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Critical Risks of the Grain Supply Chain in Hungary

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***Abstract* – In Hungary, annually tens of millions of tonnes of grain products are sold in commerce domestically and several million tonnes leave the country towards the export markets. The commercial chains dealing with the distribution are organised on the basis of the joint and complex effect of several special risk factors. The supply chains have to manage the uncertainties of the expectable grain yields, as well as the development of the local demand-offer relations. In addition to this, the development of the local prices is also influenced significantly by the world market price levels and processes. The agrarian policy of the country, as regards the grain sector, defines the fundamentals of the international competitive situation as well as the basis of the development of foreign trade. The individual members of the supply chain are not able to identify the economic risks that originate from this activity and then they are not able to manage these risks appropriately in each case. This study presents a solution for the management of the identified risks and for appropriately supporting the specific supply chain decisions.**

***Keywords* – Grain Markets, Risk Management, Supply Chain, Sustainability.**

I. INTRODUCTION

A significant part of the Hungarian GDP[1] is based on agricultural activities. Thanks to the geographical and climatic conditions of the country, it is a perfect site for agricultural activities and a significant part of its territories are suitable for cultivation. An extensive commercial network, processing industry and logistical chains have been built on the basis of the products of the agrarian sector. The specific crops may be used also as the input materials of several industries. For example from maize it is possible to make food raw materials for human consumption, animal fodder products, but even bioethanol fuels.

The raising and processing of grains are often directly connected to each other, through vertically integrated companies, company groups. One group of the companies deals with farming, another group deals with processing, yet another one with the selling of the processed products. In addition to the integrated companies characteristically there are also companies that are specialised only on certain activities, as e.g. fodder mixers, animal feed producers, food product manufacturers and fuel producing companies. In both cases the commercial process has to manage the uncertainties of the expectable crop yield, as well as the development of the local demand-offer relations. Due to the uncertainties and the unique characteristics of raw material trade special risk factors of several different types may appear in the life of the enterprises of the sector.

II. PERFORMANCE OF THE HUNGARIAN GRAIN SECTOR

When analysing the role of agriculture within the macro economy it can be established that the "agriculture-fishery-forestry" industry produces a significant part of the gross domestic product. The grain sector is an outstanding sector within this industry due to its production volume. The Table I summarises the results of this industry achieved in the previous years.

Table I: The gross added value and proportion of the agriculture- forestry-fishery sector within the Hungarian national economy. [5]

Year	2009	2010	2011	2012	2013
Value, at current price (million HUF[2])	782, 864	809, 176	1,106, 256	1,088, 116	1,098, 836
Share of the GDP (%)	3.5	3.6	4.7	4.5	4.4

The development of the GDP share – especially in the case of the products of the agrarian sector, and within it in the case of grain products – mostly depends from two factors, namely, the volume sold and the unit price of selling.

The output of grain production appears each year on the market unevenly, seasonally, after the period of harvest. The exact timing of the period of harvest is defined in an unpredictable way by precipitation and the weather, thus practically the intervention of mankind has no impact on this.

In addition to its unpredictable seasonal character, the quantity of grain products harvested domestically also fluctuates significantly year by year. There is a huge difference between the 10.3 million tonnes of 2012 and the 16.5 million tonnes of 2014. 2012 was the year of least yield, and in the subsequent years a growth may be observed as regards the volumes on the Diagram I.

On the basis of the historic data of the Budapest Commodity Exchange in Diagram II, the price of maize quoted on the commodity exchange was 61995 HUF per tonne in March 2013, and then the value of the same crop was only 35 918 HUF per tonne in November 2014. A reversed relationship may be observed between the development of the commodity exchange prices and the crop volumes as regards these two years. It can be also well seen that until the harvesting of the crops of year 2013 the weaker yield of year 2012 induced higher contractual prices even during the first half year of 2013.

