PANNON MANAGEMENT REVIEW

PMR.UNI-PANNON.HU

VOLUME 3 · ISSUE 3 (SEPT 2014)

FACULTY OF BUSINESS AND ECONOMICS

FACULTY OF BUSINESS AND ECONOMICS
UNIVERSITY OF PANNONIA

Egyetem utca 10. Veszprém 8200 Hungary
+36 (0)88 624 847 (t) +36 (0)88 624 859 (f)
titkarsag@gtk.uni-pannon.hu (e) http://www.gtk.uni-pannon.hu (w)

TRADEORG KFT.

Szállás utca 4. Balatonfűzfő 8184, Hungary
+36 (0)88 450 450 (t) +36 (0) 450 450 103 (f)
nyomda@tradeorg.hu (e) http://www.tradeorg.hu (w)
p-ISSN 2063-8248 e-ISSN 2064-0188

Faculty of Business and Economics
University of Pannonia

Pannon Management Review

Editor
Zoltán Veres

This journal is produced the TÁMOP-4.2.3-12/1/KONV-2012-0026 project supported by the European Union and co-financed by the European Social Fund.

HTTP://WWW.PMR.UNI-PANNON.HU

Pannon Management Review

Pannon Management Review contributes to bridging scholarly management research and management practitioner thinking worldwide. In particular, *Pannon Management Review* broadens the existing links between Hungarian scholars and practitioners, on the one hand, and the wider international academic and business communities, on the other—the journal acts as an overall Central and Eastern European catalyst for the dissemination of international thinking, both scholarly and managerial. To this end, the articles published in *Pannon Management Review* reflect the extensive variety of interests, backgrounds, and levels of experience and expertise of its contributors, both scholars and practitioners—and seek to balance academic rigour with practical relevance in addressing issues of current managerial interest. The journal also encourages the publication of articles outside the often narrow disciplinary constraints of traditional academic journals, and offers young scholars publication opportunities in a supportive, nurturing editorial environment.

Pannon Management Review publishes articles covering an extensive range of views. Inevitably, these views do not necessarily represent the views of the editorial team. Articles are screened—and any other reasonable precautions are taken—to ensure that their contents represent their authors' own work. Ultimately, however, *Pannon Management Review* cannot provide a foolproof guarantee and cannot accept responsibility for accuracy and completeness.

CONTENTS

Zoltán Veres

EDITORIAL: A CONSULTANT IS WORTH AS MUCH AS HIS OR HER CLIENT

Dear Reader,

In the third issue in 2014 of the Pannon Management Review you are holding in your hand, we have chosen business consulting, more specifically management consulting as our main topic. The consulting business is mostly a product of the organizational market. Unlike internal consultants working as employees, consultants (who provide a service) solve their clients' planning, organizing, development, management and operative tasks in a business-like manner. Their activities can be carried out on the leadership level, but may also extend to the client's entire organization. In recent decades, as economic processes were beginning to get more complex, the companies' need for consultancy increased in accordance with the requirement of constant growth and the globalization of firms. Today, consultants are indispensable actors in the economy, and most of the companies sooner or later come into contact with a consultant in one way or another.

The characteristics of business consulting can be summarized as follows:

- it is *knowledge-intensive* – it is provided by highly qualified experts,
- it is highly *customized*,
- the role of *autonomy* and *personal judgment* is important,
- there is an *interactive relationship* between the consultant and the client,
- it meets the requirements of *professional standards* and *codes of ethics*.

The classical literature of consulting basically distinguishes two advisory roles. In the *expert role*, consultants help their client through their factual knowledge and expertise in specific areas: the consultants obtain information, plan new systems, formulate recommendations, work out solutions by themselves and seek acceptance of these among the employees of the company. *Process consultants*, on the other hand, try to help the organization in solving its own problems. They pass on the methods, but do not propose any solutions.

If a client requires help with a decision-making problem, and his or her participation involves only assigning the tasks, then the consultant provides *analytical* service. The intellectual result of the analysis is created, while the number of interactions with the client is limited

(jobbing). This kind of consultancy is pure and is not directly related to the results of the client's activities. If the task assigned to the consultant involves the creation of a result, then we call it *engineering*. A typical example is giving investment project advice, where the physical content of the transaction can be significant. The service also in this case involves solving the client's problem which is of intangible nature, independently of the project tangible content. Another type of consultancy services is characterised by intensive interaction between the service provider and the client. Here the result depends on the continuous cooperation between the two parties. The four-handed cooperation involves analysing the situation through *joint reflection*, whereas the *GP consultant* finds a cure for all the client's problems. Thus, this might include the direct organization of production as well. A special form of interactive consulting is coaching. This is a series of discussions with managers and it serves as a solution for professional problems and stress-relieving training. Such professional/psychological help is primarily required in senior management.

Need for consultancy

In general, companies ask for help from professional consultants because they need external assistance to solve their business problems. Such need can arise for a number of reasons. The priority of the individual reasons and motivations changes depending on the level of development of the economy and corporate culture, but the reasons behind laying a charge on consultants are basically similar:

- *Lack of time* – The task goes beyond the daily operational job and the problem cannot be solved with the existing capacity.
- *Lack of expertise* – The more special the problem, the more often an outside expert is needed.
- *Outsourcing* – In this case, the organization entrusts an outside firm specialized in that particular field with carrying out an existing activity that was previously performed in-house and which is not the company's core business; so it is generally not a revenue-generating activity.
- *Objectivity* – The company's leaders may also use an external consultant because they need confirmation.
- *Legislation* – Often it is some kind of regulation that encourages companies to work together with a consultant.
- *Transferring the risk* to the consultant.

Expectations for consultancy have changed much in recent decades. Today, clients expect consultants not only to solve business problems, but also to transfer knowledge. This transfer adds to the clients' knowledge. They have insight into the process and get a clear picture of how and using what methods the result will be produced. The knowledge acquired in this way is useful for the clients in two ways: on the one hand, it makes it possible for them to make better decisions and, on the other, it strengthens their business capabilities. In Hungary, multinational companies generally engage in knowledge management projects launched on the corporate level. However, in other organizations (including the institutions of the public service sector), there are currently fewer knowledge management initiatives supported by technology due to a lack of the necessary approach and the lower labour costs.

