# The Influence of Intergovernmental Organizations on Main Determinants of the Open Systems Model with Correlation Analysis Method Application.

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## ABSTRACT

The paper aims at analyzing the nature of relations between Intergovernmental Organizations and International Corporations. In first instance the study concentrates on identifying the key determinants of Intergovernmental Organizations behaviours. The following section is a description of business environment of International Companies based on the Open Systems Model. Three levels of interrelations have been mentioned, including the Operating Environment, the Host – Country Environment and the Global Environment. The solution proposal provides an analysis of the influence of determinants of Intergovernmental Organizations behaviours on the determinants of business environment of International Corporations with use of correlation analysis method.

### Keywords

International Management, Geopolitical Organisms, Intergovernmental Organizations, Correlation Analysis

## INTRODUCTION

In a global World, the role of Intergovernmental Organizations (IGOs) becomes more and more important. Not only they allow a smoother problem solving between the national states, but also prevent the degeneration of natural conflicts of interest into disastrous wars. They also enhance the communication and the cooperation between their member states. Some of the most important global IGOs are the United Nations, NATO, World Bank, IMF, WTO, WHO, INTERPOL, some of the regional ones are the European Union, ASEAN, African Union, APEC, MERCOSUR, whereas between IGOs with various membership criteria OPEC, OECD and the Arab League can be found. [3]

E. Brahm provides a set of five points describing the functioning of IGOs:

- they provide a forum for discussion, which lowers the contact costs for member states;

- they serve as transparent information providers, which lowers the risk of misperceptions;

- the discussed issues are seen from a broader perspective, which makes the linking of separate issues easier and problem solving more effective;

- they give the member states a long – term perspective, which helps to concentrate on really important issues;

- due to their multilateral nature, they are more effective as individual states in their actions.[1]

The present paper aims at analyzing the impact of Intergovernmental Organizations behaviours on those of International Corporations. To achieve this goal the author proposes to first take a look on the determinants influencing the actions of both organisms. Fig. 1 below shows a brief scheme of such a relation.
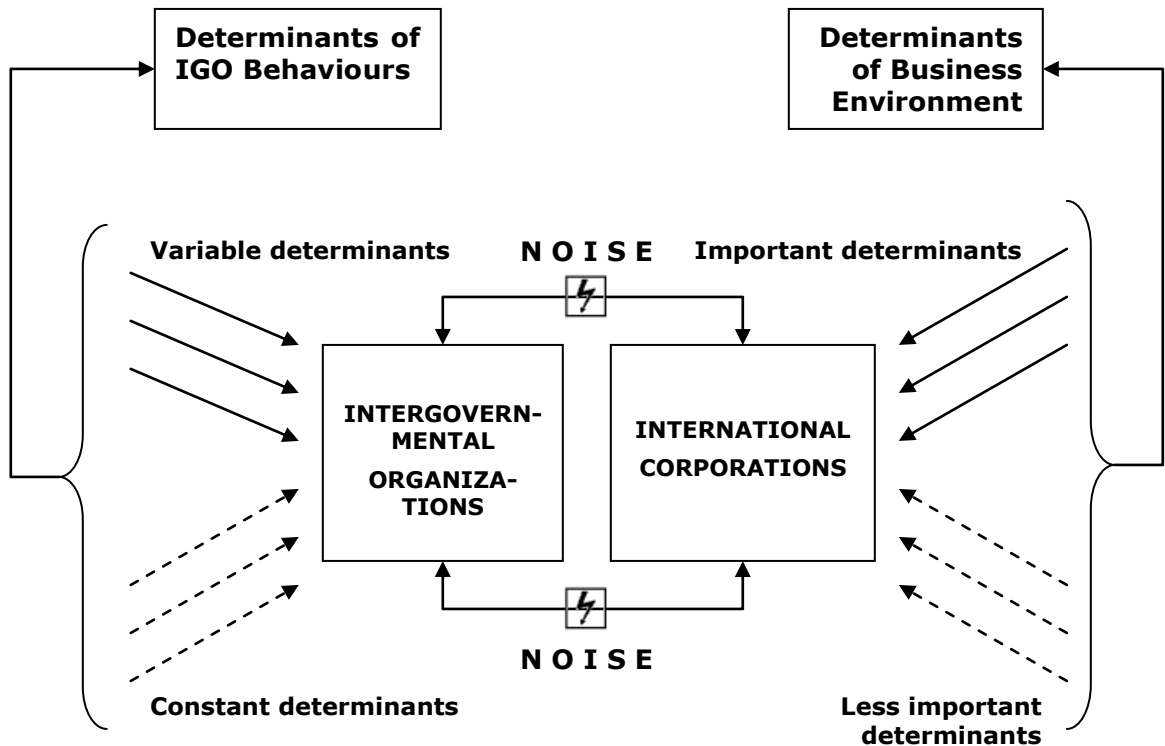


Fig. 1 Intergovernmental Organizations Vs International Corporations

*Source: own study*

## THE DETERMINANTS OF INTERGOVERNMENTAL ORGANIZATIONS BEHAVIORS

### Variable Determinants

The first group of IGO determinants consists of those that in short- or medium – term can be subject to external influences. The meaning and relevance of presented factors will be evaluated by expert rankings in further parts of the paper.

