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Business based on modern technologies

The present issue of FAIMA BUSINESS AND MANAGEMENT JOURNAL is dedicated to how the business can be developed based on modern technologies.

Commercial businesses are relations between two parties whereby both trying to have a gain. Entrepreneurship can occur whenever there is a feasible idea and forces to turn the idea into a business.

For business it is necessary to have an idea, a set of concepts that enable success.

Plato said that ideas are the essence of things; they cannot be seen, but they turn into the real world. The business idea should relate to the product envisaged to be realized, to customers who will buy the product, and to the product field. On this basis the business concept needs to be clarified; it can be determined by identifying three dimensions: the market, the needs satisfied, and the technologies used in the field.

If the concept is a viable one, a structure called strategic business unit can be designed.

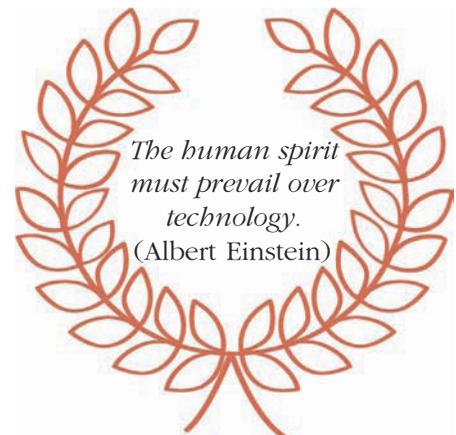
Businesses are based on technology, which is a set of available knowledge and skills required to transform a structure. Technology materializes in equipment, procedures, documentation and know-how, utilized to realize a product in favorable economic conditions. Technologies are business accelerators and not business creators.

The technological potential of a firm is given by the value of technology resources existing within it.

Technologies have a certain life cycle and there are embryonic technologies, emerging, evolving, mature, declining and outdated technologies. Most entrepreneurs use craft technology, although large companies showed that they developed with high-level scientific technologies. The use of these technologies is not more difficult than the craft technologies.

A technology loses its novelty in 8-12 years. Dissemination of technology follows a similar cycle, with an incubation phase, test, spread, maturity, saturation phases. At a given time, companies possess a portfolio of technologies in different stages of the life cycle. Making a product requires different technologies seniority. Business can do with disruptive technologies, technology simplified (less sophisticated), arising from the advanced one.

Performance technology increases slowly, and then linearly at the end is capped. For this reason, technical progress should be sought in new solutions and emerging technologies.





At the same time, technologies are goods for sale and they have a price. It is believed that the technology can be bought, but good technology is not for sale. Buying licenses does not lead to mastery of technology.

Technology influences the production process by several aspects. For example the cost of manufacture depends on how technological development is achieved. It affects labor costs, losses due to working capital asset, cost of equipment and the tools. As time passes, due to technical progress, duration of efficient fabrication of a product decreases. The smaller the

time for technological development, the longer the life of a product. Technologies influence the company's structure. Some technologies are suitable for small companies; others imply the existence of large enterprises. Also, technologies influence resource use. Upgrading technology has economic influences, reflected in the quantity of goods produced and the resources used.

The evolution of technology occurs in leaps, discontinuities. A metaphor about technology is a tree which shows that the enabling technologies give enterprise capability, which transforms into processes, which allow the manufacturing of products.

Technologies are business accelerators, they are not business creators.

Examples comprised in this issue of the FAIMA Journal show that a variety of modern technologies have been applied to develop new business.

*Prof. Sorin Ionescu
Editor-in-Chief*



TECHNOPRENEURSHIP – AN EMERGING CONCEPT

Cezar Scarlat

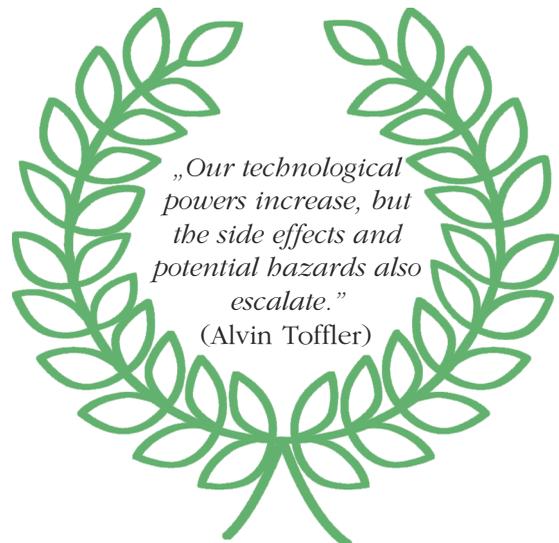
University „Politehnica” of Bucharest, Romania

Abstract

Technology, innovation, and entrepreneurship are all subjects of current interest – for both theorists (as academia, researchers’ community) and practitioners (business people as well as strategists and decision makers at all levels) – each subject having its own quite well-defined study area. This paper introduces the concept of Technopreneurship as a merging point and interdisciplinary area of interest of entrepreneurship, technology, and innovation. The concept emerges naturally, as recent development trend of all the above. However, the author takes the entrepreneurship side (actually technology-based entrepreneurship). The three focal merging areas of interest are presented on the background of recent literature summarized survey on several topics related to entrepreneurial studies: entrepreneurial profile; gender, age and ethnicity; entrepreneurship studies by industries and/or regions; legal and fiscal entrepreneurship environment; entrepreneurship education and entrepreneurial university. Some newer areas of entrepreneurial studies are also mentioned: intellectual entrepreneurship; social entrepreneurship; entrepreneurship infrastructure; entrepreneurial networks. The aim of the paper is to launch a provocative discussion on the newly coined term Technopreneurship, and even newer concepts as Technowledge (technology knowledge) and, therefore, Technowledgepreneurship (technology knowledge entrepreneurship).

Mostly conceptual, based on significant literature survey, the paper explores the entrepreneurship bordering areas, and the discussion stimulated by this paper may be important for scholars and entrepreneurs alike.

Keywords: Entrepreneurship, Technology, Innovation, Technopreneurship, Technowledge, Technowledgepreneurship



INTRODUCTION

This paper intends to present the concept of *technopreneurship* not only as an overlapping zone of interdisciplinary studies („triple-point-border”) but also as a natural trend: a merging point of three distinct areas of interest. *Technopreneurship* emerges naturally, as new development of all the above mentioned subjects: entrepreneurship, technology, and innovation. All the way, the author’s standpoint is on the entrepreneurship side (technology-based entrepreneurship – as we talk today about technology increasingly).

It is the author’s intention that ideas, which are launched herein as result of fair and extensive literature survey, in addition to own experience, to generate fruitful further discussions.

The paper is organized into two main parts: recent mainstream literature on entrepreneurship; fair arguments for interdisciplinary studies in the areas of interest (Entrepreneurship – Innovation; Innovation – Technology; Technology – Entrepreneurship), completed with conclusions and new avenues identified in entrepreneurial studies.

Literature on Entrepreneurship

Traditionally, entrepreneurship is about entrepreneur and his/her enterprise; how to make it successful. According to the modern theory of firm, a successful enterprise has to make happy all its stakeholders: business owners, employees, clients, and society.

The crucial role of entrepreneurship in economic and social development is largely acknowledged and, consequently, the role of the entrepreneurial education and entrepreneurial research [1, 2]. This is why recent literature deals with influence of entrepreneurial education and training [3, 4], and even *entrepreneurial university* [5, 6] – to mention just the already classical authors. Noteworthy, chronology of American entrepreneurship goes back as far as 1876 [7]. Systematic entrepreneurship studies have started in Romania in mid 90s [8], as well as studies on entrepreneurial education in Romanian technical universities.

It is behind the purpose of this paper to examine the literature on entrepreneurship extensively. However, some recent developments have to be emphasized.

The legal framework, financing and capital access are subjects of top interest for entrepreneurs. Ferris and Voia [9, p. 415] have found that „access to knowledge, entrepreneurial capabilities and access to finance rank highest as determinants of entrepreneurial activity”.

Family entrepreneurship, gender issues – male vs. female entrepreneurs [11], as well as age issues [12] and ethnic entrepreneurship [13] – are other key-interest areas, not only in Europe and/or North America. Actually, Volume 18, No.1 of the *International Journal of Entrepreneurship and Small Business* (2013) was dedicated to „Family and Gender Issues”.



The focus of many studies is on mixed, inter-related issues – for example: Johansen and Foss [11] are concerned about influence of gender on entrepreneurship education and its effects; immigrant women entrepreneurs in Sweden are studied by Pettersson and Hedberg [14]; Indian software entrepreneurs networking in Italy were surveyed by Cucculelli and Morettini [15].

As far as entrepreneurial studies by regions or industries the literature is also wide-ranging. To mention just a few recent examples: entrepreneurship in certain activities as exports (Roy, Vyas and Jain, 2013) or industries – as tourism, hospitality or farming – and/or specific geographical areas – from developing regions from South America, Africa and Asia to developing countries or emerging economies (Bangladesh, India, Malaysia, Indonesia, Iran, Egypt, Togo, Namibia, Colombia, Romania) to post-soviet economies [16].

Comparative studies by regions, multi- and inter-cultural studies on entrepreneurship and entrepreneurial profile are of large interest. Such studies are conducted and promoted by the Global Entrepreneurship Research Association (GERA). Their Global Entrepreneurship Monitor (GEM) is published yearly: Amorós and Bosma [17] just published the 2013 GEM.

Another excellent example is the international research project „Entrepreneurship Work in Organisations Requiring Leadership Development – E-WORLD” (2008-2010) – led by Missouri State University in Springfield, MO, USA, which has been conducted in 37 countries (Romania included). Research results were disseminated by several papers (for example: Scarlat, Rozell, Scroggins [18]).



It is also creditable to mention some pioneering studies on cultural background of entrepreneurship in proverbs – nationally, as well as internationally and/or interculturally (for example: Scarlat and Afendras [19]).

The aim of this paper is not to discuss each of the above areas of interest, one by one (technology, innovation, entrepreneurship), which are extensively represented in literature. Even the idea of two-by-two interdisciplinary studies is not new; the interdisciplinary studies between Entrepreneurship and Innovation; Innovation and Technology; Technology and Entrepreneurship, are snappily presented in the following sections of this paper (Figure 1).

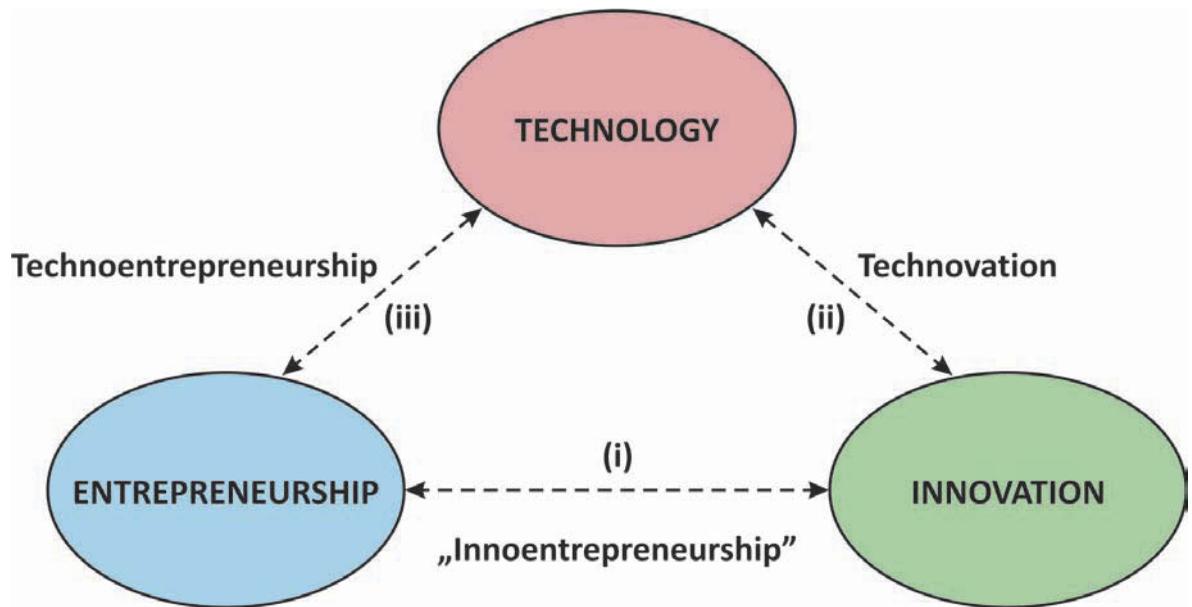


Figure 1 – *Technology, innovation, entrepreneurship, and their two-by-two relationships: a base for a conceptual model*

Entrepreneurship – innovation

According to the famous Austrian American economist Joseph Schumpeter, carrying out innovations is fundamental in history. Schumpeter has made a case that *innovation and technological change come from entrepreneurs*; he coined the word *Unternehmergeist*, German word for entrepreneurial spirit as „the doing of new things or the doing of things that are already being done in a new way”.

The Schumpeter’s theory on entrepreneurship and his view that entrepreneurship is actually innovation was emphasized in many recent studies [20]. Peter Drucker also reckons the organic link between innovation and entrepreneurship [21].

By definition, the entrepreneur is an innovative character; in this respect, to discuss about innovative entrepreneurship sounds somehow pleonastic. However, Lynn and Lynn [22] have launched their book about turning new ideas into busi-

ness under the title „Innopreneurship” – aiming to underline the importance of innovation in entrepreneurial activities.

Supported by the International Society for Professional Innovation Management (ISPIM), Inderscience Publishers issues *International Journal of Entrepreneurship and Innovation Management* since 2001.

Innovation – technology

According to Pol and Carroll [23], Schumpeter also identified innovation as the critical dimension of economic change: economic change *revolves around innovation, entrepreneurial activities, and market power*. He argues that *technological innovation* often creates temporary monopolies which are necessary to provide the incentive for firms *to develop new products and processes*.

Specifically, technological innovativeness was studied by Antoncic *et al.* [24],

while models needed to analyze innovative technologies or innovation potential of the firms [25] were extensively developed even in emerging economies as Romania.

Not only new words but new concepts and definitions are currently coined, trying to keep the pace with new technologies, new jobs, and new situations. To cite just an example, related to the very dynamic information technology industry: „cyber entrepreneurial interest is a term used to describe the readiness and willingness to become an internet-based self-entrepreneur” [26].

Among high-profile journals dealing with technology and innovation issues, *Technovation* (H index = 51) is published in the UK by **Elsevier Limited** since 1981. Devoted to theoretical and empirical analysis of innovation and new technology, *Economics of Innovation and New Technology* (H index = 9) is published in the USA by Routledge, while *Journal of Technology Management and Innovation* (H index = 6) is published in Chile – both since 2008 [27].

Technology – entrepreneurship

Technology development has continuously a source of inspiration for entrepreneurs: biotechnology [28], pharmaceuticals, new materials, communication and information technology [15, 29, 26]; new technology, in general [30].

E-commerce, e-payment, and mobile payment services are becoming a common place in contemporary business; e-entrepreneur and e-entrepreneurship are not meaningless. Actually, there is a natural fit between (new) technologies and entrepreneurship.

The mutual influence and interdependence between technology and entrepreneurship were studied by many scholars as Cuero Acosta [31] – so that technology-based entrepreneurship (or technology entrepreneurship) starts to be known as technoentrepreneurship.

Although International Journal of Technoentrepreneurship started back in 2007, it counts only two volumes (eight issues). Less focused, aiming at several subjects (among them: technology and innovation as separate issues), Synthesis Lectures on Technology, Management and Entrepreneurship (H index = 0) has been published less **regularly too** [27].

TECHNOPRENEURSHIP

New words are enriching the vocabulary – as even the name of some journals displays (Technovation = Technology and Innovation; Technoentrepreneurship = Technology and Entrepreneurship).



Consequently, considering all the above, it makes more sense to call **Technopreneurship** the common zone of inter-disciplinarity between all three area

of interest: technology, entrepreneurship, and innovation (Figure 2) – not only the technology – entrepreneurship zone.

