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Preparation of International Business Negotiations Strategies Based on Evaluation of Negotiating Power: Case of E-Commerce

Kęstutis Peleckis

Department of International Economics and Business Management, Faculty of Business Management, Vilnius Gediminas Technical University, Vilnius, Lithuania
E-mail: k.peleckis@vgtu.lt

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Abstract. Research Design and Methods: logical analysis, generating conclusions, comparing and generalization methods, game theory methods, multiple criteria evaluation. Findings: from experimental verification of model, which was created by author of article for development of international business negotiations strategies, it can be stated that this model can be used for electronic negotiations: both as a standalone tool or as a measure requiring partial negotiator intervention. As well created negotiation strategy model can be used to support the negotiations through various databases. Results of the investigation can be used to create business negotiation strategies in international business, with regard to globalization, internationalization and cooperation processes characterized by multiculturalism. Implications and Recommendations: The use of the heuristic algorithms can help to manage effectively the process of negotiations. Selection of principles and rules must be carried out by specialists of high qualifications and experience, consultants, negotiators in the fields concerned, in order to determine which option is the best, taking into account the specifics of each task, goals and conditions. Contribution and Value Added: perspective of using the developed model of international business negotiations: negotiation support tool, information tool for reducing uncertainty, autonomous engine of the negotiation process, management of large quantities of information.

Keywords: negotiation, negotiation power, e-commerce negotiations, negotiation power assessment, strategic decisions and negotiations support, negotiation strategy.

JEL Classification: M16, M54.

Conference topic: Internationalization Processes: Contemporary Challenges.

Introduction

Modern international business is developing in the context of rapid social and political change, has an impact on the economic and cultural priorities change, changes in thinking and behavior. This puts new requirements on business negotiations strategies design and implementation – in these processes must be ensured set of planned and implemented negotiating action, enabling to understand the other side of negotiating in various situations, to achieve mutual understanding, to reach a common understanding, negotiating and eventually find an optimal solution. In this work will be tested model, designed to help to develop international business negotiation strategies based on negotiation power evaluations. This model will be tested in a typical field of international business negotiation – electronic commerce. It consist the use of game theory methods, aims to find the optimal strategy of negotiations and customize the optimization rules in negotiations under uncertainty. The developed model is designed for assessment of bargaining power, analysis of strategic actions in negotiations and strategic decision-making. Taking into account the abundance of the criteria used in negotiating issues has been used multi-criterial analysis by means of expert assistance.

In study was made experimental verification of model for development of international business negotiations strategies, which can be used for electronic negotiations: both as a standalone tool or as a measure requiring partial negotiators intervention.

Problem. In the field of electronic commerce there is no theoretical solutions which are using game theory methods for the assessment of bargaining power in international trade negotiations, especially with regard to very important opportunities for international business development to apply support technologies during the course of negotiations.

Research object. Support of the development strategies based on negotiation power evaluations of international business negotiation in e-commerce.

The aim. To provide a theoretical model for developing international business negotiation strategies based on negotiation power evaluations, to verify experimentally developed model adequacy and application in the field of electronic commerce in international business negotiations.

Research methods – comparative, logical analysis and synthesis of scientific literature, comparison and generalization methods, mathematical and statistical methods of data analysis.

Characteristic of a typical case of strategy development model based on the assessment of bargaining power in international business negotiations

There will be carried out a typical case of strategy development model based on the assessment of bargaining power in international business negotiations characteristic – in the area of e-commerce. In this section we will review the importance of this activity in the EU and Lithuania. Analysis has been prepared based on data of Eurostat (2015), the Ministry of Economy of the Republic of Lithuania (Lietuvos Respublikos ūkio ministerija 2015), the Department of Statistics of Lithuania (Lietuvos statistikos departamentas 2014, 2015) and the Bank of Lithuania (Lietuvos bankas 2015).

E-commerce. In 2013 year computers and electronic networks for trade (to buy or sell goods or services) used 35.8 per cent of enterprises (from 2012 to 34.7 per cent). In 2013 year 24.6 per cent of enterprises purchased (ordered) goods or services through internet or computer networks, using electronic data interchange technology, 19.3 percent – received the orders (in 2012 year – respectively 21.9 and 22.2 percent). 12.1 per cent indicated that they received payments for goods which were sold electronically (by e-booking). In early 2014 year the use of computers and internet was among all manufacturing and service companies employing 10 or more employees. The broadband internet use 99.4 per cent of enterprises, wireless internet access – 61.8 percent, of which more than half (53.3 percent) – supplied mobile broadband cellular (mobile) telephone operators networks (Lietuvos statistikos departamentas 2014). Mobile internet access for business use 11.4 per cent of staff (2013 to 10.5 per cent). In 2014 year beginning the web site had 74.5 per cent of enterprises, 43.5 per cent of the company's website announced goods or services catalogs and price lists, 20.2 per cent – provided the opportunity to book, reserve or purchase products electronically (Lietuvos statistikos departamentas 2014). A quarter of enterprises are buying online, and one-fifth of companies get online answers, we can see that the internet and computer technology are increasingly being used in various business processes, e-commerce increasingly is used in business, so we can say that e-commerce business occupies an important place and has great potential to expand. As we see the importance of this activity is significant in the EU and Lithuania. Therefore, in further will be carried out a typical case of strategy development model based on the assessment of bargaining power in international business negotiations characteristic – in the area of e-commerce.