To this group belong the following:

**Political Environment** – this factor determines the attitude of national states towards their membership and participation in various IGO initiatives. It is also relevant for an analysis of level of particular countries involvement in common initiatives, together with other member states. In some cases the membership in an IGO is not followed by real activity in its field of action; in other cases countries turn themselves to IGOs in order to join forces for complex problem solving issues. The political environment towards IGO activities can be generally divided between non – favourable, indifferent and favourable.

**Strategic Management –** determinant showing the approaches inside an IGO to strategic management issues. Are the organization actions being taken only *ad hoc* or are they a part of a broader organization strategy? Is the organization seen by its member states only as a problem solving facility, as a thought – feeding and a discussion space, or maybe broader – as a powerful tool for dealing with greatest problems of the World and for changing its face into a more positive one? The gradation of strategic management level within an IGO can be the following: non – existing, short- and long – term).

**Knowledge Management –** the way organisation deals with its intellectual property and know – how. Can be ineffective, average or effective and is another indicator of organization's view on managerial questions. Different approaches can be observed. In one of them the unique knowledge of the organisation is seen as its main asset and is guarded precisely and hidden from a wider public. Other organizations treat their know – how as a public good and are willing to spread their ideas to the broadest possible extent.

**Learning Ability** - understood as IGO's ability to adapt its profile of actions to the changing needs of a global World and to the communication and functioning possibilities offered by modern technology and information society. The proposed gradation is low, average and high. The individual level of this determinant indicates indirectly IGO's effectiveness through its adaptive skills.

**Organizational Control Systems** – a factor describing IGO's internal safety measures. Internal control systems are necessary to prevent the organization authorities to derive from its primary goals, but also to ring a warning bell in case of too serious engagement of the organization in realisation of interests of one particular member state or a group of member states or a simple fraud. This factor can differ from lack of control systems, through primary advancement until developed professional organizational control systems.

### Constant Determinants

The second group has been named the constant determinants because the author assumes that they remain unchangeable until an important strategic change in the organisational life of an IGO occurs. Some of the constant determinants of IGO behaviours are the organizational goals, founding members, organization's financing method and organizational culture. These factors will not be taken into account in further analysis stages, because they are irrelevant in short or medium term for the functioning of international corporations.