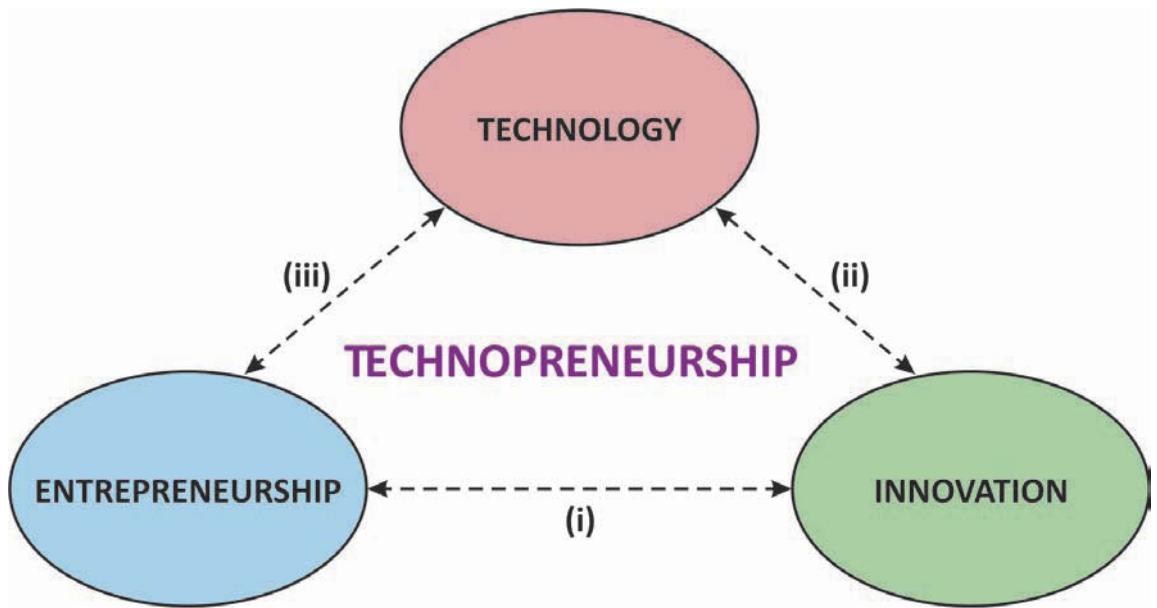


Figure 2 – A conceptual model of Technopreneurship

New avenues in entrepreneurial studies

Besides notions as technopreneurs and technopreneurship, there also are newly born concepts as mumpreneurs and mumpreneurship [32], while terms as seniorpreneurs and seniorpreneurship [12] are becoming more and more familiar.

Considering the human side of entrepreneurial activities [33] and their social role, the social entrepreneurship gets more and more ground [4, 34].

Tseng [35] considers the importance of entrepreneurship infrastructure while other scholars focus their research efforts on role of clusters and entrepreneurial networks [15].

A newer concept: Technowledgepreneurship

An interesting theory stream is intellectual entrepreneurship [36] which has

made Hildebrand [37] to state that „Academics are intellectual entrepreneurs”. It is not our goal to argue on this issue; however, unmistakably, intellectual activities and capacity neatly play a significant role in contemporary knowledge economy and knowledge society. Many surveys show that an important part of new businesses are knowledge-based enterprises initiated by intellectuals. It is less and less uncommon than successful high-tech start-ups are promoted by PhD nuclei, and there are numerous examples of successful technology businesses that have cohorts of PhDs not only as hyper-skilled labour force but among board members and/or top managers.

Accepting that *Technowledge* is an appropriate term for technology knowledge, then managing this particular type of knowledge as well as knowledge-based



[new] technology businesses is a particular type of management: *technowledge management* (i.e. technology knowledge management). Therefore, *Technowledgepreneurship* might be a suitable term for *technowledge entrepreneurship*.

Conclusions

It is obvious that scholars agree on the intimate interdependence between entrepreneurship, innovation, and technology.

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As result, corresponding studies are carried out and specialized journals publish them, more or less successfully. However, it is noteworthy that several journals are focused on interdisciplinary areas, two by two: entrepreneurship and innovation; innovation and technology; technology and entrepreneurship), which demonstrates the high level of interest among theorists and practitioners equally, both authorship and readership.

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MOBILE PAYMENT – RISKS OF A NEW TECHNOLOGY

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Abstract

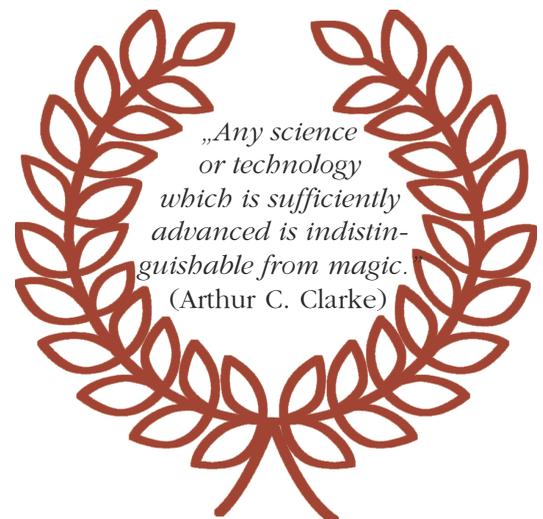
Technology companies only maintain a leading role, if their innovations are adopted by the majority of consumers and if their launches are distinctive from the competition. Due to an increasing mobility of today's society and progress in technological infrastructure, the mobile phone technology has been quickly adopted worldwide. The technology advances in the contactless communications and the development of sophisticated mobile applications have enabled mobile phones to become means of payment. Mobile payment services (MPS) have been launched in several countries and continents with divergent success. The purpose of this article is to present results of cross-cultural adoption research on MPS, leading to an identification of the drivers and barriers of adoption and to the conclusion of opportunities and risks of Mobile Payment Services.

Keywords: Mobile Payment Services (MPS), mobile phone technology, digital payment process, technology adoption research, cross-cultural study, convenience

INTRODUCTION

Companies in the telecommunication industry are obliged to constantly innovate and/or to develop new markets in order to secure their future as their established business models are under enormous pressure; D'Aveni [1] has coined this setting as „Hypercompetition” meaning a competitive setting of rapidly escalating competition based on price-quality positioning, competition to create know-how and establish first mover advantages. Especially establishing a first mover advantage is very often considered as the key for new growth and higher margins [2]. Only if the managers are able to develop and launch an attractive product aligned

with the defined consumer segments the company has an opportunity to generate a first mover advantage, but even then,



there are risks to consider [3]. At the heart of the management problem lays the question how could the involved companies make sure that the newly launched payment products will subsequently lead to new and to steady income streams.

While shells, cowries and gold coins were once used as payment tools to

transfer value, payment habits have changed significantly. But also the era of bank notes and debit cards seems to be ending soon; with the worldwide consumer acceptance of electronic commerce (e-commerce), there arose a growing need for a digital payment process, too (Figure 1):

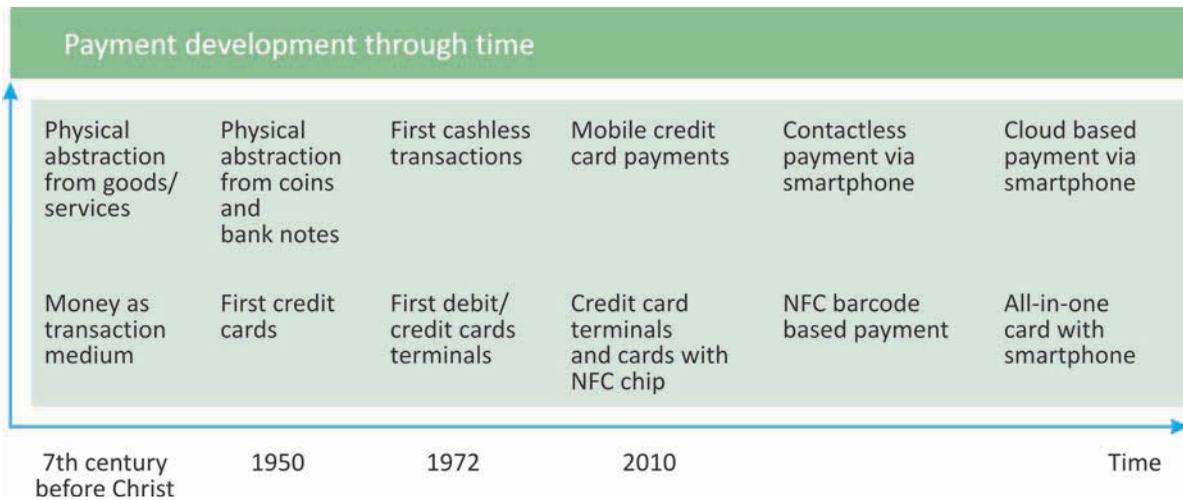


Figure 1 – *Payment development through time*

With this ongoing transformation from the physical to the digital payment process, we experienced a paradigm shift in the corporative value transfer. Not the possession of physical money, but the permanent availability of its income value became relevant. The technological advances in the field of near-field contactless communications (NFC) and the development of sophisticated mobile applications have enabled mobile phones to become a potential means of payment, and thus a potential opportunity for competitive advantages.

The notion of Mobile Payment Services (MPS) refers to making payments for goods, services and bills authorized, that are initiated and realized by using mobile devices independent from a bank website connection [4]. The transaction

can either be remote (SMS-based for instance) or processed locally via contactless technologies such as Near Field Communication (NFC) at the Point of Sale (P.O.S.) as Starbucks or REWE offer it in Germany. One aspect of MPS is mobile ticketing; it has been adopted by some public transport services and other public authorities in urban areas of larger Western and Eastern European cities, as at the airport or in train stations. The administration of the city of Düsseldorf for example offers cash-less payment options for parking tickets via mobile payment. It is a very convenient way to pay and even to extend the parking time via SMS payment. The city of Bucharest offers the possibility to pay the underground-ticket cash-less via mobile phone or via credit card that has to be held against an NFC terminal.

Market differences

Mobile Payment Services (MPS) is a dynamic and growing market segment, regarded as strategic business field and thus, potential providers and retailers aim for a competitive advantage if they start offering MPS to their consumers, but according to a study from Arthur D. Little [5], the so called „mobile payments” represented a transaction volume of \$250 billion in 2012 and remained below general expectations. The overall aim of MPS providers is to analyse the consumer and market perspective to ideally realize a strong position in the market as reflected in the Market-Based View (MBV). In this logic the value proposition of the product is a result of how an innovation is accepted by the consumers in comparison to comparable products from the competitors [6].

Germany is an example for a strong economy, but the mobile payment market is still in its infancy. This argument is substantiated by the following facts of the payment market in Germany:

- The German card market is highly competitive and decentralised with more than 30 issuer, 16 acquirer and 8 card processors;

- Cash is still the preferred payment method;
- Card penetration is high with 156%, although card payments account only for 15 % of all cashless payments;
- Debit cards are the preferred card payment method (80%) credit card payments are rare (3 %);
- $\frac{3}{4}$ of all cards are issued by public and cooperative banks with strong customer ties;
- Germans are very restrictive in „discussing” money issues or publishing financial data.

In summary, the payment market in Germany is competitive and decentralised with only 15% of cashless payments [7]. All existing payment methods are perceived as convenient. Shopping is preferably done in stationary shops, but the MPS accessibility at P.O.S. is very limited while transaction terminals for debit and credit cards are widely available and the card payment is perceived as convenient and fast.

In countries where the existing payment regimes do not work well, we have seen recent surge in the use of MPS. We find that in emerged markets the change towards MPS is more important. It allows them to use financial services in a more efficient way; it improves the standard of living of those countries and contributes to giving them an opportunity to a better life. In developed markets, MPS is more of an extension of the existing payment infrastructure and allows people to deal with their financial needs „on the go” and in a timely fashion. A relevant example described in the Global M-payment report by Little, Taga and Oswald [5] of one of the different factors determining the acceptance rate of MPS is how well the current payment system works in a given country.





Especially in less developed markets as Africa, M-Pesa is successful in offering mobile payment solutions, for instance, for more than 14 Mio customers of Vodafone Kenia, SMS-based payment with simple mobile phones is the most convenient payment method. The success is due to the fact that the infrastructure for existing banking and alternative payment system is absent.

China's payment market is at an adolescent stage, but with high potential as it has the largest mobile subscriber base in the world with more than 1 billion users; additionally the Chinese population is highly resourcing to bancs, with over 2,86 billion banking cards in circulation, and it has been established that more

than 440 of the approx. 600 cities in China have set up systems that allow people to swipe smart cards on public transportation, and about 430 million Chinese use the mobile internet. The telco company China mobile bought 20% of PuDong bank stake (about \$5,9 billion) to develop MPS in May 2010; they have launched an MPS platform with an NFC standard to enable the Chinese population to subscribe and use MPS. Google Ventures invested 100 million into MPS in the same period. Alipay is the largest third party electronic payment company in China and the most important electronic payment provider in China, with more than 300 million subscribers [8], having launched MPS already in 2008. Its mobile service solution is an intermediary that provides MPS by integrating the functions of the mobile network operators' communications network with the financial institutions' payment accounts. Alipay MPS can offer broader payment services by supporting a wide range of mobile networks and bank accounts.

	Developed markets	Emerging markets
Economical and technological factors	<ul style="list-style-type: none"> • Developing banking infrastructure – • Regulatory restrictions – • High internet penetration – • High mobile penetration – <p>(– inhibiting mobile payments)</p>	<ul style="list-style-type: none"> • Low penetration of banking infrastructure + • Low income per capital + • Low internet penetration + • Low mobile penetration + <p>(+ stimulating mobile payments)</p>
Social and cultural factors	<ul style="list-style-type: none"> • Credit card usage legacy – • High computer literacy + • Technology sawy (Easdt Asia) + <p>(+ stimulating mobile payments)</p>	<ul style="list-style-type: none"> • High percentage of emigration + • Low computer literacy – • Cash based societies + <p>(– inhibiting mobile payments)</p>

Figure 2 – Differences in developed and emerging markets that are influencing MPS

Drivers and barriers for adopting Mobile Payment Services

„Discovering preferences transparently means that the marketer learns the customer needs without actually involving them. When marketers learn customer preferences collaboratively, they engage in a dialogue to help customers to articulate their needs and identify how to meet those needs” [9]. In order to better assess the consumer needs and to decrease the risks, the authors thus intended to identify the main barriers of MPS consumer acceptance and adoption.

A literature review and previous empirical research, contributed to first insights. The meta study by Tornatzky and Klein [10] on innovation adoption provides a fundamental understanding of influential variables of the intention to use innovations in general. Mallat [11] identified MPS

drivers and barriers of consumer adoption, and together with Tuunainen [12] finds barriers of merchant adoption. The study by Schiertz et al. [4] explored acceptance determinants of MPS. Yang *et al.*'s [8] exploration conducted among Chinese and Americans is not limited to the „intention to use”, but includes results from the post-adoption stage of MPS usage. Research results of consumer acceptance in e-commerce [13] and m-commerce [14] have been incorporated to examine the role of trust for adoption.