Strategy development in the area of e-commerce by model based on the assessment of bargaining power in international business negotiations

In our view, the development and implementation of negotiation strategies must rely on evaluation of negotiating power. However, the cognition of situation can take place in process of negotiations, so the implementation of the strategy and tactics of actions (steps) may change with each new issue. The analysis of the scientific literature (Ginevičius *et al*. 2014; Ginevičius 2008; Tamošiūnas 2011; Hashemkhani Zolfani *et al*. 2015; Zavadskas *et al*. 2004; Lova *et al*. 2000) shows that the application of heuristic algorithms is promising for the development and implementation model of negotiating strategy based on evaluation of bargaining power better reflect the progress of negotiations. We define the condition that each negotiating issue will be examined only once, without returning to it. The heuristic algorithm will seek to find the negotiators win strategies, which produce the maximum cumulative negotiating benefits. In order to find them will be used optimization rules. Negotiating issues provide a sequence so that the issues go from the most important to least important, in order to ensure that the further course of negotiations would not be in vain. For example: finding out in the last negotiation phase that another side of negotiations could not meet the basic criteria (negotiating team has not the person empowered to sign the agreement, a contract), it turns out that the costs incurred until then in negotiating have been made in vain. This optimization problem is quite complicated because of that in previous talks single most useful issues will not necessarily win the best value of all negotiation issues cumulative winnings, which means the need to look the best value during the whole negotiation process, the total dividend, this is to solve global optimization problem. For example: in the negotiations are settled three questions, each question is chosen from the available alternatives, though winnings are in the first two questions, in each question they were not the most useful, but their best choice led to the third questions alternatives winnings, which in the final produced the maximum possible benefits of negotiating process. After defining the priority list of negotiating issues, we must emphasize that on each issue is negotiating with a set of potential negotiating partners. Let assume that negotiator has a finite set of alternatives and each issue consists of t alternatives. Let us denote alternatives $b_{i,j}$, $j = 1,2,3,\ldots,t_i$ for the *i*-th question. Then *i*-th question of all alternatives set of values is denoted $w_i = \{b_{i,1}, b_{i,2}, \ldots, b_{i,t_i}$, and $w_1 \times w_2 \times w_3 \ldots w_n$ is the set of all possible negotiation scenarios when for every issue is selected one from the available alternatives, *n* is the number of negotiating issues.

Noted b_0 as start of negotiations, where the arcs $H_{i,b_{ij}}$ denotes winnings after we have chosen the *j*-th alternative to resolving the the *i*-th issue.

$$\max_{k\in w_1\times w_2\times w_3\ldots w_n}\left(\sum_{i=1}^{n}H_{i,b_{i,j}}\right), j=1,\ldots,|w_i|, \quad (1)$$

where:

H – the negotiators issue as winnings according to the chosen optimization rule (Hurwitz, Wald, Werner etc.); n – the number of negotiating issues (peaks mark the start and end of negotiations).

The peak b_0 marks the start of negotiations, peaks *bij* notes the *j*-th alternative of *i*-th question, and the arcs $H_{i,b_{ij}}$ indicates winnings, which we could have by selecting *j*-th alternative in solving the *i*-th issue $j\in w_1\times w_2\times w_3\ldots w_n$.

Further, as an example, we shall provide Hurwitz formula (Zavadskas *et al*. 2004), which will be used in order to find the best issue winnings for negotiations at the uncertainties:

$$H_u=\max_u\left[\gamma\min_z a_{uz}+(1-\gamma)\max_z a_{uz}\right] \text{ (the best maximal decision);} \quad (2)$$

$$H_u=\min_u\left[\gamma\max_z a_{uz}+(1-\gamma)\min_z a_{uz}\right] \text{ (the best minimal decision),} \quad (3)$$

where:

H – negotiator winnings on negotiating issue by Hurwitz rule.

a_{uz} – negotiator winnings, which he is able to get if he will do the move u in case if opponent will make a move *z*.

Negotiators set of moves is finite and consist of the moves which will be numbered: u = 1,2,3,...,s.

We accept the assumption that opponent's set of possible moves is finite and consists of k moves which are numbered: z = 1,2,3,...,k.

γ – hope parameter; γ – a factor that varies from 0 to 1. In the formula we can see that if γ = 1 so Hurwitz criteria coincide with Wald, this is with the pessimistic criterion.

If γ = 0, we obtain an optimistic solution, one that allows you to get the maximum winnings. What size coefficient to choose depends on the type of decision – optimistic or pessimistic – negotiator chooses. Perhaps it is the most acceptable factor γ = 0.5, because this is a situation where the average solution is selected between pessimistic and optimistic. This gambling can be written by the so-called winnings matrix array and is called gambling. Zero-sum games form:

$$\Gamma=\{S_1,S_2;A\}. \quad (4)$$

Applying it to the negotiating challenges it can be suggested that the first negotiators set of strategies (pure strategies) is $S_1=\{S_{11},S_{12},\ldots,S_{1s}\}$, and set of pure strategies of second negotiator is $S_2=\{S_{21},S_{22},\ldots,S_{2k}\}$. S_1 and S_2 are finite and known. Function of winnings is $A=a_{uzsxk}$. Negotiators moves set is complete, it consists of s moves, which are numbered as u = 1,2,3,...,s. We accept the assumption that opponent's possible set of moves is finite and consists of k moves z = 1,2,3,...,k.

