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A Structured Expert Judgement Approach**

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Decision-making in early internationalization: a structured expert judgment approach

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Abstract

The aim of this chapter is to show how a structured approach to elicit expert judgement (SEJ) can guide the practice of early internationalization. We applied SEJ to forecast some critical issues upon which an innovative start-up wished to base their decision of whether to expand their initial operations in Poland and Czech Republic to Brazil. 16 participants of an Executive MBA program acted as experts and underwent the procedure for eliciting their judgements. The performance of experts was quantified in terms of the statistical accuracy and informativeness, which combined provided the weight for each expert according to Classical Method methodology. The combination of weighted expert judgments led to improved statistical accuracy and informativeness of the forecast. The procedure demonstrates how entrepreneurs can take advantage of expert knowledge in deciding about risky endeavour when lacking their own experiences and reliable data that can guide their choices.

Keywords: structured expert judgement, internationalization, location choice, forecasting, international new venture

1. Introduction

How can international new ventures take advantage of external expertise in their initial location choice decisions? This question is quite fundamental, as new ventures lack the resources to mitigate risks of internationalization, and decisions on location choice largely condition their future fortunes. Earlier literature established that the success of international new ventures largely depends on the unusual composition of competencies and experiences from different national markets in the

possession of entrepreneurs and the core management team (Phillips McDougall, Shane, & Oviatt, 1994). As it is unusual to have a relevant constellation of experience agglomerated in the top management team of a new venture, the problem of knowledge sourcing arises for companies that need to internationalize. Using the cumulated knowledge of external experts provide the means to overcome this problem. The need to source knowledge from outside seems especially relevant for new ventures located in the Central and Eastern Europe (CEE) due to very limited chances of having entrepreneurs with relevant personal experience from earlier internationalization projects, It is well established in the literature that outward FDIs from this region were scant before transition, and the process of internationalization have gradually started to emerge after the fall of the Berlin Wall a (Ferencikova, & Hluskova, 2015; Wilinski, 2013).

The necessity to internationalize may be present due to the nature of the industry, or limited opportunities to grow business in home market. If the necessity is there, and entrepreneurs do not have sufficient competences and knowledge, what options do they have? One solution can be to accept affordable risks of losses and experiment with the internationalization process, applying effectuation logic (Sarasvathy, 2001). The effectuation process of decision taking assumes a limited set of resources, such as financial resources, knowledge or managerial time, as given, and attention is concentrated on choosing between the possible effects of applying resources to alternative internationalization projects. This approach seems most suitable when the decision is not precisely specified due to ambiguous and rapidly changing goals and values. An alternative approach proposed by Sarasvathy (2001) is a process applying causation logic. The causation process takes a particular effect, such as expanding into a location of choice as given, and focuses on the best means available to create an effect. In the case of international expansion, this approach assumes that the choice of location can be made by entrepreneurs, and only particular modes of expansion require further inquiry. In reality, entrepreneurs are forced to choose among many locations due to the scarcity of resources and the management attention that they can give to an international expansion project at an early stage of company development (Nummela, Saarenketo, Jokela, & Loane, 2014). The studies determining how new ventures are making strategic decisions usually examine two types of approaches: effectuation and causation (Nummela et al., 2014; Kalinic, Sarasvathy, & Forza, 2014) though there

are others i.e. the entrepreneurs' idiosyncratic prior knowledge and their prior social and business ties (Evers & O'Gorman, 2011). Lower probabilities of survival rates of international new ventures as compared to other internationalizing companies (Mudambi & Zahra, 2007) raise a question, whether the use of effectuation and causation logics aiming to find creative solutions in the absence of knowledge and expertise are indeed the best possible routines in the initial phase of internationalization? In this paper, we propose that rather than accept affordable losses and aim to improve their decision logic, entrepreneurs may elicit the expertise from outside of their team. The use of external advisors can prove to be a must when a new venture considers a location in a distant and largely unknown country. A distant location, such as one on another continent, is perceived as a risk increasing choice in international business literature (Zdziarski, Światowicz-Szczepańska, Troilo & Małys, 2017). Assessing a case where risks are very high, and internal knowledge is limited, requires appropriate methods of eliciting the knowledge from experts. In this paper, we demonstrate how the method of structured expert judgment (SEJ) can improve the reliability of information upon which entrepreneurs make their location choice decision. In our study, we focus our attention on the location for the first deliberate foreign investment decision of a firm that is considering expanding globally. Our particular interest in this study is on the use of external forms of assistance, such as experts' advice. We apply the method known as the Classical Model (Cooke, 1991) of eliciting experts' knowledge in a structured manner in an experimental setting in which Executive MBA students from the International Management Centre at the University of Warsaw acted as experts. The Cooke's method is widely applied to elicit an expertise needed in technical projects where risks are high and little, or no prior data is available. Our unique contribution presented in this paper consists of demonstrating how this state of the art decision support technique under uncertainty can be applied to guide business decision on foreign location choice. To our best knowledge, structured expert judgment hasn't been used in the strategic business decision making process so far. We also aim to contribute to literature on decision making and risk mitigation in early internationalization by focusing on knowledge sourcing from external experts.