Based on the Technology Acceptance model (TAM) by Davis [15], and the Innovation Diffusion Theory (IDT) by Rogers [16] with the scope to determine drivers and barriers across opposite cultures, a qualitative study among German and Chinese Bachelor students aged between 21 and 24 years has been conducted, based on an own research model (Figure 3):

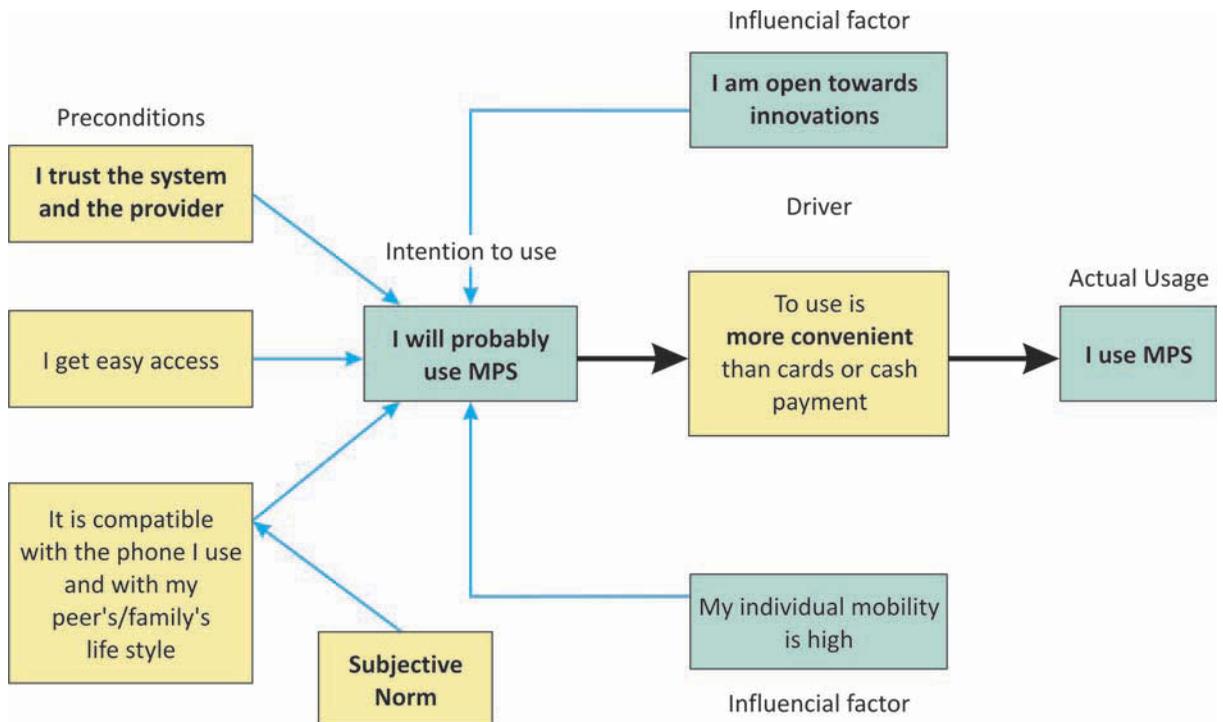
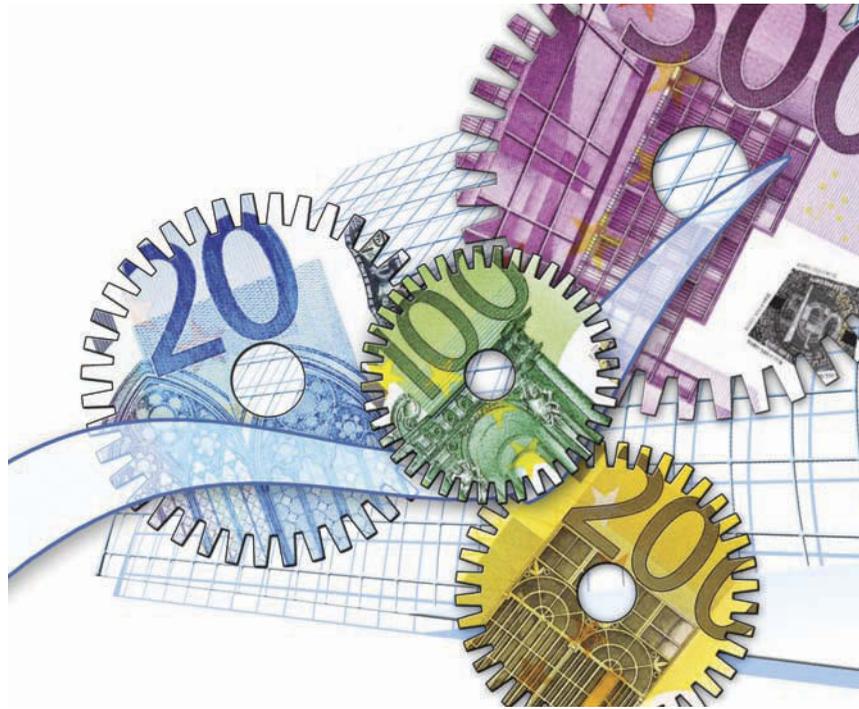


Figure 3 – Research Model

All participants in the study were born in the digital internet and mobile communication era and without any fears of using technology in their daily lives. Most of the students still live with their parents or share their apartment with other students. While the Chinese are technologically the best equipped with the latest Apple iPhone and Tablet PC and Lenovo computer and have the highest income available of all students (the majority had a budget available of 1000-2000 € per month). The German students all possess a smartphone from top brands as iPhone or a Samsung, and live on an average budget of 1000 €.

Common behavioural variables were a „high degree of mobility in life” and the „predisposition to be open towards innovations”; however, the majority is hesitating being the first to try innovations („I would only try new technology after others tried it first and approved it.”). Consumers which technology usage behaviour can be related to the target groups „Innovators” and „Early Adopters” [17] show a high degree of individual mobility, a positive attitude towards innovations and have experience with technology; at the same time they have a low personal risk perception, which correlates positively with the „intention to use” MPS [4, 18].

A remarkable insight was that the majority of the Chinese believe that money leads to a happy and a satisfied life, while for most German students money is „important, but not essential for happiness”. The Chinese are very conscious to avoid debts. The majority does not possess a credit card as it would possibly lead to making debts. The majority of the Chinese uses the cash disposal machine only once a month. Germans did not have an issue with making debts or using



credit cards. The German Bachelor students prefer cash, except for e-commerce purchases and for the booking of hotels and flights, although they are fully aware of the disadvantages of cash money. These culturally rooted factors can be related to what established researchers understand by „subjective norms” [14].

The majority of all interviewees prefer stationary shopping to online shopping. If they go online for purchases, all students prefer to use a computer and a W-LAN access at home as it was perceived as safer and more convenient than m-commerce via mobile device. Convenience was very important to all interviewees. The main benefit and reason for using the latest technology is convenience as it „makes life easier”. Other reasons are „status” and a higher acceptance within the peer group. As could be seen in the clear preference for the brand Apple, for the Chinese students, „conformity” might still play a role and might possibly root in decades of communism.



The authors came to the conclusion, that following variables are driving MPS acceptance and adoption, which was also confirmed by previous research:

- Trust the system and the provider(s) [11, 12, 15, 16];
- Compatibility of the system [10, 11];
- Accessibility to the system [11];
- Convenience [20].

While the first three variables (trust, compatibility and accessibility) became pre-conditions in the ongoing worldwide adoption process of this payment method, the providers of MPS can deliver a real benefit to potential consumers by offering more convenience than alternative payment options or „value added services” [11].

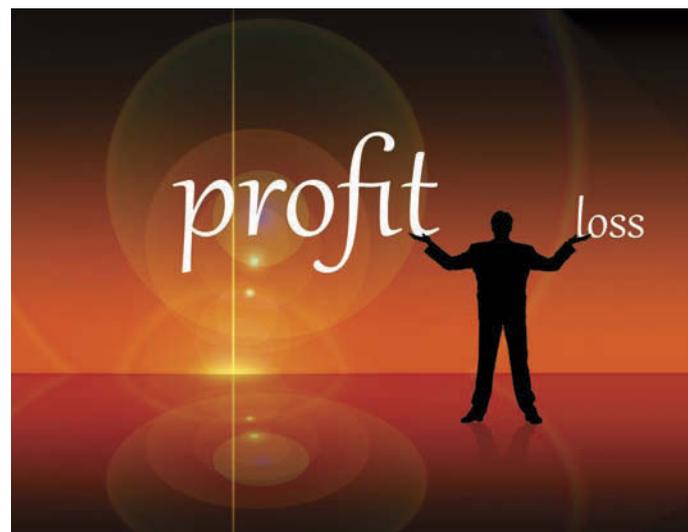
According to the primary qualitative research conducted by the authors, MPS was perceived as „convenient alternative” to pay, especially vs. cash money; thus, the relevant competitive reference should not be debit or credit card payment, but cash payment; another important insight was the meaning behind convenience; „convenience” means fastness and simplicity of the financial transaction via mobile phone.

Identified barriers of MPS consumer adoption are:

- The absence of trust into security dimensions of a payment system. Most authors and researchers agree upon the dominant role of security issues for the acceptance of online and mobile payment services [15, 19].
- Complexity as the opposite of convenience (or simplicity), but in the sense of too many different procedures to accomplish the payments on POS and long lasting registration procedures [20, 21].
- All factors that hinder merchants to adopt mobile payment systems and thus, prevent from making the services accessible for the consumer [12].

Conclusions

The success drivers for digital payment solutions as mobile payment do not differ significantly from those for physical payment methods. Customers have to trust the providers concerning technical reliability and data security [19, 20]. Mobile payments are highly convenient for consumers, but what stands behind convenience and which is the point of reference (cash money) has not been clearly communicated to the relevant consumer target groups. Especially consumers who were not born in the digital era do not



yet realize the real benefit and advantage of MPS vs. cash money. Their mobile phones are still primarily used for phone calls and emails and less for entertainment reasons.

The merchants who adopt MPS are expecting MPS to become a new sales driver, at the same time they expect cost reduction through simplified payment transactions and cash handling [12]. Shopping is preferably done in stationary shops, but the MPS accessibility at P.O.S. is very limited while transaction terminals for debit and credit cards are widely available and the card payment is perceived as conve-

nient and fast [21]. Additionally, MPS are Micro-payments, limited to low amounts of money; thus, it is questionable, if those payments are attractive enough for potential providers in terms of revenues and competitive advantages.

If one analyzes the success of disruptive technologies and applications, these main parameters have to be seamlessly working together: a reliable technology behind the product, transparent communication, data security measures, and a high acceptance rate of retailers. Figure 4 shows the opportunities and risks of Mobile Payment Services:

Opportunities	Risks
<ul style="list-style-type: none"> • New sales driver and increase of customer spendings • Cost reduction in the trade through simplified payment transactions and cash handling • New awareness opportunities for Marketing, advertising and CRM 	<ul style="list-style-type: none"> • Market splits off in island solutions • Data security problems • Lack of trust • Consumers do not see added value of MPS vs. alternative payment media

Figure 4 – *Opportunities and risks of Mobile Payment Services*

If MPS providers and retailers start to create the preconditions for usage intention i.e. wide access and compatibility – most preferably in offering the most convenient and secure solution – the mobile payment method could receive more attention. But, it needs a clear positioning, a transparent information policy by banks and credit card companies, and more intense sales activities by the respective technology providers to convince consumers and retailers that this

technology is worth investing, as it will help them increase the retailer's sales significantly and build long term consumer relations. Avenues of research can be seen in the exploration of cultural factors influencing the intention to use in additional target groups of different education and income level, which show less affinity towards innovations; these explorations may result in more representative results and concrete implications for segmenting, targeting and positioning MPS.

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GEOMARKETING FOR SALES NETWORKS

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Abstract

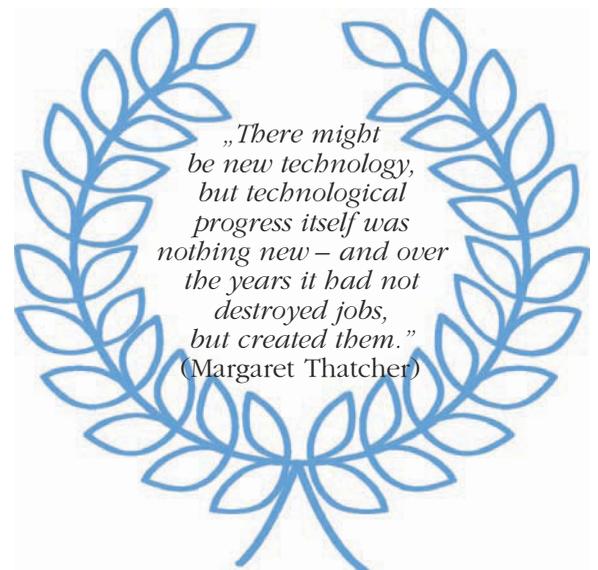
Lately, the expansion of Geomarketing, especially in the car distribution networks has brought major changes with regards to the Geomarketing tradition perspective. Such a complex approach foresees decision making problems and provides solutions, so that managers can make more informed location based decisions. More exactly, we examine how geographical marketing analysis of territories is made through geographical informative systems and spatial data, that is, through Geomarketing instruments. In this article we propose and analyse a new vision of Geomarketing as an instrument for evaluation of sales territory efficiency with the major target of finding the optimal place of a Skoda car dealership network in the Iași area. The results of the research prove that managers need rethinking the location of Skoda dealership network in Iași, which, although close to Peugeot, is in the opposite part of the city compared to the other car dealership networks. As the article will prove, the deliveries of competing brands are much higher, due to their location. Also, Peugeot is substituting customers from Skoda. Therefore, the solution proposed for Skoda is either relocating in territory (in the area where are concentrated the deliveries of competing brands) or opening a new delivery outlet in the same area of strategic interest of its competitors, currently uncovered by Skoda.

Keywords: Geomarketing, car network, place marketing, spatial decision-making

INTRODUCTION

The aim of this article is to support both expert and end users' activities where the geographic instrument is an important factor. Geomarketing offers solutions and their benefits will be investigated hereinafter.

According to MacEachren [1], studies suggest that 80% of all digital data developed nowadays include geospatial referencing (for instance, geographic dates, addresses, postal codes, etc). In fact, most scholars agree that the geographic component has become a ubiquitous factor which



is not only an integral part of a territory, but also contributes to reach knowledge with regards to this phenomenon. This recognition has a direct implication on studies made on the general subject of Geography, Management, Marketing and Environmental Science, where a parameter implied in the investigative methods is now focused on place and space. Indeed, studies from those disciplines have admitted that in order to convert massive heterogeneous data volumes into information, there is a challenge to create methods able to comprehend patterns and relationships in geographic space together with their changes in time or actions that can be held responsible for them. In order to reach this aim, human vision next to domain expertise can be analyzed in relation to computational tools.

Primarily, a Geomarketing representation and computing can conduct to better pattern recognition of customer's motivation and hypothesis generation, by this allowing better comprehension of distribution structures and marketing processes, and supporting knowledge construction for companies of all kinds. Nowadays, mar-



keting tasks are best performed with the help of specialized software that lets you visualize the sales rappers directly on digital maps, plan new optimized structures and perform fine-tuning measures.

Major Geomarketing applications are to be found in Figure 1:



Figure 1 – Geomarketing applications. (Source: [2])

The aforementioned processes and actions fall in the area of Geomarketing (or geospatial analytics). This is part of the Geomarketing research field and has to do with problems concerning geographical space and various products, events, phenomena, and processes populating it. Also, it benefits from the integration of various disciplines, as the ones mentioned above. Indeed, the adoption of Geomarketing interactive methods and their development with new offers of computational techniques, put up the basis for effective support to data examination and decision-making processes, due to the capacity of mixing geospatial data with „human vision and domain expertise” [3, 4].

The proliferating volumes of geospatial data represent a major challenge in the research of patterns and customer-company relationships. Geomarketing is meant to create grounds of placing points that will allow accepting the forecast decisions regarding them, with the capacity of the planning of economic activity. The fundamental task of Geomarketing is to establish the optimal place of trade point spotting and defining its optimal features.

The aim of our study is to offer support to decision makers when facing issues that involve rapid solutions despite the complexity of scenarios under research. For achieving this aim, our researches have been focused on Geomarketing research field, which plays a major role in this scope, because it exploits outcomes from several disciplines, among which we mention exploratory data analysis and GIScience, to offer expert users with highly interactive instruments with the help of which they can visually synthesize data from large information sets and perform complex analytical tasks such as: the prospects of a certain business in a particular local attachment, and also information for optimal configuration of the suggestion on this area.

Academic researches on Geomarketing do focus on all type of companies, particularly on the favourable impact factors that the Geomarketing software and geographic information systems (GIS) provide. The research starts from Geographic Information Science (or GIScience) that is the science behind the GIS technology.

An initial definition by Goodchild describes GIScience as a „science which deals



This research will be an explorative research that will examine if and how the Skoda car dealership network are managing efficiency and competitiveness situations through spatial marketing applications and what are the specific steps that they are taking in order to prepare the organization for rethinking their marketing place strategy. Using a Geomarketing approach the research will be highly analytical, examining if it is necessary or not to open a new Skoda dealer shop, and in which area of strategic interest in the specific region.

