R	Wilk's Lambda	Chi-Sqr.	df	p-value
7.921721	0.942292	0.071663	295.2075	22	0.000000



### Classification based on classification functions

As a result of the analysis of discriminant functions, the coefficients of classification functions for each class were obtained (Table 5).

Table 5

#### Classification function grouping GSPI Rank

Variable	Low p=,70833	Middle p=,21667	High p=,07500
<b>Familiarity</b>	-8.305	-6.513	-8.173
Reputation	103.771	103.960	104.026
Influence	30.328	31.600	43.780
Business & Trade	-11.615	-10.634	-16.355
Governance	-47.764	-49.248	-43.263
International Relations	10.226	13.714	20.491
Culture & Heritage	-18.077	-17.384	-16.619
Media & Communication	-15.929	-15.656	-21.669
Education & Science	5.153	6.210	10.980
People & Values	23.775	26.234	27.428
COVID-19 Response	2.000	2.598	-1.214
Constant	-256.197	-300.372	-366.662

The following specification of the discriminant model is obtained:

$$\text{High} = -366.7 - 8.2 \cdot F + 104 \cdot R + 43.8 \cdot I - 16.4 \cdot BT - 43.3 \cdot G + 20.5 \cdot IR - 16.6 \cdot CH - 21.7 \cdot MC + 10.9 \cdot ES + 27.4 \cdot PV - 1.2 \cdot CO;$$

$$\text{Middle} = -30.4 - 6.5 \cdot F + 103.9 \cdot R + 31.6 \cdot I - 10.6 \cdot BT - 49.2 \cdot G + 13.7 \cdot IR - 17.4 \cdot CH - 15.6 \cdot MC + 6.2 \cdot ES + 26.2 \cdot PV + 2.6 \cdot CO;$$

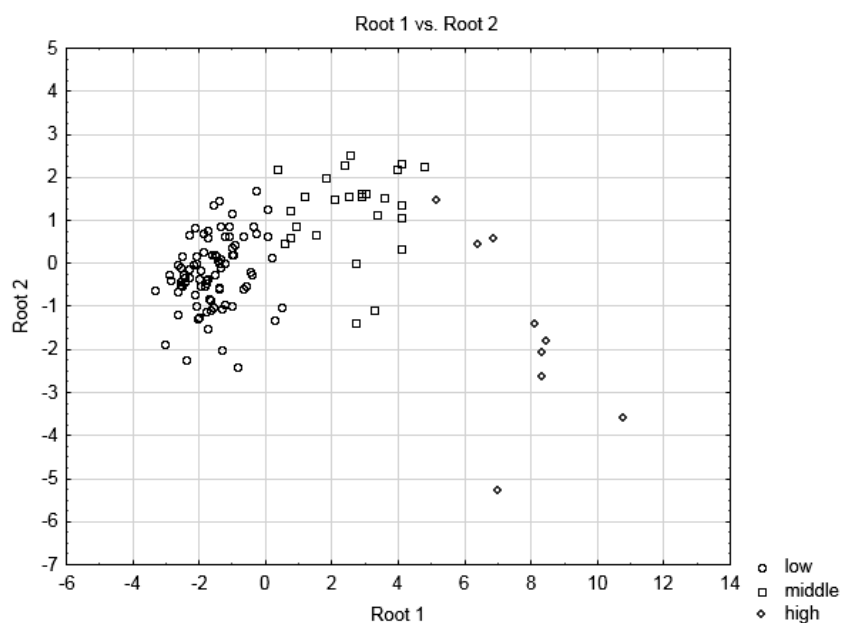
$$\text{Low} = -256.2 - 8.3 \cdot F + 103.7 \cdot R + 30.3 \cdot I - 11.6 \cdot BT - 47.8 \cdot G + 10.2 \cdot IR - 18.1 \cdot CH - 15.9 \cdot MC + 5.2 \cdot ES + 23.8 \cdot PV + 2 \cdot CO.$$

This is a system of equations that are linear combinations of variables that optimally separate the analyzed groups. With these functions you can classify new observations. They belong to those classes whose classification values are maximum.