The paper is structured as follows. We start with introducing the context of the foreign market location choice at international new ventures operating in emerging market. Later, we present the structured

expert judgment methods with particular focus on Cooke's Classical Model. We describe the research experiment and show how the application of SEJ improves the reliability of forecasts in key areas as defined by the entrepreneur in the process of decision making about location choice. We conclude with a discussion on the possibilities to improve practices in location choice decisions, as well as the advantages and limitations of the presented method of decision support.

2. Literature review

2.1. Foreign market location choice in international new ventures.

Foreign market location choice in international expansion is among the classic subjects of inquiry in the field of International Business (IB), and its predecessors in international trade and capital theories (Kim & Aguilera, 2016). The inquiry on foreign location choice is a part of a broader attempt to explain the logic of a firm's internationalization that includes research on the selection of an entry mode, sequence of internationalization, and the related concepts of liabilities of foreignness and outsidership (Johanson & Vahlne, 1977; 2011). In the seminal paper, (Dunning, 2009: 16) argues that "more attention needs to be given to the importance of location per se as a variable affecting the global competitiveness of firms". We follow this call to increase the research attention in a specific context of the location choice process in the case of a small, entrepreneurial firm that has a potential to become an international new venture.

International new ventures were identified as a new phenomenon in the last decade of the XX century as "a business organization that, from inception, seeks to derive a significant competitive advantage from the use of resources and the sale of outputs in multiple countries" (Oviatt & McDougall, 1994: 49). In the light of progressing globalization and increasing competition from abroad, a small business must be interested in internationalization, as this is one of the ways to counter the growing competition (Kubickova & Peprny, 2011). Supporting this view, a study of 126 CEOs and top managers responsible for their companies' internationalization indicated that they perceived non-internationalization as bearing higher risk than concentrating exclusively on the home market (Kraus, Ambos, Eggers, & Cesinger, 2015).

Since these firms do not possess abundant resources that are at the disposal of multinational corporations, the consequences of selecting a wrong location to expand bring even more critical risks for their survival and future prospects. Entrepreneurs and managers of international new ventures are often unexperienced and despite their mindset for international expansion, they possess limited knowledge and competences (Crick, 2009). Past research confirms that risks from global expansion materialize for many rapidly internationalizing firms, which often do not perform well after initial investments (Barringer & Greening, 1998; Bell, Crick, & Young, 2004)

New theoretical approaches like the LLL (linking, learning, leveraging) model of internationalization (Mathews, 2006), springboard perspective (Luo & Tung, 2007), or adventurous internationalization (Zdziarski et al., 2017) are helpful in explaining the logic of internationalization of large corporations from emerging markets. However, the explanatory power of many IB theories is fairly limited in its application to small, entrepreneurial, international new ventures (Phillips McDougall et al., 1994, Coviello, 2006). The unique character of these firms justifies the exploration of new theoretical propositions and decision routines that can guide both the theory and the practice of international entrepreneurship. In particular, it should help to explain internationalization from less developed, emerging economies (Bruton, Ahlstrom, & Obloj, 2008).

Usually, research on the antecedents of the location choice regresses the probability of investing in a given location on a set of independent variables that are expected to influence the profitability of an internationalization project. These variables explaining the probability of selection typically include some measures of local market potential, cost of production, cost of transportation, taxes, and the general business environment in a given location (Cheng & Kwan, 2000). Some researchers have also given attention to the legal form, or the mode of entrance. For example, in their study, Agarwal and Ramaswami (1992) found that small firms with limited multinational experience preferred entry into foreign markets through a joint venture. Physical distance is also taken into account; however, differences should be marked between distance-creating factors like culture and language, as well as distance-bridging factors like international travel (Ellis, 2007) and the internet, including the presence and intensity of absolute and comparative advantages (Franco, Rentocchin, & Marzetti, 2008). Indeed, research confirmed that various forms of distance (cultural, geographic,

political, and economic) are strong predictors of risk perceptions in internationalization decisions, markedly exceeding the role of market-entry mode (Kraus et al., 2015).