The collection of primary data will be conducted from Geomarketing instruments. By these tools, the paper will examine sales territory planning by using large wall maps, pins and strings. Along with its specialized software, Geomarketing will provide in depth data regarding the process

of sales structure directly on digital maps, will plan new idealized structures and perform fine-tuning measures for Skoda dealer network from Iași, Romania. Secondary data will be collected from reviews of other comparable researches conducted in this field, as well as from review of the literature written on this subject.

RESULTS AND DISCUSSION

The best arguments in favor of a sales territory restructuring imply greater fairness, insight into the amount of available local market potential through map studies and reports and realistic, motivating growth targets for employees.

First of all, it should be noted that, Skoda dealer location in Iași is not in the same area as the rest of its main competitors (Dacia, Renault, VW, Opel, Ford, etc.), as it can be seen in Figure 2:



Figure 2 – Car dealership network location in Iași

As it can be seen in Figure 2, six major car dealers are located on Păcurari Area, meanwhile Skoda and Peugeot are located in the opposite part of the city, but in the same area.

In addition, from our results it becomes clear that the heat point of the car geographical distribution are situated on the Păcurari Area, in Iași), where most car networks are located, and not in the Skoda



Figure 3 – *Car dealership network heat map in Iași*

network location, as it can be observed in Figure 3.

Further on, it is calculated the market share evolution during 2009-2013, with and without Dacia in order to get a perspective view on the share evolution of each car dealership network from Iași.

The authors have chosen to calculate the deliveries of the car dealer networks in Iași, during 2009-2013 according to their location, in order to understand if Skoda has or has not a competitive advantage due to its location. Without taking into consideration Dacia (which has a high market share), the scale expands and this gives us the opportunity to analyze in detail the performance of all competitors in the field. In the last year, Peugeot enjoyed its geographical position winning Skoda customers (see 2012 versus 2013 benchmarking in Figure 4).

As in every distribution business, the controlling of the distribution policy is very complex and has an important role

for the success of the company. It has not only to check if the products arrive at the final consumers in a desired way, but it also has to analyze the costs of the logistics in order to reduce them as much as possible. The fact that Peugeot has taken over Skoda's clients is a big threat for Skoda, especially when we speak of about 15% of its customers (Figure 5).

Conclusions

Traditional cartography represents a fundamental tool to describe facts and relationships regarding space and territory. It associates geographic concepts with graphic symbols and as a consequence helps readers gain an immediate comprehension of represented data. This approach is well-established and decision makers are generally satisfied by its expressiveness when having to do with the cartography of facts. However, even if

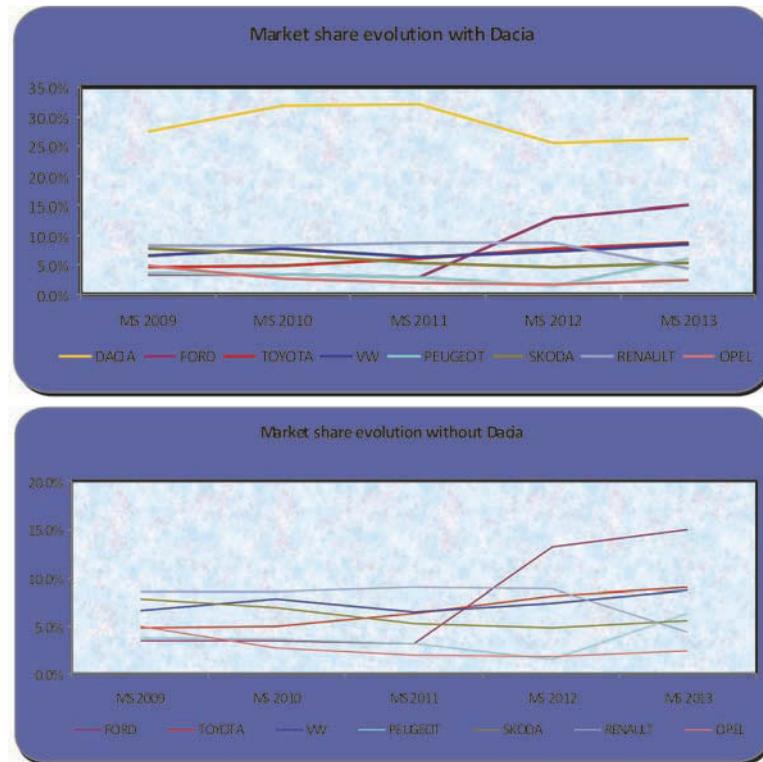


Figure 4 – Car dealership network market share evolution in Iași (with and without Dacia)

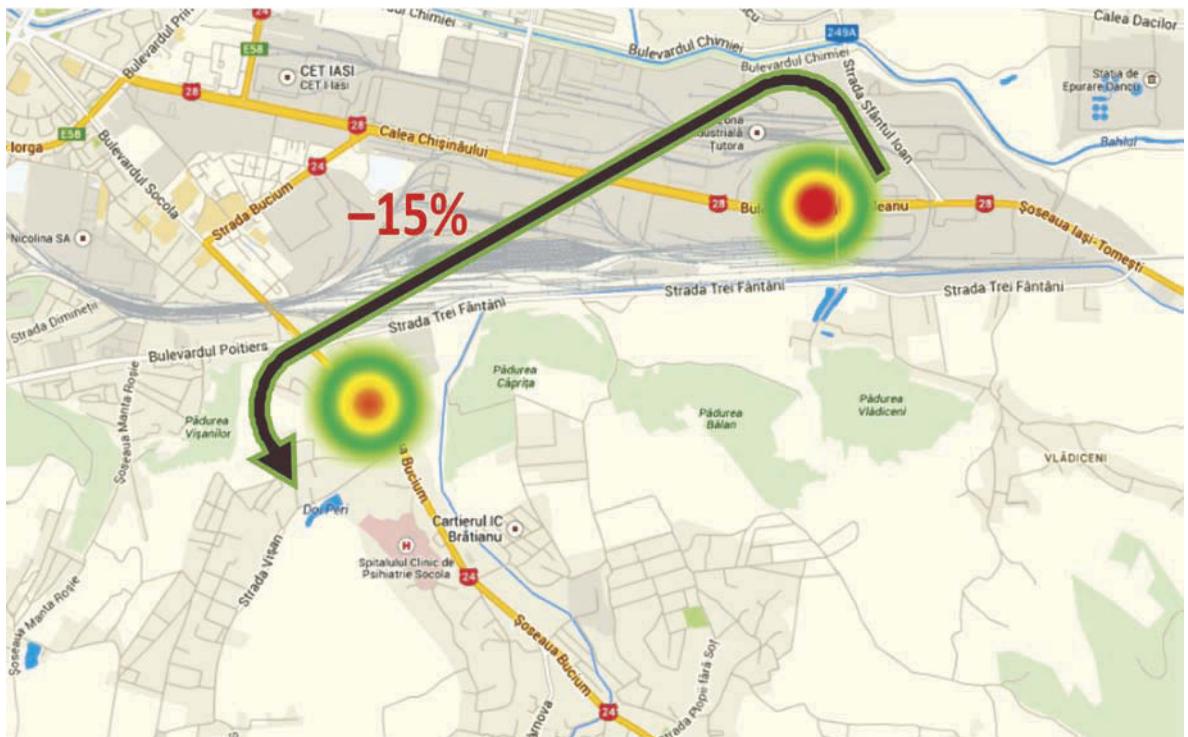


Figure 5 – Deliveries 2009–2013. Geographical transition of deliveries between Skoda and Peugeot

Geomarketing activity begins to have an increasing recognition in larger firms in Iași, Romania, by creating specific departments and placing it at a strategic level, Geomarketing still remains at a low developed level [12].

The results of the research prove that managers need rethinking the location of Skoda dealership network in Iași, which, although close to Peugeot, is in the opposite part of the city compared to the other car dealership networks. As the article proved, the deliveries of competing brands are much higher, due to their location. Also, Peugeot is substituting customers from Skoda. Therefore, the solution proposed for Skoda is either relocating in territory (in the area where are concentrated the deliveries of competing brands) or opening a new dealer outlet in the same area of strategic interest of its competitors, currently uncovered by Skoda.

The outcomes of this study are new and they are very important for decision-makers who want to perform analytical

tasks and discover the best positions for automotive car networks and not only, from geographical databases. The research advances the technological solutions for the wider scope of Geomarketing and offers the Skoda dealer from Romania, city of Iași as a sample case, in order to document knowledge discovery from spatial databases by using Geomarketing methods in that context.

This could be seen as a preliminary work for building sales territory planning models and offers a relevant contribution to the development of advanced spatial analysis applications that can be analyzed further on.

These outcomes are the juxtaposition of theory and methods along with development activities which have conduct to the creation of effective instruments for expert users which take advantage of innovative technologies, such as Geomarketing software, Global Positioning System (GPS) and synthesis techniques that create Digital maps of information.



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TRANSITION TO STABLE AND MATURE PROCESSES

Dănuț Iorga

SC. Agri Terenuri S.A.

Abstract

The current paper presents a tool designed to transform an unstructured activity into a stable and mature process able to generate predictable results. For this purpose, the authors created a method, The Matrix of the Business Dynamic Indicators (MBDI). The effect of the MBDI tool is powered and multiplied by the Transfer Function Matrix, which helps the people to adapt their actions in order to maintain a high correlation level among the key factors of the business. The originality of the research consists in creating, for the first time in service sector, an instrument that links three business areas such as customers, strategic objectives and continuous improvement for a process-oriented organization. Despite the fact that the research was limited to a specific business, Land Book Registration, due to the potential of the tools involved and the integrating character of the matrix, the method could be used with a significant effect also in other areas where the repeatability of results is high and can be measured.

Keywords: Business Process Management, Transfer Function Matrix, Balanced Scorecard, Lean Six Sigma, Correlation

GENERAL CONSIDERATIONS

Business Process Management is defined as: „a management practice that provides for governance of a business’s process environment toward the goal of improving agility and operational performance. BPM (Business Process Management) is a structured approach employing methods, policies, metrics, management practices and software tools to manage and continuously optimize an organization’s activities and processes” [1].

The major issue in traditional companies (from a functional point of view) is

the „silo effect” over the information flow and over the production processes.



A negative element is the oversight of the real objectives, when different functional areas face particular events. In general, the challenges generated by the „silos” inputs and outputs are seen as elements that must be „passed on” to the following department as soon as possible.

A basic element of Process Management is the layout of the organization. The structure of the companies should be radically changed in order to adjust to a process oriented strategy. Many companies that took over these methods (Genpact, Accenture etc.), especially from outsourcing for financial areas, human resources, and acquisitions, demonstrated that this kind of approach generates costs reduction and positive effects in quality services.

Lately, more and more managers have understood the importance of the holistic approach in processes; therefore, the systemic approach becomes more popular in the business environment. As Pourshahid said, „Business processes and their management have always represented challenges for organizations. These difficulties are

now amplified by processes that are often cross-functional in the organization or that are crossing the organization’s boundaries” [2].

Business Process Management supporters consider that discipline in action and thinking helps to create a stable, predictable and comfortable environment, favorable for stimulating employees’ creative thinking. Nowadays, top companies include continuous improvement initiatives at systemic level, seeking rational means for stimulating collective or individual creativity (projects and improvement initiatives). Created in these circumstances, the circuit for generating ideas is maintained by the relationship between systemic thinking – sustained improvement, based on projects managed by people who know best the business processes, as being their users (Lean Six Sigma) [3, 4, 5, 6].

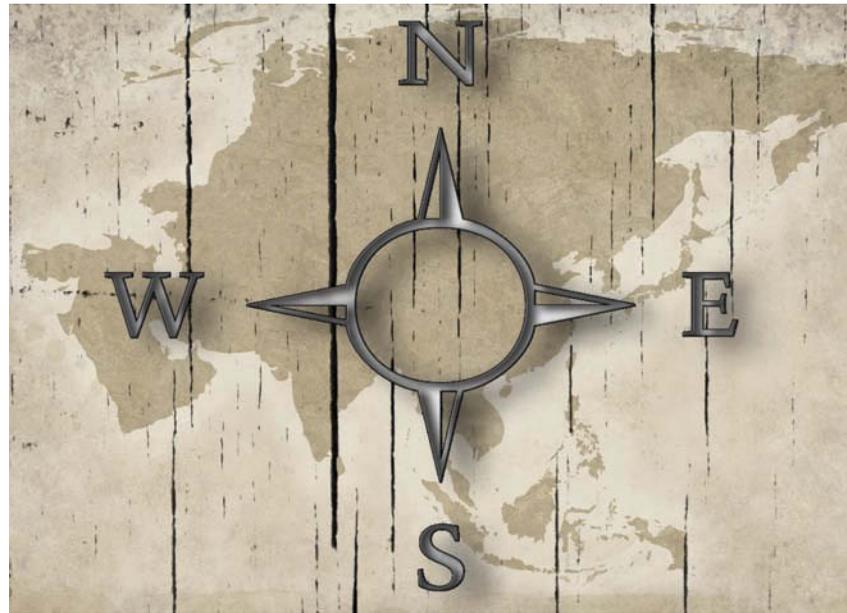
One of the obstacles that continuous improvement has in the classical (functional) approach is the „formal” allocation initiative to specialists, without taking into consideration the importance of



management, in order to obtain successful results. Often, the breakdown of the continuous improvement initiatives are generally caused by a lack of will or a deficiency in the management understanding, regarding the importance of innovation or improvements projects results, that must be implemented in current activity. The collapse appears when management doesn't get involved in order to establish the improvement targets, when it isn't interested in constant tracking of the activity evolution, and furthermore, is perceived as being absent when identifying improvement solutions or passive in implementing the results of the investigations conducted by the project teams [3, 5].

In the last decades, the former specified obstacles have been outrun using philosophies like Six Sigma. In these cases, management becomes an active part in finding improvement solutions or in business process development. „Process governance” becomes the managers' main concern in the systemic approach of the business. Thereby, new positions appear in the company's organization structure. For example, the process owner and the process specialist, who are involved in business process architecture projection and at the same time, in creating premises for coherent functioning of the company from cross functional perspective [1, 7, 8].

Companies like GE, Accenture, and IBM decided to introduce instruments specific to Operational Excellence concepts, in order to stimulate the entire organization to participate in creating architecture, capable of generating remarkable results for the clients, as being part of projecting business systems. The beneficiary of this approach becomes the main leader of this entire strategy and of the entire company. The customer needs and requirements



are closely analyzed and most of the decisions and innovating or development initiatives of the company are strategically aligned according to these expectations.

The process is a sequence of activities that transform different tangible or intangible resources in necessary results that are expected by a beneficiary. Processes can be identified in every performed action. Some of them are generated for a momentary purpose, and others are documented, planned, monitored and maintained for longer periods of time (weeks, months or years), with clear stated goals. The later (process design) favors a continuous improvement approach with incremental gains for organizations. For example, Lean Six Sigma has a comprehensive approach in five steps, define, measure, analyze, improve and control in order to generate money to shareholders and satisfaction to customers. Moreover, Lean philosophy enhances the power of Six Sigma by adding the concept of waste elimination [3, 4, 9, 10].

In a business environment, the stability of the processes of the organizations



represents a key element in order to obtain profit and add value to the customers. Therefore, lately, many companies decided to pay attention to a systemic approach of enterprise organization, allocating time for developing resources, capable of using all the benefits resulted from process based management.