### THE BUSINESS ENVIRONMENT OF INTERNATIONAL CORPORATIONS INSIDE THE OPEN SYSTEMS MODEL

The analysis of business environment of International Corporations inside the Open Systems Model is a concept by H. Deresky, an American author whose research is concentrated on the activity of International Companies. H. Deresky's model is based on the division of International Corporations business environment on three groups: the operating environment, the host – country environment and the mega environment. Fig. 2 shows the components of each group. [2]
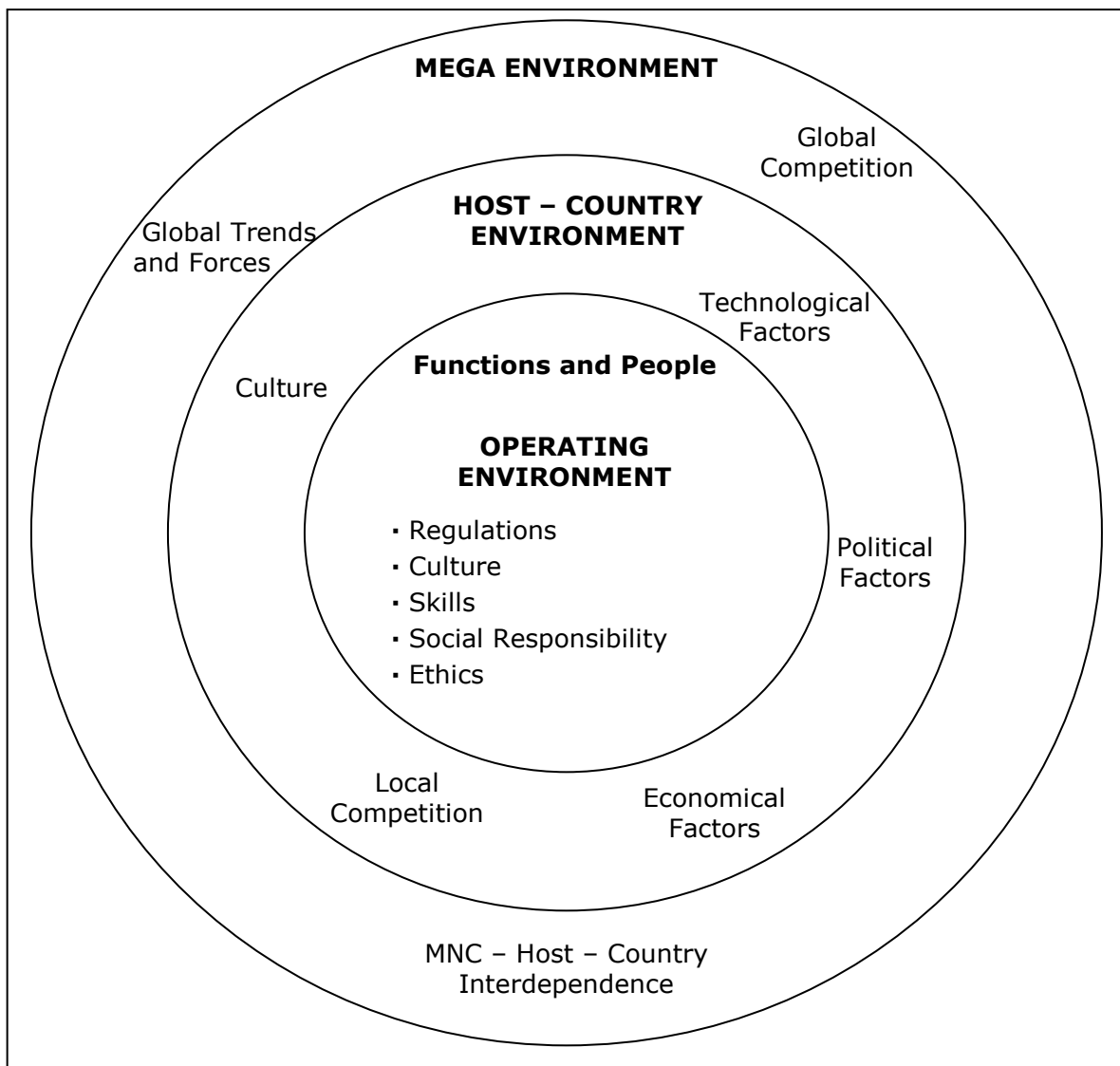
Fig. 2 An Open Systems Model – Business Environment of International Corporations
*Source: [2]*

The Open Systems Model derives form physics, where an open system signifies a free flow of matter and energy inside and outside the system. In management science it signifies – *per analogiam* – a system that acquires raw materials, capital and qualified staff from outside and – through technology and human abilities transforms them into goods and services. Those are sent back to the macro – environment where they are purchased by the customers. Closed systems are an opposition to open ones. They allow matter in- and outflows but it is not the case of energy. From the economical point of view a closed system is self – efficient and does not come into interactions with its environment.

A responsible global manager has to realize that he / she is functioning in an open system. This fact brings serious implications for the decision making process, because it becomes crucial to anticipate the interrelations between various elements of company's micro- and macro – environment. In case of International Corporations these relations take form of interplays between operating, host – country and mega environment. The following paragraphs of the present paper are devoted to a short description of the determinants composing each of those three groups of factors. The

author want to add that at least some of the determinants presented below can influence strongly the strategic behaviours of International Corporations.

## Determinants of Operating Environment

**Legal Regulations** – a set of legal acts determining the functioning of mother country companies. Three main types of legal systems can be actually found in the world. The first one is the European Continental Law, dating back to the Roman Empire times with a central role played by codes and legal acts issued by governments. This type of legal system is the most popular in the world, now. The second is the Common Law where judicial precedents are the main source of law. Legislative acts do still play an important role, but are not influencing the formerly codified body of law. The third legal system type – the Religious Law is based on religious books which are seen as the basic and unchangeable source of law.

**Culture in Organizational Aspect** – mainly understood as the influence of local human factor on numerous aspects of organizational behaviours. From the organization's spectrum the cultural factors that bear the most important effect on the functioning of organizations are: the level of orientation towards the results, the ability of strategic planning and the orientation towards a human being.