Gambling matrix is used to find the most advantageous strategy for negotiating issue. Every play has a finite solution in pure or mixed strategies and the net value of solution complies with the inequality: $\alpha\le\nu\le\beta$.

If $\alpha=\beta=v$, then solution with clear strategies is a saddle point (only one optimal strategy for each player).

The number α is called the lowest slot value, β – largest gambling value, v is called the net value of gaming or gambling price.

By using game theory methods for specific tasks it is needed efficiency indicators of a pure value which must express relationship with optimum value and must be independent from matrix.

We shall use simple additive weighting method (SAW) of exponential expression using different degree of measure criteria values in cases of the best minimal and the best maximum values, when normalized values are limited in the range [0,1]:

$$a_{uz}=\left(\frac{\min_u c_{uz}}{c_{uz}}\right)^3, \text{ if } \min_u c_{uz} \text{ advantageous;} \quad (5)$$

$$a_{uz}=\left(\frac{c_{uz}}{\max_u c_{uz}}\right)^2, \text{ if } \max_u c_{uz} \text{ advantageous.} \quad (6)$$

The latter formula we will use for the normalization of negotiations indicators in order to facilitate the processing of the outcome of negotiations and to obtain comparative values.

Keeping the initial data about the importance of indicators on negotiating issues, it is necessary to determine the significance of parameters characterizing the negotiating issues (Ginevičius *et al.* 2008, 2014; Mandow, Pérez de la Cruz 2003; Wibowo, Deng 2013; Azar 2014). Indicators significance will show how many times the usefulness rate of one or another negotiating issue is higher (lower) than another indicator's usefulness. Knowing significance of the negotiations issue parameters there can be determined each of their values in such a way (Ginevičius, Podvezko 2008a, 2008b; Ginevičius *et al.* 2008; Stewart *et al.* 2013; Ehtamo *et al.* 2001; Martín Ramos *et al.* 2010; Lourenzutti, Krohling 2014; Chang, Wu 2011; Azar 2014; Keršulienė 2008):

Elected the most significant indicator of negotiations issue – a_{ger};

For the best value of analysed issue is given 1 point value of significance ($a_{ger} = 1$);

It is determined by how many percent (q_v) the values of remaining indicators (b_v) are worse than the best ($a_{ger} = 1$);

For indicators values are granted the relative values ($a_v = 1 - q_v / 100$);

The relative values of all indicators (q_v) are converted in such a way that their sum would be equal to one:

Table 1. International business negotiation strategy and the preparation of the theoretical model based on bargaining power estimation (Source: composed by the author)

	Subjects interested in negotiations	Negotiations participant	Negotiations opponent	Competitor of negotiations participant
No.	The order of application of the algorithm formulas	Mathematical expressions of steps of the algorithm		
1.	Is performed nonlinear Peldschus normalization of negotiations issue indicators.	$a_{uz} = \left(\frac{\min\limits_{u} c_{uz}}{c_{uz}} \right)^3$ if $\min\limits_{u} c_{uz}$ favorable, $a_{uz} = \left(\frac{c_{uz}}{\max\limits_{u} c_{uz}} \right)^2$ if $\max\limits_{u} c_{uz}$ favorable.		
2.	Multiple criteria evaluation on negotiation issues indicators.	– Election of the most significant indicator of negotiations issue – a_{ger}; – For the best value of analysed issue is given 1 point value of significance ($a_{ger} = 1$); – It is determined by how many percent (q_v) the values of remaining indicators (b_v) are worse than the best ($a_{ger} = 1$); – For indicators values are granted the relative values ($a_v = 1 - q_v / 100$); – The relative values of all indicators (q_v) are converted in such a way that their sum is equal to one: $\sum_{v=1}^{m} q_v = 1;\ v = 1, 2, ..., m.$		