The mass of data and information generated in organizations on a daily basis by e.g. ERP or other transaction-processing and office systems generally requires additional systematization, combining, filtering and interpretation. For electronic and printed documents, this function is primarily performed by document management systems and knowledge archives containing additional information, while the financial data are increasingly managed in leading organizations by data warehouses. Certain technologies are capable of recognizing relationships and patterns in a dataset (data mining) and identifying, capturing, and then using regularities (use of self-learning artificial intelligence).

Business consultants typically manage intangible resources including, in a large part, *competencies*. These include the knowledge, the abilities and the skills needed by a consultant to carry out a task successfully. Different levels of competencies can be distinguished, i.e. individual, organizational, and leadership competencies. Individual competencies include expertise, skills, capabilities, and aptitude, whereas organizational competencies include the knowledge regarding clients and competitors in other forms, operation-related procedures and methods as well as norms and values embodied in the corporate culture. Naturally, organizational and individual competencies interact. They offer competitive advantage for the consultants. When consultants sell services, they essentially sell competencies. Competencies have a primary role in strengthening and establishing long-term relationships as well.

Collaboration between the client and the consultant is influenced by many factors, first of all the willingness of the people working on the project to cooperate, the harmony of knowledge levels, etc. When a client decides which consultant to choose, personal impressions and sympathy also play a role. The management not only chooses a consulting firm, but it must select those employees as well who they find suitable for cooperation both professionally and personally. *Relationship marketing* is of key importance both in the process of customer retention and customer acquisition. Building customer relations is a long process

that needs to be planned consciously. A good relationship is based on the high quality of the consultancy project and the customer service. Consultants need to strive to keep promises, for adapted services and it must be made sure that the relationship with clients is continuous.

However, the core benefit of consultancy is above all honesty. This is because the consultant/service provider is not paralyzed by any internal (business or personal) relationship, which would weaken his or her critical skills. It is in his or her expressed interest to achieve results, because the consultant's good references build up the corporate image that is essential for mitigating the performance risk perceived by the client. Regardless of this, experience shows that an inexperienced, "soft" client cannot spur the consultant to such good performance as a "hard" one. Therefore, it is pertinent to say: A consultant is worth as much as his or her client.

In this issue an essay on the international consultancy business, an analysis of the psychological influence of the Hungarian "tobacconist law", an interview with one of the Hungarian management consultants and, finally, an inspiring contribution to the measurement theory and practice have been selected.

Andrew Gross and his co-authors Jozsef Poor and Emeric Solymossy in their paper of *The western ways of management consultancy: shifting from credentials to competency and creativity* point out the heterogeneous environment of the globalized consulting industry. The delicate approach of their argumentation makes the paper a unique presentation on the topic.

Judit Tessenyi and Klara Kazar in *The potential effect of the „tobacconist law" on entrepreneurs* chose to apply a special theoretical dimension when analysing the theme. It is namely the economic psychology and the behavioural research of the entrepreneurial sector. The authors put the dynamic inconsistency into the focus of their analysis. A really exciting paper it is...

Following the PMR traditions – publishing portraits of companies and individuals whose performance is illustrative of management achievement – in this issue, we feature an interview with Imre Hercegh, Certified Management Consultant of VIALTO Consulting. „Consultancy is an industry in which the real assets go home every night..." – as he described his business. The interview is full of interesting - partially shocking – details about the cyclical ebb and flow of the industry.

And we offer a publication opportunity to a young researcher in this issue as well. This time the paper of Csaba Hegedűs has been selected under the title of *Risk-based consideration of measurement uncertainty in decisions.* In a very sophisticated presentation the author leads

the reader into the problematic of how to reduce risk of quality and maintenance related decisions based on uncertainty of measurement and estimation. The presented method gives a new tool to the managers to extend the typically reliability focussed decisions with consideration of their consequences.

We hope that again in this issue, we can present new, exciting topics from management science as well as encourage other researchers to present themselves in our journal.

References

Gadrey Jean (1992): *Manager le conseil. Stratégies et relations des consultants et de leurs clients.* Ediscience International, Paris

Nádor, É. (2009): A tanácsadás. (The Consultancy) In Veres Zoltán: *A szolgáltatás-marketing alapkönyve*, Akadémiai Kiadó, Budapest, 496–507.

Veres, Z. (2012): Uncertainty-reducing project-competences as organizational capabilities. *The IMP Journal*, Vol. 6, Issue 2, 154–166.

Veres, Z. – N. Buzas (2006): Management des risques bilatéraux dans le transfert de technologie, *La Revue du management technologique*, PUG, Grenoble, Vol. 15, No. 2, 47–74.

Zoltán Veres, Professor of Marketing, at the University of Pannonia, Veszprém, Hungary, Head of Department of Marketing. He was born in Hungary and he received his university degrees from the Technical University of Budapest (Masters degree in Electrical Engineering) and the Budapest University of Economic Sciences (Masters degree in International Business). He obtained his PhD in economics, at the Hungarian Academy of Sciences. More recently, he obtained his habilitation degree at University of Szeged, Faculty of Economics and Business Administration.

He worked as project manager of numerous international industrial projects in the Mediterranean region (e.g. Greece, Middle East, North Africa) between 1977 and '90. Since 1990, he actively participates in the higher education. In 2011 he was appointed professor of Marketing at the Budapest Business School (BBS), Hungary and between 2010 and 2014 he was also Head of Research Centre at BBS. Since 2014 he is Head of Department of Marketing, at the Faculty of Business & Economics of the University of Pannonia, Veszprém, Hungary. From the beginning of this year he is the editor of the Pannon Management Review.

Zoltán Veres has had consultancy practice and conducted numerous research projects on services marketing and project marketing. In 2001 and 2002 he was Head of Service Research Department at the multinational GfK Market Research Agency. He is member of the research group European Network for Project Marketing and Systems Selling, Lyon; Advisory Board member of Academy of World Business, Marketing and Management Development, Perth (Australia); Advisory Board member of the Nepalese Academy of Management; Advisory Board member of McMillan & Baneth Management Consulting Agency, Hungary and consultant of Consact Quality Management Ltd., Hungary.

