THE EVOLUTION AND STRATEGIC MOVES OF ROMANIAN ENGINEERING CONSULTING AND DESIGN SERVICES FIRMS SERVING THE STEEL INDUSTRY

Gabriel Sorin STROE[1]

In the case of professional services firms, the engineering consulting and design firms belong to, it is argued that they are client dependent and their reactions to the changes in the environment are driven by the actions of their clients and not by any internal logic or strategic direction. The purpose of the paper is to show whether this unidirectional dependency relationship exists in the case of Romanian firms that provide engineering services for the steel industry from Romania (client industry), and what survival strategies they applied when the client industry exhibited decline over an extended period of time.

Keywords: professional services firms (PSFs), Engineering Consulting & Design Services Firms (ECDSFs), steel industry, client industry, survival strategy.

1. Introduction

Within the professional services firms (PSFs) sector, Engineering Consulting and Design Services Firms (ECDSFs) are among the least studied entities ([1], [2], [3], [4], [5]) as far as their management and business strategies and practices are concerned. Moreover, the strategic researchers have paid little attention to the competitive environment of these firms and their behaviour determined by the actions and moves of their clients.

The ECDSFs, among others of the same knowledge-based and professional type, are worthy of attention since they played and are still playing an important role in the economic growth of countries in the world today ([5], [6]), and it is assumed they will play a major role in the new "knowledge economy" as well.

That they have been unnoticed so far is probably because they are so obscure, small and hidden in statistics as services or, in the best case, as PSFs in general. Another likely reason for the shortage of studies on engineering consulting and design services firms is that these private firms have little incentive to reveal their financial status and, as a result, it is difficult to get them responding to surveys that inquire about explicit data about their performance [2].

[1] PhD Student, University POLITEHNICA of Bucharest, Romania, email: sorin.stroe@uzineng.ro

Consequently, the Romanian literature on the management and business practices of Romanian engineering consulting and design services firms serving industrial sectors is practically inexistent or less known.

The analysis in this paper is supported by the extant literature on strategic management of professional services firms, by the available official data regarding the outputs and performance indicators of these firms and their client industry's, also draws from authors' own experience, one of them with more than 20 years in the consulting and engineering design industry, both as a design engineer also as a general manager of a Romanian leading engineering company.

The present paper starts with an introduction to the engineering consulting and design services sector, then followed by a short presentation of this sector in Romania, by an overview on the evolution of the steel industry in Romania and evolution of Romanian engineering consulting and design services firms from 2004 until 2012. The study purpose is to try to find out what Romanian ECDSFs did actually do when their client industry declined over an extended period of time, and what their evolution trajectories were in comparison with those of the client industry. The focus was on analyzing the Romanian ECDSFs serving the steel industry, and the steel industry from Romania over a period of nine years during which both industries faced turbulent times, radical changes and growing uncertainty. The paper ends up with a set of conclusions and managerial implications, also with a set of proposed directions for further research on the industry.

2. Introduction to the industrial engineering consulting and design services sector

Engineering consulting and design services, as highly specialized activities, represent a key knowledge-intensive sector that emerged during the later phase of industrial development when a need for innovative solutions and improved design for construction projects, plants layouts and technologies became evident. It has been seen as the key factor in the generation and definition of new technologies in advanced industrial economies and as a key, risk-reduction factor in undertaking technology transfer in developing economies.

Engineering consulting and design services are generally defined as highly specialized activities of intellectual nature, which identify, select, organize, process, and apply technological engineering knowledge for purposes of investments and production. They are characterized by certain methods/methodologies of work and often by a multidisciplinary approach (engineering, architecture, economics, finance, project management, environment protection). The ECDSFs may provide any or all of a number of services, from consultancy to engineering, and these services can be categorized according to the

stage of a project for which the services are provided. As such, there are services related to formulation of the project, research operations which explore various technologies available for a specific operation resulting in the choice of product design and technology to be used, project evaluation, basic and detailed engineering and design, procurement of plant components, preparation of bid and contract documents, supervision of fabrication and construction, commissioning, testing and start-up of a new plant, training of personnel, services related to the operation and maintenance of an industrial facility.