Continued Table 1

	Subjects interested in negotiations	Negotiations participant	Negotiations opponent	Competitor of negotiations participant
No.	The order of application of the algorithm formulas	Mathematical expressions of steps of the algorithm		
3.	Gaming matrix is solved in order to find the most advantageous strategy for negotiating issue.	The form of zero-sum games: $\Gamma = \{S_1, S_2; A\}$. Applying it to solve the negotiating issues you may suspect that a set of the first negotiators strategies (pure strategies) is $S_1 = \{S_{11}, S_{12}, \ldots, S_{1s}\}$, and a set of the second negotiators pure strategies is $S_2 = \{S_{21}, S_{22}, \ldots, S_{2k}\}$. S_1 and S_2 are finite and known. Function of winnings is $A = a_{uzsxk}$. A set of negotiators moves is finite and consists of s moves, which will be numbered u =1,2,3,…,s. We accept the assumption that your opponent's set of possible moves is finite, which consists of k moves. These moves shall be numbered z = 1,2,3,…,k. Every finite gambling has a solution in pure or mixed strategies and the net value reflects the inequality: $\alpha \le \nu \le \beta$. If $\alpha = \beta = v$, then solution with clear strategies is a saddle point (only one optimal strategy for each player). The number α is called the lowest slot value, β – largest gambling value, v is called the net value of gaming or gambling price.		
4.	The optimality rules are usedin order to find the maximum win of the negotiations issue (as the example is provided Hurwitz rule).	$H_u = \max_u \left[\gamma \min_z a_{uz} + (1-\gamma) \max_z a_{uz} \right]$ (The best maximal decision); $H_u = \min_u \left[\gamma \max_z a_{uz} + (1-\gamma) \min_z a_{uz} \right]$ (The best minimal decision), where: H – the participants winning of negotiation issue according Hurwitz rule, a_{uz} – the winning, which participant could get if he will make the move uin case if his opponent will make the move z. Negotiators moves alternatives set is complete and consists of s moves, which will be numbered u = 1,2,3,...,s. We accept the assumption that opponent's possible set of moves is finite and consists of k moves z = 1,2,3,...,k. γ – the hope parameter; a factor that varies from 0 to 1.		
5.	Optimization task is solved in order to find the maximum winnings of negotiations	$\max_{k \in w_1 \times w_2 \times w_3 \ldots w_n} \left(\sum_{i=1}^{n} H_{i,b_{i,j}} \right), j = 1, \ldots, \lvert w_i \rvert$, where: H – the participants winning of negotiation issue according Hurwitz rule, n – amount of negotiating issues (the peaks note the start and the end of negotiating issue). Noted b_0 as the start of negotiations, where graph arc $H_{i,b_{ij}}$ indicates the winnings, which can be achieved by selecting j-th alternative in solvg the i-th issue $k \in w_1 \times w_2 \times w_3 \ldots w_n$. After defining the priotity list of negotiation issues, let us note, that on each negotiating issue there negotiations with a set of potential partners of negotiations. Let us assume that set of negotiator's alternatives is finite and each issue consists from t alternatives. Alternatives of i-th issue will be noted as $b_{i,j}$. , $j = 1,2,3,\ldots,t_i$. Then i-th issue set of all alternatives we shall note as $w_i = \{b_{i,1}, b_{i,2}, \ldots, b_{i,t_i}\}$, o $w_1 \times w_2 \times w_3 \ldots w_n$ which is set of all possible nagatiations scenario, when on each issue is selected one from possible alternatives, n is amount of negotiations issues.		
6.	Comparison of bargaining powers and decision making	Strategy of international business negotiations based on estimation of bargaining powers.		

$$\sum_{v=1}^{m} q_v = 1;\ v = 1, 2, ..., m.$$

We use multiple criteria evaluation in case of using game theory methods when the issue of negotiations deals with more than one indicator. This estimation of few normalized indicators will be used in gaming matrix in order to find the winning of negotiations issue.

Table 1 presents theoretical model of international business negotiation strategy based on estimation the bargaining power. In the model are made ratings of bargaining power for three subjects: the negotiations participant, his opponent, the competitor of negotiations participant. The bargaining power of these subjects is assessed according to their importance in the negotiations participant's strategy, which is based on the bargaining power estimation. These entities directly influence decision-making in preparing negotiating strategy.

In the model evaluation of bargaining power of all subjects of negotiations and preparing strategy of negotiations are carried out in this order: first non-linear normalization of the indicators of negotiation issues is carried out; multi-criteria evaluation of negotiations issues indicators; gaming matrix is used to find the most advantageous negotiating strategies on the issue; optimality rules are used to find the maximum win of the negotiations issues; optimization task is solved to find the maximum win for the negotiations; finally, the comparison of assessed bargaining powers is carried out.

Created model for negotiating strategy development will be used for preparing international business negotiation strategies based on the bargaining power assessment. This negotiating strategy development model later will be used in solving complex issues and problems of negotiations. We will investigate whether model designed is effective for support of international business negotiations in e-commerce.

The methodology of the empirical study designed to test strategy development model based on the assessment of bargaining power in international business negotiations

In this paper, empirical studies attempts to analyze negotiating strategy based on the assessment of bargaining power in a typical field of international business negotiation – in the case of e-commerce. In order properly adjust and check the created model of business negotiation strategy based on evaluations of bargaining power in international negotiations. This study is necessary, because it can show the potential applicability of the model and check its basic settings. In the empirical study are used the following research methods: logical analysis, logical generation. comparison of findings and generalization techniques; mathematical and statistical methods of data analysis used in processing and analyzing empirical data obtained through studies of statistical analysis performed using SPSS (Statistical Package for the Social Sciences) software. Game theory methods (Xu *et al.* 2012; Peña *et al.* 2014; Cevikel, Ahlatçıoğlu 2010; Panda, Das 2014; Zavadskas *et al.* 2004; Apynis 2007; Žilinskas 2007) and multiple criteria evaluation are used to carry out an assessment of business entities bargaining power in international business negotiations, in order to choose effective strategic decisions in international business negotiations. This is done using MathLab software.

The investigation raised the following hypothesis: the use of electronic technology in distance business negotiations is a key factor and a priority for the international business development under conditions of globalization, the internationalization of the economy and management. Electronic technologies allow considerably effective distance talks in business negotiations, using the key negotiating powers. Trying to approve the hypothesis will be analyzed the development of negotiating strategy based on the assessment of bargaining power in case of e-commerce.