The general concept of the processes is defined by input, set of activities, output, feedback and „noise” [3, 1, 9, 10]. The output of the processes is linked with the input through activities performed by people or machines. Therefore, Y's vs. X's should be strongly correlated through activities. Thus, the process-oriented organizations have the opportunity to survey the dynamic of the business using mathematical models to understand and act in order to optimize their results. One of the general approaches could be the Transfer Function, which has the general form as follows [7, 8, 11, 12]:

$$Y[y_1, y_2, \dots, y_n = F(X[x_1, x_2, \dots, x_n])$$

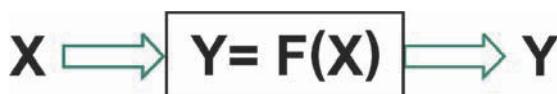


Figure 1 – *The general model for the Transfer Function*

Starting with Balanced Scorecard concepts created by Kaplan and Norton, the

structured approached of the business became a key part of the organization strategy, and in this circumstances the systemic perspective was embedded into the main frame of the BSC philosophy [13]. Therefore, according with BSC one part of the total four dimensions is the business processes. The dynamic markets revealed that the approach of the business strategy proposed by Kaplan and Norton is one of possible ways to deal with the uncertainty of the economic environment [13]. Therefore, many companies decided to make part of their strategy the four-dimension frame of the BSC (The Balanced Scorecard). The main role of the BSC is to help companies to adapt rapidly their strategies and to communicate effectively the objectives to the entire organization. The Balanced Scorecard could act as master plan for the entire organization based on a continuous rolling system of four principles. First principle is to clarify and translate the vision and strategy to the entire organization, second is to communicate, train, set the correct objectives aligned to the main vision and create a correlation between reward and performance, third is to set targets and plan (allocating resources), fourth is the strategic feedback (revising and adapting the strategy, train the people) [13]. Kaplan and Norton explain that BSC translate the mission and the strategy in objectives and targets, organized in four perspectives; financial, client, business process and „growth and learning company” [13]. The main perspective of the business is related to shareholders expectation regarding the financial results of the company. In order to achieve the financial goals, the organization should answer to the question „how can the company gain the financial success?” Further BSC suggest that the

main driver of the company in order to gain money is the customer. From customer perspective the company should find the answer to the question „How should organization behave in order to satisfy the customer?“ The third dimension is related to the problem of internal processes and the question is „What are the processes which the organization should excel at?“ The fourth dimension is related to people’s organization and the question is „How enforce the organization the change and continuous improvement to achieve success?“ [13].

MATURITY AND STABILITY OF THE BUSINESS PROCESSES

During of a period of three years the authors conducted a research in order to

design a general method to transform the unstructured activities of a company from service area into mature and stable processes [9, 10]. The experiment was conducted into a Cadastre Company involved in farmland Land Book registration [7, 8]. The authors developed a method to conduct the transformation. The main result of this transformation method was the Matrix of the Dynamic Business Indicators created to harmonize and to adapt continuously the company’s processes to the pressure of the environment [9, 10]. The authors’ method has two phases and each phase has three steps. The first phase has the objective to create a correlation instrument of process variables vs. result critical parameters [7, 8, 9] and the second phase has the objective to design the Matrix of the Business Dynamic Indicators (BDI – Matrix) [10].

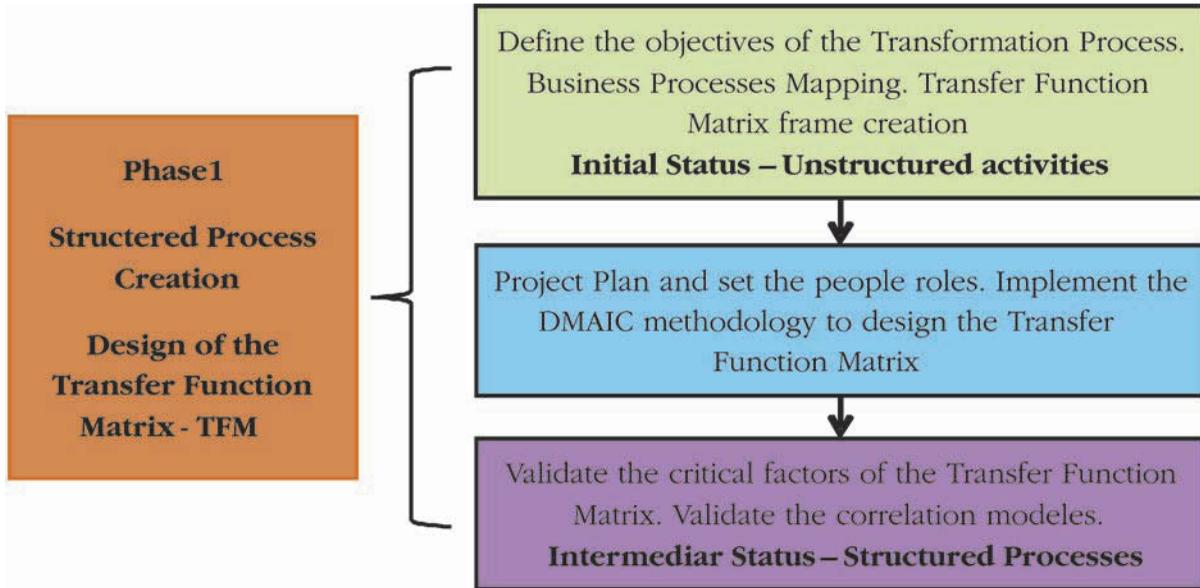


Figure 2 – BDI Matrix Methodology (1) Transfer Function Matrix

The end of the first phase was materialized by creation of a Transfer Function Matrix, which represented the main driver of the processes’ transformation. Thus, in

the first step, the authors together with the organization management decided the objectives, the strategy of the project, who are the project members, and what is the

scope of the project, according to Lean Six Sigma methodology [3, 5, 12]. In addition, in the first step, the authors with the help of the people from the process figured the frame of the future Transfer Function Matrix (TFM). The design of the matrix took into consideration the general conditions of the business, and the environment influence. To accomplish this, the

authors inspired from concepts as Six Sigma, Design for Six Sigma and Lean Operations [7] in order to develop the matrix [9].

One of the main purposes of TFM is to align the results to the strategic objectives [9] and critical customer requirements by establishing clearly defined specification limits.

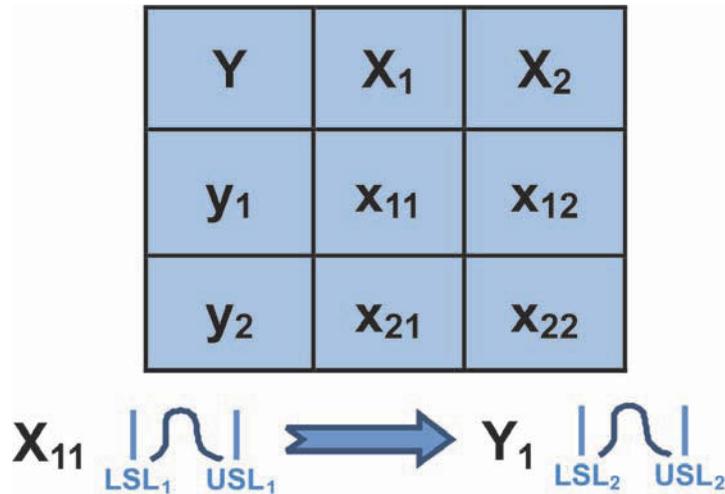


Figure 3 – *Specification limits for input and output*

For example, if it is needed to keep Y_1 variance range within $LSL_2 - USL_2$, then must be found a distinct mathematical model in which X_{11} variance should be maintained within $LSL_1 - USL_1$ range. That means the operators have to focus on X 's to keep their values within specification limits in order to obtain the quality of the output at the desired level [7, 8].

Consequently, TFM is used by management permanently to prevent the failure of the process output. Although, due to the continuous change of the environment even the characteristics of the Transfer Function should be surveyed [11].

TFM, during this research, was utilized as a strategic tool which helped to leverage the rolling down of the strategic objectives

in the entire organization (setting measurable limits for relevant factors). TFM was enhancing the Balance Score Card (BSC) effect of the control and survey of the Key Performance Indicators (KPI) [10]. In general, for the process oriented organizations, TFM represents a conveyance to stabilize the process results, and for the study it was also used to shorten the time to structure the current activities [14].

In the next paragraphs, the authors will present the high-level process steps [14] of the cadastre business in order to understand the effect of the designed tools on the entire business [7, 8]. Thus, the paper continues to describe the activities rolled during the process steps and emphasizes the importance of human resources skills, clarity of the work instructions, the

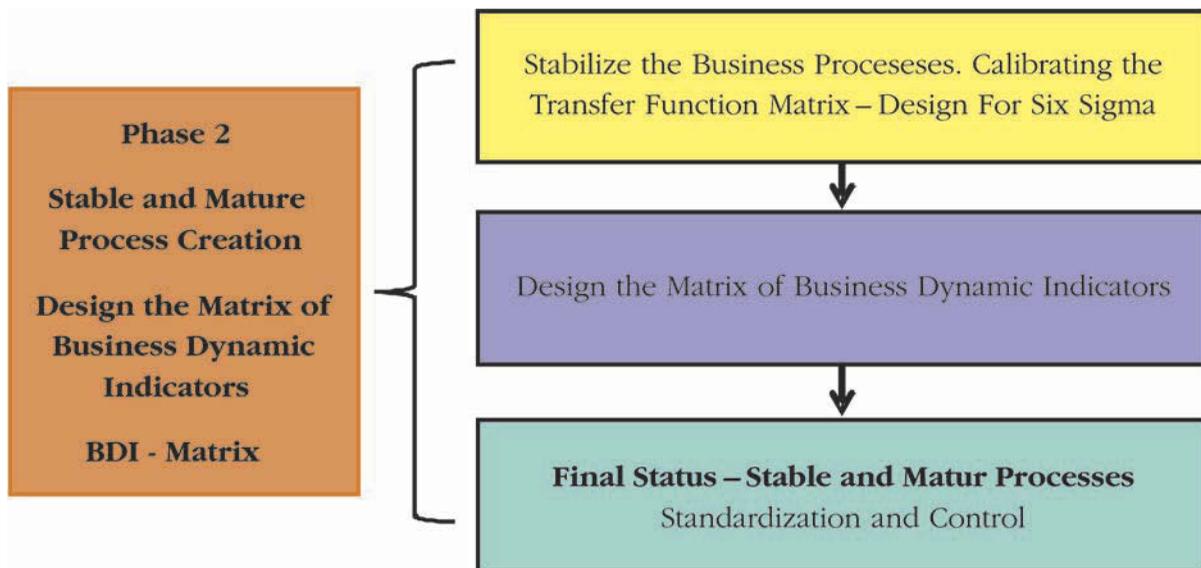


Figure 4 – *BDI Matrix Methodology (2)*
Design of the Matrix of Business Dynamic Indicators

negative huge influence of the public agencies and the criticality of current client requirements.

Logic of the Process: Registering of the agriculture plots in Land Registry (end to end process).

Process Input: Receiving primary information (Documents/papers which show the history of the property right/ownership over the land e.g. property title, heir certificates, legatee certificates, court orders, documents/papers of voluntary separation, sale purchase agreement/contract, donation contract, real estate exchange contract, sale purchase agreement with a maintenance clause)

Step 1: Land identification

Step 2: Land coordinates measurement (in field)

Step 3: Receiving the information from OCPI and Village Hall

Step 4: Completion of cadastral emplacement and delimitation plan („PAD”) and cadastral framing plan („PIT”)

Step 5: Document validation by OCPI and Village Hall

End of the Process/Process Output:
Delivering the results to the owner.

Challenges

Process Key Elements

- ⊙ Repeatable activities
- ⊙ Measurable process outputs and inputs
- ⊙ Critical Customer Requirement (CCR)
- ⊙ Internal Standard aligned to CCR. Set the specification limits of the results.

Team Challenges (as declared by process operators):

- ⊙ The current results are below expectation levels. Objective: at least 25 units/week to be finalized. The initial situation „overall average 1 year” 16.95 units/weeks in average
- ⊙ The OCPI was changing randomly the rules and requests
- ⊙ The restitution process was ineffective with a lot of flaws and errors. There are above 10% erroneous issued documents.

- The process results are highly related with the operators' skills. The first pass yield error level was very high, almost 50 %.
- The response time from the public administration was long (OCPI – response time 30 days, Village halls more than 2 weeks)
- Inertia in the public system is very high, the civil servant is „very demanding” in terms of request with direct effect in document rejection

Based on this challenges the research was helping to develop a useful TFM, which enhanced the knowledge of the people about their processes, facilitated the improvement of the results, and cre-

ated the platform to structure the business processes [14].

Therefore, as the paper showed above the main result of the first phase was creation and validation of the Transfer Function Matrix for the activity of this business. Even if the frame of this matrix was elaborated from the very beginning, during the entire transformation, the relations and the correlation among factors [1, 7, 15] was changed based on the influence of the environment and dynamic evolution of the factors (due to the knowledge curve of the people and improvements done with the help of Six Sigma and Lean instruments [9]). However, at the end of this endeavor the TFM was correlated as is represented in Table 1 [10]:

Table 1 – The Transfer Function Matrix

Design Parameters	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13
Y1-Number of land registered docs				□	□	□	□	□	□	□			
Y2-Lead Time							□					□	□
Y3-Quality	□	□				□							
Y4-Skilled Workforce	□		□								□		
Y5-Productivity			□			□					□		

The TFM for the cadastre firm is relying on the relation between the input and output of the business processes, and help people to take the proper actions in order to achieve the targets [7]. The authors used for this analysis the linear models in order to maintain the process controls on the results. Nevertheless, the

relation is dynamic and the coefficients are not constant during the surveillance of the factors and results [9, 10, 16]. In these conditions, more important is to find when the influence is changing and the effect of the factor is no longer significantly affecting the results.

Table 2 – *Process Variables*

Factors number	Process Variables
X1	HR – Training
X2	Work Instruction
X3	HR – Knowledge Level
X4	Village Hall successful number of contacts
X5	OCPI agency successful number of contacts
X6	Internal Quality
X7	Number of delivered requested docs
X8	FTE (available)
X9	Frequency of visits OCPI –SME
X10	Frequency of calls OCPI – SME
X11	Workforce Moral
X12	Frequency of visits Village Hall
X13	Backlog

For example at the beginning of the research the „X9 – visits at the cadastre agency done by subject matter experts” factor was more important than was at the end of the initiative, this happened because the influence stopped to have a high effect on the percentage of volume growth. In fact, it was visible that the more important (greater effect on results) was the volume of items delivered to the agency. This change in impact was possible because the constraints were changing slowly from understanding the way each local agency validates the items, to the constraints of company’s capacity to cope with a numerous types of problems [6]. Therefore, the team put emphasize on increasing capacity and finding ways to improve productivity. For this, the management launched the continuous improvement initiative in order to find solutions

to remove the barriers and overlap the gaps for achieving the expected results [9, 10].

In conclusion, the TFM should be perceived as a dynamic tool, which should be continuously updated. In addition, the relations among factors and between inputs and outputs should be interpreted accordingly with strategy and environment changes. However, each level of correlation should be formalized and continuously communicated to the entire team using the visual management techniques [14]. For example, in Table 3, the authors presents the levels for Y1 transfer function factors involved in reaching the target (>25 items/week for Y1).

The authors integrated the TFM into a comprehensive instrument BDI – Matrix using tools and methodology from Design for Six Sigma and Lean. Thus, the Transfer

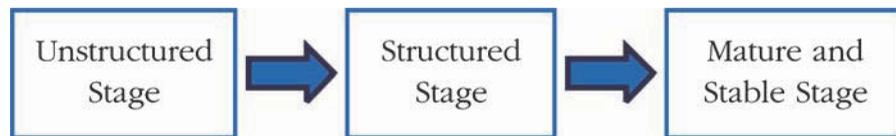
Table 3 – *Transfer Function process variables specification limits*

X Process Variables for Y1	Name	Limit
X6	Internal Quality	<5%
X4	Village Hall successful number of contacts	>6 units
X7	Number of delivered requested docs	>53 units
X8	Number of FTE	>5 FTE <16 FTE
X	Frequency of visits OCPI	>1 unit

Function Matrix was transformed into a „spinning wheel” which is monitoring the balance between critical factors and requested results. The TFM was fully operational when the processes became structured and results had an acceptable level of repeatability within the limits of customer

expectations. From this moment, the authors and management concluded that the processes became structured [10].

The authors considered three main staged for processes during the endeavor to transform an organization into a process-centered enterprise.

**Figure 5** – *Evolution Stages of the Process Centered Organization*

The methodology in phase one covered the first two stages as the paper presented at the beginning of this chapter. The third stage was accomplished when the authors finished implementing the BDI Matrix. Therefore, in the following paragraphs the paper will present the logic of the BDI Matrix [10].

The BDI Matrix has the main purpose to guide the organization management in order to develop the business process architecture according to the environmental changes and business strategy adjustments. The final stage of the business process is the mature and stable one. The moment coincides with the sustainable profit generation of the company and high level of customer satisfaction.

