RISK TYPOLOGY IN THE HUNGARIAN CONSTRUCTION INDUSTRY

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Abstract

Purpose Risk management is a decisive part of project and corporate management. The first process of risk management is to frame a risk typology which needs a uniform risk approach and terminology. We assume that economic actors detect exogenous (external) and endogenous (internal) processes and related risks differently. These dissimilarities and differences generate heterogeneous risk approach and terminology in construction risk management literature and in practice, too.

Methodology As a part of a long-run research project, an enquiry on the literature and on the Hungarian construction industry was made, to identify the differences and dissimilarities between theory and practice and to frame a relevant risk typology for construction projects. Deep interviews with some of the key actors of the industry and with different actors of construction projects such as lenders, insurers and investors were made. After sealing of interviews, we also made an online survey in the Hungarian construction industry in order to assess the way the stakeholders of the industry think about different risks and how these risks are evaluated.

Findings We could collect information about the risk perception, explanations, the accuracy of risk assessments, risk management experiences and techniques and tools of different actors and about the relations of construction companies, identifying different patterns, typologies, practices and learning processes.

Practical implications In this study we present a heterogeneous risk approach and terminology of different actors based on our research, with an attempt to make a risk typology which is adequate for project risk management processes in construction risk management.

Keywords: Risk management, project management, construction industry, risk typology, Hungary

1. INTRODUCTION

In this paper relationship patterns and risk-taking strategies of Hungarian firms related to the construction industry are examined and described. Our main goal was to create a solid empirical foundation to create a service that can deal with risk analysis and predict the influence of certain risk types on a project. In order to create the methodology to the inputs to such software we had to broaden our theoretical research and review the literature on uncertainty, risks and risk probability (Sasvári-Rauch-Szabó, 2014).

The theories related to the above mentioned three concepts are rather young in Hungarian literature. In the last decades several researcher and theorist discussed risk exploration and management and the history of risk theories were also written down. The first practical handbook dealing with the problem of risk management of enterprises in Hungary was written by Szilveszter Farkas and József Szabó is an in depth resource of conceptual basis, risk management processes and risk management tools (Farkas-Szabó, 2005). It is clear that this Hungarian approach fits into a trend as the last decade has several comprehensive work on risk and risk management but mostly from the field of practical side of management and project management (Coleman 2011, Crouhy-

Galai-Mark, 2001, Hopkin, 2012)

As a result of the global economic crisis in 2008 more and more scholars turned his head toward this field in order to dig up some new information and solution to financial problems. It means that risk research and risk management methodology is focused only on risks bundled to financial matters. This field is a well-known part in Hungarian literature but not filled with homogenous thoughts (Bélyácz, 2011). Péter Medvegyev (2011) explains that most scientific theories are at most complementary, possibly conflicting, or more or less loosely related with each other, therefore logical consistency can only be found within one model, a universal model cannot be built. Medvegyev adopts Knights approach (Knight, 1921) from the several risk and uncertainty concepts. In this case uncertainty is a case when determinative parameters cannot be explored using statistical methods, on contrary when statistical methods are useful one must talk about risk.

Erzsébet Kovács's study differs from this idea as her opinion is that risk is a latent concept which is cannot be measured therefore statistical approaches are useless (Kovács, 2011). We also used Knight's theory in our research and tried to conceptualize a complete set of factors related to risks in constructing. This means that not only the financial risks but all type of risks had to considered and measured in our research.

2. METHODS

2.1. QUALITATIVE RESEARCH METHOD

As the first method for our research, and also, as the first part of a long-run research project and to help the development of the later, widely distributed online questionnaire, in order to get more precise information on the Hungarian construction industry, structured interview was chosen. The questionnaires contained a general section, studying the basic characteristics of the sample, and a specific section, focusing on risks and their managements. Our aim was to show the particularities of the actors' participations in construction investments. Focusing on the group of contractors, using interviews as a method for a qualitative research, we were interested in the opinions and reflections on the other relevant players of industry such as lenders, insurers and investors. The interviewees were asked to draw their definition of risks and risk management, based on their own experiences. The questioned groups of risk factors were collected from the previous scientific literature.

The interviews were carried out between May and September in 2013. Most of the interviews were recorded in July. This part of the survey was completed with a 28 successful interviews. As shown in the 1. Table, more than the half of these interviews was made with contractors. The other category covers different experts of the industry, including a market-leading real estate company dealing with distribution of real estates, having a deeper insight into the processes and trends of the industry. Where it was possible or there was a position related to the examined topic we made the interviews with these employees, if such position wasn't existed we contacted the CEOs.