To determine the contribution of each discriminant function to the distribution between groups, the Scatterplot of canonical scores was constructed (Fig. 3).

Figure 3

### Scatterplot of canonical scores



### Conclusions

The nation's brand is an important indicator of choices in development and governance strategies, economic and social policies, and international relations based on public opinion and global perceptions. The Global Soft Power Index is a guide for countries around the world in shaping their political vector in the short, medium and long term. Many countries around the world perceive national soft power as an important element of statehood and national identity and seek to improve this tool and apply it in both international relations and foreign policy, as well as in trade policy management. However, as a result of the full-scale military invasion of Ukraine by Russia troops, the need to re-evaluate previous trends

and possibly improve the methodology for determining national soft power has become obvious.

By launching an unjustifiably brutal war against the people of Ukraine, the Russian Federation has demonstrated its hard power (the use of military and economic means as the main method of achieving its goals). On the one hand, it is coercion, looting, bullying and killing of the civilian Ukrainian population, and on the other – military threats and economic pressure on states that provide assistance to Ukraine in this war. The demonstration of the military force of the Russian Federation confirmed the complete failure of its national soft power as the ability to attract and co-opt what they want. Ukraine is demonstrating to the world the effective use of soft power to shape a new global perception of Ukrainian identity, using openness and independent media, and the ability of soft power to prevent global catastrophe. The price of trust, like the price of injustice, is difficult to quantify. However, research on such a plan is essential to ensure global security and stable world peace. Russia's military invasion of Ukraine and the heroic resistance of the Ukrainian people have become a litmus test that has necessitated a rethinking of a number of components that determine national brands, soft power, reputation and credibility and influence on the international arena.