For some time now, we have been also observing a more embedded network perspective on the location choice of multinational enterprises (Cantwell, 2009; Johanson & Vahlne, 2011; Xia, Ma, Lu, & Yiu, 2014). In consequence, the network based relational variables are increasingly prevailing in explaining the selection of a country for international expansion. This is reflected in a recent critical review of location choice research in the field of IB from 1975 to 2015, which has identified the following determinants of location choice: experiential learning, top management's or firm's background and networks, customer relationship, industry characteristic, inter-regional ties, macroeconomic environment, distance between home and the host country, availability of natural resources, and agglomeration (Jain, Kothari, & Kumar, 2016). As a result of the review, the authors have proposed a two-stage decision model in which the determinants were grouped into two higher level constructs: those that facilitate resource deployment internationally for exploitation or exploration, and those which enable to evaluate the attractiveness of a host country for resource deployment (Jain et al., 2016: 305).

Internationalization is often perceived as a gradual process in which firms accumulate knowledge over time, or as a learning process based on trial and error (Blomstermo, Eriksson, Lindstrand, & Sharma, 2004). The fact that decision makers and firms learn in the internationalization process implies that the first decision on location bears the most severe risks and the highest liabilities for a firm. This belief can be found in the early IB literature: "The first foreign investment decision is, to a large extent, a trip to the unknown. It is an innovation and the development of a new dimension as well as a major breakthrough in the normal course of events" (Aharoni, 1966: 14). In our study, we focus our attention on the location for the first deliberate foreign investment decision of a firm that is considering expanding globally. Our particular interest in this study is on the use of external forms of assistance, such as experts' advice that proved beneficial for the entrepreneurs in four of the five cases included in the study of the internationalization of small firms (Barringer & Greening, 1998). Experts help to limit uncertainty and risks, such as in the case of investing in a distant location, by providing relevant information upon which a decision maker decides about the future project. However, since

experts are used for advice on uncertain future events and states, they often do differ in their judgments. In such a case, the entrepreneur may be often left with an uneasy choice of which expert advice to follow, and which to ignore. In the absence of own expertise, he or she can also use some form of averaging the conflicting forecasts. The work on improving the assessment methods under uncertainty resulted in the development of standard procedures that prove to outperform either simple averaging or random choice of an expert in the majority of analysed cases, such as the Cooke's method (Cooke, 1991) that we use for this study and present below.

3. Material and methods

3.1. Structured Expert Judgment use in the evaluation of risk

The evaluation of risk is an assessment of the uncertainty, and, in the absence of data, experts' knowledge can provide proper risk quantifications. The Classical Model (CM) or the Cooke's method (Cooke, 1991) is one of the best-known methods of eliciting experts' knowledge in a structured manner. CM has been used in numerous applications from various sectors, e.g. nuclear applications, chemical and gas industry, water pollutions, occupational, health, aerospace, banking, volcanoes and dams (Cooke & Goossens, 2008; Colson & Cooke, 2017).

We emphasize here the distinction between problems of managerial and scientific uncertainty; therefore, we distinguish between indecision, ambiguity and uncertainty (Liesch, Welch & Buckley, 2014). The issue of indecision refers to finding the best solution given the circumstances and it is seen as the stakeholder's or problem owner's task. The issue of ambiguity is in the responsibility of the analyst to make sure that the problem is clear. The issue of uncertainty refers to quantifying the existing uncertainties, either from data or from experts. It is the analyst's responsibility to account for uncertainties resulting from data and it is the experts' responsibility to account for uncertainties when data is lacking or is inappropriate.

CM employs a protocol in which experts are asked to assess their uncertainties by stating quantiles for the distributions of various uncertain quantities. The standard approach is to ask experts for the 5%, 50% and 95% quantile. The 5% quantile is the value stated by the expert for which she/he thinks there is a 5% chance that the true value is below the stated value. It is regarded as the lower

bound of expert's -credible interval. Similarly, the 95% quantile represents the upper bound of the confidence interval, denoting a value for which there is 5% chance that the true value lies above the 95% quantile. We interpret the expert best estimate as the median or the 50% quantile.

The protocol distinguishes two types of questions: the questions of interest and the calibration or seed questions. The calibration questions are questions for which the true value (or realization) is known to the analyst. The role of the calibration questions, or seed variables, is three-fold. Firstly, they support the objective quantification of experts' performance with respect to statistical accuracy and information. Secondly, they enable a performance-based combination of experts. Finally, they allow for the evaluation and validation of the performance-based combination of experts (Cooke & Goossens, 2008). The calibration questions and hence the calibration score provide the means to prove that "heuristics can be accurate in the face of uncertainty" (Loock & Hinnen, 2015).