**Skills** – special predispositions and preparation of mother country population to entrepreneurship, team work, problem solving and adapting to variable environment. Another group of skills are those areas of industry and economy in which the mother country population shows competitive advantage due to some historical reasons or unique conditions of local natural environment.

**Social Responsibility** – the level of awareness of mother country population about the questions from Corporate Social Responsibility area. In general this idea bases on an assumption that an enterprise's managerial board should take into account the needs of all shareholders, not only the major ones. Another group that should not be omitted are all these people who are in any way concerned by business activities of the company, i.e. workers, suppliers, local communities, Non – Governmental Organizations, business partners, investors, individual shareholders or single proprietors.

An enterprise socially responsible seeks for potential growth possibilities not only in its economical and financial charts, but also in the cooperation with its local environment. A good example is a construction of road or goods market facilities for the local municipality. Another indicator of enterprise's social awareness is how its employees are being treated – whether they are adequately paid, they are not forced to work longer hours, etc.

**Ethics** – is directly linked with social responsibility. This factor determines the strength of enrooting of moral rules in mother country society. On the other hand it shows the level of compliance to these ideals in the economic praxis and can be also understood as a general ability of the society to solve the entity of problems that arise with the economic development of a country in an ethical way. In this case ethical means conform to the moral rules. The indicators of ethical development of an enterprise can be found in its vision and mission, its internal regulations, but also in every day behaviours of its workers.

Another areas showing very clearly the ethical advancement of mother country is the corruption level, the average delay in current payments, the way of legal problems solving and forms of state aid offered to business – the extent to which it limits the free competition.

**Determinants of Host – Country Environment**

**Economic Factors** – they are focused in several areas and are highly relevant when taking investment decisions. The most important of them is the general economic system – free market economy, a centrally planned one or a totalitarian system with elements of free market (e.g. People's Republic of China). The stability of host – country economy plays also an important role for International Corporations expansion decisions. The qualitative character of this determinant can say something about the investment attractiveness of a given country – is it interesting as a long – term location of capital or only as a short term investment field in an instable economy, exposed to external speculative pressures. Another factor is the stage of economic development (rich developed countries, developing countries or Third World countries).

Another group of economic factors consists of GNP structure, adopted economic and fiscal policies, disproportions in distribution of welfare and the model applied for redistribution of fruits of society's work. The investment risk of host – country is one of the most important economic determinants. Its analysis can be based on World Bank's list and International Monetary Fund regional rankings. The author decided to cite these publications because of the complexity of matters presented there. In fact this determinant – investment risk - integrates many other economic values, such as the GNP (Gross National Product), inflation rates, public debt level, budget deficit, the level of current expenses, interest and exchange rates, local currency stability and others. One should not omit the international economic position of host – country, either.

In Open Systems Model the local competition is seen as a separate determinant. Despite that, the author decided to include it into the group of Economic Factors in order to obtain symmetrical matrixes, which will highly facilitate further calculations. The number of competing enterprises, strength of local competition, legally allowed competition methods and factual business practices in this field are very often the critical determinants for the decision whether to invest in a particular host – country. Together with entry and leaving barriers the local competition level is one of most important economical determinants of international companies' business environment.

**Political Factors** – every enterprise's investment decision has to be preceded by an analysis of host – country political risk. T.W. Shreeve divides this risk in two types: the macro – political and the micro – political risk. The first one concerns several countries in a region, when some political steps taken by one of them or by the international community towards one of them influences the economies of other countries. In example one country becomes subject to economic sanctions which will influence its trade balance with its neighbours. The second type, the micro – economic risk influences one or several companies from a branch and takes form of subtle, but constant pressure by country's authorities making sometimes the normal functioning of the enterprise very difficult. This type of political risk can be even more harmful for foreign businesses than a direct expropriation, because it cannot be subject to any kind of insurance and its indirect nature makes the eventual reactions slower.

T.W. Shreeve proposes a list of seven possible events from the political risk area:

- Expropriation of enterprise's assets without due and adequate recompense;
- Forced sale of actions to host – country citizens, usually below their real value;
- Discriminative treatment of foreign companies when applying the rules of law;
- Creation of abroad fund transfer barriers (profits or actions);
- Deprivation of technology or other intellectual property (patents, trademarks, brands);
- Interference in decision making processes;

- Fraud of state authorities and their representatives, including the recalling or changing of former agreements, bribe extortion, etc. [6]

Another factor from the political risk area that should be taken into account when analyzing different localizations for future investments is a proper identification and understanding of ethnical and religious questions in host – country. The nature and temperature of its internal political disputes (populist or moderate and problem solving oriented) can also say something about the risks coming from the political determinants of host – country environment.