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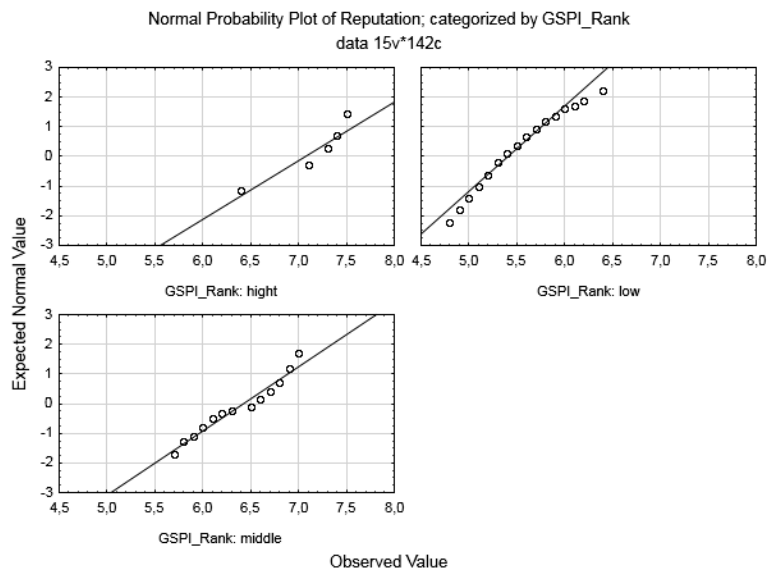
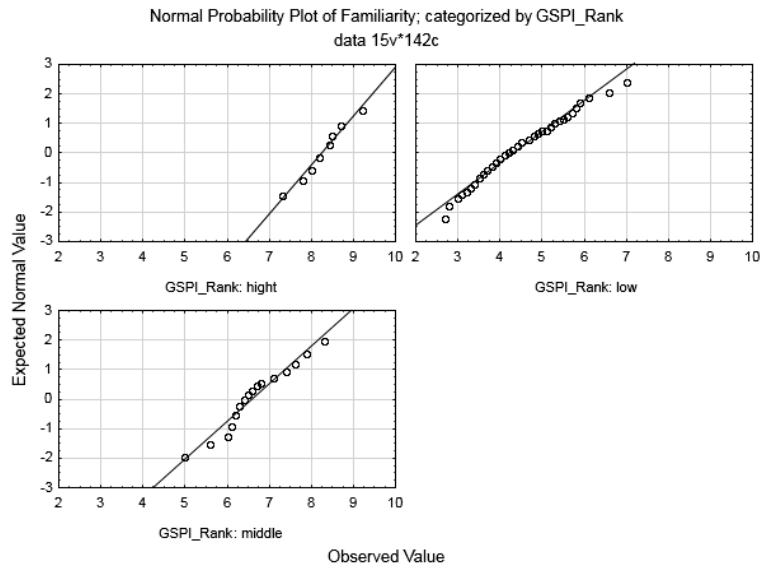
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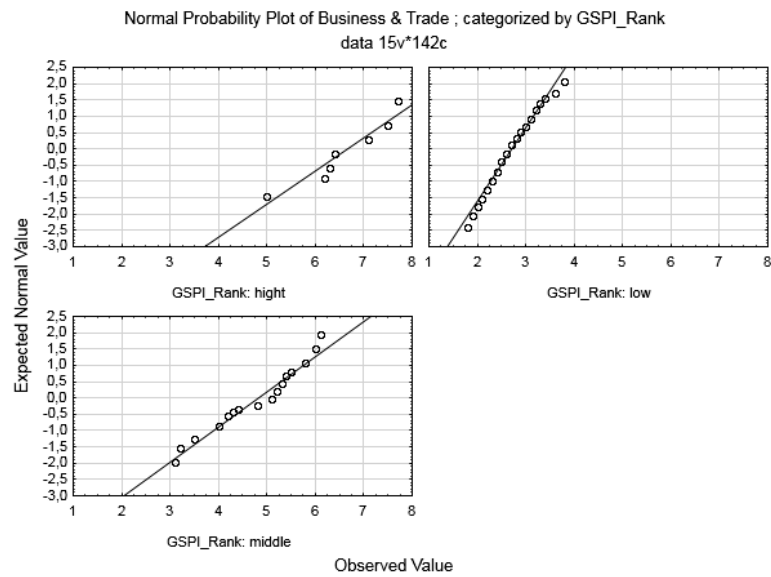