Table 1

Orientation and size of the interviewed contractors

	The average value of work undertaken (thousand Euros)			
Segment	>30000	30000-30000	30000-300000	Total
Structural architecture	8	2		10
Civil engineering		1	3	4
Both			1	1
Total	8	3	4	15

Source: based on the data of construction companies participating in the interview

The majority of interviewees are seated in Győr and in its agglomeration or in Budapest. On one hand, it is proven by the fact, that these geographic areas have a relevant construction output. On the other hand, a significant increase can be observed in Győr-Moson-Sopron County, while as a contrast, in Budapest and Pest county, high production values are associated with mild downturn, which was proven as an interesting background process, concerning the answers in the interviews. We did not want to make a representative sample out of these interviewees as this phase of the research was undertaken in order to establish a solid scientific ground for the e-survey.

In the interviews, 9 respondents of the 15 contractors were concerned in civil engineering projects, five businesses represented firms from structural architecture, and one firm is involved in both segments. Nine companies considered themselves a general contractor. Among them, there were some that are also prime contractors for large projects. The rest of the respondents belonged to the group of smaller subcontractors. The value of projects managed in general showed a high standard deviation at the surveyed contractors, with a spread from 30000 up the multi-million Euros. The three investors covered actors like market-based investors, municipalities, and financial institutions, managing high value EU investments.

After sealing of interviews, in order to refine and complement our primary information, we made an online survey in the Hungarian construction industry which was inspired to assess the way the stakeholders (investors, property developers, construction firms, financers and insurance companies) of the construction industry think about different risks, and how these risks are evaluated by them. With the help of this process, we could collect information about the risk sensation and risk management tools of different actors. We were also interested in risk explanations, the accuracy of risk assessments, risk management experiences and techniques, and the relations of Hungarian construction companies, in order to identify different patterns, typologies, risk management practices and learning processes.

2.2 QUANTITATIVE RESEARCH METHOD

We sent out e-mails weekly between September and December in 2013 with the calling for filling out our online questionnaires to the collected 6755 e-mail addresses. These callings were sent out 7 times. The potential respondents had the opportunity, to unsubscribe from these e-mails. Before each sending, the e-mail list had to be manually updated (cleaned) according to the following criteria; remove the unsubscribed ones, remove ones who had filled out the questionnaire before, delete the e-mails of recipients that we got error messages from.

As a result of the sending of questionnaires, a complete group of the domestic, active, online reachable construction business had been addressed. In an industry, in which nearly 90,000 businesses are registered, of which there are only 23, where more than 250 people are employed. As a result of the sendings, with a closing date of December 20 of 2013, 99 fillings occurred. According to the size of the companies and geographic location of their seats, the fillings developed as follows; from companies employing more than 250 people, only one replied to the questionnaire. From the business category with 101-249 employees five, from the category of 10-49 35, from the category of 0-9 58 filled out the questionnaire (*Table 2*). These rates are a fairly good approximation of the structure of the supply-side of the industry, which reminds of phenomena of the dominant and competing edge companies models.

Table 2

The number of employees and number of fillings of the questionnaire based on the geographical location

NUTS 2 region	Number of employees				
	more than 250	101-249	10-49	0-9	Total
Northern Hungary	0	0	1	2	3
Northern Great Plain	0	0	4	4	8
Southern Great Plain	0	1	5	9	15
Central Hungary (Budapest included)	0	4	10	22	36
Central Transdanubia	0	0	2	5	7
Western Transdanubia	1	0	6	8	15
Southern Transdanubia	0	0	7	8	15
Total	**1**	**5**	**35**	**58**	**99**

The majority of the respondents were the members of senior management or the owners of the businesses, due to the method of the inquiry, and -on the other hand - also to the content of the sample, small businesses dominated. The number of lower-level managers and employees was negligible among the respondents (*Figure 1).*