The performance-based weighting has been shown to outperform the equal weighting of experts in all but one of the 33 CM studies and when performing in-sample analysis (Colson & Cooke, 2017). Furthermore, performance based weighting of experts has been recently shown to outperform the equal weighting via out-of-sample validation, in 26 out of 33 CM studies (Colson & Cooke, 2017).

The method aims at a rational consensus rather than a census or a political consensus (Cooke & Goossens, 2008). The rational consensus emerges as group decision processes, where "the group agrees on a method according to which a representation of uncertainty will be generated for the purposes for which the panel has convened, without knowing the result of this method" (Cooke & Goossens, 2008). Therefore, unlike other expert judgment methods such as Delphi and Sheffield method, CM does not require each expert to adopt the results as her/his own degree of belief. The rational consensus implies that the experts agree with the scientific method of assessing the performance and combining expert opinion. This is referred to as rational consensus.

The method invokes four necessary conditions: accountability, empirical control, neutrality and fairness. The accountability assumption ensures that the method is based on a fully tractable process, in which the expert's assessments are not publicly linked, but are available to peer review and must be reproducible. Secondly, experts' assessments are subject to empirical control. The neutrality

ensures that experts are encouraged to state their true beliefs. Fairness entails that experts are regarded equal prior to evaluating their assessments.

Along with CM, different models and methods that help to make predictions attracted quite a lot of attention in recent years (Bolger & Wright, 2017). EKE consists of a set of techniques and methods, including the Delphi and Sheffield method, that help to elicit the knowledge of experts. Furthermore, expert assessment is an established methodology to obtain information about relationships that are difficult to observe directly (Uusitalo, Lehtikainen, Helle, & Myrberg, 2015).

3.2 Empirical setting and the structure expert judgment elicitation

3.2.1 The Context of the Study

We performed SEJ for an existing company that was pondering over the area of future market expansion. Sat Agro is a Polish startup company providing applications that translate satellite maps into programs guiding precision fertilization. The company developed from a scientific collaboration of Przemysław Żelazowski and Kazimierz Stopa having institutional affiliations at of University of Warsaw, Polish Academy of Science and Oxford University. In 2016 they registered company Sat Agro and were joined by another partner and board member Urszula Starakiewicz-Krawczyk. During the first year of their activity, Sat Agro internationalized its operations to the Czech Republic based on a client's request. The initial internationalization was done without seriously considering this move as neighbouring country of Czech Republic was considered to be close and well known to entrepreneurs, and thus bearing no serious risks. It is currently considering a further expansion to other international markets, possibly to another continent. Such a move has many unknowns and requires more careful managerial consideration of choices in opinions of decision makers we interviewed at the beginning of the study.

3.2.1 The Process of the Study

The process of the study was performed in two stages: first, the company specified potential markets and criteria for consideration as well as information that would help them to make an informed choice. The founders considered several potential markets for international expansion,

including France, Australia, US, China, Russia, Ukraine, Brazil, and the southern African region. Executive MBA students participating in the International Business course were assigned these markets – one for each group with a task to recommend a decision if the company should go for an international expansion project in the market that they are analysing. The students presented their reports during a 4-hour workshop with Sat Agro entrepreneurs commenting on each presentation. In a summary of the session, the entrepreneurs explained that, based on their updated knowledge from the teams' presentations, their preferred choice of a market to focus their attention on was Brazil. For their final location investment choice, they believed several further uncertainty areas need to be considered to assess what they can expect in near future. As the company expressed an interest in the Brazilian market, the second stage of the study that is of core interest for this article focused on this country. In the second stage, we applied Cooke's method to elicit expertise from a group of Executive MBA students having more diverse experiences and competences with internationalization projects than the entrepreneurs themselves.

3.3 Method

3.3.1 Participants

Sixteen Polish participants (9 male; 7 female) of the Executive Master of Business Administration (MBA) course participated in the study. The participants were in the middle of senior executive positions in a variety of organizations, including banks, multinational and Polish enterprises, as well as public administration, i.e. in the Ministry for Economic Development, the Ministry of Foreign Affairs, or the Chief Pharmaceutical Inspectorate. The Executive MBA is a flagship executive education program at the University of Warsaw, and the first program of this type established in Poland at the beginning of the transition to market economy in 1991. Since then, 23 cohorts of students, i.e. almost 1000 people, graduated from the program.