The engineering consulting and design services industry is very heterogeneous but in this paper we focus on those engineering consulting and design services firms which serve an important industrial sector in Romania, namely the steel industry, getting involved in investment projects to be implemented in this client industry. Industrial engineering consulting and design services are particularly defined as activities involved in the identification and organization of technological knowledge, relating its possibilities and uses to the context of physical, technological, economic, social, and environmental requirements. Depending on the stage of a project within which the services are provided, these services can be grouped into three categories:

- Pre-investment engineering services, rendered before the materialization of an investment, in order to identify, prepare and evaluate projects and select the appropriate technologies. These services are provided before the actual start of engineering design and fabrication and comprise techno-economic, pre-feasibility, project feasibility and evaluation studies (including market, location, technological, economic, commercial, financial and environmental aspects), preparation of terms of reference and invitations for tender;
- Project implementation engineering services, rendered during the execution of the project. These services comprise project engineering (choice of appropriate technology and equipment, engineering surveys, specifications, tendering, bids evaluation and contracting, negotiation of financial, commercial, know-how agreements, information systems), supervision of project execution (procurement, fabrication, construction, erection, installation), and commissioning and start-up (including personnel training);
- Engineering services for management and production, rendered during the operation stage of an investment which has already been materialized. These services comprise technical assistance and troubleshooting during operation/production, production planning and control, cost control and optimization, product design and development, process improvement, quality control and maintenance systems, sales and inventory systems, expansion programmes, personnel training, management information and control systems, etc.

Engineering design services, rendered mainly during the project implementation stage (project engineering), are particularly defined as activities involved in the application of knowledge in order to develop data, diagrams, drawings, models, simulation and calculation reports, product&process specifications, bills of materials and fabrication specifications, wear and tear parts specifications, painting, packing, labelling, and transport specifications, procurement specifications for special plant components and equipment, risk analysis reports, instructions for assembly, erection, installation, commissioning, start-up, operation, maintenance, with the purpose of implementing physical facilities for economic activities, and of optimizing and maintaining the existing facilities.

The industrial engineering consulting and design services are required in conjunction with procurement, fabrication, construction, installation and commissioning activities to implement industrial investment projects that are usually undertaken to build new industrial facilities, increase the capacity or improve the productivity of industrial facilities, although safety and environmental based projects are also common.

The markets for engineering consulting and design services are therefore primarily related to the growth of industries (metals, mining, power, oil & gas, heavy machinery, cement, pulp & paper, rubber, glass, etc) and construction sector, and business in this industry tends to fluctuate with the cycles of growth and stagnation in manufacturing and production in major markets. Demand of industrial consulting and engineering design services is regularly characterized by uncertainty, unpredictability, severe fluctuations, stagnation, or even discontinuity over time, depending on the economic cycles, growth and development of client industries and investment policies and plans of the potential customers belonging to various industrial sectors.

Nowadays, almost all countries have their own engineering consulting and design companies that have been founded in order to assist local industries and organizations in the development and implementation of new technologies and products on investments projects. It is said that engineering consulting and design services play a unique and crucial role in industrial development due to their presence at the junction of information and decisions flows circulating amongst productive units, capital goods fabrication, and research and development. Since the outputs of the engineering consulting and design activities are not products that feed the final consumption in a society or industry, but inputs to other industrial activities (industrial investments projects principally), their demand largely depends on the volume of these activities which are themselves related to the extent of actual or planned changes in a country or client industry [6].

From time to time, firms' environments undergo cataclysmic upheavals, that is changes so sudden and extensive that alter the trajectories of entire

industries, overwhelm the adaptive capacities of resilient firms, and surpass the comprehension of experienced managers. This was the case of Romania when, in 1989, all the industries and entire economy faced such an upheaval. Like earthquake victims, researchers and managers run for shelter, wait for the dust to settle down, and then return cautiously to search through the debris. This was a general situation in Romania, although some managers had the forwardness and ability of changing their optics, successfully managed the new situations and secured the survival of their companies.