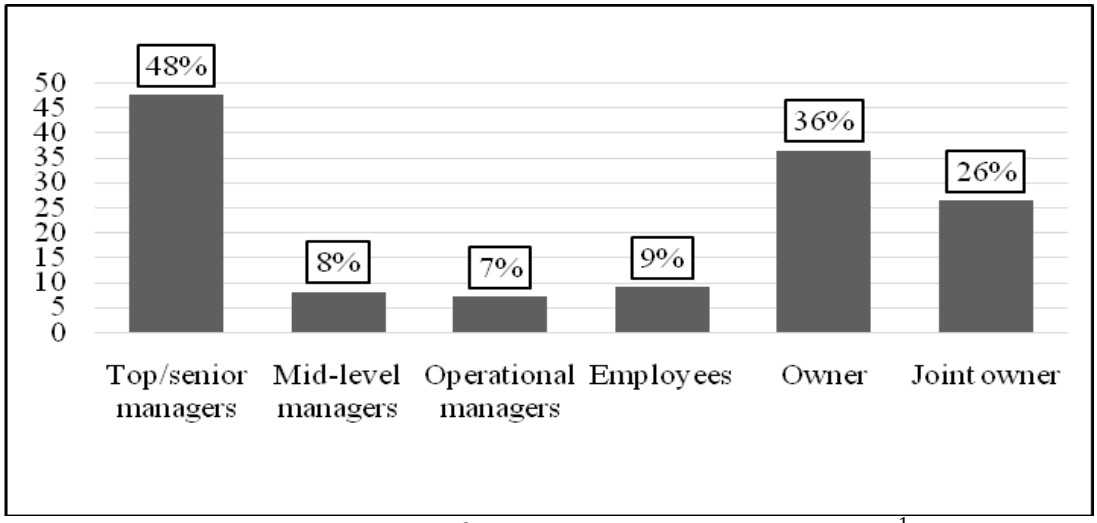

Figure 1. Function of the respondents at the businesses[1]

3. FINDINGS

3.1. RISK ASSESSMENT IN THE STAGES OF PLANNING

Among the participant companies, fundamental differences can be found in the number and sorts of possibilities, appliances and opinion of the importance of risk assessment in the planning stage. The first fault line can be perceived along the constraints of applications/tenders. For many respondents, it's not possible to carry out risk assessments, or they just don't have the resources, competence or authority for these activities and tasks. According to their opinions, in several cases, the *unstable regulatory environment* is a major obstacle to risk planning. Generally, at companies where tenders have a highlighted role, the legal side of this type of planning is being promoted increasingly. The relative weight of the planning and construction phase of the risk assessment and

[1] One could choose more than one option, therefore percentages does not sum up to 100%.

management practices appear somewhat contrary, too. The bottom line of one of the approaches is that processes, that couldn't have been assessed - or the company couldn't insured against to - will be out of their hand in the later phases. In contrast, according to others' opinions, opportunities for carrying out risk assessments in the planning stages are very limited, so they are rather a proactive practice in the implementation phase.

3.2. THE SIZE OF THE COMPANIES AND RISK TAKING BEHAVIORS

Before the discussion of the participant's risk taking behaviors, it's important to emphasize, that the size of companies and their position in the construction chain can show a strong correlation. In addition to the required production equipments, major construction firms, typically present in most parts of the construction chain, also have possession of adequate human resources, networks, and furthermore, they have had accumulated a significant presence in a wide range of knowledge capital. They have a significantly greater awareness in the management of risks, particularly in the case of technical risks. They can professionally and deliberately respond to the risky fields and explored risks. On the basis of interviews, the employment or assignment of the staff, dealing with legal issues and problems, can be particularly important, because the co-operation of legal representatives and / or claim groups can be of key importance for legal proceedings, brought by or against the company.

Examining the human resources, it can be observed, that the degree of diversification can be increased by the involvement in other areas in addition to the main operating profile (like special staff dealing specifically with financial investments). Certain risks - eg. exchange rate risks – thereby can be reduced substantially. In the content of human resources, larger companies have more freedom in decision-making – whether we're talking about a project or the whole company – so, through the appropriate vehicles, proper formation[2] of these structures can contribute to the management of risks. In a matrix organization structure, each project leader, from the foundation of the whole process, can call for assistance from the representative of different specialties, significantly reducing industry-specific problems and related plan-fact differences.

Regarding the management of risks, there are essentially two possibilities present in the minds of the interviewees, used side by side. One of these is the pricing of risks, or the *enforcement of risks in their pricing*, which results in the payment of the expected value of the damages by the investors. The other option is to *pass these risks to the subcontractors*. It should be also noted, that the social capital of larger companies can be risk-reducing, which can have a positive influence on them in the different phases, from the selection of partners and the contraction of assignments to the follow-up stages of the projects.