3.3.2 Procedure

The study took place after a regular class. The participants were informed about its purpose and asked for the consent to participate. Next, the introduction to the SEJ method was given, followed

by a dry-run of the CM methodology. During a short break, the experts' calibration and information scores were computed and their assessments aggregated using the performance based weighting scheme. The experts were informed afterwards about the results and the manner in which their assessments are evaluated in the CM was emphasized. After making sure that all experts clearly understood the procedure, the proper elicitation was conducted. All participants received the elicitation forms containing the calibration and questions of interest (see Appendix). The elicitation was conducted for all of the participants at once – it was ensured that the participants did not have contact with each other, so they made the assessments individually. After the study, the experts were thanked for their participation.

3.3.3 Materials

Dry-run. The “Expert Judgment Evaluation of Weather extremes (see Appendix)” exercise was used to help the experts practice the CM method. The weather exercise contained three calibration questions asking the experts to assess the weather in a particular month/year. The question of interest asked about the maximum temperature recorded in April 2017 in Warsaw (i.e. the near-future time and the location where the study took place).

3.3.4 EJ Elicitation Protocol.

We adopted the formalized procedure for eliciting expert judgements, based on the Classical Model for structured expert judgement (Cooke, 1991). All participants completed questionnaires consisting of 18 questions – 12 calibration questions and 6 questions of interest. The questions were prepared based on the interview conducted by the authors with one of the founders of the Sat Agro company. The owner was asked about the factors that they take into account when deciding on the internationalization strategy as well the foreign markets that they consider for potential expansion. The owner was also asked to justify their decision to explore further opportunities in the Brazilian market, which they chose in the first phase of the project. One of the arguments in favour of Brazil was the lack/small number of competitors, while i.e. in the United States, the market was congested, and

barriers of entry would be higher. Regulations in the Brazilian market were not as strict as in the other countries under consideration.

The interview enabled the identification of key criteria that the entrepreneur would focus on when evaluating their final location choice decision. Accordingly, the questions of interest enquired about the prediction of various Brazilian market scores in 2020. We asked six questions regarding the Corruption Perceptions Index (CPI), the Global Innovation Index, the Global Competitiveness Index (GCI), the Country Risk Index, the World Justice Project (WJP) Rule of Law Index, as well as the forecasted number of paid users (see Appendix). The relevance and content of the items used in this task were verified by peer judges prior to the study.

4. Results

First, we analysed the experts' assessments for the calibration questions with respect to two performance measures, the calibration score or statistical accuracy and the information score. The analysis has been performed using the Excalibur software, which has been developed at the Delft University of Technology. Table 1 below presents the performance score for each expert, as well as their combined score and the weights resulting from these scores.

Table 1 goes about here

The calibration score is computed for the 12 calibration questions and denotes the statistical accuracy with respect to the true values of the calibration questions. It ranges between zero and one, where a high score denotes a better statistical accuracy. We note that the most statistically accurate expert is Exp1, with a calibration score of 0.046. Nonetheless, the calibration scores are quite low. The information score denotes how informative the experts' assessments are. The information score reflects the experts' uncertainty; therefore, a low information score denotes a high uncertainty, whereas a high information score denotes a low uncertainty. The information score in Table 1 is obtained by averaging the information scores of the 12 calibration questions. Similarly to the calibration score, the higher the information score, the more informative the expert is. We observe that the information score ranges from 0.97 to 2.662, where 2.66 denotes a high information score.

Even though the true value is not known for the questions of interest, the information score can still be computed. An average of all the information scores of all questions in the study, and therefore both calibration questions and the questions of interest, is provided in ‘Information all questions’. It is interesting to investigate the differences between the two information scores, as it reflects on the differences between the uncertainties in the calibration questions and the questions of interest. For experts with a lower information score for all questions, such as Exp1, Exp4, Exp10, etc., it denotes a higher uncertainty in the questions of interest than in the calibration questions. For Exp2, the information score in the questions of interest is higher than the information score for the calibration questions.

Ideally, we would like the experts to be highly informative and, more importantly, highly calibrated. A higher calibration score is preferred to a higher information score, since high information with poor calibration denotes overconfidence. This is observable, for example, for experts with very high information scores but very low calibration scores. The combined score captures this preference, and we observe that Exp1, though not as informative as other experts, has the best combined score, as a reward for being the highest calibrated expert.

The normalized weights of the experts are computed by dividing the expert’s combined score by the sum of all experts’ combined score. Given the highest combined score of Exp1, it is straightforward that Exp1 also receives the highest weight. The second highest weight is received by Exp14 and all other experts receive a very low weight.