This mechanism has five quadrants, and each quadrant comprises elements correlated with other quadrants directly or indirectly. The mechanism has a cyclic principle and binds together the customer needs, the processes' results and the strategic objectives. Thus, the mechanism helps the organization to increase the flexibility in prioritizing the resources according with momentary needs of the company generated by the environment changes. In these conditions, the objectives terms should be diminished dramatically from years to months in order to better adapt to continuous changes of the economic conditions and market requests. The mechanism was designed to fit in an acceptable way to these constraints of the dynamic environment.

The first quadrant of the BDI Matrix presents the main dimensions that are part of this relationship. Consequently, the matrix was designed to keep correlated the strategy with operational area and continuous improvement initiatives according with the customer (market) needs. Thus, the results of the processes should be repeatable and predictable. In this context,

the Transfer Function Matrix highlights the moments when the elements from quadrants lose the correlation [15] and the results are not according with the requested expectations. The authors created a control plan to monitor the process variables, critical results parameters and strategic objectives in order to validate or invalidate the correlation areas of the BDI Matrix [10].

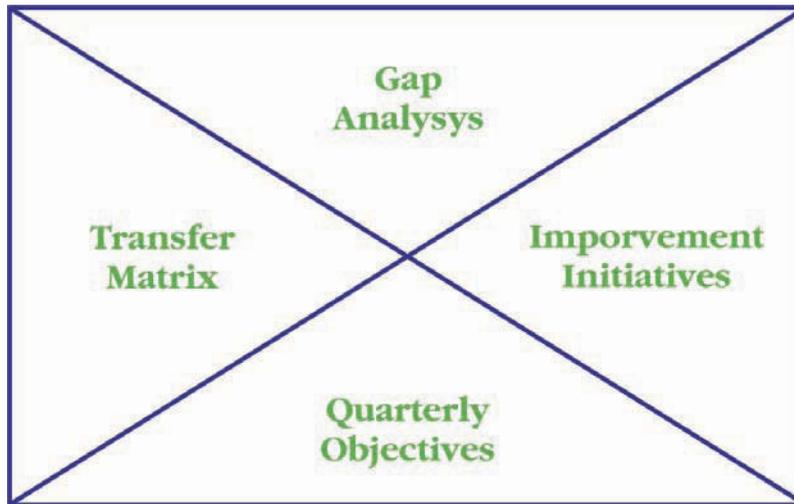


Figure 6 – *Quadrant 1*

The second quadrant of the BDI Matrix represents the measurable objectives of the four Balanced Scorecard dimensions that are the main direction chosen by management to achieve the goal of the company [13]. Each objective from the matrix is linked through a correlation matrix to the functional requirements of the processes [10, 15, 12]. The main advantage of using the BSC classification is that the objectives are from the very beginning related to customer needs and end to end process perspective. Thus, the objectives are related to the both size of the enterprise, voice of the customer and voice of the business. To cascade all these objectives the authors and project team used QFD matrix and DFSS tools [16, 11, 12].

The third quadrant of the BDI Matrix is the functional requirements parameters. In this area, the specialists control the processes performance and any loss of correlation between objectives and parameters is analyzed and reported. When any improvements in results are not having a positive influence on strategic objectives, the problem is reported and management should take decisions.

For example, if productivity improvement stops giving any significant increase rate in money, this is the signal that the management should analyze more profound the business and try to understand what are the new environment elements that should be taken in consideration.

Customer satisfaction	
OCPI/Village Hall Rating	
Customer importance (percentage from business)	CUSTOMER
New villages entry rate	
Time to conform to new customer requests	
Unit cost	
Fixed costs	FINANCIAL
Variable costs	
Cost of poor quality	
Volume of delivered docs	
Service quality	INTERNAL
Takt time	BUSINESS
Process improvement rate	PROCESSES
Productivity	
Adaptability to new conditions encountered	
Learning curve	
Number of training hours	
Adaptability in working at any workstation	LEARNING
Number of certified employees	AND GROWTH
Number of training courses per employee	

Figure 7 – Quadrant 2

Productivity
Skilled Workforce
Quality
Lead Time
Number of land registered docs

Figure 8 – Quadrant 3

The fourth quadrant of the BDI Matrix is the process variables. In this area, the people from the processes analyze and signal any failure regarding the correlation between quadrant three and four. Thus, the management will analyze any process variable that is not having impact on quadrant three and, therefore, on the functional request and finally on main objectives of the organization, and in the end they will decide if the issue will be transformed into an continuous improvement project (initiative) or if the entire process will be reengineered. The Transfer

Function Matrix has the main role in correlation control for this quadrant.

The quadrant five of the BDI Matrix is problem solving initiatives, Six Sigma projects and Process Designing initiatives. This quadrant has three types of initiatives:

- Kaizen, this is a short-term initiative. Duration of this type is maximum two weeks and they are oriented to quick win problem solving. For example, the process team prepared an error type dictionary. For short term initiatives the people use PDCA methodology (plan, do, check and act) [17].

Approved equipment and software
Backlog
Village Hall succesfull number of contacts
Workforce Moral
Frequency of calls OCPI – SME
Frequency of visits OCPI – SME
FTE (available)
Number of delivered requested docs
Internal Quality
OCPI agency succesfull number of contacts
Village Hall succesfull number of contacts
HR - Knowledge Level
Work Instructions
HR-Training

Figure 9 – Quadrant 4

- Second type is medium term initiatives. For these cases, Lean Six Sigma projects will be the main drivers. These are the situations when the correlation between process variables and quadrant three or two became weak and the processes could lose their stability. The impact is severe and the cause is unknown.
- Third type is the long-term initiatives. For these cases, Process Design or Re-engineering could be the answer. These are the situations where the results could transform dramatically the entire organization and could affect the

strategic objectives too. The financial impact and the total risk are high. The organization culture could be affected. These types of initiatives are under the top management responsibility.

The Matrix of the Business Dynamic Indicators is a cyclic mechanism designed to continuously survey the business processes using the results of the Transfer Function Matrix spin wheel effect. The link between these mechanism parts are the mathematical models like Multiple Linear Regression, ANOVA, Hypothesis Testing and other statistical tools [7, 8, 9, 10].



Transfer Matrix

○	○	○	□	●	Approved equipment and software							
			□	○	Backlog			●	□			
□		○	□	□	Village Hall succesfull number of contacts				□			
□	□	□	□	□	Workforce Moral	●	●	●				
			●	□	Frequency of calls OCPI – SME				□			
			●	□	Frequency of visits OCPI – SME				□			
○			○	□	FTE (available)	●			□			
□			□	□	Number of delivered requested docs				□			
□	●	□	□	□	Internal Quality	□	□	□				
		○	●	□	OCPI agency succesfull number of contacts				□			
		○	●	□	Village Hall succesfull number of contacts				□			
□	□	○	●	●	HR - Knowledge Level			●				
□		●	□	●	Work Instructions	□	□	□				
●	●	□	●	○	HR-Training	□	□					
Productivity	Skilled Workforce	Quality	Lead Time	Number of land registered docs	<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;">Transfer Matrix</div> <div style="width: 30%; text-align: center;">Gap Analysis</div> <div style="width: 30%;">Improvement Initiatives</div> </div> <div style="text-align: center; margin-top: 20px;">Quarterly Objectives</div>					Kaizen initiatives based on failure modes	6 Sigma Projects in business areas with unattained goals	Process redesign
			○	□	Customer satisfaction							
	●	□			OCPWillage Hall Rating							
			●	□	Customer importance (percentage from business) CUSTOMER							
		●	□		New villages entry rate							
			□	○	Time to conform to new customer requests							
□				□	Unit cost							
□				□	Fixed costs	FINANCIAL						
□				□	Variable costs							
□				□	Cost of poor quality							
				□	Volume of delivered docs							
			□		Service quality	INTERNAL BUSINESS PROCESSES						
			□		Takt time	□	Strong relation					
	●		●		Process improvement rate	●	Medium relation					
□					Productivity	○	Weak relation					
		●	□		Adaptability to new conditions encountered		Outputs					
□					Learning curve	Y1	Volume					
□					Number of training hours	Y2	Lead Time					
□					Adaptability in working at any workstation	Y3	Quality					
□					Number of certified employees	Y4	Skilled Workforce					
□					Number of training courses per employee	Y5	Productivity					

Adjust quarterly objectives based on results

Figure 10 – The BDI – Matrix

Conclusions

During the entire research, the authors has been inspired from concepts such as Business Process Management, Six Sigma, Lean Operations & Manufacturing and Design for Six Sigma and used specific tools or instruments such as Multiple Linear Regression, ANOVA or elements from Linear Algebra.

Therefore, the authors conducted a case study into a cadastre company in order to develop the methods. The methods proved to be effective by doubling the company turnover with direct effects on productivity, people moral and profitability. The originality of the paperwork consists in designing, for the first time in the Romanian service sector, an instrument that links three business areas such as customers, strategic objectives and

continuous improvement for a management who decided to have a process-oriented organization. The EDI – Matrix has an effective impact only through a continuous correlation, surveyed with The Transfer Function Matrix, between the business process variables and the expected results by customers and shareholders. Despite the fact that the paperwork is limited to one area, cadastre, the authors considers that, due to the generality of the tools involved and the relational character of the matrix, the method is appropriate to be used also in other areas where the repeatability of results is high and could be measured. To conclude, the method could add value to the management of any organization in order to increase the predictability of the results and therefore, to increase the performance and profitability in general.

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IT SMEs IN FRANCE AND ROMANIA

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Abstract

This paper presents the results of a comparative research regarding the development of IT SMEs in France and Romania. The dynamic of the information technology industry challenges the SMEs to constantly perform and grow, while avoiding growth crises and other organizational issues. The present research explores the differences and similarities of development of the IT SMEs in the two countries, by applying original matrix and statistical models on SMEs samples, by taking into consideration three indexes: age of the SMEs, number of employees and turnover. The results of the research suggest the maturity of the French IT market, while the much younger Romanian IT market provides growth opportunities.

Keywords: SMEs, growth, information technology industry, growth crisis

RESEARCH CONTEXT

In order to study the development and growth of small and medium enterprises (SMEs) the fundamental concepts must be identified, studied and integrated. The fundamental concepts in this paper's case are the organizational life cycle, the growth of SMEs and the organizational growth crisis process.

The organizational life cycle is an established model based on the premise that enterprises develop through time, while passing through different progressive development stages, which are relatively foreseeable [1]. This model is in close relationship with the study of organizational growth and development and it is based on a biological metaphor referring to the

life cycle of live organisms, which follow a regular development pattern: birth, growth, maturity, decline and death. Similarly, organizations follow a series of development stages, generally grouped into four or five stages: start-up, growth, maturity and decline.





This model is most visible in the case of small and medium enterprises (SMEs), because these present certain specificities that facilitate the study of the organizational life cycle.

The description of the organizational life cycle is founded on two premises. The first premise refers to the fact that some regularities are noticed throughout the organizational development, and these regularities can be grouped into stages [2], each of these having specific characteristics, activities and structures, none of which resemble the ones of prior or future stages; The second premise refers to the problems confronting entrepreneurs in each stage and the manner they address these issues, as this manner will affect and influence the transition to the next stage, but also the evolution of the enterprise within the stage [3].

Although within the organizational life cycle model „growth” is viewed only as stage, growth is a premise for the success of the SME throughout its life cycle. In the management literature *growth* is mostly associated with size growth. However, as well in theory, as in practice, the growth of the enterprise is operationalized in different ways and by using different indexes [4]. Among these indexes are mentioned the number of employees or the turnover. Studies show that the indexes used in the context of SMEs are strongly interrelated.

The growth types are defined in the specialty literature by the strategies the SMEs implement in order to survive, grow profitability and ensure longevity. Generally, there are two main types of growth: organic or intensive growth and inorganic or extensive growth. The inorganic growth, which is not very often encountered with SMEs, refers to a growth generated by acquisition of new firms, strategic alliances

with other SMEs or joint ventures. The organic growth, the most often met in the case of SMEs and also the recommended one, refers to a paced growth, which allows the organization to sustain the growth, both financially and organizationally. This leads to a sustainable and organic growth. A manner to identify this sustainable growth is by using a complex index called *the sustainable growth rate*, which indicated the rhythm by which an enterprise can grow without endangering the survival and development of the organization: if the growth exceeds this rate, the enterprise will not be able to finance or sustain with own resources the growth; if the growth is too slow, the enterprise will fall into a stagnation status, which again does not benefit the company.

To fully understand the growth phenomenon it is significant to understand which factors stimulate and which ones inhibit growth. That is why the influencing factors and the barriers to growth need to be identified. Among the most important influencing factors the following must be mentioned: the selection of the growth models [5], the availability of the necessary resources for growth [6]; the decision making process of the entrepreneur regarding the company strategy regarding growth stimulation [7]; organizational culture, management, communication, technology information and human resource management [8]. According to established literature references [2], the barriers to growth are, mainly, grouped into five categories: institutional, social, financial, external and internal. All these barrier types can raise various challenges to the entrepreneur in his mission to develop and stimulate the growth of the enterprise.

Regardless of the macroeconomic context in which an enterprise performs its

business, whether it is small, medium or large, it can encounter internal organizational crises, which can derail it from the vision and objectives established by the entrepreneur. Such crises may rise as a consequence of organizational change, which is a result of the growth of the enterprise: the entrepreneur must delegate executive power to a professional manager, the employees' number grows, as well as the complexity of information and processes within the business, such as decision making and operational ones [13]. However, it is much more difficult for a SME to surpass such a crisis, because of limited human and financial resources, but also due to reduced negotiation power in relation to external creditors. A special type of organizational crisis is the organizational growth crisis, which, besides the typical general characteristics of an organizational crisis, directly attacks the development of the enterprise and puts at risk even its survival.

Understanding the process of crisis development is important [11], because only by apprehending and addressing the fundamental reasons of the crisis measures



can be created and implemented in order to prevent and counteract crisis. Only this way it can be worked towards regenerating the business and avoiding collapse. Moreover, the deep understanding of this process leads to more clear perspective of how various influence factors connect in time (causes, consequences, symptoms). The first author who researched the theme of the organizational crisis process is [12], and only after him other researchers elaborated wide exposures of the organizational crises process, enhancing Argenti's model, completing it with new aspects [13], [14].

The most important aspect of describing the organizational growth crisis as a process is being able to identify the stages of its development: causes, symptoms and effects. SMEs have proven a good research material, as for the last 60 years they have played a great role in the development of countries, but also because they are adaptation models during crisis periods (having characteristics necessary for adapting to difficult situations: adaptability, dynamism and flexibility) [19] and development models [16].

As said before, the specialty literature identifies two concepts related to organizational growth crisis processes: causes and symptoms [11]. Regarding causes, there are different types in function of author. However, there can be identified 3 main groups of causes: owner dependency, insufficient capital or faulty management.

The symptoms of organizational growth crisis are phenomena which indicate potential future events and which facilitate taking action for preventing or avoiding organizational growth crisis. According to Ropega [11], the symptoms of organizational crisis can be grouped into two categories: financial and non-financial symptoms. The financial symptoms are identifiable by tradition financial and risk management instrument. However, these symptoms indicate a potential crisis only in a very late state, when usually it is very difficult to avoid it. The non-financial symptoms refer to factors such as employee confidence in the company's vision, bad debt or client satisfaction. Such symptoms, although they are more difficult to identify and need new instrument to be monitored and supervised, can indicate in a much earlier stage a potential growth crisis.

In this constant challenge of the entrepreneur to grow its business and also to avoid growth crisis, some phenomena may appear, which may lead to organizational growth crisis, although the entrepreneur tries the opposite. According to a study conducted by Probst and Raisch [17] on large enterprises, 70% of those who went through an organizational crisis suffered from the Burnout Syndrome and 20% from the Premature Aging Syndrome. According to research [18], these two syndromes may apply in an adjusted form to SMEs as well.