This study is carried out with the purpose to adjust and check out the module for development of negotiating strategy based on the assessment of bargaining power. Empirical research is oriented to the search for the basic model parameters and justification of its application possibilities.

The study aimed to examine negotiating strategy based on the assessment of bargaining power in a typical field of international business negotiation – in the case of e-commerce. Here it is aim to adapt created model on negotiation strategy development in e-commerce negotiations. This type of e-business negotiations are relevant because of their cost, both financially and on time, because after all international business negotiations can take place between distant countries of businesses, which are separated by thousands of kilometers and consequently long hours of travel time and costs. In the current investigation are used game theory methods, heuristic algorithms (Mandow, Pérez de la Cruz 2003; Wibowo, Deng 2013; Azar 2014; Tamošiūnas 2011), multi-criteria assessments.

The experts are employed for multi-criteria evaluation of negotiating issues according to the specific areas of negotiation cases. The work deals with bodies involved in in the negotiations and their subjects to negotiation. It reflects the typical international business negotiation cases.

The specific subjects and objects of the negotiations data are confidential in order do not disclose their commercial secrets, so the following research data are limited. However, the data presented will allow to reflect the research progress and the results.

For empirical verification of the model it is appropriate to rely on game theory methods, because it allows to analyze the interaction of objects having their own goals. This is particularly important in international business nego-

tiations where representatives of different cultures are meeting, and this creates a lot of uncertainties. In order to develop the international business negotiation strategy based on the assessment of bargaining power, it is appropriate to use game theory methods that help to create a model for preparation of effective strategies. Game theory is described as a set of methods for handling conflict situations. Its purpose is to prepare recommendations in accepting rational solutions for the participants of conflict (Bivainis 2011). To use of game theory methods always is available when it is possible to foresee options of negotiators activities, analyzing one version of each negotiating party (the player) (Keršulienė 2008). Of course, game theory can't fully define the decisions in all cases of negotiations but practice has proven that game theory methods are the perfect tool helping to make reasonable and appropriate strategic decisions. In many situations of business negotiations negotiators often must make decisions under uncertainty. Of course, in the assessment of bargaining power we tried to reduce this information deficit, but this was not possible to achieve fully due to the large number of variables. Therefore, there are invoked various rules for calculating the optimal strategies.

Strategy development based on the assessment of bargaining power in international business negotiations in case of e-commerce

This study will examine model of strategy development based on the assessment of bargaining power in international business negotiations – case of the e-commerce.

It will allow to check out the adequacy of created negotiating strategy development model for business negotiation support based on the assessment of bargaining power, there will be carried out assessment of bargaining power through negotiation stakeholders, according which will be prepared strategy. In the study took part e-commerce business entities. Next are described the participants of negotiations and its context.

The situation and its context. Subject to negotiation are services of the virtual server. The required services are supplying participant of the negotiations, according to the wishes of negotiating opponent. The server must ensure a steady flow of corporate data and operate without interference. Priorities of the opponent are data centers operating in Lithuania.

Business entities who are interested in negotiations:

Participant No. 1 – is the entity for whom will be performed negotiating support. The participant has its own center of data that achieved a significant expanding, is one of the largest exporters in Lithuania of such services abroad. He is a competitor for negotiation participants No. 3 and No. 4.

Participant No. 2 – the contracting business entity – is negotiating opponent. Negotiations opponent wishes from the participant No. 1 the lower prices than now, a better quality of service and minor disturbances: because of these disturbances is not allowed activity of the company. Once there disappeared accounting data because it was not saved backup copy and there is number of letters incoming by unsolicited commercial e-mail hinder the company's staff time.

Participant No. 3 – the competitor for negotiation participant No. 1. The provider of server services for current opponent of negotiation. Services are provided to participant of negotiations No. 2 for 8 years. The competitor's advantage is that negotiations participant No. 2 – to the opponent is difficult to decide to change the service provider.

Participant No. 4 – is competitor for negotiations participants No. 1 and No. 3. This competitor resells hosting services of foreign partners.

The winnings of negotiations will be assessed in relation to the business entity which purchases products. The negotiating with other business entities will take part in these international negotiations (Eqn (1)). The criteria by which proposals will be evaluated in accordance to other business entities: duration of server services supply (weeks), price (in euros), the probability of delays to pay (per cent). The results of probability on delivery time, price and delay to pay will be minimized (Eqn (5)). For the evaluation importance of negotiating issue criteria experts from negotiating team (10 e-commerce sector experts – project managers, managers, brokers and clients) are invoked. Concordance rate is calculated to determine the compatibility of the expert opinions Appendix 2, (Eqns (16)–(19)). Then is given a normalized decision matrix (Eqns (5)–(6)) in accordance with the relevant criteria and calculated the total value of alternatives.