Typically, smaller companies are only able to perform less complex assignments, that don't require specialized knowledge and / or technology. The majority of these companies, in the absence of specialized knowledge, corresponding assets and human capital, can only work as a necessity or forced businesses and able to undertake specialized or auxiliary assignments. Obviously, they won't occupy general contractor positions in projects. In addition to the less favorable conditions, it's more difficult for them to raise external sources and to collect claims or debts, and they have to fulfill their liabilities on time. In managing liquidity, especially in the absence of major financial knowledge and contacts, they have hard work to do. In many cases, they are working with outdated equipments; failures are frequent by these, compromising the timely completion of the tasks. It's also not a negligible factor that smaller businesses, in terms of material price have less bargaining power, due to the lower volume of their purchases and they are less able to pass unfavorable changes in the prices on their clients. Smaller companies have insurances only on smaller scales and

[2] The ability a group of risk management or risk manager to analyze and manage the risks of multiple projects can have a great importance.

on fewer scopes, so they are observing and managing their risks instead[3].It's also worth mentioning, that during the planning processes[4], smaller companies typically tend to see their specific, technical risks, rather than economic risks. One main reason for this is that in terms of human resources, smaller companies tend to shift considerably towards professionals of directly specific activities and from this perspective we can often encounter disadvantageous rates. One of the potential results can be the observance of the purely technical risks, without an adequate perception of the other economic or indirect risks. In addition to the above, it can be also a significant risk factor for smaller businesses, whether they expand their organization appropriately, correspondently to their potential growth as a company. Failing that, they may face the undertaking of a new set of risks.

Typically operating at the end of the production / business chain, smaller enterprises are more likely to be delayed in the payments or will receive reduced fees. Therefore, their activity is accompanied by greater financial risk. On the lower levels of the chain, in many cases, delayed, or no payments are made, in cases when the client does not, or not fully pays to the contractor. Companies in the higher levels of the chain can plan better, since they are closer to the procurer; costs incurred at them are more likely to be compensated at the right time and degree. Its determinative for smaller construction firms, that their number on the market is high, they're using the same, or nearly the same production technology, their products are close or perfect substitutes for each other, and for these reasons, they're price takers. In most cases, pricing of their risks would result in non-competitive offers by them. According to the literature, their situation corresponds to the main characteristics of the distinguished phenomenon of price-taking firms, using the same technology, and struggling with information asymmetry. In addition to the price-taking behavior, they are also taking tasks and schedules correspondently. They typically undertake too many projects, overwork, to ensure a continued realization of revenue, and such phenomena, compared with the undertaking of an ideal amount of tasks, will result in taking additional risks.

The use of black labor is a common phenomenon by them; it also involves additional risks to the long-term operation. It's also not negligible, that contrary to the terms and conditions, it's usually required the contractors to do additional tasks, to get their work accept or taken over by the client. These phenomena can be very harmful for smaller companies in terms of their operation, because carrying out additional tasks can tie up serious amount of resources that can not be operated for other ongoing projects.

Risky behavior is not a bad decision, or a result of a series of decisions, it's a fact for smaller-sized businesses. Their role in the project can significantly determine the size, amount and nature of the risks they run. It's also important, that in a significant portion of cases, they're not protecting themselves adequately, even against identified risks. Hindered by the lack of resources, both directly and indirectly, they aren't able to take protective measures, services or mechanisms appropriately. It is also not negligible, that generally businesses can defend themselves against endogenous risks, concerning the role of the business in the project, are usually less efficient.

[3] There are usually financial reasons behind this, but the fact that the companies in question operate without them, assumes, that they are willing to accept the orders under such conditions. The retention of their treatment does not necessarily mean risk management, since in many cases the respondents do not know their own subjective and objective risks either, so in these cases there're extra risks, which is kind of equal to "gambling" in the world of risk management.

[4] The planning activity in this case is defined broadly, including the organization of work processes as well.