He has more than 200 scientific publications, including the books of *Introduction to Market Research, Foundations of Services Marketing* and *Nonbusiness Marketing*. He has been editor of series to Academy Publishing House (Wolters Kluwer Group), Budapest. Besides Zoltán Veres has been editor of the journals Revista Internacional de Marketing Público y No Lucrativo, Spain, Tér-Gazdaság-Ember and Marketing & Menedzsment, Hungary; member of Journal of Global Strategic Management, Advisory Board and Review Committee; member of Asian Journal of Business Research, Editorial Review Board. He is a member of the Committee of Marketing Sciences at the Hungarian Academy of Sciences.

Andrew Gross – Jozsef Poor – Emeric Solymossy

THE WESTERN WAYS OF MANAGEMENT CONSULTANCY: SHIFTING FROM CREDENTIALS TO COMPETENCY AND CREATIVITY

How to be entrepreneurial in the field of management consultancy during an economic downturn, while new technologies come to the forefront? Much of the answer lies in stepped up marketing efforts and in cost-cutting measures. In addition, however, it is crucial to embrace new ideas and techniques. The large consultancies as well as small firms or individual practitioners from the West will have to adjust their philosophy and style to this new environment – by emphasizing their industry and functional competencies along with creativity and innovation, rather than their credentials. By data mining, we have been fortunate to come across three Western nations, the United Kingdom, France, and Spain that provide recent statistics on management consultancy. The future will depend not only on the success of existing firms, but on opportunities for the rise of new ventures. The future contours of management consultancy are being carved steadily by organizations, large and small. The large consultancies seek to avoid regulation at all costs. How can small management consultants prosper now and later? They can adopt the credo of marketing orientation and entrepreneurship to heart: they must be proactive, innovative, and risk-taking.

A brief history of management consultancy

While commercial activity is as old as civilization itself, management consultancy is of more recent vintage. Business historians put the origins of consultancy in the mid-19th century when Samuel Price, Foster Higgins, James Sedgwick and others began operating "advisory practices" in England and the United States. Many historians also agree that Arthur Little was the founder of the first pure consultancy in the USA in the 1880s with a focus on technology and engineering economics.

In the 1890s, George Touche and William Deloitte started accounting practices and by the first two decades of the 20th century they expanded into auditing and advising, focusing on large clients, offering assistance on financing, taxation, and corporate strategy. Just about

all of the early accountancy firms or partnerships, with such hallowed names as Arthur Andersen, Arthur Young, Cooper Brothers, Ernst & Ernst, Peat Marwick, Touche Ross, have entered into the realm of "advice business". Meanwhile, technology firms, and institutes, such as Stanford Research and Battelle Memorial, joined the fray, marketing themselves as technical-managerial counselors (Biswas and Twitchell, 2002; Gross and Poor, 2008).

The appearance of "true" management consultants is traced to Edwin Booz in the 1910s and to James McKinsey, and Andrew Kearney in the 1920s in the USA (Kipping and Clark, 2012). Their names survive to this day in partnerships or companies, but others have not fared as well. These pioneers also started with assistance on finances and taxes, but they soon got involved in long-term corporate strategy and short-term operations. In the 1930s, sensing opportunity in an era of depression, Marvin Bower took charge of McKinsey & Company. He hired graduates from top business schools, mostly from Harvard Business School, put them to work as analysts, then later as consultants, emphasizing repeatedly that "the firm" was to be the locus and focus of professionalism (Bower, 1998; Higdon, 1969; McKenna, 2006; O'Mahoney, 2010).

Even in these early years there was much debate about credentials, qualifications, and branding, followed by heated discussion about accountability, client cultivation, and "proper" competition. The Association of Consulting Management Firms (ACME) was formed in 1929 to serve as both "spokesman and policeman"; its current name is the Association of Management Consulting Firms (AMCF). Since then several other associations arose in both USA and Europe.

The driving forces behind the growth of management consultancy in the USA have been analyzed in two doctoral dissertations (David, 2001; McKenna, 2000). David identified four major forces that fueled the growth of consultancy during 1930-1960: the increasing number and complexity of companies; the spread of corporate ideology to non-corporate sectors; the organization for the World War II; and the growing impact of business education and the business press. McKenna, on the other hand, emphasized that entry and expansion of consultancies came from emulating the patterns set by three professions: accounting, engineering, and law.

In contrast to both David and McKenna, several European authors (e.g. Kipping and Engwall, 2001) found that consultancies in that region owe much to the work of Taylor, Emerson, and the Gilbreths, that is the "scientific management" movement that had its start in the USA. They cite the examples of the firms of Morrini, Urwick Orr, and the REFA Institute from Italy, the UK, and Germany, respectively, to show that emphasis on efficiency, cost containment and strict work rules held sway in Europe during 1915–1965. While this

signifies disagreement in regard to the forces that influence consultancies, the debate is about the impact of each specific factor.

On a worldwide basis, it is estimated that revenues for management consultancies grew from about $1 billion in 1955 to over $150 billion by 2005 or at an annual rate –nearly 11 percent- that is in excess of the growth rate of global trade, output, or investment. (Czerniawska, 2006; FEACO, 2008; Kennedy Information, 2009). New firms were formed during this period, primarily in the USA, such as Bain & Company, Boston Consulting Group, and the Monitor Group. Older firms, such as McKinsey, Kearney, Booz Allen, ADLittle and others also did well; McKinsey was especially successful invading the UK. Specialists did well too e.g. Hay, Hewitt, Mercer, and Watson Wyatt in human resources. The big accounting firms are still doing consultancy and high-tech firms such as IBM are now at the top of the list.

Several books (and, of course, many articles) published in the past fifteen years analyzed the growth of consultancy in the second half of the 20th century. These volumes fall into three distinct categories: (1) "panorama" books that deal with major trends, corporate practices, cases, and profiles of key firms (Biswas and Twitchell, 2002; Curnow and Reuvid, 2001; Fombrum and Nevins, 2004); (2) "revelation" books that emphasize the politics of the sector and major missteps by consultants and/or their clients (Kiln, 2006; Micklethwait and Wooldridge, 1996; O'Shea and Madigan, 1997; Pinault, 2000); and, (3) "update" books that show the state of the art and recent activities of companies, along with expansion of business in a given region (Armbruster, 2006; Ferguson, 2002; Kipping and Engwall, 2001; O'Mahoney, 2010; Poor and Gross, 2003; Thommen and Richter, 2004). In contrast, the doctoral theses written during this period emphasized the international expansion of consultancies (Backlund, 2004; McKaig-Berliner, 2001; Wood, 2001).