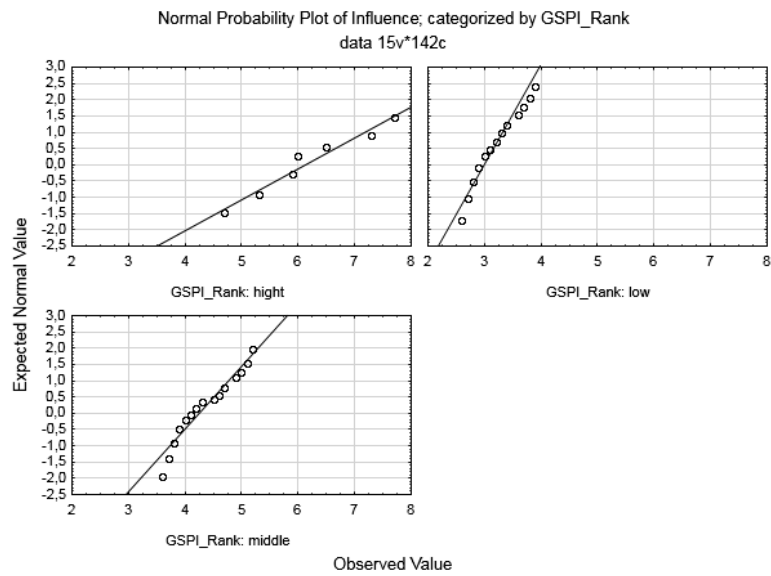
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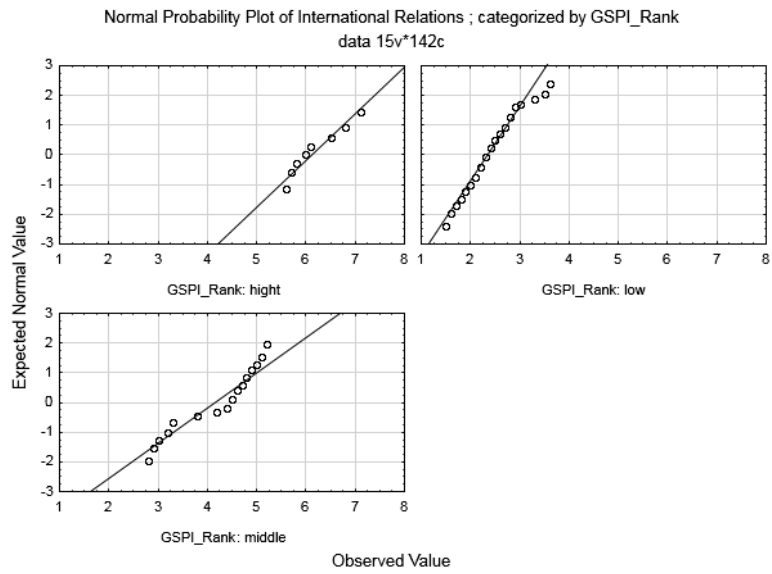
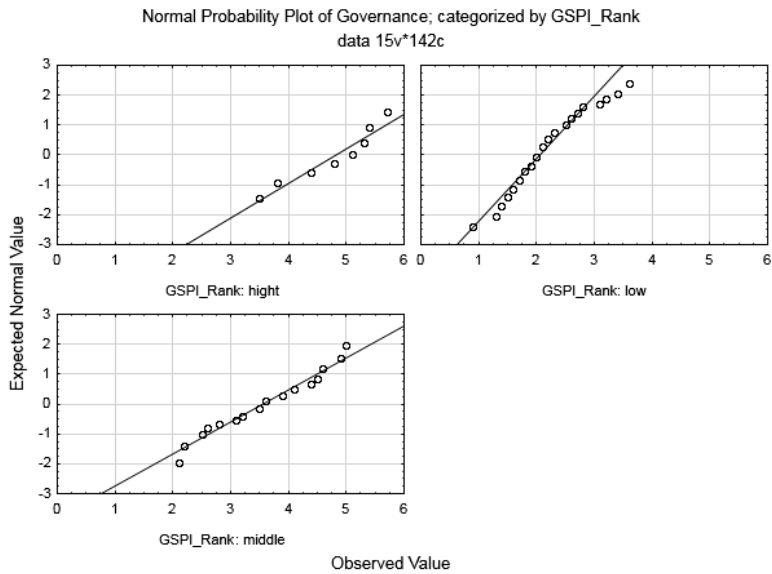
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*Appendix 1*