**Technological Factors** – they play a crucial role in modern economy and can be perceived dually – as a general level of host – country technological and scientific advancement or as the level of host – country's preparation for the reception of modern innovative businesses. The first meaning can be directly measured by the number of international industrial patents pended by the companies operating in a given country. Another indicator can be the number of public and private independent research institutions and think – tanks focused on technological development. Indirect indicators showing the technological advancement of a country is the percentage of GNP invested into scientific research and education, existence of national innovation strategy, level of intellectual property protection, incentive programs for creation of research nets, number of international R&D projects and others. [2]

We can also understand the technological factors as the level of host – country preparation for the reception of modern innovative businesses. Its level can be measured by evaluating the compliance of technical and informatics solutions elaborated in host – country with those available in the rest of the World. Another good indicator is the analysis of technology development trends – whether they are conform to those observed in other countries or not. We can also measure the adequacy of applied technologies to factual business needs, as well as the availability, number, innovativeness and general level of development of e – business services on the local market. [5]

**Culture in individual aspect** – mainly understood as its influence on communication between individuals. In different host – countries the individual aspect of culture can be observed in the following areas: varying society organizations (hierarchical, democratic); adopted system of values; individual ways of thinking (depending on the obtained education); varying social roles of citizens; attitudes towards entrepreneurship and other forms of activity; perception of time (circular or linear); role of language and non – verbal communication (including the body language); proxemics – the extent of personal space in both private and professional life; role of touch and cultural context in communicating.

The weight of local culture influence on strategic management of an enterprise can be observed in attitudes of employees of mother unit, but also in business model developed through the years of enterprise functioning. The author want to add that this last one can factor be strongly influenced by former periods of enterprise's functioning in its mother country. The manager's role towards the cultural aspects of management cannot be overestimated, as it belongs to his / her duties to link the organizational tradition of the enterprise with cultural reality of host – country environment.

**Subsidiary – Host Interdependence** – this determinant shows the level of interdependencies between companies investing and operating outside its country of origin and the host – country. Some countries will be encouraging the inflow of Foreign Direct Investment by providing numerous incentives for foreign enterprises interested in entering their internal markets. The available instruments are tax deductions, cheap ground, help in infrastructure building, providing suitable technological resources and trained staff and many others. At the same time other countries will be protecting their

local businesses by making the entry barriers for foreign companies higher. The means used for this purpose can be various, i.e. excessive licensing, high customs levels, direct and indirect aid available to competitive local companies, strengthening of national monopolies and many others.

## Determinants of Mega Environment

**Global Trends and Forces** – the entity of economical and political phenomenon that together with international and global institutions and NGOs are bearing an indirect, but important influence on strategic decisions of managerial boards of enterprises. The manager's role is to identify and rank a big number of events from this area. The ability of selecting the important ones, a consequent and skilful building of enterprise's international position and lobbying groups becomes toady a crucial skill in the field of international management. PR agencies, lobbying groups or some NGOs can be very helpful in this field.

**Global Competition** – the functioning of international enterprises in global competition does not essentially differ from its substance on a local or regional market. Still two main pillars of the system – consumers and producers do exist. The difference comes with a higher number and scale of competing subjects, new marketing forms and distribution channels, size of logistics operations, diversified access to raw materials and others, which causes automatically a much higher complexity of issues to deal with. The global competition should not be understood only as another stage of fight for a new customer, global this time, because it involves also another areas, such as access to new technologies, alternative sources of energy and other resources, cheaper forms of production, outsourcing of a part of business functions, differentiation of suppliers and changes in practically every aspect of enterprise functioning, including the strategic planning and widely understood management.

**Multi – National Companies – Host – Country Interdependence** – the main difference between this determinant and the Subsidiary – Host – Country Interdependence is the direction of the relation. When at a regional level it was rather the foreign or mother country company that was the beneficiary of potential help from the state, in the actual case it is the host – country that can be strongly dependent on international businesses operating and paying taxes on its territory. Difficulties encountered by global businesses can have a strong effects on host – country's economy, in particular on its tax revenues, unemployment rates or accessibility to modern technologies and level of innovation inflow.

Next two factors are not a part of the Open Systems Model. Despite that the author decided to add them in order to make the picture more complete.

**International Law** – the multilateral international agreements, the United Nations Universal Declaration of Human Rights, International Court of Justice rulings and laws issued by other international organizations (i.e. EU, WHO, WTO, WIPO, ITU, UNESCO) are forming the body of public and private international law. When operating on a global scale, this determinant can be of crucial importance. Neglecting the international laws by international companies can result in a set of negative aspects influencing their functioning and future development. The instruments that can be used here will come from financial fines, through important limitations of fields of activity and defy from global customers side up to bans of activity continuation. All of these methods can be very harmful for international businesses, so most of them find out that the functioning in conformity to the rules of international law pays back.