Currently, the services the ECDSFs aim to deliver are increasingly coming under pressure because of a continually changing environment, economic cycles and competitive dynamics affecting the spending patterns of their clients [7]. Because of the technological developments, globalization and changing roles of competitors, blurred identity of the industry, commoditisation of engineering design, shifting patterns of customers' demand, slow and erratic growth in the domestic market, intensified regulatory pressures on business conduct and investment decisions, intensified competition both from traditional domestic competitors and also from the new wave of foreign competitors entering domestic market, the Romanian ECDSFs had to take notice of these changes and seek out viable strategies - from the narrower range of strategic choices - through which to be able to survive and continue their endeavours to drive innovation and economic growth, thus fulfilling their mission and the critical role that they play within the national context.

The engineering consulting and design services sector cannot be viewed in isolation since the sector's structure and trends are influenced, among others, by a wider range of stakeholders, out of which the customers are of vital importance. It is argued that there is a strong, close, and vital dependency of ECDSFs on their clients and that much of ECDSFs behaviour is directly driven by what their clients are doing and not by any internal competitive logic or deliberate strategic direction. Generally, ECDSFs tend to follow the same economic cycle as their customers but with more exaggerated swings between peaks and troughs, for the simple reason that they are, in many cases, the first thing on which cash is spent on upswings and the first to get dumped in downturns [7].

3. The steel industry in Romania – evolution and actual status

In Romania, a country with a strong steel making and manufacturing tradition, steel making industry enjoyed a privileged position during the planned economy until 1989 and has maintained its important role, although declining, in production, employment and foreign trade until present day. After 1989, most countries in the Central and Eastern Europe have passed through long recession periods which led to low levels of capacity utilization, significantly reducing their

production, with Russia, Ukraine, Romania, Poland and Czech Republic being the most affected.

In the past 25 years, like in the most countries in the region, the Romanian steel industry has undergone a major restructuring and preparation process for the European and world steel markets competition. In this context, there was an attempt to proportion production capacities to market needs, to close overcapacities, to modernize the steel making and rolling facilities that were still functioning, to optimize the number of personnel in accordance with the level and technicality of production capacities, and to privatize the steel companies [8]. After 1989, capacity utilization level decreased steadily from 75% to below 60% in 2002, although approximately half of the existing 18 million tons/year production capacities were closed because of the obsolete equipment and technologies that resulted in highly inefficient operational activities [9]. The evolution of the steel industry from Romania between 2004 and 2012 in terms of crude steel production is presented in Figure 1.

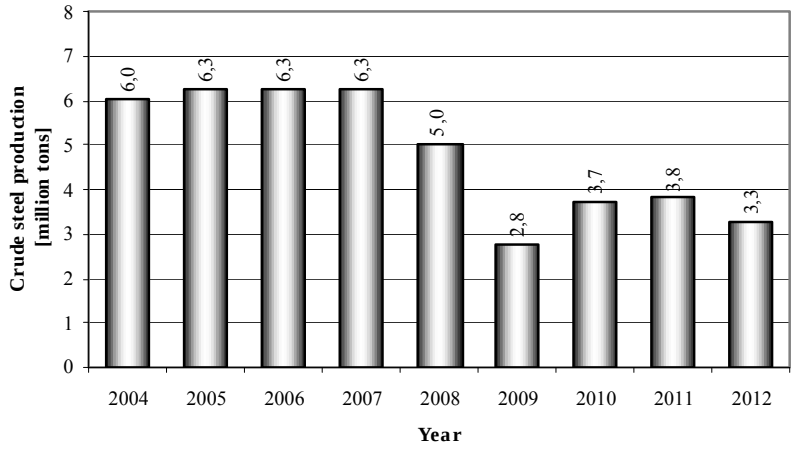

Fig. 1 – The crude steel production in Romania 2004-2012
(source: authors' own construction based on data from [9])

As one can notice, if in 1989 the Romanian steel industry production reached 14.4 million tons crude steel ([9], [10]), in 2004 the production dropped to approximately 6 million tons, that is 41.6% of the 1989 production. In 2012, the total crude steel production reached approximately 3.3 million tons, that is a decrease by 45% as compared to 2004, and by 77% as compared to 1989 [9]. As compared to 2004, it can be said that the steel industry has faced a decline in terms of crude steel production. Moreover, the decline can be acknowledged also

by the reduction of production capacities, turnover, and number of employed personnel.