Record-keeping firms also appeared in this era e.g. Kennedy Information (KI) and the Vault in the USA, Datamonitor and the Management Consulting Association (MCA) in the UK, and the European Federation of Management Consulting Associations (FEACO) in Belgium. These organizations make a valiant attempt to gather good data on firm revenues and related statistics; but problems arise in regard to terminology, classification, and data collection. Recently, these firms, much like the consultancies they survey, expanded the scope of the sector to include outsourcing; it was simply added to the traditional four areas of strategy, operations, human resources, and information technology. We found some outright errors as well as lack of consistency and transparency in the published data. Finally, there is a tendency to exaggerate growth rates, "hot fields," and opportunities in developing nations.

The current competitive landscape

As we noted, management consulting got its strongest impetus in the USA and the revenues from clients in this nation still account for about one half of the worldwide total. Competition now takes place globally among major firms. The leading organizations are information technology firms such as Accenture, CSC and IBM and firms with a strong accounting background, such as Deloitte, KPMG, and PWC have occupied the leading ranks. Global revenues and steady growth in sales, along with market share and contracts won, are objective measures of success on an annual basis. Yet longevity and recruiting are still of great importance and on these facets the old-line firm such as McKinsey, Boston Consulting Group (BCG), Bain, and Booz have done very well. They prospered by recruiting at top business schools, granting generous salaries and bonuses, stressing long-run strategy, and cultivating top management clientele (Datamonitor, 2008; Gross and Poor, 2008; O'Mahoney, 2010, Vault, 2008; etc.).

Both the business and popular press in the USA espouse rankings such as "ten largest" or "twenty best," so publishers started to evaluate not just cars and appliances, but institutions, such as colleges and hospitals. Reaction to such rankings is predictably in a dual mode; decrying them as simplistic or even misleading, while embracing them for promotional goals when one's rank improved or is high. Kennedy Information, Vault and others now rank management consultants and report that McKinsey, BCG, Bain, and Booz are still at the top in terms of prestige, both in the USA and in Europe, but the information technology firms of Accenture, IBM, and others are making inroads in this largest sub-sector. Roland Berger of Germany was rated the top non-U.S. consultant.

Observers argue that beyond financial indicators and subjective rankings lie "the true measure" of success for organizations— in building corporate culture, reputation, competence, and a solid base of loyal clients. The early pioneers of such thinking were James McKinsey and Marvin Bower, under whom McKinsey & Company became known as "The Firm." They argued that status and success should be achieved by strong governance and reputation-building at the level of the firm. They also sought jurisdictional control, while opposing any outside regulation. Finally, they thought that emulation of accounting, engineering, law, and medicine would lead to professional recognition (McKenna, 2000; Bower, 1998). Others, including James Allen, chief executive of Booz Allen Hamilton in 1960, argued that consultancy did not possess admission and performance standards comparable to the older, established professions and that consultancy was a business. However, both sides were determined to chase out self-styled experts, aggressive salesmen, and especially charlatans.

The debate continues on where consulting really belongs and has not been settled. Hallmarks of a profession are formal education, full-time occupation, a vast body of specialized and published knowledge, and a code of conduct. In addition, regulatory bodies and associations or special groups emerge that strive to restrict entry and establish some monopoly rights. There are complex issues that have been debated at much length (Blair and Rubin, 1980; Shimberg et al., 1972). Various degrees of occupational regulation exist, e.g. licensure, certification, and registration for doctors, accountants, and engineers, respectively (Hollings and Pike-Nase, 1997). But so far, states and nations have not enacted legislation for consultancies, in part due to practitioners opposing such moves and in part –as many case studies indicate- because the old-line firms contend that they are the locus of professionalism and that they would enforce rules of conduct and high standards (McKenna, 2000, Rasiel, 1999; O'Mahoney, 2010).

Government bodies in the USA and Western Europe generally declined to take a regulatory role vis-à-vis consulting firms or individual consultants. But at the same time, associations have stepped in to represent them and to act as spokespersons for members, at times becoming aggressive lobbyists. Over time, many associations take on bargaining for their members. They also assume an institutional role and can turn into bureaucracies protecting the interest of administrators more so than that of their members. Traditionally, business or industry associations enroll companies, while professional associations recruit individuals, but there are some hybrids. Associations in North America are especially popular, but they are visible in Europe as well; over 20,000 said to be functioning on both continents (Gordon, 1997; Schaus, 2004; Svevo-Cianci, 1995).

The two types of associations in the field of consultancy follow the pattern described above. Representing companies in the USA is the Association of Management Consulting Firms (AMCF) with a current membership of around 30 organizations, ranging from small entities to large ones such as CapGemini, Deloitte, and even IBM. However, many of the old-line, "hallowed" firms, namely Bain, Booz, BCG, and McKinsey did not join. In the UK, the Management Consultancies Association (MCA) signed up about 60 firms, including those belonging to AMCF; but, once again, the old-line firms are conspicuously absent. Still, the MCA can claim, per classification in UK occupational statistics, that it advances this specific profession as well as business interests.

Examples of the second type of association, those catering to individuals, are the Institute of Management Consultants-USA (IMC-USA) and its counterparts around the world with similar names. They belong to an umbrella group, founded in the 1980s, the International Council of Management Consulting Institutes (ICMCI). It has 45 national groups as its

members, including even IMC-USA. At this point, IMC-USA has about 2,000 individual members, a decline from 2,800 a few years back. This is remarkable, since IMC-USA absorbed other organizations recently in the consulting field. Furthermore, we would expect individuals to seek security and status as well as networking opportunities by joining. In contrast, we found that in Central Europe, including Germany, membership in associations has risen during 1989-2009.

Both IMC-USA and ICMCI are dedicated to "advancing the consulting profession" via the routes of advocacy, skill building, networking, and business development. However, the strongest suit in their arsenal is the designation of members as "certified management consultants" or CMCs. This designation is said to confer credibility, visibility, and status. Certification can be achieved through fulfilling specific requirements, such as testing and experience. While IMC-USA is part of ICMCI, their standards for achieving CMC status appear to differ in certain respects as illustrated in Table 1.

In Germany, the BDU, the federation of management consultancies, requires its 550 member firms to require the CMC designation from its 15,000 individual members. The BDU developed stringent conditions of admission. Right now, only about 300 consultants acquired the CMC designation. There is definite reluctance on the part of states or national governments to mandate certification for consultants. This trend is true for Germany as shown in the details of Table 2 (which also applies to Austria).