**Level of Global Technological Advancement** – available technologies in World's scale. When taking a decision about entering the market and investing in a particular host – country the leaders have to take into account the relation of host – country's technological advancement and its ability of new innovations creation in comparison to

the level of technology available around the World in general. A situation when the potential host – country is on a lower technological advancement level than other possible locations will have a serious impact on investment decisions and has to be taken seriously into account when the company's managerial board seeks not only for cheap labour force but also for future development perspectives.

## HOW INTERGOVERNMENTAL ORGANIZATIONS CAN INFLUENCE THE BUSINESS ENVIRONMENT OF INTERNATIONAL CORPORATIONS – SOLUTION PROPOSAL

The subject of analysis consists of four groups of factors. The first group is a set of determinants of Intergovernmental Organizations behaviours described in paragraph above devoted to this matter:

- Group A – variable determinants of Intergovernmental Organizations behaviours

The next three groups belong to the Business Environment of International Corporations and have been described in paragraph above devoted to the Open Systems Model. These are the determinants of International Corporations behaviours in following areas:

- Group B – variable determinants of International Corporations Operating Environment

- Group C – variable determinants of International Corporations Host – Country Environment

- Group D – variable determinants of International Corporations Mega Environment

Each of the groups A, B, C, D is composed of factors that will be subjects to analysis. The constant determinants of IGO behaviours have been omitted on purpose, as they cannot be influenced in short- or medium – term by any external agents. In effect each of the groups is a 5 element ensemble, where:

$$\textbf{A}\ [a_1,\ a_2,\ \dots\ a_5]$$
$$\textbf{B}\ [b_1,\ b_2,\ \dots\ b_5]$$
$$\textbf{C}\ [c_1,\ c_2,\ \dots\ c_5]$$
$$\textbf{D}\ [d_1,\ d_2,\ \dots\ d_5]$$

The subject of analysis is the influence of determinants of Intergovernmental Organizations behaviours on factors influencing the development of International Corporations. As the matter of such interrelations is always a delicate one, the author assume that the International Companies can be directly influenced by IGOs only in very few and special cases (e.g. European Union binding decision addressed directly to individuals or business units). However EU example is rather an exception and in further research will be treated as such. Following this logic, the author decided to perform an indirect analysis of described interactions under condition that the International Corporations behaviours are being directly influenced only by the determinants of their Business Environment taken from the Open Systems Model. In other terms the conclusions about the IGO influence on International Corporations will be drawn from the nature of IGO impact on three groups of determinants of their Business Environment. This means that the subject of analysis is the influence of group A on groups B, C and D. Correlation analysis will be applied for this purpose. Further

research will be lead in 4 steps and will consist of expert evaluations, homogeneity of variance check, experts' credibility check and check of interrelations occurrence.

## Step 1 – Expert Evaluations

For the needs of further analysis same group of independent experts performs an evaluation of significance of each determinant, assuming that the sum of points given by every expert cannot exceed 100. This assumption standardizes the evaluation of experts in relation to a maximal number of one hundred points.

In this way sets of evaluations for each group of factors are obtained. Table 1 shows an example for group A – Intergovernmental Organizations, where $a_1$, $a_2$, … $a_5$ stay for its behaviour determinants described above. The presented figures are only a simulation and cannot be treated as real expert statements at this stage of research.

Table 1: Expert significance evaluations for group A – Intergovernmental Organizations

| Group A | | | | | | |
|---|---|---|---|---|---|---|
| Expert | $a_1$ | $a_2$ | $a_3$ | $a_4$ | $a_5$ | Σ of points |
| X1 | 22 | 10 | 24 | 12 | 9 | 77 |
| X2 | 28 | 21 | 9 | 17 | 19 | 94 |
| X3 | 28 | 7 | 12 | 20 | 23 | 90 |
| X4 | 27 | 10 | 23 | 14 | 19 | 93 |
| X5 | 31 | 15 | 13 | 21 | 17 | 97 |

*Source: own study*

## Step 2 – Homogeneity of Variance Check

As a result of statistical calculations Table 1 has been extended into Table 2 (shown below) by addition of average values of expert evaluations, their variances and standard deviations both for each expert and every determinant. These values will be used in further calculations.