Nowadays, the following steel mills are still in operation: ARCELOR MITTAL Flat Carbon – Galați, ARCELOR MITTAL Long Products – Hunedoara, ARCELOR MITTAL Tubular Products – Iaşi, Roman and Galați, CORD – Buzău, DAN STEEL – Beclean, DUCTIL – Buzău, ERDEMIR – Târgovişte, GALFINBAND – Galați, GRANTMETAL – Bucureşti, GRIVIȚA – Bucureşti, EUROSTEEL Industries – Bucureşti, LAMDRO – Drobeta Turnu Severin, OȚELINOX – Târgovişte, PROFILAND-INTFOR – Galați, SÂRME şi CABLURI – Hârşova, METALICPLAS – Dej, TENARIS – Zalău, Călăraşi, Câmpina, TMK ARTROM – Slatina, TMK – Reşita, TUBINOX – Bucureşti, ZIMTUB – Zimnicea, DONALAM – Călăraşi, STG STEEL – Focşani, FERAL – Tulcea [9]. The companies from Târgovişte, Oțelu Roşu, Câmpia Turzii, Buzău, Brăila, that belonged to MECHEL Group until 2013 have not been mentioned because of the fact that they are all in insolvency and their future is uncertain.

The steel industry from Romania is a very important sector for the national economy because, as a part of several industrial value chains and being closely connected to many downstream industrial sectors (automotive industry, constructions, electric and electronic industry, machinery industry and ship-building industry), represents a multiplier of gross value added, industrial production, employment, and taxes as well. In 2012, with approximately 22.5 thousand employees, the steel industry from Romania achieved about 2% out of European Union's steel production and contributed to achievement of macro-economic indicators of the country, namely: circa 8% out of total industrial production and around 11% out of total export volume of the country ([11], [12]).

Today, the steel industry from Romania is 100% privatized and the new owners are foreign industrial groups, in proportion of 80%. Although steel industry boosts the national economy, the steel policy is not being formulated at Bucharest any longer and seems not to be guided by long-term national goals and perspectives.

After almost 25 years of downturn, the steel companies from Romania are still struggling to improve their international competitiveness, facing similar problems such as overcapacities, fragmentation and a production structure and quality that do not always match the market requirements.

4. The Romanian ECDSFs serving the steel industry – evolution and actual status

In Romania, many engineering companies (former state owned industrial technology institutes) were established more than 50 years ago with the intended mission to serve industrial sectors, such as iron & steel metallurgy, non-ferrous

metallurgy, mining, cement, oil & gas, pulp & paper, glass, rubber, textile fibres, power, machine-tools, heavy machinery, ship-building, etc, and some of them are still in operation today. After 1989, along with the restructuring and changes occurred in Romanian industrial sectors, many of these engineering institutes suffered dramatic changes and some of them got closed, except for those operating in iron & steel metallurgy, cement, oil & gas, power and ship-building.

In the iron & steel industry, the three Romanian engineering institutes IPROMET S.A. Bucureşti (founded in 1958), IPROLAM S.A. Bucureşti (founded in 1959), and UZINSIDER ENGINEERING S.A. Galați (former ICPPAM S.A., founded in 1960) are still functioning and serving the steel industry. Even if they were initially allocated certain Romanian steel companies as clients, or within a certain steel company a certain technological sector to provide support services to, after 1989, because of their market's shrinkage, they started sharing the uncertainty arising from the future evolution of the domestic market and competing against each other and against other foreign engineering companies on the entire steel industry in Romania. On the other hand, the Romanian engineering firms realized the inevitability and started to compete internationally, particularly when acknowledged that foreign companies started competing on Romanian market fact that led to shrinkage of their market share. It is argued that firms which operate internationally are more likely to survive than firms operating solely on the domestic market [13].

Between 1990 and 2000, the Romanian ECDSFs serving the steel industry relied almost exclusively on and easily derived their revenues from contracts with the Romanian steel companies owned by the government. But, beginning with 2000 and completely effective 2004, the year when the privatization process of Romanian steel industry ended, the loss of the traditional and reliable client posed a bigger threat on ECDSFs than before and thus they started to deal with the new owners of the steel companies and search for new clients and projects from other related industries in order to smoothen the demand fluctuations and manage the uncertainty of the engineering services market.