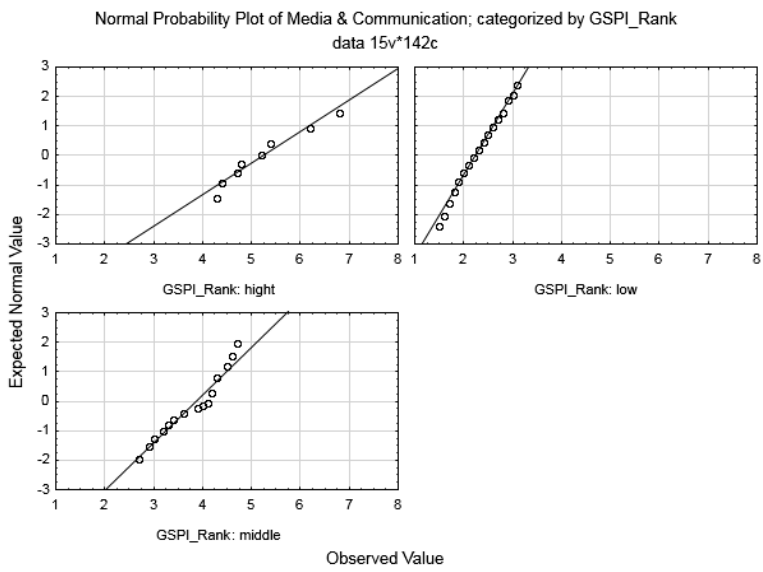
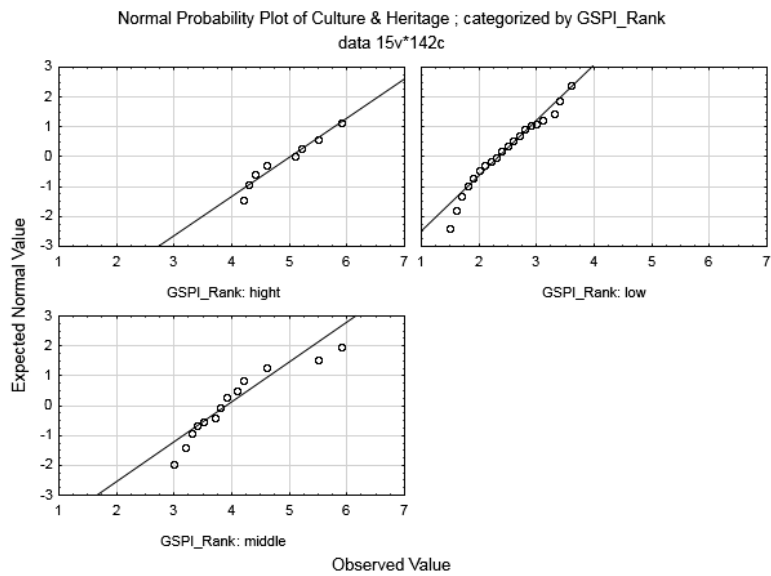
**Normal Probability Plots of All Independent Variables;  
Categorized by GSPI Levels**