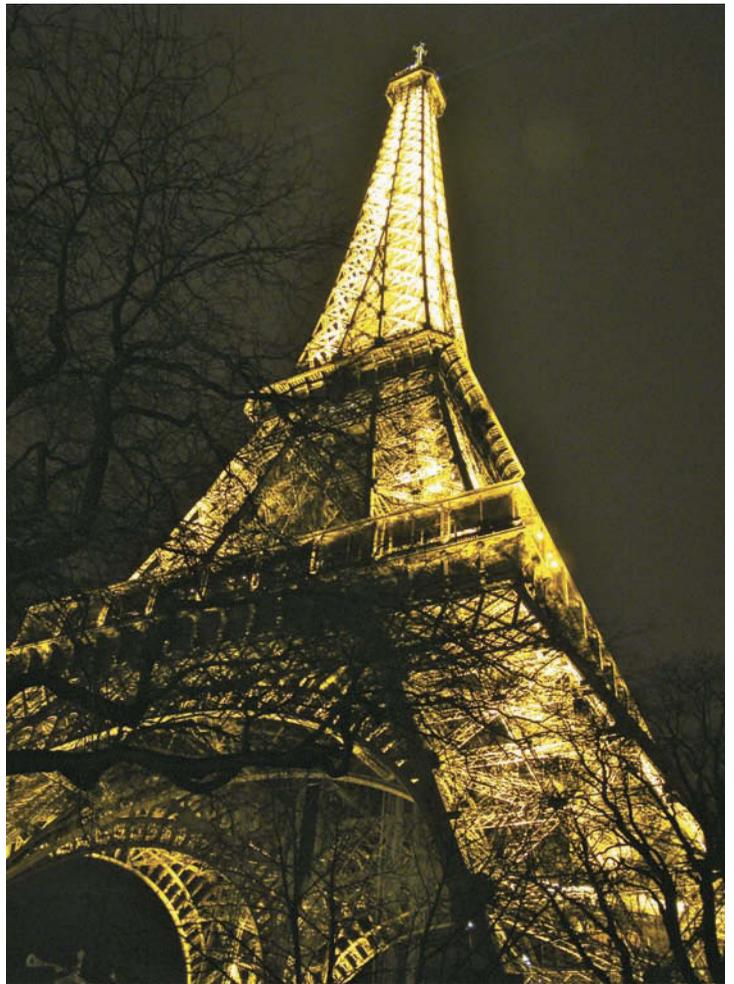
To attain the profitability potential, an enterprise must grow [19]. However, a too fast paced growth can lead to losing control over the development of the company. A constant growth can prove positive effects, but any growth, which surpasses the optimum growth rate, all these effects may become negative. To determine the optimal growth rate a series of financial, market and management indexes must be taken into consideration. In such a case can the index, presented earlier – the sustainable growth rate – be implemented. The fundamental idea in maintaining a healthy growth rate is to seek balance in five aspects: leadership style, organizational culture, change management and growth strategy.

METHODOLOGY OF STUDY

In order to analyze the development of SMEs in France and Romania a comparative study has been conducted in the two countries. The methodology of the research presents how the two SME test samples have been built and the original matrix and statistical models used to determine the evolution of SMEs in the two countries.

The research is concentrated on the SMEs from the information technology (IT) industry. In this respect the SMEs in the test samples have been chosen from the J section of the CAEN Code (Classification of the Activities in the National Economy; this codification of economic activities is generally available at European level), division 62, „IT Services” with its code classes 6201, 6202, 6203 and 6009.

The research has been conducted in two stages in the two target countries: France (during a research visit at the



Dauphine-Paris University) and in Romania. During the research visit in France a test sample containing 192 IT SMEs has been built. This test sample has been used to create and test the models, which will be presented further. In Romania a 1292 IT SMEs sample has been built. For France the data was collected for the period 2009–2012 and for Romania for the period 2008–2012. The type of data collected for both samples includes: enterprise name, SRC (sole registration code), district, city, incorporation date, turnover (2009–2012 for France; 2008–2012 for Romania), profit (2009–2012 for France; 2008–2012 for Romania) and CAEN code for the main activity of the SME.

Furthermore, the age for the year 2013 has been calculated in a separate column. According to the European Union's definition of a SME (fulfillment of conditions regarding number of employees and turnover per year), each SME in the two samples has been tagged as a microenterprise, a small enterprise or a medium enterprise.

During the research several original models have been used to analyze the available data. The first of these models is the statistical model of the evolution of SMEs from a given industry. This model is based on a linear regression function and analyzes a set of data in time.

- The T_i incorporation moments of each enterprise i , respectively the age of each enterprise X_i at the i moment of analysis (calculated as the difference between the calendar date of the analysis moment

T_a and the calendar incorporation date of the enterprise T_i):

$$X_i = T_a - T_i; \quad i = 1, \dots, N;$$

($N = \text{No. Analysed enterprises}$)

obviously the measure unite of the enterprise age is a temporal one (year, quarter, month, etc.);

- The size Y_i of the enterprise i at the analysis moment – evaluated based on the number of employees at the T_a analysis moment;
- The performance Z_i of the enterprise i at the T_a analysis moment – evaluated based on the turnover of the enterprise i .

Having a limited serie of entry data, the question raised refers to the identification of performance differences versus size differences among different types of enterprises in the given industry.



The next model presented is the tridimensional matrix model „SAVANA”. For comparing the values of each enterprise, initially, a two dimension model has been used, in which indexes have been compared in pairs (of the three used indexes: age, no. employees and turnover) in order to identify organizational growth crisis situations. By analyzing the cases obtained in this manner, it has been noticed that this approach does not offer enough information to describe the contexts of the enterprises, in order to be able to characterize them. This is why a tridimensional matrix model has been built, which takes into consideration all three indexes, aggregating all analysis cases in a single matrix.

This approach facilitates a better rounded characterization of each analysis case and, also, a grouping of these cases into four situation groups, function of the level of growth crisis risk. These large situation groups have been named, taking into consideration the growth crisis risk level and the basic characteristics of the situations, after the most important five animals in South Africa (The Big Five – the Black Rhino, the African Buffalo, the Cheetah and the Lion; the only animal missing from the Big Five in the model is the African Elephant). The criterion for choosing these animals is their behavior in the savannah, this being, also, the reason for which the model was named „SAVANA”.

RESEARCH RESULTS

After applying the first analysis model on the two databases of IT SMEs from France and Romania, the growth velocity of each index can be compared.

Considering the growth dynamics of the index „No. employees”, after approximating

the discrete continuous functions, the following two functions were obtained for France, respective Romania:

$$Y_F = 0.1019x + 38.409 \quad (1)$$

$$Y_R = 0.3338x + 10.185 \quad (2)$$

The parameter of x defines the slope of the linear function, and this the growth velocity of the index. That is why we can compare the slopes of the two functions:

$$0.1019 < 0.3339 \rightarrow \alpha_F < \alpha_R \quad (3)$$

As we can notice, the slope α_F is smaller than the α_R , which indicates that Romania has a higher growth velocity of the employees' number than France.

By approximating the discrete function of the index „turnover” by means of a linear continuous function, the following two expressions are obtained:

$$Z_F = 27,896x + 7,000,000 \quad (4)$$

$$Z_R = 7118.9x + 569,331 \quad (5)$$

From these two expressions it is noticed that β_F (the parameter of x) is almost four times greater than β_R , which indicates no growth velocity of the turnover four times higher in France than in Romania.

Although the index „No. employees” grows faster in Romania than in France, the index „Turnover” grows faster in France. This may indicate a very low productivity in Romania, but also the maturity of the IT industry in France.

To better understand the context differences in which the SMEs in the two countries perform their business, a comparison of the analysis cases distribution will be performed, at first at high, general level, and then at SME type level. At general level, the average values used in the analysis are the following (Table 1):

Table 1 – *Average values used in the comparative analysis of SMEs in France versus Romania*

Index	France	Romania
X_m (years)	13	11
Y_m (no. employees)	55	14
Z_m (€)	11,094,861.69	671,565.37

Regarding the average values for the IT industry, the context looks a bit different for both indexes: France indicates higher values, which underlines the observation that the Romanian market is still young, but has a high growth potential. Following these values, it can be noticed that most IT SMEs in France are small or medium, while in Romania the majority of them are represented by microenterprises. However, the analysis at the entire SME sector level

is not relevant, mostly because of the great differences between the limitation of each subsector, but also because of the different weights each of the subsector has within the sector.

Microenterprises

The average values used in the analysis of microenterprises from the two samples are the following (Table 2):

Table 2 – *Average values used in the comparative analysis of microenterprises in France versus Romania*

Index	France	Romania
X_{rm} (years)	10	10
Y_{rm} (no. employees)	5	3
Z_{rm} (€)	1,251,687.53	101,019.85

The only similarity among the two sub-samples, as it can be noticed in Table 2, refers to the average age of microenterprises, which is in both cases 10 years. The sub-sample of microenterprises in France shows that both the average employee number ($Y_{rm} = 5$) and the average turnover (Z_{rm}) are larger than the ones in Romania. This can be a consequence of the more stable and favorable economic context of France, but also of the fact that the IT market in Romania hasn't reached its maturity yet.

From the perspective of the analysis cases, the two countries show both similarities and differences. In France most microenterprises are in a severe crisis context (France – 56%) compared to Romania, where the microenterprises present a low risk of crisis (46%). However, in the case of microenterprises with high crisis risk, in France the most common problems relate to low productivity issues (33%) or an extensive growth (22%), while in Romania these microenterprises are whether in stagnation stage (32%) or in an intensive growth stage.

Although in France only 19% of the microenterprises have a low risk for growth crisis, most of them, similar to the ones in Romania, fall into the analysis case „start-up” (66%, respectively 60%). A high percent from this category from Romania confront them also with a maturity stage (19%).

Noticeably larger is in France the microenterprise percent in crisis (19%) compared to the one in Romania (only 8%). In both cases, however, most microenterprises confront themselves with failed growth. Only in Romania cases of very low productivity can be found (21%).

In Romania only 2% of all microenterprises are out of any type of crisis, while in France the percentage is higher (6%). However, in both cases the enterprises are in a stage of late sustainable growth, Romania offering also cases of mature

microenterprises with very high productivity (40%).

Small Enterprises

The average values used for small enterprises are presented in Table 3. As it can be noticed, the average age in France for this enterprise category is higher than the one for Romania (12 years, respectively 11 years). Not the same can be said about the average employee number, which in Romania (22 employees) is larger than in France (21 employees). The difference becomes interesting when the average turnover is analyzed, which is larger in France's case. These differences suggest the high productivity of small enterprises in France compared to Romania.

Table 3 – Average values used in the comparative analysis of small enterprises in France vs. Romania

Index	France	Romania
$X_{\mu m}$ (years)	12	11
$Y_{\mu m}$ (no. employees)	21	22
$Z_{\mu m}$ (€)	3,482,043.30	1,069,991.55

From the point of view of small enterprise distribution depending on the analysis cases, the greatest difference noticed is that the small enterprises from the France sample show only two types of analysis cases, with high and low crisis risk, while for Romania there are small enterprises identified in each analysis case. Most of the small enterprises are in the middle cases – the orange and yellow areas. Yet, most French enterprises from this category (59%) show characteristics of low levels of crisis risk, while in Romania (50%) most of them have a high crisis risk. In both

countries most small enterprises are whether in stagnation (France – 54%; Romania – 35%) or depict an intensive growth (France – 15%; Romania – 18%).

This polarization of the enterprises' issues may indicate the presence of the two syndromes, the Burnout Syndrome and the Premature Aging Syndrome. Similar to the case of microenterprises, in both countries, the majority of small enterprises with reduced crisis risk are in the start-up stage (France – 50%; Romania – 69%), the others going through a maturity stage (France – 37%; Romania – 24%).

Moreover, compared to France, in Romania are small enterprises in crisis (9%), as a consequence of failed growth, but also there are some in a stage of late growth, and thus outside any type of crisis (4%).

Table 4 – *Average values used in the comparative analysis of medium enterprises in France versus Romania*

Index	France	Romania
$X_{\Delta m}$ (years)	14	11
$Y_{\Delta m}$ (no. employees)	87	109
$Z_{\Delta m}$ (€)	18,633,021	5,892,848

Although the medium enterprises in France have an average life duration (14 years) longer than the ones in Romania (11 years), these show a lower average of the employee number (87 employees) versus Romania (109 employees). Nevertheless, the productivity is much higher in France, due to the almost four time higher average turnover than the one in Romania.

The percentage of medium enterprises with high crisis potential is approximately similar in the two countries (France – 47% and in Romania – 46%), while the low crisis risk percentage in France is with 17% higher in France than in Romania (33%).

Among the medium enterprises from the orange area, the one depicting the high crisis risk analysis cases, the most enterprises from both countries confront themselves either with stagnation (36% in France, fewer than in Romania – 48%) or in an intensive growth stage (41% in both countries). Other existing cases of high crisis potential are represented by low productivity (Romania – 18%) or fast growth (France – 17%). In the yellow area, the one with reduced crisis risk level, as before, most medium enterprises, in both countries, are start-ups (France – 60%; Romania – 74%).

Medium Enterprises

The average values of the analysis used for medium enterprises are presented in Table 4:

In the case of medium enterprises, it is very interesting that the very low percentage of such enterprises in crisis in France is just 1%, while in Romania the share is considerably higher, 14% (due to failed growth). In both countries, 7% of this enterprise category presents characteristics of a late growth, which indicated an almost null crisis level.

Conclusions

In order to approach the research regarding the development of SMEs a series of fundamental concepts (the organizational life cycle, the growth of SMEs and the organizational growth crisis process) were pinpointed and integrated in order to create a framework for the creation of the models presented in the methodology section of this paper. The three models presented help towards the identification of different crisis situations for SMEs – the SAVANA model suggests 27 crisis analysis cases. This model together with the statistical one presented in the methodology section helps create a dynamic image of the development of SMEs in the two countries.

After conducting the research, the main conclusions refer on the one hand to the maturity level of the IT market in France, as well as the high productivity of IT SMEs in this country, and the other hand to the youth of the IT market in Romania and its low productivity with respect to IT SMEs. However, the results may be influenced,

also, by the common practice of Western Europe SMEs, in the last decade, of outsourcing specific IT services in countries in Eastern Europe, due to lower costs. This detail may explain the results from another point of view and opens an interesting path towards further research.

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FORECAST OF ENERGY CONSUMPTION

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Abstract

The forecast can be defined like approximately of the unknown events from the future; this is necessary because of the existence of some unknown events, but these events play an important role in taking decisions. It is obvious that the uncertainty's elimination is not possible, so the forecast is a tool who attempts to minimize the uncertainties.

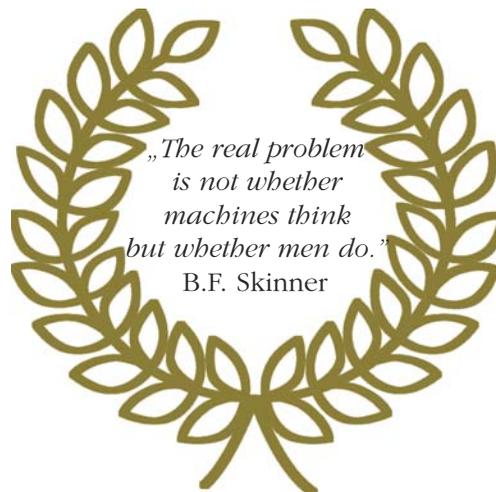
The forecast importance in the electrical energy management is very high. The forecast of the energy's request presumes the estimation of this request's characteristics: size, time evolution, the request's structure, and others. The forecast of the electrical charge is a tool of a modern energy management system (EMS).

Keywords: *Forecast, electrical energy, mathematical model, consumption.*

INTRODUCTION

The importance of forecast in management is very high. Some of the most important aspects in which the forecast studies on short term are crucial are: the initiation of the privatization process of the electric energy distribution, the generalization of the transactions on the electric energy on the market, the substantiation of new mechanisms and instruments for the market risk management, and the accentuated decentralization of the electric energy sales. In this context, the paper shows many aspects connected with the short term forecast of the electric energy consumption. The powerful industrial development has brought important changes in all areas, and this was reflected in the

environment, and also at the society level. The only possibility to maintain the control on the fast and important changes is the adaptive behavior against these changes. This means firstly to establish the future development and the correct appreciation



of the impact of factors and decisions for the future by forecast, and secondly, in the decisions phase, to introduce the assessments needed for these purposes. [1]

Thanks to the process of forecast and decisions taking, there are processes which are developed in time, in conditions of random perturbation. The adaptation process must be continuous, showing forecasts and continuous adaptation which will maintain the evolution towards the target. Moreover, once the specific targets are approached, new targets are developed for the future, who presume new forecast horizons and new decisions.