These weights are referred to as performance based weights, since they are computed based on the two performance measures. The performance based weights allow for the aggregation of experts into the so-called decision maker (DM) for the questions of interest. It is the DM’s assessments that are usually reported as a conclusion of the study. Furthermore, the DM can be regarded as any other expert and hence can have its performance evaluated with respect to the calibration and information score.

Another method of aggregating the experts’ assessments is equal weighting, where each expert, regardless of their assessments, receives equal weight. In our study, since there are 16 experts, every expert receives the equal weight of 0.0625. We will denote by ‘Performance DM’ the DM

obtained by aggregating the experts using performance based weights and 'Equal DM' the DM obtained by weighting the experts equally. The results of the two DM's are presented below.

Table 2 goes about here

Table 2 presents the results for the two DM. First of all, we notice a calibration score of 0.446 for the performance based DM. This reflects a good statistical accuracy, which is much higher than the calibration scores of each expert. It shows that the DM has improved significantly its statistical accuracy compared to the statistical accuracy of experts. Moreover, its calibration score is also higher than the calibration score of the equal based DM. Finally, the information scores display a much better performance for the performance based DM than for the equal based DM.

We can improve DM's performance by excluding some experts with very low calibration scores. The optimized combination of experts leads to a weighting scheme that is different from the one in Table 1. Table 3 below shows the results of performing an optimization analysis, as well as the performance scores of the optimized DM.

Table 3 goes about here

We notice that only two experts get non-zero weight in the optimized combination of experts. Nonetheless, given the very low weights of other experts, the weights do not differ much from the weights in Table 1. Furthermore, we note that the calibration score is the same as for the non-optimized DM, whereas the information scores are higher.

The final results regard the questions of interest, namely the DM's resulting quantiles. Table 4 below contains this information.

Table 4 goes about here

The first question of interest helps to assess the anticipated corruption level in Brazil. We have informed the experts on the standard measure of corruption perceptions provided annually by

Transparency International – the CPI index. The CPI ranges from 0 (highly corrupt) to 100 (very clean). Between the years of 2012 and 2015, the level of the index ranged between 38 and 43. The experts were asked to elicit the CPI index in 2020. As we can read from table 4, DM expects the corruption to increase in the next few years to the anticipated level of 35 CPI, which is the value assigned to 50% quantile that best represents the expert's opinion. The entrepreneurs can also be assured by this table that DM expects less than a 5% chance that CPI will decrease below 25.12, which would denote a substantial increase in the corruption levels; or will increase above 44,8 which would mean a very small increase as compared to the years of 2012 and 2014 in which Transparency International CPI scores for Brazil were 43.

In question two, we were concerned about the innovation capacity of Brazil for which the experts were asked to estimate changes in the Global Innovation Index (GII). This index is based on, among others, human capital and research, infrastructure, scientific outputs, creative outputs. It ranges from 0 (very bad) to 100 (very good). We have used a similar format as the one reported for question 1. The experts were given information about the Global Innovation Index for Brazil in 2012 and 2014, which ranged from 34.95 to 36.33. Their task was to respond to the following question: What will the Global Innovation Index be in 2020? The results from table 4 above indicate that the best DM estimate is that the level of index moderately increases to 37.35. It is worth noting that, unlike in the case of question 1, the best estimate is closer to the range of historical values, suggesting one should only expect a moderate and positive change in respect to the innovation capacity – the factor that the entrepreneurs thought is important in their knowledge intensive industry.

The third question concerned the Global Competitiveness Index (GCI) for Brazil in 2020. The index is provided by the World Economic Forum every year in the Global Competitiveness Report. The Global Competitiveness Index (GCI) accounts for factors that determine the level of productivity and economy, but also institution and policies; its scores range from 1 (the lowest GCI) to 7 (the highest GCI). The Global Competitiveness Index 2016–2017 for Brazil was 4.06. According to the answers provided by the optimal performance-based DM, the estimated GCI in 2020 is 4.04, which denotes a conservative approach to the current GCI. The experts' combined assessments lead to confidence intervals of [3.03;4.98] to capture the uncertainty around the estimate.

Question number four involved the Country Risk Index (CRI), calculated based on the business risk rating, the country risk rating and the political risk rating. The index ranges from 1 (very risky) to 100 (not risky at all). In 2014, the Country Risk Index for Brazil was 69 and in 2015, it was 67. The experts needed to estimate the Country Risk Index for Brazil in 2020. The DM's estimated the index to be at 65, which denotes a slight decrease compared to the values in 2014 and 2015. The uncertainty inherited from the experts' distributions is nonetheless quite large. This shows a high variance among the experts' assessments, which denotes a disagreement among the experts' assessments.