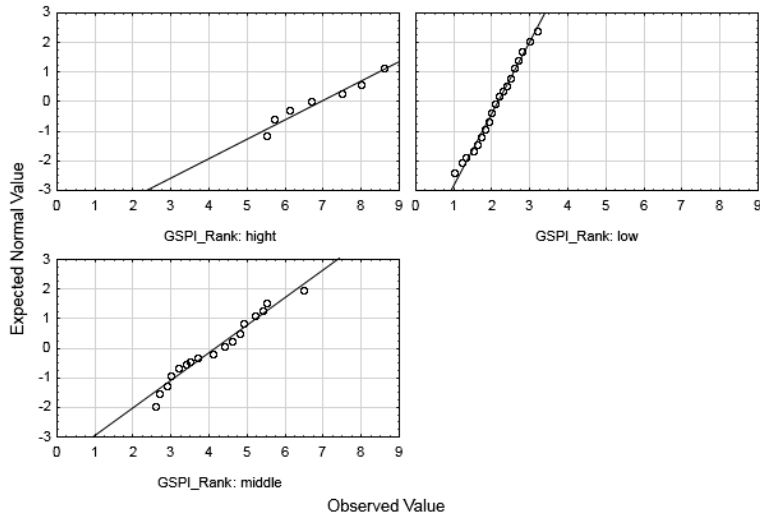




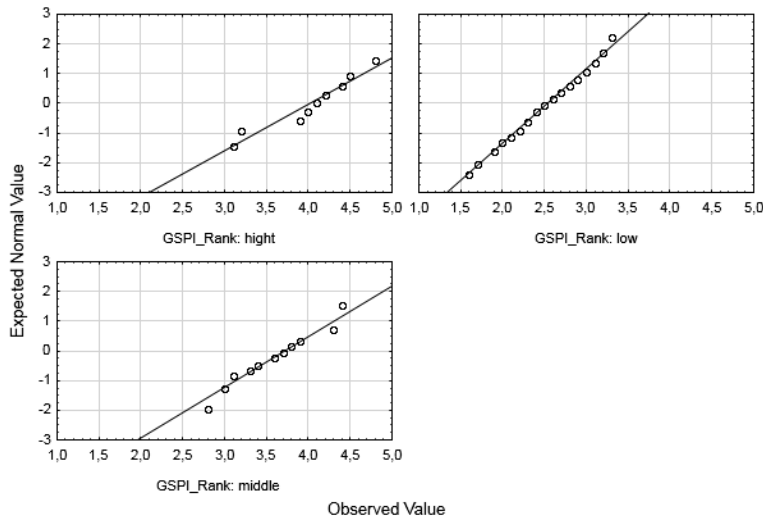


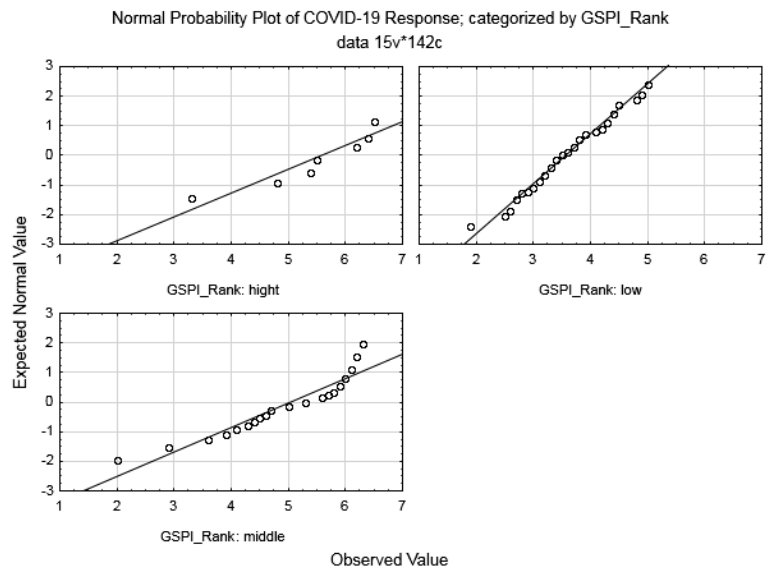


Normal Probability Plot of Education & Science ; categorized by GSPI\_Rank  
data 15v\*142c



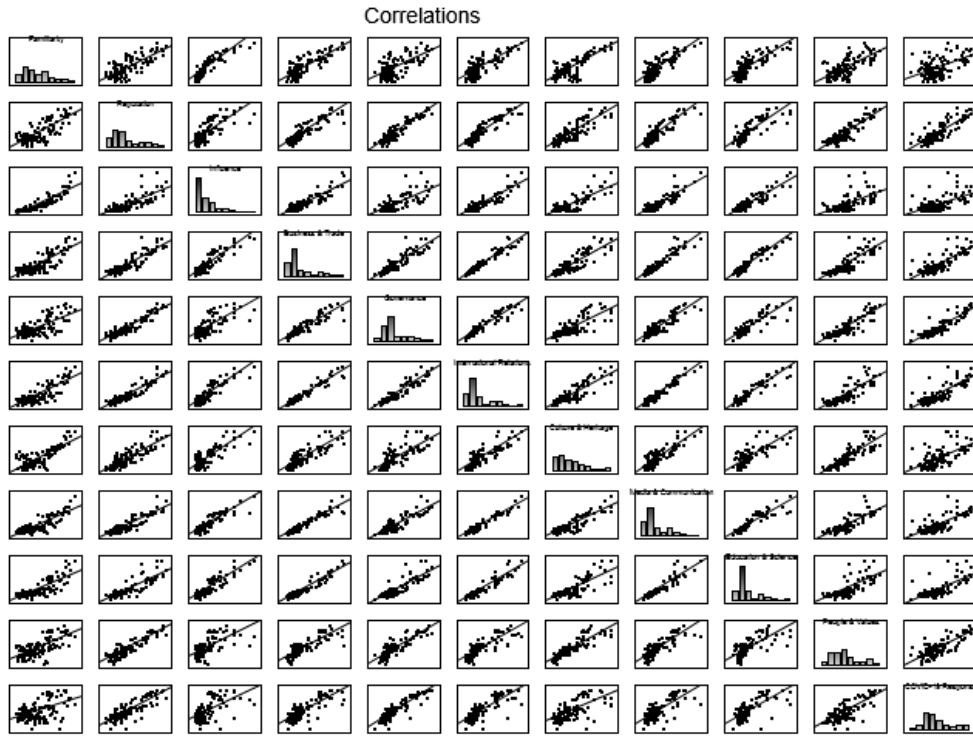
Normal Probability Plot of People & Values; categorized by GSPI\_Rank  
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*Appendix 2*

**Plot of Total Correlations**



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