As seen in the table, the rules are that those with education who work for a consultancy can claim the designation as consultant, though not as a CMC. In the USA, the CMC designation is rated highly by both small firms and individuals; the old-line consultancies, as we noted earlier, see the firm as the locus of professionalism. Still, IMC-USA is working hard to promote the attainment of CMC status.

Standard	IMCIC.org (EU/Int'l)	IMC-USA.org
Experience	Three years as management consultant	Three years in practice as a fulltime responsible consultant
Education	Recognized degree or prof'l qualification or five years in consulting in lieu of degree	Degree from a four-year college
Time	1200 hours/year in active mgmt. consulting during three qualifying years over preceding five years & currently active in mgmt. consulting	No such heading
Engagement	No such heading	Written summaries and discussion with panel of 5 client assignments
Independence	Owner or employee of a firm in independent practice or internal consultant in an organization that meets the Institute's criteria	No such heading
Application	No such heading	Written response to an engagement case study & presentation to a panel
Examination	Written examination or structured interview to test knowledge of the code of professional conduct & common body of knowledge	Qualifying written examination and oral review by senior CMCs to show competence, currency, understanding process & written exams & oral interviews on code of ethics
Sponsors	Two sponsors who are full members or fellows as CMC, FCMC, FIMC	No such heading
References	Written descriptions of five assignments and five client references (verification)	Five satisfactory references from officers or executives of client organization

Table 1. Standards Set by Two Major Associations for Qualification as Certified Management Consultant (CMC)
Source: www.icmci.org for ICMCI plus interviews with members
http://www.imcusa.org for IMC-USA plus interviews with members

- There is no certification system; staff members at a consultancy can call themselves consultants. However, as discussed in the text, the BDU, the German Management Consulting Association does require the CMC designation for individuals at firms.
- Usually a business degree is required by most consulting firms; however, engineers, scientists, et al. working there are consultants as they provide value and possess professional knowledge; and, only 50% of consultants have a business degree.
- Consultants are regarded as working full-time if they work a minimum of 150 days per year and do a minimum of 30 hours of continuing education.
- Typical career steps in a consulting firm are as follows (guideline, not mandatory):

Level	**Experience**
Business analyst	1–2 years
Junior consultant	3 years
Consultant	3–4 years
Senior consultant	5–7 years
Managing consultant	5 or more years
Principal	6–15 years
Partner	over 10 years

Table 2. Rules Regarding Management Consultants in Germany and Austria
Sources: www.bdu.de for Germany; www.ubit.at for Austria; http://en.wikipedia.org (German edition)
Authors' experience from conversation(s) with German consultants

Currently, creative individuals wanting to consult can promote themselves today in many specific ways, with a variety of newly available tools, including e-commerce techniques, as shown in Table 3. This business, except for some countries, has been non-regulated service-sector (Brooks and Edwards, 2014). In Table 3 we classify promotional efforts into three distinct categories that should appeal to those consultants that follow the three basic tenets of entrepreneurial orientation: being pro-active; being innovative; and, being risk-taking. Pro-active means seeking client assignments and building relationships. Innovative means adopting a combination of ideas and procedures that take advantage of tested techniques along with new ones. Risk-taking means investing for the long run, not just for short-term gains, yet maintaining cash flow.

Take the idea of appearance or 'image'—one can appear in person, on-line, in print or even a combination of these at the same time! Lectures at seminars can be coupled and harmonized with websites and blogs, news releases, "learned" articles, citations, and testimonials (note the various journals started by McKinsey, Ernst & Young, et al. and books published by their staff, dating back to Peters and Waterman, 1980). These techniques have been favored lately by both Western firms moving into the transitional economies of Eastern Europe and into the emerging markets of Asia, Latin America, and Africa (Poor and Gross, 2003; Czerniawska, 2006; O'Mahoney, 2010; and others). But the global crisis and recession of 2008–2010 brought additional challenges.

In-Person	Electronic/Print Media	Combination/Other
Client presentations	Websites, blogs	Memberships
Seminar speeches	Advertising	Referrals
Conferences, trade shows	Directory listings	Automated calls
Social gatherings	Newsletters, podcasts	Sample proposals
Cold calls	Brochures, flyers	Donations, grants
Word-of-mouth	Books, journal articles	Testimonials
Class lectures	Professional networks	Giveaways, souvenirs
Charity work	Social networks	Brokers, agents
Radio, TV talk shows	Bids, auctions	Global/virtual travel

Table 3. Promotion Methods Available to Creative Consultancies, 2012
Source: Authors' compilation based on primary research in USA and Central Europe

From credentials to competency and creativity

How to be entrepreneurial in the field of management consultancy during an economic downturn, while new technologies come to the forefront? This is the question we wish to address in the remaining paragraphs, having absorbed the lessons of history as outlined in the previous pages. We also looked at the practices of small, medium, and large consultancies in North America and Europe, especially those in Central and Eastern Europe where the field of consultancy is relatively recent. Much of the answer lies in stepped up marketing efforts and in cost-cutting measures. In addition, however, it is crucial to embrace new ideas and techniques.

According to a respected newsletter (Kennedy, 2009), enhancing sales effectiveness is at the top of measures taken by nearly 300 practicing consultants in the USA. Yet as costs are reduced, firms are also cutting back on investments made in sales training; this can easily backfire. In this issue, the head of Potter Advisors recommends: (1) focusing on "rainmakers" who bring in the lucrative contracts; (2) providing client testimonials and documented benchmark gains to potential clients from prior projects; and, (3) aligning the client firm's capabilities with its proposed objectives. Yet another, parallel finding that emerges from the practitioner literature is that consultants should never use "canned methodologies." Old templates need revisions; transfer of ideas from one sector to another must be adjusted or adapted. This means, there is room for solo experts who can specialize in one area and thrive with deep industry or functional knowledge.

The academic literature supports the practitioner journals. In case studies conducted at Accenture and CapGemini, Swedish researchers found that articulate and tacit knowledge can enhance experience rather than replace it (Werr and Stjernberg, 2003). German academics reported that in management consulting the main drivers of competitiveness are neither price nor measurable quality, but experience-based trust and 'network reputation' (Gluckler and Armbruster, 2003). Finally, a U.S.-French team reported that competitive performance in consultancies depends not on how much firms know, but on how they use what they know (Haas and Hansen, 2004). But there is even more.