[1] GDP - Gross Domestic Product

[2] HUF - Hungarian Forint

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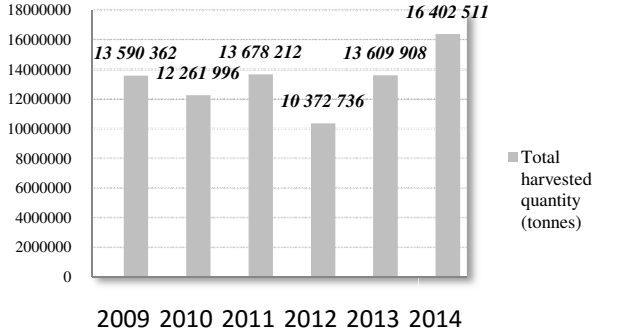

Diagram I: Harvested grain crops in Hungary, 2009-2014. [6]

Diagram II: Historic price quotes of fodder corn and feed wheat on the Budapest Commodity Exchange in HUF, 2013-2014. [1]

2013						
corn	***March***	***May***	***July***	***September***	***November***	***December***
	61995	59685	56732	49405	42104	44948
feed wheat	***March***	***May***	***August***	***September***	***December***	
	67510	66348	44044	43744	47916	
2014						
corn	***March***	***May***	***July***	***September***	***November***	***December***
	48345	51902	49020	-	35918	38669
feed wheat	***March***	***May***	***August***	***September***	***December***	
	53720	52200	43251	41814	45000	

The high level professional specialisation, the seasonal production of the cereals, the time shift between demand and offer led to the development of a rather specialised trade. All the risks of balancing production and processing is often undertaken by a trading company.

Trade is primarily based on feeding, foraging and energy industrial utilisation, but demand also includes a share of unlawfully conducted trade. Significant quantities had been moved and invoiced in a fictitious manner by VAT[3] crooks and business oriented criminal organisations. In Hungary the non-payment of VAT and the hiding of income tax are primary tax evasion methods as regards their volume [9.]. The population usually learns of the misuses explored as regards the grain trading sector from news that are widely covered by the press. [8]

Naturally the export demands also compete with the local demands. This competition is characteristically generated by the procurement demands of countries that are poor in grain (e.g. the countries of the Near East, some countries of Africa), therefore they may also have a significant impact on the trend of the domestic grain prices. This special economic and market environment and the unique features of the grain sector represent unique risks. It is expedient to explore these risks one-by-one and to summarise the most important aspects and to provide a solution for appropriately managing the related risks.

III. Market Pricing

60 % of the world's agricultural crop quantities is represented by maize and wheat. The development of the production of these crops is vital from the aspect of feeding mankind. The prices of these crops are reflected by the quotes of several commodity exchanges. These quotes also serve as reference prices for most of the commercial deals. [13]

The development of the world market prices nowadays already does not refer to a seller and buyer trying to agree in the price of a sack of wheat at a given marketplace. The commodity exchange prices are influenced by several complex factors, which have both physical and speculative aspects. The traditional group of participants of the physical demand-offer relation – for example the farmers, traders, end users – therefore have to face price influencing factors like the commodity exchange positions of different directions and extents taken by pension insurance companies and/or venture capital funds. These participants submit a significant part of the commodity exchange quotes based on different forecasts and management decisions.

Diagram III: Changes of the wheat prices quoted at the Commodity Exchange of Chicago [11]

The changes of prices of wheat quoted at the Chicago Commodity Exchange – the commodity exchange that may be considered the reference commodity exchange of North Africa - may be said to have been dramatic during the past five years. The Diagram III shows that from the level of USD[4] 500 per unit it gradually increased to USD 800-900 per unit and then, by today, it has dropped back again to the USD 500 level. This dramatic price movement made farming unpredictable, but the same way the options available to the processing industry also became unpredictable.

Let us put two imaginary straight horizontal lines across the above diagram, the production cost level of two farmers: one at the 500 and the other one at the 800 value. In our example the market occasionally paid even the price of the farmer, whose production cost was higher, but the market price generally moved under the high production cost price during the years.

[3] VAT – Value Added Tax

[4] USD = United States Dollar

Therefore the evolution of the commodity exchange quotes influences significantly the pricing options of the grain sector in each given moment. This means that it has a significant impact also on the revenues and expenses of the specific players, independently of their operation costs or operation revenues. This risk may be identified as the market **pricing risk**. This way among the deals taking place between the farmer and its buyer there may be even such transactions in the case of which the buyer gets certain crops at a cheaper price than the production cost of the farmer, because the world market price is lower than the farmer's production cost. In case the farmer at such a moment in time is under the force of selling, it may easily occur that it will realise a certain loss over the complete harvested quantity. However, this is true the other way around as well: if the world market price is the double of the production cost, the farmer will get a significant extra profit without having to take any methodological steps in practice in the interest of increasing its profitability. On the side of the buyer (trader, processor) the given higher price level also means that the financial plans have to be rewritten, the economic activity has to be transformed or even terminated. Market pricing is in close relationship with local supply-demand and the possibilities of substituting the specific products from another market. The changes of the supply-demand restructure the directions and the way of the goods flow frequently, meaning unbalanced utilisation of storages, transport tools and other supply chain infrastructures.