Table 2: Expert significance evaluation for group A – Intergovernmental Organizations – extended table

| Group A | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Expert | $a_1$ | $a_2$ | $a_3$ | $a_4$ | $a_5$ | Average | Variance | Stand. Dev. | Σ points |
| X1 | 22 | 10 | 24 | 12 | 9 | 15,4 | 49,8 | 7,06 | 77 |
| X2 | 28 | 21 | 9 | 17 | 19 | 18,8 | 47,2 | 6,87 | 94 |
| X3 | 28 | 7 | 12 | 20 | 23 | 18 | 71,5 | 8,46 | 90 |
| X4 | 27 | 10 | 23 | 14 | 19 | 18,6 | 46,3 | 6,80 | 93 |
| X5 | 31 | 15 | 13 | 21 | 17 | 19,4 | 50,8 | 7,13 | 97 |
| Average | 27,2 | 12,6 | 16,2 | 16,8 | 17,4 | | | | |
| Variance | 10,70 | 30,30 | 46,70 | 14,70 | 26,80 | Average Variance | | | 25,84 |
| Stand. Dev. | 3,27 | 5,50 | 6,83 | 3,83 | 5,18 | Average Stand. Deviation | | | 5,08 |

*Source: own study*

For evaluation of homogeneity of variance the Hartley test will be applied. The use of this tool is possible because the assumption of identical sample sizes of all probes is

fulfilled.

It takes the following form: $F_{max} = \dfrac{S^2_{max}}{S^2_{min}}$ , where $F_{max}$ – Hartley statistics value;

$S^2_{max}$ - maximal probe variance value; $S^2_{min}$ - minimal probe variance value.

If $F_{max} \leq f_{max}$ (value taken from statistical tables), there is no reason for elimination of hypothesis about homogeneity of variance.

**Calculations example 1**: Variance Homogeneity Check - Hartley test for group A

$f_{max} (0,05;4;4) = 20,6$ , where α = 0,05 – significance level, k = 4 number of degrees of freedom for $S^2_{max}$ , v = 4 number of degrees of freedom for $S^2_{min}$ [8].

Conclusion: as for group A $F_{max}$ = 4,36 ➔ $F_{max} \leq f_{max}$, also there is no reason for abolishing the hypothesis about homogeneity of variance, variances in group A are homogeneous.

Same reasoning has been applied for groups B, C and D, which resulted in obtaining similar tables for International Corporations Operating, Host – Country and Mega Environment. As this paper is only a presentation of the method, other tables have not been entirely included because of their similarity. Table 3 below shows average, variance, standard deviation and $F_{max}$ values for groups B, C and D.

Table 3: Important statistical magnitudes for groups B, C, D.

| Group B | | | | |
|---|---|---|---|---|
| **Average** | 12,8 | 16,6 | 16,8 | 20,4 | 22,4 |
| **Variance** | 16,20 | 60,30 | 34,20 | 41,80 | 24,80 |
| **Stand. Dev.** | 4,02 | 7,77 | 5,85 | 6,47 | 4,98 |
| **Fmax = 3,72** | | | | | |
| **Group C** | | | | | |
| **Average** | 21 | 17,6 | 16,6 | 19,2 | 22,2 |
| **Variance** | 32,50 | 13,80 | 21,30 | 8,00 | 12,70 |
| **Stand. Dev.** | 5,70 | 3,71 | 4,62 | 2,83 | 3,56 |
| **Fmax = 4,06** | | | | | |
| **Group D** | | | | | |
| **Average** | 19,2 | 16,8 | 20,6 | 14 | 19 |
| **Variance** | 48,20 | 66,20 | 55,00 | 72,50 | 68,50 |
| **Stand. Dev.** | 6,94 | 8,14 | 7,42 | 8,51 | 8,28 |
| **Fmax = 1,50** | | | | | |

*Source: own study*

It can be easily seen that variances from groups B, C and D are homogenous as well, which allows the author to proceed to the next step.

**Step 3 – Experts credibility check**

The checking of credibility of experts will be performed by testing the reciprocal influence of their evaluations in different groups.

Hypothesis: no correlation between evaluations of a given expert for groups A and B exists (A & C and A & D *per analogiam*).

Assumption: the correlation test of determinant evaluations is performed for each expert separately. The relations between evaluations proposed by different experts are not taken into account.

The Student test type *t* will be used for this purpose. It takes the following form:

$$t_{iAK} = \frac{\left| \overline{X}_{iA} - \overline{X}_{iK} \right|}{S_i \sqrt{\frac{1}{n} + \frac{1}{m}}}, \text{ where } X_i = \text{Expert}_i, I = \{1...5\}; n = 5, m = 5;$$

$$K = \{B \vee C \vee D\} \text{ – actually analyzed group of determinants.}$$

$S_i^2 = \left( S_{iA}^2 + S_{iK}^2 \right)$ - summary variance ; $S_i = \sqrt{S_i^2}$ standard deviation for average expert ratings in groups A and K.