An in-depth article emphasized idea generation in the corporate world (Segal, 2010). Specifically, quoting academic gurus and creative practitioners, the author wants consultants not to go beyond advising, but to stop short of that step! In the words of V. Govindarajan at Dartmouth: "What I want is for companies to self-diagnose their problems and self-discover their own solutions through my thought leadership." And R. Mudambi of Temple is quoted, stating that "traditional consulting firms talked and advised about innovating for years, but the advice was usually that it was dangerous for a large company to innovate from within; rather they should buy new ideas, small firms." Finally, C. Christensen of Harvard sums it up this way: "Innovate or die."

The new "idea entrepreneurs" from firms such as Jump, Ideo, and Kotter International do not wish to be called consultants. They shy away from old-fashioned brain-storming and group-think sessions. Instead, they wish to practice an "abstract-expressionist era of management" and yet, Segal says, that they are "squarely in the management consultants' space." The central thread running through the discourse is innovative design, with ideas coming from "non-linear connections" and meditative states. The firms cited above are proud to have landed major contracts to deliver value with their "blue sky thinking."

Taking a historical perspective, one could argue that India and China dominated the world economy between year 1 and 1820. If one considers that they "paused" for 200 years, it is possible they may resume their reign after 2020. Put differently, the British Empire prevailed in the 19th century; the USA proved to be the dominant power in the 20th; and the 21st will belong to the Asia-Pacific region as well as to Latin America and Africa. Applying this to management consultancy, Accenture, IBM, CSC, and other Western firms now face competition from Infosys and Wipro, while McKinsey, Bain, BCG and others encounter competition from Tata Consultants. To stay "healthy and wealthy," the large consultancies as well as small firms or individual practitioners from the West will have to adjust their philosophy and style to this new environment – by emphasizing their industry and functional competencies along with creativity and innovation, rather than their credentials. Then they can build bridges to overseas clients in emerging economies with the result of strengthening long-run relationships.

Management Consulting Across Three European Union Nations

By data mining, we have been fortunate to come across three Western nations, the United Kingdom, France, and Spain that provide recent statistics on the management consulting sector (Gross et al., 2013). In Tables 4–6, we offer data from the national statistical bureaus, supplemented by our own computation of growth rates plus two ratios: the number of staff (persons, employees) per enterprise and revenue per staff member. Please note that the time horizon is different for the United Kingdom than for France and Spain. Further, the terms or codes in each table are those used by the respective agencies and are not fully explained. However, we can still draw meaningful comparisons.

In Table 4, we note that in the UK management consultants employed 373,000–406,000 persons working in about 113,000–116,000 enterprises. Total turnover has been relatively steady during 2008–2010. The number of firms and staff size is notable, since managers of large firms some-times go into self-employment or start a small enterprise. Thus, there are only 3–4 employees per enterprise. Earnings per employee are approximately 105,000 pounds. These remuneration patterns may reflect demand-supply facets as well as institutional context.

In Table 5, we are looking at data from France during 2002–2010, noting that some of the numbers are questionable despite our best efforts to ascertain them (as indicated by e). There are between 100,000 and 120,000 workers in management consulting , while the enterprise numbers range from around 65,000 to 95,000. The worker to enterprise ration is between one and two. The revenue per worker statistics show relatively low remuneration in

management consulting, which is not at all surprising given both the tradition in labor market conditions and the recent rise in supply of management consultants in this nation.

Table 6 presents data for Spain, a nation that has had a high unemployment rate recently (over 25 percent), especially for those under 25 (over 50 percent). In our data set, we find the number of employed personnel in management consultancy only around 40,000–60,000. The number of management consultancy firms shows a steady increase, from 40,000 in 2002 to over 58,000 in 2010. The average personnel per company was steady 4–5, with revenue per person increasing from 69,000 in 2002 to 106,000 in 2010.

Looking at Tables 4-6 in terms of ratios and growth rates, we find either stability or steady growth, with a minor decrease in employees per enterprise. The revenue per employee data shows higher remuneration rates in United Kingdom and France than in Spain (although only slightly in 2010), which is not surprising in light of economic development, tradition, and "customary" remuneration patterns. All in all, we are encouraged by the increase in the number of enterprises, the relatively steady state of turnover, and the stability in employment that is reflected.

	2008	2009	2010	Percent Annual Growth
Number employed (000s)	383.0	406.0	373.0	−1.3%
Number of enterprises (000s)	114.4	113.6	116.2	0.8
Total turnover (billion pounds)	43.2	41.3	41.1	−2.5
Employee/enterprise	3.3	3.6	3.2	−0.1
Turnover/employee (000s pounds)	112.8	101.7	110.2	−1.2

Table 4. Management Consultancy Services, United Kingdom, 2008–2010
Source: Gross et al., 2013, p. 254

	2002	2006	2010	Percent Annual Growth
Number of workers (000s)	113.7	99.4	117.4	0.4%
Number of enterprises (000s)	59.2	77.9	94.7	6.0
Total revenue (billion euros)	6.2e*	7.5e	8.8*e	4.4
Worker/enterprise	1.9	1.3	1.2	−5.8
Revenue/worker (000s euros)	54.4	75.8	75.2	3.9

Table 5. Management Consultancy Services, France, 2002–2010
Source: Gross et al., 2013, p. 255

	2002	2006	2010	Percent Annual Growth
Number of personnel (000s)	40.2	55.0	58.4	4.8%
Number of companies (000s)	8.5	11.7	13.4	5.8
Total revenue (billion euros)	2.9	3.9	6.2e	9.9
Personnel/company	4.7	4.7	4.4	–0.9
Revenue/personnel (000s euros)	69.0	70.0	106.1	5.5

Table 6. Management Consultancy Services, Spain, 2002–2010
Source: Gross et al., 2013, p. 256

The Path for Professional Enterprises in the West

In Table 7, we summarize our findings regarding external challenges, industry drivers, and the currently important issues of ethics and trust. The roadmap for the future will depend on how management consultancy addresses its challenges. The most intriguing facet, however, is likely to be the question of competition not just within one field, but rivalry among the sectors in the future. Fundamentally, other consultancy sectors (e.g., engineering, legal, and accountancy) also are advising business clients about strategy and tactics in planning and managing. It is likely that they will invade management consultancy's turf in an aggressive way in the near future - especially in the West with its mature markets.