IV. Liquidity of the Market

Liquidity is a property that is characteristic of a given moment and a given geographical area or market. In the course of managing the liquidity risk it is necessary to assess and examine the liquidity of the target market. In connection with the liquidity of the market it has to be examined whether it is possible to trade with the given goods, assets at the currently effective market price, and if it is possible then in what quantities and how fast and with how low transaction costs this may be done. [14]

The agricultural crops get from the lands to the consumers, to the users through a complex value chain, in some cases after several transformations or different logistical operations that are significant even as regards geographical distances. The value chain built on the crops of the country is an integrated part of the world market. On the other hand several dimensions of the local value chain are defined by the current global demand-offer relations, meanwhile the world market trends are also decisively influenced by the local impacts. Such local impacts may be the climatic conditions of the given year, as a result of which the crop yields may change, or the level of development of the local processing industry, or the own market influencing means of the specific countries, which may appear in respect of a given crop e.g. in the form of an export prohibition. These local impacts define essentially or influence the level of the risk carried by the differences of the demand-offer sides, that is, the **liquidity risk** of the given commercial activity projected to the given country or region.

It is generally characteristic of raw materials – therefore it is characteristic of cereals as well – that they are available in large quantities in several points of the world and they may be classified into classes on the basis of certain quality parameters, and within one class the items may be replaced, substituted with one another and purchased.

The risk of liquidity can lead to forecasting problems, either the forecasts cannot be prepared on a proper level or the purchase or sale forecasts cannot be fulfilled even in case of these easily replaceable goods.

V. Regulatory Environment

Hungary joined the European Union (hereinafter referred to as EU) in 2004, and simultaneously with this it also joined the Common Agricultural System. The free flow of goods – including the cereals – transformed the former commercial structures and market relations. With the changing of the commercial environment we also entered the intervention system of the EU that had been created by the agricultural subsidy policy of the European Union. Within the intervention system it was possible to offer certain cereals in significant quantities for intervention purposes that is it was possible to sell the products to the EU – in Hungary as well – at crop prices fixed in advance. This regulatory environment provided a very favourable situation for the domestic farmers and traders, since in addition to the commodity exchange price for the same product there was another, state guaranteed price as well. This situation completely changed the structures of the specific commercial chains year by year. In the year in which the market price of cereals was higher than the intervention price, the products were sold on the market. When the market price was lower than the intervention price, practically each farmer offered its stocks for the EU intervention.

981 offering parties registered goods for intervention purposes in Hungary in the business years of 2004-2005. If sorted by quantity the first four offering parties represented 21 %, the next 155 represented 55 % and the remaining 822 represented 24 % of the interventions. In this period the number of farmers was approximately 200 000. Based on these ratios it may be said that mostly not the small farmers applied actively for this option, but probably the trading companies were the large offering parties. [3]

The items that had been submitted for intervention purposes within the framework of the EU program in the case of Hungarian crops had been stored by the Ministry of Agriculture and Rural Development until the central distribution system of the EU did not decide the fate of the stocks. The stocks had to be stored and the state did not have own storing capacities sufficient for the order of magnitude required as regards quantity. It was characteristic of the stored items that often they had to be stored for longer periods. Therefore from time to time the Ministry rented different agrarian logistical facilities and warehouses for storing the goods offered for intervention purposes. Around 2005, due to the above impacts,

privately financed significant crop storing real estate investment were implemented in Hungary, since in addition to normal commercial activity really significant storing demands appeared due to the intervention cereal purchases. This regulatory environment induced a significant number of cereal industrial and logistical investments.

By 2010 due to the problems and contradictions of the intervention system the EU completely terminated this institution system in the case of cereal crops. The regulatory environment changed within a very short time, the significant investments – driven by the intervention – became unfounded, and many of the players of the grain supply chain ended their activities and were terminated.