In order to take out of discussion the influence of government ownership on the investments and commercial transactions of the steel companies from Romania, it is considered of relevance for the present analysis the evolution of steel industry and engineering consulting and design services sector serving the steel industry in Romania during the period between 2004 (the year when the privatization process of Romanian steel industry ended) and 2012. Thus, in Figure 2, the evolution of total turnover for each of the three Romanian engineering firms serving the steel industry is presented.

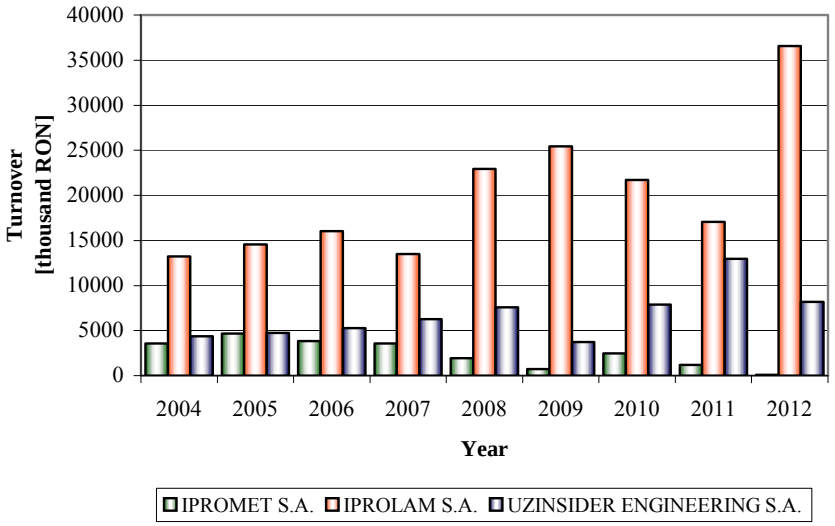

Fig. 2 – Total turnover of Romanian engineering firms serving the steel industry (source: authors' construction based on firms' official data)

As one can notice, except IPROMET, the other two engineering firms followed a slightly fluctuating but growing trajectory in terms of turnover. Because there are no actual and reliable official data regarding the turnover of the steel industry from Romania, we assume that its turnover is directly proportional with the steel production, and the variation shape is similar for turnover and production. This assumption may be accepted just to get an image of the evolution trajectory. Thus, in Fig. 2 can be seen that there is no similarity between the evolution of the steel industry and evolution of the two engineering companies, IPROLAM and UZINSIDER ENGINEERING. IPROMET only exhibited a decreasing trajectory, approximately of the same shape as steel industry did.

It can be concluded that, apart IPROMET that had a similar evolution trajectory as steel industry had, the other two engineering companies followed different and growing trajectories. In order to explain this phenomenon, we have to search for the determinants of this difference in evolution.

Thus, for each company (except IPROMET for which official detailed data are not available) the total turnover has been decomposed and retained the portion which has been derived from domestic market, from steel industry and other industries (Fig. 3, Fig. 4).

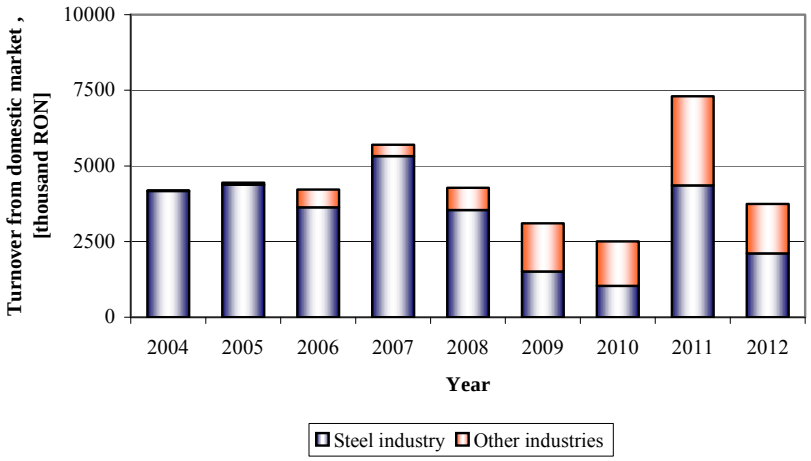

Fig. 3 – The structure of UZINSIDER ENGINEERING's turnover derived from engineering services for domestic market (source: authors' construction based on firm's official data)