External Challenges	Industry Drivers	Ethics/Trust Issues
Mixed reputation	Professionalism: firm or person	Public vs. client interest
Ease of entry	Reputation vs. certification	Self-regulation
Lack of regulation	Alumni placement	Excessive billing
Self-sufficient clients		Revolving door
Friends in high places		

Table 7. Management Consultancy: Challenges, Drivers, and Issues
Source: Gross et al., 2013, p. 257

The future of will depend not only on the success of existing firms, but on opportunities for the rise of new ventures. Entrepreneurship looms significant for both industrialized and industrializing nations, in both mature and emerging industry sectors. Small and medium

enterprises account for 99 percent of all nonfinancial firms; the challenge is to increase their share of the labor force and of value added. In this task, both private sector enterprises and government agencies will play a key role for many years to come.

Toward A Global Reach

The future contours of management consultancy are being carved steadily by organizations, large and small (Gross and Poor, 2008). The top 50 firms in the field "follow the money"—the top 500 U.S. firms and the top 200 global companies. They are set to cater to national governments, state enterprises, and sovereign funds in all emerging large markets. In the emerging countries, they prefer the Asia-Pacific region most, followed by Eastern Europe, Latin America, and Africa. While consultants made inroads, they are likely to face at least four barriers in the coming years.

First, there are long-established networks of a domestic nature in each nation—family firms, interlocking directorates, and the tradition of doing business only with family members, trusted friends, and domestic partners. Second, some Asian information technology and consulting companies, already cited, are established on their home turf and are moving abroad to compete. Third, there are relatively few multibillion dollar enterprises or public agencies to which bids can be tendered. Fourth, growth rates are bound to slow down worldwide as a result of the current financial crisis, scarcity of resources, emphasis on curbing consumption and "going green," and transparency demanded by customers. Just the same, the 13 companies listed in Gross & Poor (2008), plus the other top 37, will do well, but their revenues will be growing annually at 5 to 10 percent, not 10 to 20 percent.

The large consultancies seek to avoid regulation at all costs. They pursue firm reputation or corporate brand equity via core (or unique) competencies. Partners, consultants, associates, and analysts seldom seek recognition beyond a generous base salary and a hefty bonus. Of course, those figures are important, and they are indeed high at the top firms (based now mostly in the Boston-New York-Washington corridor). Young MBA graduates often earn $150,000 per year or more; hourly billing rates charged to clients go from $100 for analysts to $500 for senior managers; and annual revenue per employee now exceeds $350,000 at McKinsey, according to TBR.

How can small management consultants prosper now and later, be they in North America, Eastern Europe, or South-East Asia? They can adopt the credo of marketing orientation and entrepreneurship to heart: they must be proactive, innovative, and risk-taking. In fact, they are following this path, hanging out their shingles, offering ideas, going into debt, networking

at seminars, and seeking out small clients that look promising in terms of past growth or potential business. They also join associations in the home country, seek reciprocity in neighbor nations, and make good use of the Web/Internet.

In our native Hungary, several consulting courses are offered at public institutions such as University of Pecs, Szent István University and Corvinus University and at the private Central European University. These courses focus on methodology (ranging from problem formulation to execution of the project), functional areas, and use of technology, "client cultivation," as well as field trips to established consultancies. The emphasis is on good diagnostic skills and implementation of tasks. What students need to discover, of course, is that while their learning is important, what ultimately matters even more is the client's learning. This is achieved by offering insights from psychology, organizational behavior, and role-playing. The perennial debate of "content versus process" is discussed, as is the notion of acting less as an expert and more as a coach.

Taking the long-run view, it is fair to say that for economic prominence in general and management consultancy in particular, the nineteenth century was that of Britain, while the twentieth belonged to the United States. The twenty-first century is likely to belong to Asia, specifically India and China. We are talking about the rise and domestic dominance of companies within these two giant nations, especially the ones from India (such as TCS, Infosys, Wipro, and many others). Further, their "global reach" will become evident as they expand their reputation for high talent, low(er) cost, and effective service offerings across the whole wide spectrum of management consultancy. However, the story does not end there.

Besides large and small Indian and Chinese firms, we shall also see professional business services arise in the major emerging markets of Brazil, Russia, and elsewhere. We illustrate this in Table 8 where we use the data presented in National Science Board (2008) on the knowledge-intensive service sector in seven major nations during the1995-2005 period. The appendix to this report offers rich details on both market and public-oriented categories. Note that, contrary to popular notion, China has experienced slightly higher growth rates in knowledge-intensive services than India, though both are doing quite well. The pace in Russia is picking up again; the situation in the other nations is mixed; but overall, it is encouraging.

VALUE-ADDED REVENUE FOR KNOWLEDGE-INTENSIVE SERVICES, SELECTED MAJOR EMERGING NATIONS 1995–2005 (BIL 2000$ AND %)					
Country	1995	2000	2005	2000/1995	2005/2000
China	147.0	252.9	449.4	11.4	12.2
India	46.6	76.9	113.8	10.5	8.1
Indonesia	17.2	19.7	28.7	2.7	7.8
Brazil	129.8	135.1	158.8	0.8	3.3
Mexico	84.8	103.1	116.0	4.0	2.4
Russia	39.1	40.2	56.6	0.6	7.1
Turkey	26.4	35.2	43.2	5.9	4.2

Table 8.
Source: Javalgi, et al., 2011, p. 175

In the future, management consultancy is going to be an integral part of such service offerings, with consulting opportunities in information technology and outsourcing, followed by operations, strategy, and human resources. It is quite likely that the boundaries among these categories will fade, as will the borders between management consulting and a host of related professional services that range from advertising to law, from accountancy to engineering. In sum, consultancy will remain a significant practice as well as asserting itself more and more as a profession (through standards, licensing, certification, inside and outside recognition). We plead at this time for more transparency and accuracy in the generation and distribution of statistics about the field.

References

Acs, J. Z., Ed. (1999). *Are Small Firms Important? Their Role and Impact.* Boston: Kluwer.

Acs, J. Z. et al. (1991). *The Determinants of Variations in Self-Employment Rates Across Countries and Over Time.* Cambridge, MA: National Bureau of Economic Research.

Aharoni, Y., Ed. (1993). *Coalitions and Competition: The Globalization of Professional Services.* London: Routledge.