In another step we shall compare gaming performance by applying different rules of optimization (Eqn (4) and Appendix 2, Eqns (7)–(15)). There was a choice of following rules (Appendix 2, Eqns (7)–(15)): Hurwitz, Wald, Savage and Niehaus, Bernoulli-Laplace, Bayes-Laplace, Hodges and Lehmann. Accordingly, under the applicable rules of optimization there were adopted the same source data for all rules: the hope factor of 0.5; and the probability of the event 0.25. Each entity provides 4 offers of alternatives. However, the accuracy of the negotiating results is determined by the possible uncertainty of information. Therefore, to reduce this negative impact on the lack of information, in order to reduce uncertainties there have been used credit information on business entities. In Appendix 1 are presented evaluation data of initial negotiation proposals. There are selected the optimality criteria and consequently are chosen the best rates. The experts from negotiating team are employed to assess the relevance of negotiations issues criterion. Next there are given results of the expert's assessment on indicators significance (Appendix 1, Tables A.1 and A.2). Therein are defined criteria for significance. There are also determined compatibilities of experts opinions – concordance coefficients (Appendix 2, Eqns (16)–(19)), which are satisfactory. In the next step is presented

normalized decision matrix (Eqns (5)–(6)), in which criteria for significance are adjusted. In Tables A.3 – A.5 (Appendix 1) are provided gaming matrix normalized according importance of the criteria (Eqn (4)). Figure 1 compares the results of gaming observed with various optimization rules. The diagram (Fig. 1) provides summary of the results of winnings on the negotiation support (according to Eqns (1), (4), (7)–(15) and Appendix 2), according to optimization rules. There is displayed information which negotiators proposal was with the biggest winnings according to different optimization rules, as well as the cumulative winnings for all issues. In Figure 1 are given support of winnings of electronic business negotiations in each question under different optimization rules: Hurwitz, Wald, Savage and Niehaus, Bernoulli-Laplace, Bayes-Laplace, Hodges and Lehmann. Optimization rules enable us to simulate various situations in the negotiations, to see the maximum, average and minimum winnings. The negotiators with high qualifications and experience in the fields concerned must choose the principles and rules. Figure 2 is the sum of all optimization rules winnings results.

In the current investigation participant of negotiations No. 1 was guided by this negotiation support system. This participant based on Figure 2 results submitted a proposal more attractive than competitors and made agreement. In the current investigation the negotiations took place in at a distance and with minimal invasion of negotiator. The negotiations took place in an electronic platform, which analyzed the data generated by our model.

The obtained results indicate that the model has helped to evaluate business subjects' bargaining power in negotiations with other business entities in a distance. So we can say that it is effective e-commerce negotiation support tool. Also this model can be used as a standalone application and as a negotiating program functioning with partial negotiator intervention.

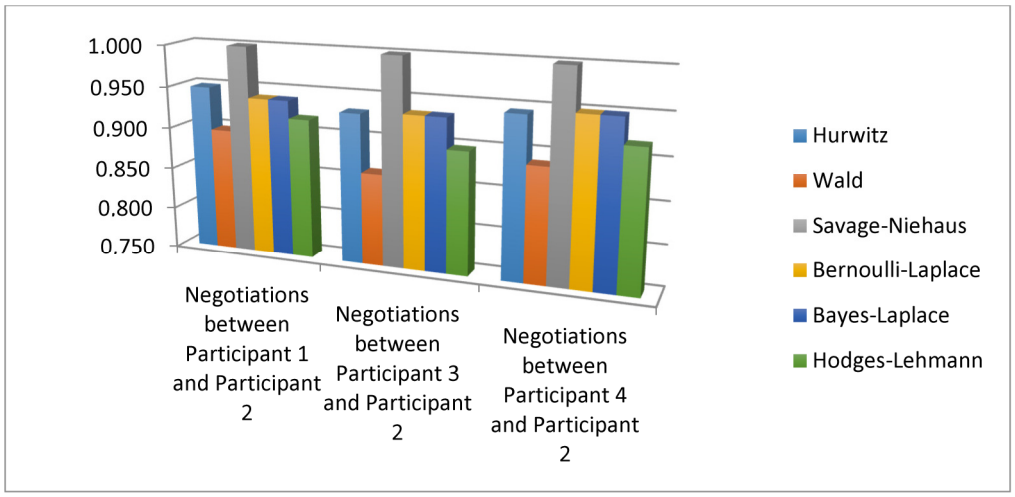

Fig. 1. Participants of the negotiations winnings distribution in electronic trading case, using different optimization rules (Source: created by the author)

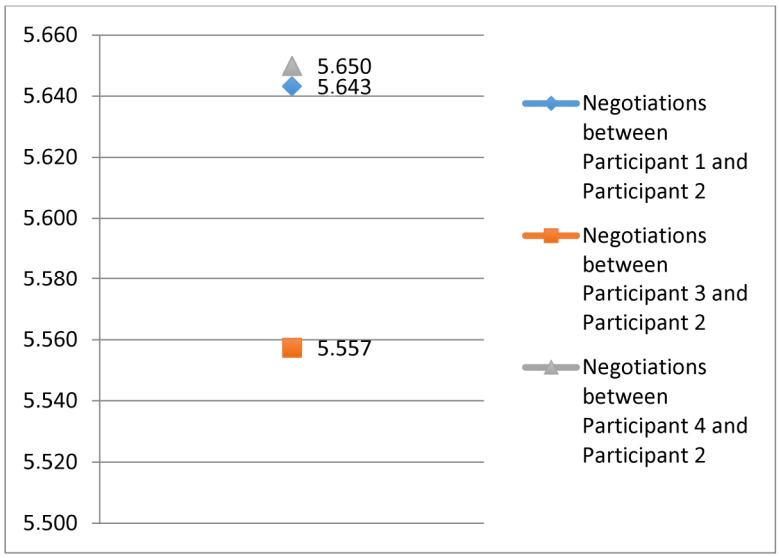

Fig. 2. International business negotiation participants bargaining power assessment sum results in electronic trading case (Source: created by the author)