The **risk of the regulatory environment** encouraged many market players to review and reorganise their operation model, which in turn transformed the entire market structure. The specific national agrarian policies are able to change the international relations and the conditions of market competition up to an extent that requires that even the analyses of the economic indices of the given area should be done carefully. The identified risk increases proportionally with the speed of the changing of the regulatory environment and the extent of the changes. [4]

VI. The Volume of the Commercial Position

During the operation of a company that carries on classical trading activity there may be periods when the company purchases crops in advance or when it sells in advance or when it implements its purchases and sales at the same time. In the first two cases we are talking about taking a commercial position. Taking a position thus has a certain risk, because the crops purchased in advance will be sold only at a later time, and between the two different times – as it could be already seen on Diagram 4 – there may be significant price differences. The multiplication product of the price difference and the volume of goods is the value of the given position. The **volume of the commercial position** clearly represents a speculative risk. Closing a position or opening a position - depending on the volume - may even become impossible, if the market liquidity of the goods is terminated. In this case the bargaining positions, pricing possibilities become restricted on the market and characteristically the given commercial positions may be closed only with significant losses.

As regards the volumes of commercial positions it is practical to establish internal rules and/or measures along principles defined already in advance, since with these steps the risks of speculative risk exposure may be also mitigated. In other words, if a commercial position that has been built based on speculative reasons has to be executed, can lead to a lack of supply chain capacities or overpriced freight charges.

VII. Partner Risk

On the individual contractual deal level of trade characteristically a relation is established between two economic operators. In the course of establishing the relation those cases have to be taken into consideration, when the performance or partial performance of the given commercial partner may be questionable or there is a possibility of faulty performance or signing the deal with the given partner may have other harmful impacts for the company. The risks of this type are jointly called the **partner risk**.

During the assessment of the partner risk the primary task is to examine the given partner from taxation aspects. Partners that are not immaculate from taxation aspect carry not only the risk of the faulty performance of the contract. In the course of the investigation procedures of the tax authority in the case of the issue of a criminal act any economic organisation that is or has been in contact with companies of doubtful backgrounds may expect that they will have to meet significant data service obligations during the execution of the investigation procedure. If at the partner company the suspicion of the criminal act is verified, a company that assessed its partner wrongly - and practically participated in the line of activities of the organisation or organisation chain that implemented manipulations for the purpose of tax evasion - may easily be involved in trouble. The due diligence examination and selecting the partners from this aspect is in the elementary interest of each honestly operating economic operator. In addition to representing a company risk, the risks of this kind do also have an impact on the entire national economy, since these tax evading activities are often committed with involving an especially high amount of money, which by causing a lack of central budget revenues have a multi-layer and negative impact on the structure of the budget. [7]

In the interest of reducing the performance risks associated with the partner it is practical to sign the contract within regulated legal frameworks that provide guarantee for the financial compensation of a possible non-performance. In this regard the best regulated trading option, which practically provides complete security from this aspect, is trading at a commodity exchange. On the basis of the rules of the specific commodity exchanges the consequence of the impact of a faulty performance may be defined in advance. In this case legal liability, the process of indemnification and the accounting of performance if partial performance is done or performance is done at another parity are exactly defined.

If the trading partner does not trade within the frameworks of a commodity exchange, because the business requires other frameworks, certain guarantees may be provided by the legal background and the content of the contracts concluded by the trading partners. In the course of signing an international contract the parties may sign as the legal mandatory rule as the legal background the provisions of the so-called GAFTA[5] collection of legal

[5] GAFTA - Grain and Feed Trade Association, www.gafta.com

provisions, provided the contracting parties are members of the GAFTA organisation. This special legal institution optimised for cereals trade has even its own court body, which in the case of a dispute after a legal procedure that corresponds to the Anglo-Saxon law – on the basis of examining the documents, establishing guiltiness, providing the detailed reasoning of the decision based on the specific GAFTA articles – issues an award that is binding for the contracting parties. Therefore it is worthwhile to reconsider the legal background of the contract that is to be signed from the aspect of managing the partner risk.