The main purpose of this paper is to present the elaboration methodology for forecasts in the energy consumptions sector, using mathematical models.

The definition for the forecast of the energy and power consumption, is „...the scientific activity having as main purpose the forecast of the energy and power consumption, based on calculations analysis and on the interpretation of a different data, so as to be obtained a more precise concordance between the estimated consumption and the one effectively realized” [1].

There are batches of parameters (reasons) with random character which lead to the energy consumption forecast: climatic factors, demographic factors, economic factors, as well as other factors.

The methodology of elaboration of a forecast study for the energy consumption has the following main steps:

- The collection, selection and analysis of the initial data;
- The establishment of the mathematical model for the consumption;
- The analysis for the variance which has been obtained for the forecast, and the establishment of the final decision. [2]

MATHEMATICAL MODEL

Consumption curve represents the energy fluctuation in time (or taking into consideration another parameter) and it can be split in more components. The forecast experience of the energy consumption shows four main components which determine the consumption curve (W) (Figure 1).

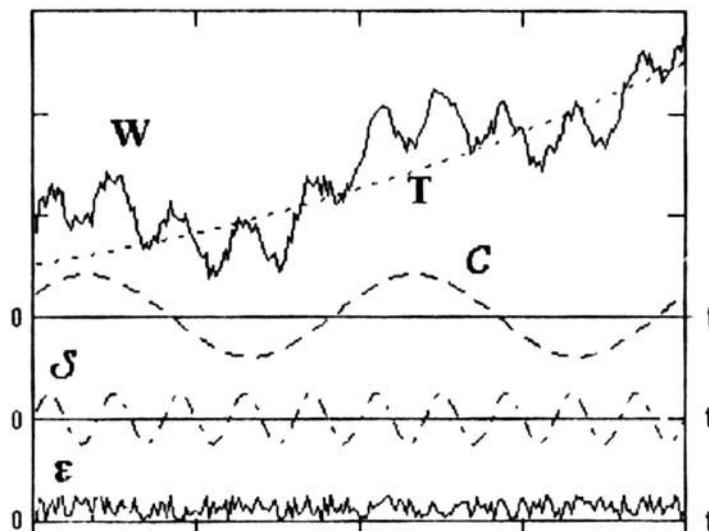


Figure 1 – *The components for the mathematical model*



The respective components are:

1. The trend (T) represents the consumption's main element, establishing the modification of the form of energy consumption.
2. The cyclic component (C) appears due to some fluctuant causes which have a small effect such as the request – supply correlation on a period over a year.
3. The seasonal component (S) it is caused by certain parameters which present seasonal fluctuations (especially climatic elements). This component has a few months variation period and a similar shape for all years.
4. The random component (ϵ) it is due to perchance causes, that has been previously specified. As a conclusion, the energy consumption results, totaling the elements that have been specified above, can be presented as:

$$W(t) = T(t) + C(t) + S(t) + \epsilon(t) \quad (1)$$

The direct forecast methods are based on the assumption that the causes, the factors and the trends which established the energy consumption in the past, are also valid in the future, without appearing any dramatic and sudden changes which will affect the consumption evolution. This assumption justifies the energy consumption evolution trend extrapolation from the past to the future, and brings the forecast problem to the analysis of the energy consumption variation from the past to the future.

The mooted forecast methods are supposed the establishment of a mathematical model likeness a one or more variables function (generally a single variable, time) who fairly estimates the trend on the last period. The estimation of the functions coefficients is done by solving an equations system where the coefficients are

means of the energy consumptions over the last period.

It is considered a value set y_t observed, of a chronological series. Mathematical shaping can be made using an additive model:

$$y_t = T_t + C_t + S_t + R_t \quad (2)$$

where: T_t represents the trend (continuous component), C_t represents the cyclical component, S_t represents the seasonal component, R_t represents the component which is due to random variations. The additive model is merged in additive model by logarithmical way. [1]

Determination of the trend T_t

The trend T_t is determined by using the following linear model:

$$y_t = b_0 + b_1 * t + \epsilon_t,$$

where finding the parameters b_0, b_1 are made with matrix method. The following matrixes are given:

$$X = \begin{pmatrix} 1 & x_1 \\ 1 & x_2 \\ \dots & \dots \\ 1 & x_n \end{pmatrix}, Y = \begin{pmatrix} y_1 \\ y_2 \\ \dots \\ y_n \end{pmatrix}, B = \begin{pmatrix} \hat{b}_0 \\ \hat{b}_1 \end{pmatrix} \Rightarrow$$

$$\Rightarrow B = (X'X)^{-1}(X'Y) \quad (3)$$

$\Rightarrow \hat{b}_0$ and \hat{b}_1 parameters which determine the regression right line: $y_t = \hat{b}_0 + \hat{b}_1 \cdot x_t$.

The advantage for this method is that it can be applied successfully in case of multiple regression and non right line regression.

Determination of the cyclical component C_t

The cyclical component C_t is acquired using the graphical method:

1. Establishing the trend (regressive right line).
2. For each time period it is evaluated by calculating the trend value \hat{y}_t .
3. The percent of the trend is $\frac{y_t}{\hat{y}_t} * 100$.

Then it is graphically represented, the points $\left(t, \frac{y_t}{\hat{y}_t} * 100 \right), t = 1, \dots, n$, and the line 100%. If there is a cyclic phenomenon, there can be considered the cycle with the length T .

Determination of the seasonal component S_t

The seasonal parameter is used to compare to periodical fluctuations on short term between seasons (in the present paper, months). The method showed below is applied for the additive model (2).





We calculate $MA(t)$; this parameter of the time series y/MA is determined; it is calculated the mean average of each month; it is calculated the sum of the average means, and it is obtained the seasonal parameters.

The forecast

The forecast can be obtained by smoothing. We will consider the exponential smoothing using the formula:

$$s_1 = y_1; s_t = \alpha \cdot y_t + (1 - \alpha) \cdot s_{t-1}, t \geq 2, \\ \alpha \in (0, 1) \\ s_2 = \alpha \cdot y_2 + (1 - \alpha) \cdot y_1, s_3 = \alpha \cdot y_3 + \\ + (1 - \alpha) \cdot y_2 = \alpha \cdot y_3 + \alpha(1 - \alpha) \cdot y_2 + \\ + (1 - \alpha)^2 \cdot y_1 = \alpha(y_3 + (1 - \alpha) \cdot y_2 + \\ + (1 - \alpha)^2 y_1), s_t = \alpha(y_t + (1 - \alpha) \cdot y_{t-1} + \\ + (1 - \alpha)^2 y_{t-2} + \dots), t \geq 2. \quad (4)$$

CASE STUDY

The data base that was considered for this paper (60 data series) represents the electrical energy consumption of an organization during January and February 2014. The registrations from the data base comprise real data concerning the energy consumptions which allows determining, with a certain trust level, the consumptions on intervals obtained by proportional division principle. The safety of the forecasts is directly proportional with the number of the available registrations and with their precision, and the dates are renewed daily.

The data estimation and the forecast in a time series are made using the modeling methods which have been discussed earlier. The mathematical model for the forecast of the electrical energy consumption was elaborated using Matlab, comprising the following steps:

- a) The realization of the data base;
- b) The calculations for the geometrical trend, and the concordance with the graphical method (Figure 2);
- c) The calculations for determining the cyclic component shown in Figure 3.
- d) The calculations for the seasonal effect (Figure 4);
- e) The forecast for the next year using the exponential straightening (Figure 5).

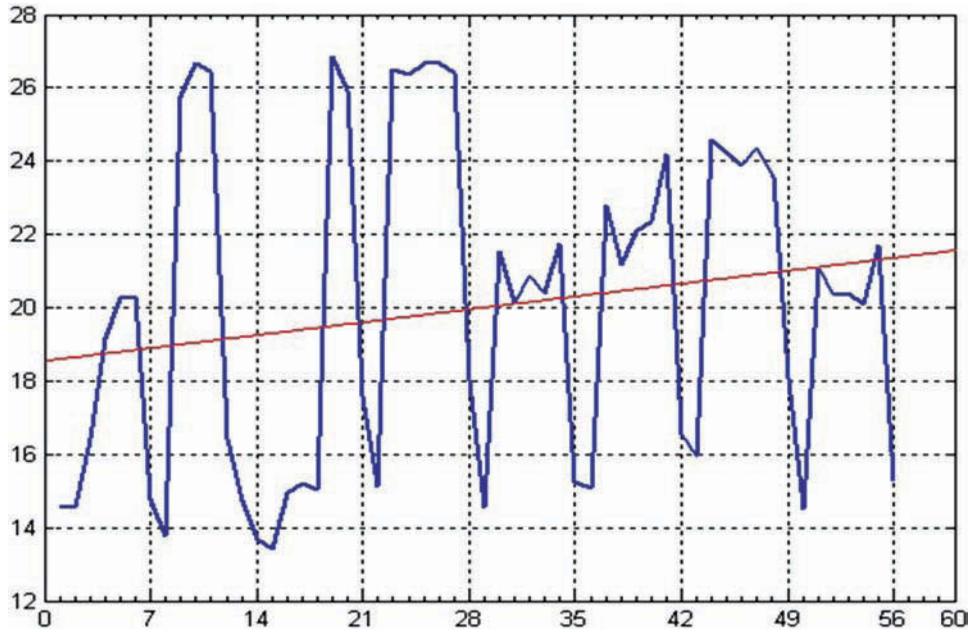


Figure 2 – *The evolution in time of the energy consumption*

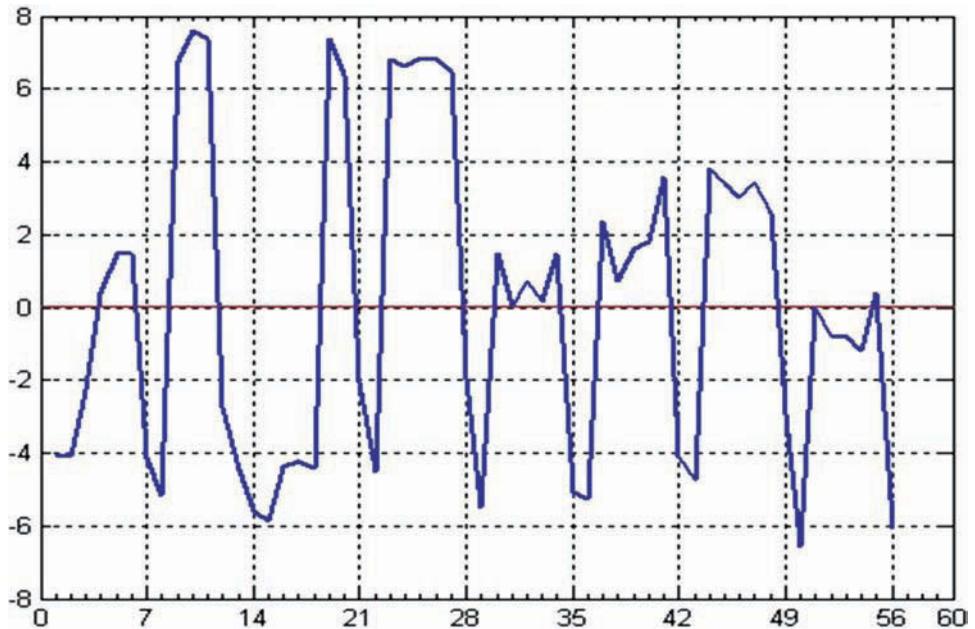


Figure 3 – *The estimative result 100 * y/y to determine the cyclic effect*

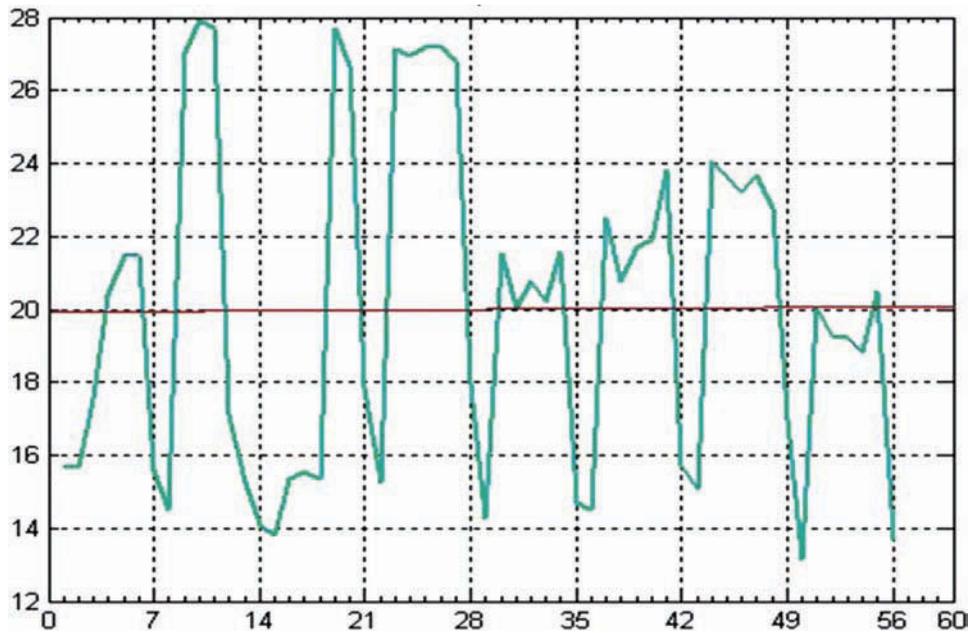


Figure 4 – *The produced energy evolution in time*

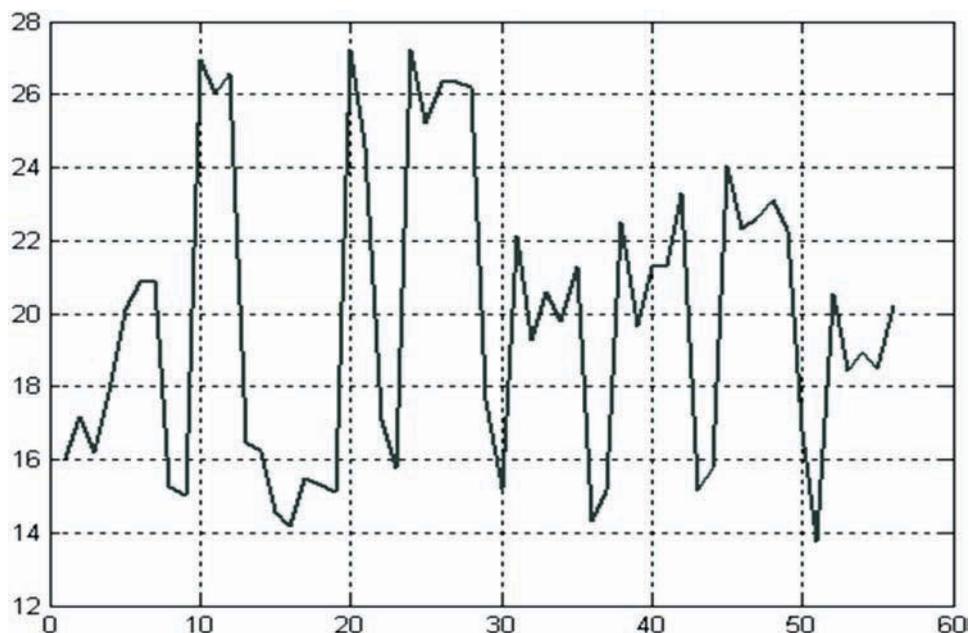


Figure 5 – *Estimative forecast of the energy consumption*

Conclusions

The forecast for consumption represents the main elements for analysis in the elaboration/modification of decisions in

different stages of the supply electric energy service management. In this case, it is needed to elaborate on short and medium term consumption forecasts, which have to be as accurate as possible.

Using the procedure of recursive approximations, good results are produced in conditions of large variations. A robust model is developed, taking into considerations data previously acquired, even if the data is in reduced number. According to

the graphs, the forecast shows that the energy consumption in March and April 2014 at the studied institution is almost the same with the one realized in January and February 2014.



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and among them is safety.

GOETHE



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