Conclusions

Electronic technologies in distance business negotiations are key factors and a priority for the international business development under conditions of globalization, the internationalization of the economy and management. Electronic technologies in business negotiations allow to carry out significantly effectively distance business negotiations by using the most important negotiating powers, it is designed negotiating strategy development model, which is based on the assessment of bargaining powers with regard to negotiating differences, interference and enabling to solve most challenging, complex negotiation issues and problems in order to reduce the uncertainty of the information needed for strategic decision making. Submitted universal model of international business negotiation strategy development and implementation focused on negotiating strategy development support, by using game theory methods to adapt the model for electronic business negotiations, international business negotiation support, international business negotiation context modeling. In the preparation of international business negotiation strategy based on the assessment of bargaining power, it is appropriate to use game theory methods. For negotiation support the most suitable is the game theory, because it is a method for analysis of objects with their targets, interactions. Electronic systems in negotiations can be useful when negotiating in distance way with partners in other countries (customers, suppliers, colleagues, etc.). Electronic negotiation systems can be an effective means of solving complex problems in managing large amounts of information. Also, these bargaining systems can be specialized and targeted facilitating specific processes or be universal to all processes. Therefore, we can say that the study results confirm the hypothesis. Designed negotiating strategy development model based on the assessment of bargaining power in international business has several prospects for application:

1. Negotiations support tool. The main purpose of this model use – support of the international business negotiation. As in these days businesses lack propensity to take strategic decisions based on negotiations bargaining power evaluations, assessing the negotiating partners, competitors and their resources, so this model, unlike currently existing tools assess the influence on these entities by a variety of factors. To use this model encourages management simplicity of this instrument and good results of support the negotiations.
2. Information uncertainty reduction. The main negative feature of negotiation support measures is uncertainty of information. This model has the possibility to assess the uncertainty by using both databases as well as expert evaluations. Databases can include both economic indicators such as tender, creditworthiness of entities, operating history, as well as non-economic, such as cultural dimensions, which are important for international business negotiations. In making decisions it is important correct understanding of participants in the negotiations, because in represented different cultures can vary even understanding of rationality.
3. Autonomous negotiation process engine. Presenting businesses in cyberspace increasingly are gaining popularity in distance trade, and thus the distance negotiations. After making appropriate restrictions this negotiation model could function as an autonomous negotiation process engine that can itself provide solutions options and alternatives. The negotiator should only assign the model databases which should help to assess participants in the negotiations and their proposals.
4. The management of large amounts information. During the international business negotiations unlike a single country-wide increase the number of negotiations, competitors or partners, for a dozen, a few dozen or a few hundred times. Such processing of data flow physically without computer assistance is practically impossible. Therefore this model would be appropriate to use for simplicity and speed processing of large information flow.
5. Communications improving conditions. Negotiations often lost even before start because of language barriers or different understanding matters or values. Therefore, this model is designed to help identify and understand common points of reference of the international business negotiation subjects. For this task would be deployed the various cultural brokers who assist to manage this model with partial intervention.

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Appendix 1

Specification of research calculations

Table A.1. The matrix of the evaluation of experts (Source: created by the author)

Estimation of criteria weight by negotiation expert group				
	Criteria			
Experts	1	2	3	Sum
1	0.1	0.6	0.3	1
2	0.2	0.5	0.3	1
3	0.1	0.6	0.3	1
4	0.2	0.7	0.1	1
5	0.2	0.5	0.3	1
6	0.1	0.5	0.4	1
7	0.2	0.5	0.3	1
8	0.2	0.5	0.3	1
9	0.1	0.6	0.3	1
10	0.2	0.6	0.2	1
Sum	**1.6**	**5.6**	**2.8**	**10**

Table A.2. The matrix of the ranging of the evaluation of experts (Source: created by the author)

Matrix of the experts evaluation ranking				
	Criteria			
Experts	1	2	3	Sum
1	3	1	2	6
2	3	1	2	6
3	3	1	2	6
4	2	1	3	6
5	3	1	2	6
6	3	1	2	6
7	3	1	2	6
8	3	1	2	6
9	3	1	2	6
10	2	1	2	5
Sum	**28**	**10**	**21**	**59**
Ranking sum average	**20**	**20**	**20**	**Sum**
Deviation	**64**	**100**	**1**	**165**
Concordation coficient W	**doti0,825**			

Table A.3. Normalized decision-making matrix (negotiations between the Participant no. 1 and Participant No. 2) (Source: created by the author)

Normalized decision-making matrix					
Alterna-tives	Criteria				
	Term of server delivery,weeks	Price, EUR	Possibility of delay, percent	Sum by significance	Sum of alternative
A1R1	1.000	0.933	1.000	0.963	2.933
A1R2	1.000	0.817	1.000	0.897	2.817
A2R1	1.000	1.000	1.000	1.000	3.000
A2R2	1.000	0.817	1.000	0.897	2.817
W31	**A1**	**A2**			
R1	0.963	1.000			
R2	0.897	0.897			