If the legal frameworks do not allow the application of other institutionalised frameworks – for example a Hungarian trader signs a contract with one from Egypt – the incorporation of delivery and payment collaterals remains the only method that is available for avoiding the big surprises, which occur when the partner does not pay for some goods due to a complaint that is created subsequently. For these cases with the involvement of independent bank contributors, different credit letter document forms are used, the so called Letters of Credit. In the case of a Letter of Credit, prior to seller delivering, the buyer has to deposit the purchase price at a bank. The bank has to hand over this letter of credit to the seller, which letter guarantees that after the presentation of the delivery documents and certain quality documents the purchase price will be disbursed by the bank to the seller. [2]

In the most risky case the buyer transfers cash in advance or the seller delivers the goods without coverage. In these cases there is no coverage at all for inappropriate performance, the risk depends on decision of the courts made on the basis of the contract according to the decision making practice of the courts of the given legal environment.

Inappropriate performance of the partner causes delays in the trade execution, bottlenecks in the supply chain. Huge volumes of the goods can get stuck by a stage of the supply chain, the goods cannot reach their destination on time, and this can lead to idle times by the end users, by a processor plant.

VIII. The Aggregated Risk of the Supply Chain

"Is it possible to drive a car on a motorway with the driver glancing on the road ahead only in each two minutes, while the driver navigates himself with the aid of the rear-view mirror? At many companies even today they consider this method of driving to be natural." [10]

It is essential for the company to elaborate a strategic supply chain plan, which on one hand defines the major transport directions of the goods marketed by the company and on the other hand which provides the supply chain infrastructure planning as well.

In the course of the operation of the companies of the cereal trade sector it is very important to have adequate planning for their entire trade execution activities and to identify the imminent risks of the plan. Due to the high quantity of cereals characteristically the supply chain process may be sustained only with a significant transport capacity demand and infrastructure involvement, the logistics planning basically defines the level of the operation uncertainties, the shipping capabilities and bottleneck management possibilities of the specific participating parties in their supply chain. The limited capacities in the supply chain lead to a risk that include the lack of access to the necessary transportation methods, the possibilities of involving and using alternative and more expensive transport and storing solutions or the possibility of causing a default situation during the trade execution process.

In the decision making process of the trading activity even the strategic decisions are made within a short term. Depending on the size and structure of the specific companies the management of their strategy may change, however it is absolutely essential to examine and to take into consideration the market signs and signals for elaborating a successful strategy [12]

During the development of the strategy questions similar to the following ones have to be answered: In what period should we trade? In which market should we trade? What trading positions should we sustain in the specific markets and countries? Before answering all the theoretical questions, one practical question has to be answered too: How will we fulfil the contracts and execute them?

All the risks mentioned in this study have a huge impact on the supply chain performance. The aggregation of the different risk factors identifies the overall supply chain risk characteristic of a given market.

IX. Risk Diagrams

In the course of the decision making process exploring the above named risks, integrating them into a system and their visual presentation are helpful means. The risk diagrams provide solutions for the overall risk analysis of the different market segments, and with taking into consideration the aspect systems it is possible to select the markets that meet the risk undertaking policy of the company, where the supply chain performance can reach its best.

The **risk diagrams** contribute to trading enterprises doing their business activities in a sustainable manner. The areas of the circles correspond to the magnitude of the identified risks. The aggregated risks will be the risks of supply chain defined for the given market. In the following the risk diagrams of two different market segments are presented as illustrative examples. If the evaluation of the individual risks is prepared, then viewing the aggregating circle it is possible to read the risk of the given segment at the given time. With the aid of this tool in the course of decision making it is practical to focus bigger sources on the market, where the risk of sustainable operation is smaller, or smaller with an order of magnitude than on another target market. Two diagrams for different type of sample markets can be seen on the Diagram 4.

Naturally the diagrams are suitable for mapping a given period of time. It is possible that the risk factors will change even within a short period, and due to this after evaluating the market signals and information in case there is a signal that indicates a change, it is practical to modify the risk values, because together with this the sustainable value of the trade of the given market will be also modified.