The fifth question regarded the WJP Rule of Law Index. The WJP Rule of Law Index 2016 presents a portrait of the rule of law in each country by providing scores and rankings organized around eight factors: constraints on government powers, absence of corruption, open government, fundamental rights, order and security, regulatory enforcement, civil justice, and criminal justice. The ninth factor - informal justice - is measured but not included in the aggregated scores and rankings. The scores range from 0 to 1 (with 1 indicating the strongest adherence to the rule of law). In 2015, The WJP Rule of Law Index in Brazil was 0.56. The question that the experts needed to answer was: What will be the WJP Rule of Law Index in Brazil in 2020? Once more, the DM's solution shows that the index is forecasted to slightly decrease, denoting a slight improvement of the Brazilian market with respect to the Law Index. The confidence intervals are relatively smaller when compared to other confidence intervals, suggesting a reduced uncertainty and more agreement among the experts' assessments.

Finally, the experts were asked to provide uncertain assessments for the number of paid users in the Brazilian market. The question was as follows: SatAgro had 23 paid users in 2016 and was monitoring 31000 ha of land in Poland and The Czech Republic. If the company decides to expand to the Brazilian market and offer their services there, how many paid users will the company have in the Brazilian market 3 years after the internationalization in Brazil? The DM's best estimate is around 42 paid users. Nonetheless, the number of paid users can vary between 5 and 100, denoting a high uncertainty.

5. Conclusions and discussion

Our contribution in this paper is to offer an application of well-established decision support methodology in a new context – that of strategic managerial decision making on international expansion of a small, entrepreneurial firm. The aim of the paper was to demonstrate how international new ventures might benefit from using external advice of experts while taking a risky decision about their initial foreign investment to a distant location. In an experimental setting, we engaged Executive MBA students in the capacity of experts. We applied the Classical Model for Structured Expert Judgment to elicit their expertise on the internationalization project. The expert panel enabled us to forecast what should happen in 6 areas identified by the entrepreneur as critical in the process of finalizing the decision whether to invest in Brazil. We collaborated with an existing, innovative Polish company SatAgro, which was at the stage of selecting from among different alternatives for its international expansion. To assist the company in making its risky decision, we engaged the participants of the Executive MBA program to first gather information about the potential locations defined by the firm, and then based on its interest in Brazil, to elicit future states in areas where the firm wishes to know more to ground its investment decision.

An initial investment in a distant location is a type of decision in which uncertainty and risks are very high. If entrepreneurs do not possess the required competences and direct experience with the market they consider for an expansion, like in the described case, they may take the advantage of reaching out for expertise. However, one can elicit expertise in several ways. An entrepreneur will often take into account advice from a single expert who seems to have business credentials and expertise. If he or she is accessible to an entrepreneur, a student of a prestigious Executive MBA program can likely be approached as an advisor. Such students need to have several years of managerial experience before being admitted to the program, and many of them had come across internationalization projects in their prior managerial careers. The result of our experiment should raise a caution that an expert having sound business acumen, and perhaps even some international experience, does not necessary offer a sound advice. In fact, quite the opposite proves to be true in our experiment – the experts were very poorly calibrated, or weak when it came to the statistical accuracy with respect to the seed questions, and often also overconfident as indicated by the information scores.

These results reflect the poor performance of individual experts as assessors of uncertainty. If the entrepreneur bases his or her decision on advice from a single expert, randomly chosen from our sample, he or she will be misguided by the poor judgment of an individual.

Nonetheless, it is remarkable that the combination of experts based on their performance leads to a decision maker that is much more statistically accurate as well as more informative. Even in the situation when each individual expert was poorly calibrated as assessed by the seed questions, we were able to combine their expertise and greatly improve the calibration scores – from 0.04 for the best calibrated individual expert to 0.446 for the performance based decision maker. Notably, performance based weighting also works much better from a simple combination of experts based on equal weights resulting with almost a half of the statistical accuracy and more than half of the informativeness that can be achieved in the case of more optimal combinations.

As our study clearly demonstrates that engaging a panel of experts in a structured elicitation process with the application of the Classical Model offers a much better alternative to either using advice from individual experts or simply averaging expert judgments from a group. The likely improvements in both the calibration and the informativeness are indeed impressive and reassure that using the Classical Method enables a big improvement in the reliability of information upon which the decision is made.