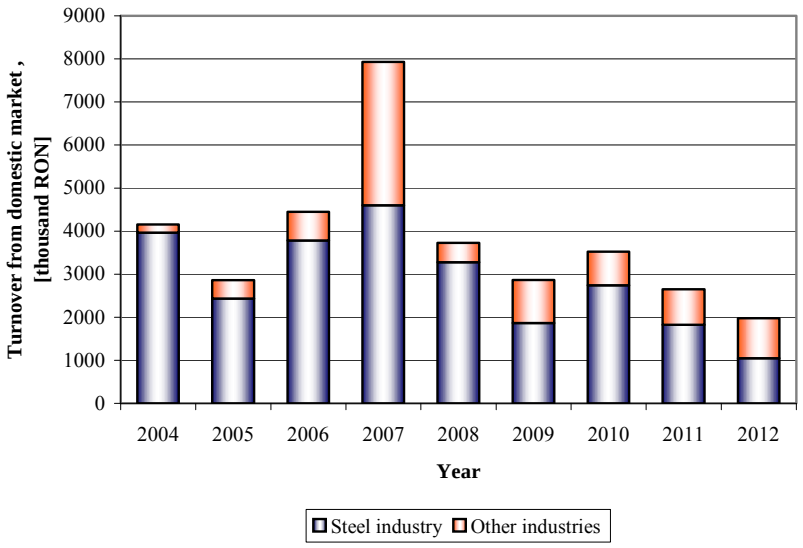

Fig. 4 – The structure of IPROLAM's turnover derived from engineering services for domestic market (source: authors' construction based on firm's official data)

As one can see the evolution of turnover derived from contracts with companies from the domestic steel industry, both for UZINSIDER ENGINEERING and IPROLAM, followed a general fluctuating but descending path, in line with the evolution of the steel industry from Romania.

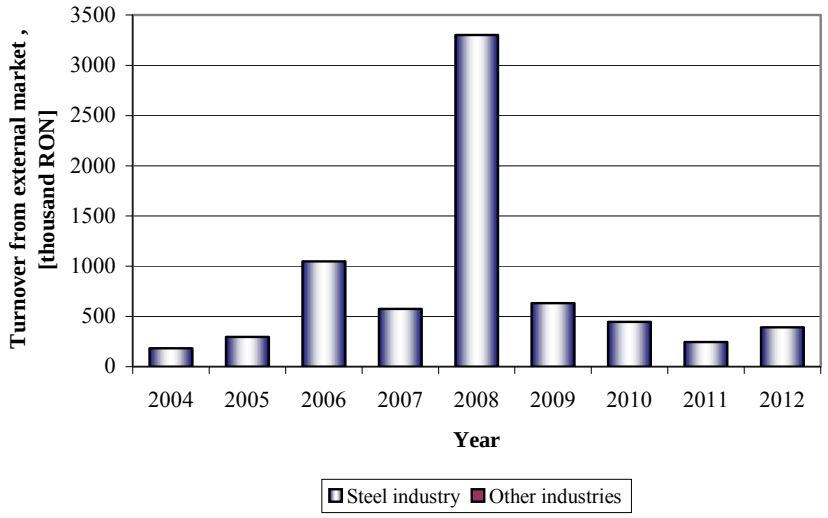

Fig. 5 – The structure of UZINSIDER ENGINEERING's turnover derived from services for external market
(source: authors' construction based on firm's official data)