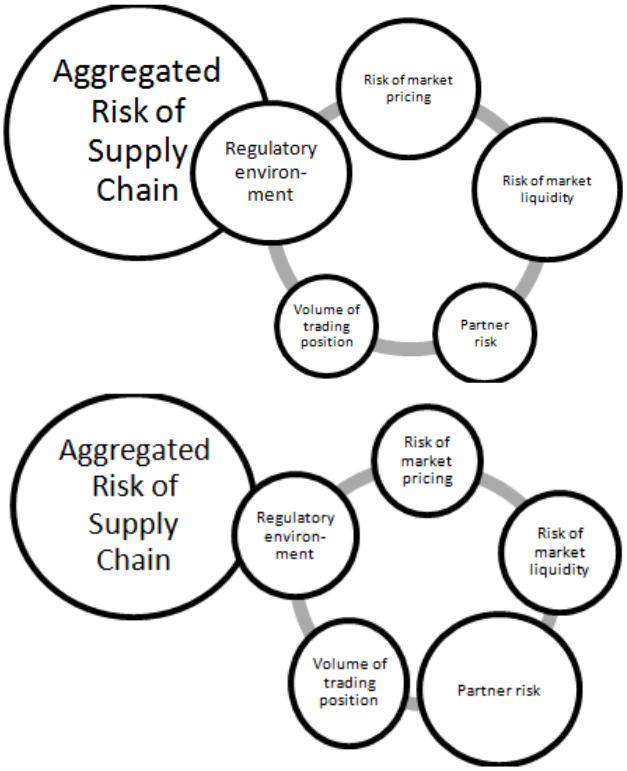

Diagram 4 – Risks identified for two sample markets of grain trade. Diagrams made by the author.

X. Conclusion

Within the grain sector several companies of ten billions of HUF turnovers and with long tradition disappeared, became bankrupt practically at a glance after Hungary joined the EU. The changing, reshuffling of the market relations is going on even today.

The main reason of reshuffling is the fact that the companies disregard the risks inherent in the supply chain mechanisms of cereals, as raw materials. Disregarding the possible risks or using inappropriate management methods for eliminating them makes the operation of the given company impossible, and in the worst case it causes significant losses and leads to the termination of the company through bankruptcy.

The grain trading sector in Hungary as a player of a complex market structure has been able and is able to produce significant results, provided in the course of the trading activity the individual companies define as the top priority target of their strategy the implementation of sustainable operation. Sustainability requires permanent market monitoring, adaptive strategy making processes, fast reaction and appropriate preparation from the participating parties.

The risk management system recommended provides a simple, but nevertheless effective means for the decision makers in order to be able to implement their activity with an appropriate and accepted risk level. The individual companies that use such a risk identification system can decide easily which market to enter or which market to focus on. It is also a useful tool to make visible and follow the change of the formation of each identified risk factors and the whole critical risk issues. The members of the supply chain are able to analyse their individual risk situation, and also able to model the risk situation of their customers and suppliers.

In addition to this it may serve as a starting out point for further, diagram based risk research that is based on quantitative methods. By examining the risk judgement and decision making of the different sized and structured companies it will be possible to define the risk levels that are characteristic of the individual groups of the domestic grain trading sector.

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AUTHOR'S PROFILE

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was born in Budapest (Hungary) on the 13st July 1952, received his master degree (1979) and doctor university degree (1981) from the Economic University Budapest. Thereafter, Mr. Nagy was assistant professor at the College for Finance and Accountant in Budapest. His major research interest was initially mainly corporate finance and management. The theory and practice equally characterised his research and publications (today more than 130) from the beginning. In 1988 he acquired his higher scientific degree, Candidate of Economic Science (CSc), at the Hungarian Academy of Sciences.

He worked thereafter for 15 years as CEO and Director for foreign-owned companies, such as Bank Austria Investment Bank Ltd. Budapest, BayWa and RWA AG (Munich in Germany and Vienna in Austria). In2004, he returned to higher education in Hungary to utilize the experiences and works for Obuda University (Budapest) as associate professor. He pursues an active teaching and research work at the Doctoral School on Safety and Security Sciences too. He received his habilitation degree (2014) from the University Debrecen (Hungary).

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has obtained a transport engineer degree from Széchenyi István University in Győr, Hungary (2000), received a postgraduate diploma in accounting & finance from Business School, Hungary (2002) and holds an MBA degree from University of Pannonia in Veszprém, Hungary (2014). Currently he is a phd student of the Doctoral School on Safety and Security Sciences at Óbuda University Budapest, Hungary.

He has more than 10 years of mid- and top management experience especially in the field of logistics, supply chain and operations management. He is active in the research of relation between company competitiveness and corporate culture and focused on the evolution of enterprise risk management systems.