Finally, the present study has limitations that need to be pointed out. Since we cannot expect that the company will soon expand to the Brazilian market, we are unable to check if the predictions of the judges are correct. That does not diminish the value of the method, but indicates the path for future studies – we would like to perform a study in which we could check the correctness of the experts versus the empirical results, which requires the experiment to be extended in time for the overall period of the forecast. The other limitations are connected with the participants – among them, only a few people had experience in internationalization, and only to markets other than Brazil. Thirdly, in the Classical Model, the experts are interviewed separately, whereas in our adopted version – we conducted our study for all of the participants simultaneously. This is not an unusual practice, as some researchers are conducting elicitations in a workshop format (Hanea et al., 2018). The Classical Model emphasized the importance and necessity of the motivation and rationales behind the expert's

assessments that provide additional information beyond the numerical judgments. Due to the time and cost of conducting the more elaborated study, we were not able to include additional questions on the rationale in the present study.

The process described in this paper of an interactive support provided by the students of the Executive MBA program to an innovative start up on its way to becoming an international new venture is a good example of action research. The early proponent of action learning approach, Kurt Lewin has famously said: “There is nothing as practical as a good theory.” (1951: 169). Our study demonstrated that the practice of internationalization in small, entrepreneurial firms can be guided by a notable contribution of Cooke's Classical Model to applied mathematics and the decision making theory.

Footnote: Data necessary to re-produce the results of the study are available upon request to corresponding author: Dr Michał Zdziarski, University of Warsaw, m.zdziarski@uw.edu.pl

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Table 1. Experts' performance scores.

Expert	Calibration	Information	Information all questions	Combined score	Weight
Exp1	0.04663	1.166	1.037	0.05438	0.6554
Exp2	6.20E-06	1.778	1.805	1.10E-05	0.000133
Exp3	1.42E-06	2.662	2.61	3.78E-06	4.55E-05
Exp4	0.000344	1.538	1.385	0.000529	0.006372
Exp5	5.59E-07	2.071	1.921	1.16E-06	1.40E-05
Exp6	3.97E-08	1.596	1.548	6.33E-08	7.62E-07
Exp7	2.55E-05	1.802	1.756	4.59E-05	0.000553
Exp8	5.59E-07	1.936	1.902	1.08E-06	1.30E-05
Exp9	3.19E-05	0.9768	0.9359	3.12E-05	0.000376
Exp10	1.42E-06	1.832	1.774	2.60E-06	3.13E-05
Exp11	4.69E-06	2.028	1.904	9.52E-06	0.000115
Exp12	1.35E-06	2.4	2.324	3.24E-06	3.90E-05
Exp13	1.37E-05	2.224	2.086	3.05E-05	0.000367
Exp14	0.01639	1.704	1.569	0.02793	0.3366
Exp15	3.49E-09	2.517	2.414	8.77E-09	1.06E-07
Exp16	5.59E-07	2.343	2.315	1.31E-06	1.58E-05

Source: own study

Table 2. Performance measures for a performance based and equal based decision maker (DM)

DM	Calibration	Information	Information all
Performance DM	0.446	1.039	0.895
Equal DM	0.298	0.476	0.424

Source: own study

Table 3. Experts' performance scores and optimized DM.

Expert	Calibration	Information	Information all questions	Combined score	Weight
Exp1	0.04663	1.166	1.037	0.05438	0.6607
Exp2	6.20E-06	1.778	1.805	1.10E-05	0
Exp3	1.42E-06	2.662	2.61	3.78E-06	0
Exp4	0.000344	1.538	1.385	0.000529	0
Exp5	5.59E-07	2.071	1.921	1.16E-06	0
Exp6	3.97E-08	1.596	1.548	6.33E-08	0
Exp7	2.55E-05	1.802	1.756	4.59E-05	0
Exp8	5.59E-07	1.936	1.902	1.08E-06	0
Exp9	3.19E-05	0.9768	0.9359	3.12E-05	0
Exp10	1.42E-06	1.832	1.774	2.60E-06	0

Exp11	4.69E-06	2.028	1.904	9.52E-06	0
Exp12	1.35E-06	2.4	2.324	3.24E-06	0
Exp13	1.37E-05	2.224	2.086	3.05E-05	0
Exp14	0.01639	1.704	1.569	0.02793	0.3393
Exp15	3.49E-09	2.517	2.414	8.77E-09	0
Exp16	5.59E-07	2.343	2.315	1.31E-06	0
DM_opt	0.446	1.067	0.9381		

Source: own study

Table 4. DM's answers for the questions of interest.

Question	5%	50%	95%
I1	25.12	35	44.8
I2	30.87	37.35	44.8
I3	3.03	4.04	4.98
I4	55.02	65	74.86

I5	0.40	0.52	0.6
I6	5.39	42.61	100

Source: own study