Table A.4. Normalized decision-making matrix (negotiations between the Participant no. 3 and Participant No. 2) (Source: created by the author)

Normalized decision-making matrix					
Alter-natives	Criteria				
	Term of server delivery,weeks	Price, EUR	Possibility of delay, percent	Sum by significance	Sum of alternative
A1R1	1.000	0.909	1.000	0.949	2.909
A1R2	1.000	0.868	1.000	0.926	2.868
A2R1	0.296	0.953	1.000	0.861	2.249
A2R2	1.000	1.000	1.000	1.000	3.000
W32	**A1**	**A2**			
R1	0.949	0.861			
R2	0.926	1.000			

Table A.5. Normalized decision-making matrix (negotiations between the Participant no. 4 and Participant No. 2) (Source: created by the author)

Normalized decision-making matrix					
Alterna-tives	Criteria				
	Term of server delivery,weeks	Price, EUR	Possibility of delay, percent	Sum by significance	Sum of alternative
A1R1	1.000	0.801	1.000	0.888	2.801
A1R2	1.000	0.893	1.000	0.940	2.893
A2R1	1.000	1.000	1.000	1.000	3.000
A2R2	1.000	0.944	1.000	0.969	2.944
W33	**A1**	**A2**			
R1	0.888	1.000			
R2	0.940	0.969			

Appendix 2

Optimization rules formulas

Wald rule

$$S_1^* = \left\{ S_{1i} \,|\, S_{1i} \in S_1 \bigcap \left\{ S_{1i0} a_{i0\,j0} \max_i \min_j a_{ij} \right\} \right\}. \tag{7}$$

Hurwicz rule

$$A_j = \max_i \left(\left(1-\lambda\right) \min_j a_{ij} + \lambda \max_j a_{ij} \right); \tag{8}$$

$$A_j = \min_i \left(\left(1-\lambda\right) \max_j a_{ij} + \lambda \min_j a_{ij} \right); \tag{9}$$

$$S_1^* = \left\{ S_{1i} \,|\, S_{1i} \in S_i \bigcap \left\{ S_{1i0} \,|\, h_{i0} = \max_i h_i ; h_i = \max_i \left(1-\lambda\right) \min_j a_{ij} + \lambda \max_j a_{ij} ; 0 \le \lambda \le 1 \right\} \right\}. \tag{10}$$

Savage- Niehaus rule

$$S_1^* = \left\{ S_{1i} \,|\, S_{1i} \in S_1 \bigcap \left\{ S_{1i0} \,|\, r_{i0\,j0} = \min_i \max_j r_{ij} \right\} \right\}, \tag{11}$$

where $r = \overline{1m}; \;\; s = \overline{1,n}$.

Bernoulli-Laplace rule

$$S_1^* = \left\{ S_{1i} \,/\, S_{1i} \in S_1 \bigcap \max_i \left(1/n \sum_{i=1}^{n} a_{ij} \right) \right\}. \tag{12}$$

Bayes-Laplace rule

$$S_1^* = \left\{ S_{1i} / S_{1i} \in S_i \bigcap \max_i \left(\sum_{j=1}^{n} q_j a_{ij} \right) \bigcap \sum_{j=1}^{n} q_j = 1 \right\}. \tag{13}$$

Hodges-Lehmann rule

$$S_1^* = \left\{ \frac{S_{1i}}{S_{1i}} \in S_i \bigcap \max_i \left[\lambda \sum_{j=1}^{n} q_j a_{ij} = (1-\lambda) \min_j a_{ij} \right] \right\}. \tag{14}$$
$$\bigcap 0 \le \lambda \le 1$$

Werner rule

$$S_1^* = \left\{ S_{1i} \mid S_{1i} \in S_i \bigcap \left\{ S_{1i0} \mid a_{i0} = \max_{i \in M_\varepsilon} a_{ij}; M_{\varepsilon i} = \left\{ i \mid \max_i a_{ij} \min_j a_{ij} - a_{ij} \le \varepsilon \right\}; \max_j a_{ij} \ge \max_j a_{i0j} \right\} \right. . \tag{15}$$

where ε – risk scale.

Concordance coefficient

The concordance coefficient W is calculated according to the formula (Ginevičius *et al.* 2008):

$$W = \frac{12S}{r^2 m\left(m^2 - 1\right)}, \tag{16}$$

where r – the number of experts, m – number of indicators evaluated.
The value S is calculated as follows:
Calculating expertise e_{ik} each indicator rank-sum e_{ik} according to the formula:

$$e_i = \sum_{k=1}^{r} e_{ik}. \tag{17}$$

Calculated the overall average grades on $\overline{e}$ according to the formula (Ginevičius *et al.* 2008):

$$\overline{e} = \frac{\sum_{i=1}^{m} e_i}{m}. \tag{18}$$

S value, e.g. sums of grades e_i deviations from the general average e_i sum of the squares is calculated according to the formula (Ginevičius *et al.* 2008):

$$S = \sum_{i=1}^{m} \left(e_i - \overline{e} \right)^2. \tag{19}$$