**Calculations example 2**: Check of correlation of evaluations of Expert 1 for groups A and B

$$S_1 = \sqrt{\left( 49,8 + 46,8 \right)} = 9,83$$

Value of statistic *t* for the evaluations of Expert 1 in groups A and B:

$$t_{1AB} = \frac{\left| 15,4 - 19,4 \right|}{9,83 \sqrt{\frac{1}{5} + \frac{1}{5}}} = \frac{4}{9,83 \cdot 0,63} = 0,64 \quad \rightarrow \quad \text{comparison with critical } t \text{ parameter}$$

value taken from statistical tables, for (n+m-2) = 8 number of degrees of freedom, at α = 0,05 significance level.

Conclusion: as $t_{1AB} = 0,64$ and $t_{(0,05;8)} = 2,306$ → $t_{1AB} < t_{(0,05;8)}$, also there is no reason for abolishing the hypothesis about lack of correlation between evaluations of expert 1 for groups A and B. This means that when evaluating one of two groups of determinants, expert 1 is not being suggested by his evaluations of the second group. His evaluations can be then judged as objective.

Same reasoning has been performed for all the experts and all of them has been proven as reliable.

**Step 4 – Check of Interrelations Occurrence Between Groups A and B**

Hypothesis: There is no correlation between average evaluation of all experts for a given determinant from group A and average evaluation of all experts for a given determinant from group B (groups C and D *per analogiam*).

Assumption: the correlation of average evaluations for each pair of determinants is being performed separately.

The Student test type *t* will be used for this purpose. Here it takes the following form:

$$t_{ijAK} = \frac{\left| \overline{a}_i - \overline{k}_j \right|}{S_{ij} \sqrt{\frac{1}{n} + \frac{1}{m}}}, \text{ where } a_i - \text{A group determinant subject to analysis; } k_j - \text{B, C or D}$$

group determinant subject to analysis; *i,j* = { 1...5} – amount of experts; *n* = 5, *m* = 5; K = {B v C v D} – actually analyzed group of determinants.

$S_{ij}^2 = \left( S_{ai}^2 + S_{kj}^2 \right)$ - summary variance; $S_{ij} = \sqrt{S_{ij}^2}$ - standard deviation for average evaluation of determinant $a_1$ and $b_1$

**Calculations example 3**: Check of correlation of evaluations of determinants $a_1$, $b_1$ for groups A and B:

$$S_{11} = \sqrt{10,7 + 16,2} = 5,19$$

Value of statistic $t$ for average evaluations of $a_1$ and $b_1$ determinants.

$$t_{11\,AB} = \frac{|27,2 - 12,8|}{5,19\sqrt{\dfrac{1}{5} + \dfrac{1}{5}}} = \frac{14,4}{5,19 \cdot 0,63} = 4,39$$ ➔ comparison with critical $t$ parameter

value taken from statistical tables, for (n+m-2) = 8 number of degrees of freedom, at $\alpha$ = 0,05 significance level.

Conclusion: as $t_{11AB}$ = 4,39 and $t_{(0,05;8)}$ = 2,306 ➔ $t_{11AB} \geq t_{(0,05;8)}$. The test is significant, which means that there is evidence for abolishment of hypothesis saying that there is no correlation between average evaluation of all experts for a given determinant from group A and average evaluation of all experts for a given determinant from group B. In fact such a correlation does exist, which proves that a situation when a determinant from group A influences a determinant from group B is possible.

Same reasoning should be made for all pairs of determinants from groups A & B. Due to a high number of tests to perform and calculations complexity this part of research will be made during future research with use of more advanced statistical tools.

The author wants to stress that all of the above is a method presentation only with simulative data and should be read as such. All mathematical values have been approximated to hundredth parts. All statistical equations and calculations have been performed on basis of information published in [8].

## CONCLUDING REMARKS

Basing on the above the author believe that the proposed method of correlation analysis can be applied for research of interrelations between the determinants of Intergovernmental Organisations and the factors influencing the strategic decisions of International Companies. Because of available statistical values this method seems to be a more relevant and promising tool for scientific analysis of interrelations than a simple query with expert opinions without further elaboration. Nevertheless a higher number of experts involved raises the evaluations credibility. The author believes that further research should be concentrated on the direction and nature of discovered interrelations and the development of methods presented in the present paper.

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