Table 3

Types of risks and their perception by the players of the industry

Type	Inherent criteria	Inherent throughout the interviews
legal	1. exogenous 2. articular in case of governmental investments where the EU funds have an important role	1. tight margin in the signing a contract process 2. it is hard to manage failures of investors because contractual conditions 3. significant inelasticity in case of EU projects
political	1. the instability of political environment 2. moral hazards in political environment	1. there is a connection with legal risks 2. the inconsistency of political decisions
financial	1. the characterization is very alterable 2. the most frequent attributes: 3. growing role of own funds 4. unconditional bank guarantee 5. censorious and post financing EU projects	1. the industry became more competitive 2. the unconditional bank guarantee indicate high financial liquidity risk for constructors 3. weak payment subordinacy 4. reverse VAT makes finance dearer 5. debits chains 6. capacity planning is very hard in unstable environment 7. financors become more conscious and it jeopardize the positions of constructors
communication-cooperation	1. significant in construction phase	1. the general contractor-subcontractor 2. relationships are not always ideal 3. potential risks in the selection of the sub-contractor and consortium partners are significant 4. the supplier's capabilities can falter 5. in case of a lot of participants, there's a lack of proper coordination
technical (engineering)	1. the actual design phase is typically shorter and stretched	1. quality of the plans becoming weaker 2. the lack of risk assessment, is a risk itself even in the design/planning stages 3. old, large design offices eliminated
technical (construction) risks	1. heterogeneous, 2. can be refined along the sub-processes of the construction process	1. material supply disruptions 2. premature secession of contractors from the construction processes 3. premature secession from the process of the consortium
Technical-economic (human) risks	1. fundamentally affected by the market environment	1. the assessment of own resources, or expertise are not always appropriate, deficiencies can be observed in the of specialist training from construction workmen to the engineering project manager 2. in many cases, there is no human resources for risk management, mainly due to financial constraints
Deadlines	1. primarily resulting from the nature of the industry	1. tendering can stretch long time, which takes away time from the detailed design and construction phase 2. not meeting the deadlines is considered to be an almost certain event
Weather, vis maior risks	1. difficult to assess and manage	1. difficult to handle deadline amendments due to weather conditions 2. difficult to predict at certain activities, there's no previous experience, everything is determined by the physical environment (especially in civil engineering)

Based on the categories of risk-taking and gambling behaviors, we can get to the conclusion, that company size and the place and role in the subcontractor chain can fundamentally determine the belonging of the actors to the categories above. Larger companies with more market power and freedom of choice, which can be partially derived from the former, and to some extent, they are more able to enforce the expected damage in their prices. Smaller companies, as a result of their lower lobbying capacity and sweeps and the existence of limitations in the recognition of their risks, they are less able to put across the expected value of the damage suffered, which can have a significant effect on their operation in the long run.

As a matter of fact both the interviews and the survey results underlined the fact the even though each stakeholder told us that there is an immanent risk in the industry their whole attitude toward risk and risk taking represent a low-key attitude. As it can be seen on *Figure 2* 90% of the answers represent this attitude but more than half of the answers are related to a risk-taker attitude and only one third of the answers are related to risk avoidance. Only 10 percent of the answers are related to extremities, where the risk avoidance has a much bigger share.