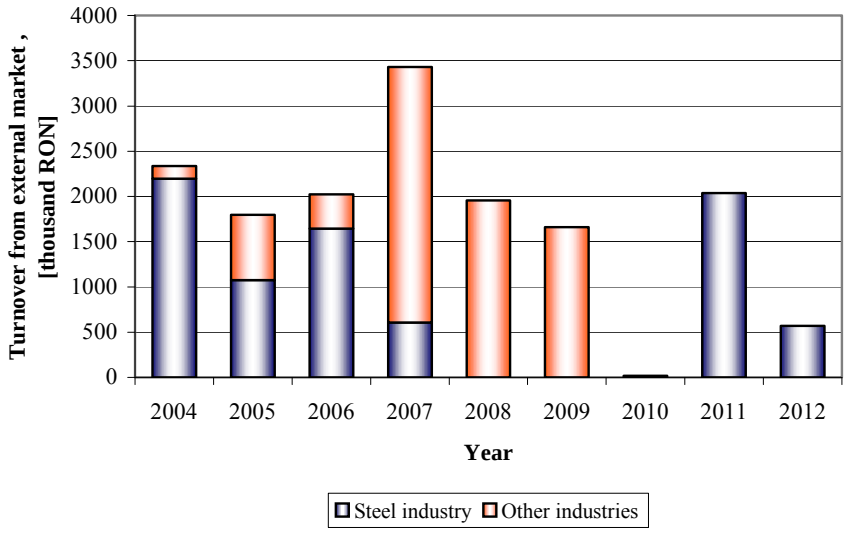

Fig. 6 – The structure of IPROLAM's turnover derived from services for external market
(source: authors' construction based on firm's official data)

As one can see in Fig. 5, for UZINSIDER ENGINEERING, the evolution of turnover derived from contracts with companies from the external steel

industry presented an aggregate growth of 16.5 times in period 2004-2008, then followed by a drop of 8.25 times in period 2008-2012. As for IPROLAM, Figure 6 shows that they had a descending evolution in period 2004-2010 followed by a slight growth in 2011 and 2012.

5. Conclusions on the evolution of the two industries

After a process of restructuring and capacity adjusting the steel industry from Romania was completely privatized in 2004. Since then, the business conditions changed once more in this industry. The new owners tried to optimize the costs and find ways to produce more competitive products as the global competition was very tough in this industry.

In this context all the investments have been thoroughly and carefully planned and their volume decreased to such an extent that resulted in shrinkage of demand for engineering consulting and design services, and an excess of engineering services capacity, which affected to some extent the Romanian engineering consulting and design services firms serving the steel industry (their client industry).

6. Managerial implications

The evolution of the Romanian engineering companies was not as dramatic as expected. As an immediate reaction to the shrinkage in demand for engineering services, the Romanian ECDSFs applied some strategic moves which resulted in beneficial outcomes for them and secured their survival. It is appropriate to call them *survival strategy.*

By analyzing the above diagrams, one can see that Romanian ECDSFs diversified their markets and approached and delivered their services to other industries belonging to the Romanian industrial sectors. On the other hand, these companies approached and delivered engineering services to steel industry and other industries from abroad.

This theoretical and empirical analysis of Romanian engineering consulting and design services firms *versus* their client industry (the steel industry from Romania) shows that ECDSFs have been affected to a little extent by their client industry. They faced a number of challenges with strategic and managerial implications generated by the client industry. The most critical seem to be the challenges arising from the client dependency the ECDCs face, i.e. the fact that the spending patterns of the client industry directly affected the turnover and market orientation of ECDSFs.

7. Avenues for further research

This analysis referred to the Romanian engineering consulting and design services firms serving the steel industry and revealed the strategic reactions of these firms as a response to the decline of the client industry. However, similar studies can be conducted in case of Romanian engineering consulting and design firms serving the mining industry or the nonferrous metallurgy industry that suffered serious decline after 1989.

On the other hand, similar studies can be conducted at a global level or in different countries by discussing the specificity of evolution of engineering consulting and design industry and steel industry varying from country to country. These discussions may depend on a large set of variables and parameters to be taken into account, such as: the industrial development status of the country (highly industrialized, developing, or under-developed country), the development perspectives of the country and influence of government policies, the historical evolution of the engineering consulting and design industry in the country, the market sector within the ECDSFs operate, the international linkage and technology transfer, the strategic approach and concentration on the development factors of the ECDSFs, the economic cycles, globalization, deregulation, relaxation.

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