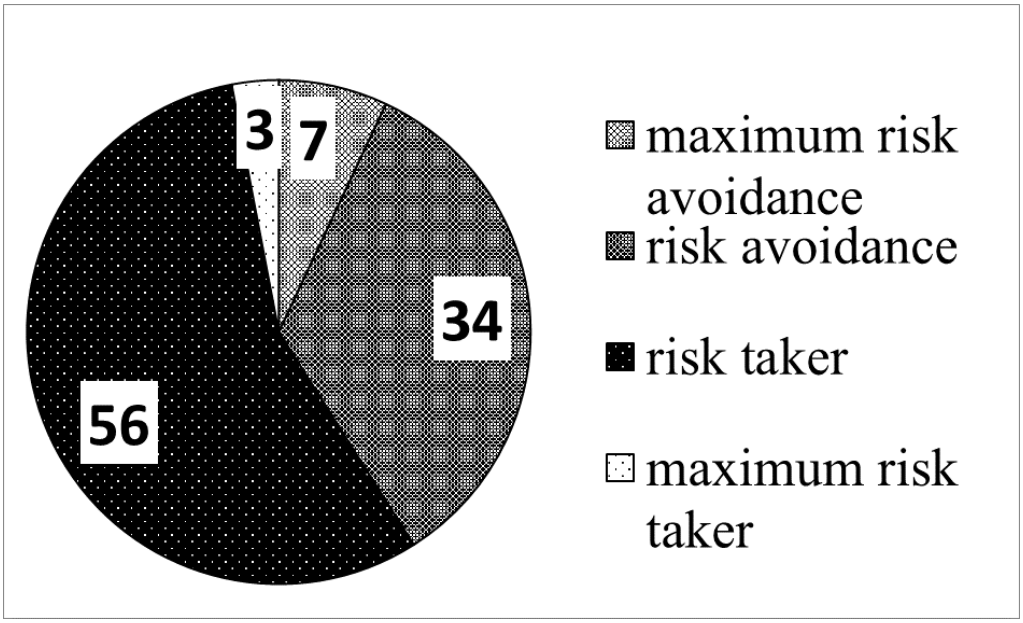

Figure 2. The companies attitudes toward risk-taking (%) N=99

3.3. RISK MANAGEMENT PROCESSES IN THE CONSTRUCTION INDUSTRY

Interestingly, even large construction firms have no separate risk management organization or organizational unit. Duties of the person managing projects includes the exploration, assessment, analysis of risks and the launch of necessary risk mitigation measures, and in many cases, the management of these, too. Risk management is usually a part of project management, taking place parallel with the time and cost planning of the projects. At players, working in a matrix organization, the project manager will organize a support team, consists of specialists from different functional areas and will conduct, monitor the project and manage the risks with their help. The project manager is a person who is absolutely concerned in the successfully accomplishment of the project because that is the key factor of the next mandate (Banaitiene and Banaitis; 2012; Zhi, 1995; Jannadi – Almishari, 2003; Kangari, 1988; and Zou – Zhang – Wang, 1985).

By well-operating, dominant players of the industry, project managers are supported by the top management and the shareholders, particularly in the introduction and implementation of risk mitigation measures. It can be also observed, that even the really big players have no regulated Risk Management System (RMS), a separate organization, or organizational unit operating these system. Risk management, operating as a part of the controlling and / or the project management processes is not insulated. It is typically treated as a drag and a necessary part of the administrative tasks.

Some interviewees even do not believe that a staff or organization, not being the merits of the certain project, could do anything to risk management. Investor-contractor battles, related to additional works, emerging in the after-care phases, the increase of bank guarantee requirements and unconditional bank guarantee institution and their drawdown, brought to life claim groups at large enterprises, consisting of qualified legal professionals, managing subsequent claims. Claims are important subdivisions of risk management, in several cases identified by the respondents simply as risk management. Activities related to the management of risks will be held together by the management. In the case of small, competitive edge companies, where economic activities are mainly limited to accounting, without controlled process systems, employees or departments who deal with the management of risks. Issues and phenomena related to the topic would converge at owner and or managing director, who would make ex post decisions, based on his or her experience and social capital.

4. THE DEVELOPMENT OF RISK MANAGEMENT

Some of the surveyed and interviewed, big companies, the *developers* believe that processes, tasks, currently operated and the applied principles at them are not entirely satisfactory, they should be improved, although they're not too bad. The biggest problem is believed to be the project manager, left to his own resources, unbacked, forced to make his own, individual decisions. In the past and today, there have been continuous efforts and pulses in this direction, especially by the owners. The interests of the management may differ, they would withhold when something goes wrong because they're afraid of loosing their jobs. According to the expressed opinions, the area should be developed. The result of these developments should be a simple, digestible methodology that sums up, provides guidance and can be taught and introduced easily. Training courses, related to the deployment, as well as the development of software, suitable for quantified information have a major role. It's s essential for the management to require a consistent implementation and application of the processes and tasks. According to key opinions, searching for exogenous solution, the education of these above should start at schools; an emphasis should be placed on strengthening the economic approach in the architect and civil engineer training.

The *longing* participants believe that the settlement of legal and economic regulators of the sector would bring to a solution, with normal prices, transparent and predictable regulatory environment and control. As a result of these, everyone could deal with the profession. As a longing and exogenous, but as a less passive solution, or as a part of, professional forums for sharing experiences and institutionalized solutions for these were also present among the answers. Smaller actors don't plan to undertake developments because according to them, these would be beyond their means. The pressure of survival enhances the weight of short-term planning; these actors, adopting follower strategies, applying asymmetric information and exposed to the strong adaptation of constraints, are encouraged to look out for solutions, coming from outside. Small firms hope that the solution will be embodied in the improvement of external conditions.

5. DISCUSSION

In our study, we have tried to show which group of risks can be interpreted and measured in the world of construction projects. We found that the company's size and position in the supply chain significantly determine the perception and practice of risk taking. Most companies take risks, because it's an inherent part, the industry itself is based on risk. While smaller companies emphasize financial and legal background when talking about risks large firms are also mention the human and human relation and organizational factor. Small companies risk management is based on minimizing external effects while large companies try to avoid the mistakes and risks of internal factors. The Hungarian construction elements outlined in the international trends blend into national difference could be made to the specific Hungarian legal situation as unique background factors.

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