Aharoni, Y. and Nachum, L., Eds. (2000). *Globalization of Services: Some Implications for Theory and Practice.* London: Routledge.

Alvarez, J. L. (1991). *The International Diffusion of the New Entrepreneurship Movement.* Unpublished Ph. D. dissertation. Boston: Harvard University.

American Society for Association Executives Staff (1999). *Going Global: An Association Primer.* Washington: ASAE.

Amon, R. et al. (1953). *Management Consulting.* Boston: MC Report Associates.

Armbruster, T. (2006). *The Economics and Sociology of Management Consulting.* Cambridge: Cambridge University Press.

Backlund, J. (2004). *Arguing for Relevance: Global and Local Knowledge Claims in Management Consulting.* Unpublished PhD dissertation. Uppsala: Uppsala Universitet.

Birch, D. L. et al. (1995). *Who's Creating Jobs?* Boston: Cognetics.

Biswas, S. & Twitchell, D. (2002). *Management Consulting*, 2nd ed., New York: Wiley & Sons.

Blair R.D. and Rubin, S.. eds. (1980). *Regulating the Professions.* Lexington, MA: Lexington Books.

Bower, M. (1998). *The Will to Lead.* Boston: Harvard Business School Press.

Brock, D. et al, Eds. (1999). *Restructuring the Professional Organization.* London: Routledge.

Brooks, A.K and Edwards.K. (2014): *Consulting in Uncertainty*. New York: Routledge

Brush, C. G. (1992). *Factors Motivating Small Companies to Internationalize: The Effect of Age.* Unpublished D.B.A. dissertation. Boston: Boston University.

Bryson, J. R., Daniels, P.W. and Warf, B. (2004). *Service Worlds.* London: Routledge.

Cassis, Y and Minoglou, I. (2005). *Entrepreneurship - Country Studies.* New York: Palgrave.

Churchill, N. et al., eds., (1991). *Frontiers of Entrepreneurship Research.* Wellesley, MA: Babson College.

Clark, T. and Fincham, R., eds. (2002). *Critical Consulting: New Perspectives in the Management Advice Industry.* London: Blackwell.

Collins, D. (2000). *Management Fads and Buzzwords: Critical-Practical Perspectives.* London: Routledge.

Culhane, J-M. H. (2003). *The Entrepreneurial Orientation-Performance Linkage in High Tech Firms: An International Comparative Study.* Unpublished PhD dissertation. Amherst, MA: University of Massachusetts.

Curnow, B. & Reuvid, J. (2001). *The International Guide to Management Consulting.* London: Kogan Page.

Czerniawska, F. (2006). *Management Consultancy in Practice.* London: Kogan Page.

Czerniawska, F. (2003). *The UK Consulting Industry*, 2002-2003. London: MCA, with PMP and IRN.

Dana, L-P., Ed. (2004) *The Handbook of Research on International Entrepreneurship*. Cheltenham, UK: Elgar Publishing.

Datamonitor Staff (2002, 2004, 2006, 2008). *Industry Market Research Reports* (selected issues). London: Datamonitor.

David, E. J. (2001). *The Emergence and Evolution of an 'Expert' Field: The Origins, Growth and Competitive Dynamics of the Management Consulting Industry.* Unpublished PhD dissertation. Ithaca, NY: Cornell University.

Duncan, J. W. and Gross, A. C. (1995). *Statistics for the 21st Century.* Chicago: Irwin.

Fombrun, C. and Nevins, M. (2004) *The Advice Business.* Upper Saddle River, NJ: Pearson/Prentice Hall.

FEACO Board and Staff (2008). *Annual Survey of the European Management Consulting Market.* Brussels: FEACO, The European Federation of Management Consulting Associations.

Ferguson, M. (2002). *The Rise of Management Consulting in Britain.* Aldershot:, UK: Ashgate.

Gartner, W. B. et al., Eds. (2004). *Handbook of Entrepreneurial Dynamics.* Thousand Oaks, CA: Sage Publications.

Ghosh, A. (1989). *Redefining Excellence.* New York: Prager.

Gluckler, J. and Armbruster, T. (2003). Bridging Uncertainty in Management Consulting: The Mechanisms of Trust and Networked Reputation, *Organizational Studies*, 24/2, 269–297.

Gordon, G. L. (1997). *Strategic Planning for Association Executives.* Washington: American Society of Association Executives.

Gross, A.C. and Poor, J. (2008). The Global Management Consulting Sector, *Business Economics*, 43/4, October, 59-68.

Gross, A.C., Holtzblatt, M., Javalgi, R., Poor, J. and Solymossy, E. (2013). Professional Occupations, Knowledge-Driven Firms, and Entrepreneurship: A National and Regional Analysis. *Business Economics*, 48/4, 246-259.

Haas, M. R. and Hansen, M.T. (2004). When Using Knowledge Can Hurt Performance: The Value of Organizational Capabilities in a Management Consulting Company, *Strategic Management Journal*, 26/1, October, 1-24.

Higdon, H. (1967). *The Business Healers*, New York: Random House.

Hollings, R. L. and Pike-Nase, C. (1997). *Professional and Occupational Licensure in the U.S.* Westport, CT: Greenwood Press.

Javalgi, R.G., A.C. Gross, W.B. Joseph, and E. Granot. (2011) Assessing Competitive Advantage of Emerging Markets in Knowledge Intensive Business Services, *Journal of Business & Industrial Marketing*, Vol 26:3, pp 171-180

Jackson, B. G. (2001). *Management Gurus and Management Fashions.* London: Routledge.

Jones, M. V. and Dimitratos, P., Eds. (2004) *Emerging Paradigms in International Entrepreneurship.* Cheltenham, UK: Elgar Publishing.

Kennedy Information. (annual). *The Global Consultant Marketplace,* Peterboro, NH: Kennedy Information.

Kennedy Information. (2009), *Consultants News* (a newsletter), June 5, 1-4. Peterboro, NH: Kennedy Information.

Kihn, M. (2006). *House of Lies: How Management Consultants...*New York; Business Plus.

Kipping, M. and Engwall, L. (2001). *Management Consulting: The Emergence and Dynamics of a Knowledge Industry.* Oxford: Oxford University Press.

Kipping, M. and Clark, T. (2012) *The Oxford Handbook of Management Consulting.* Oxford: Oxford University Press.

Kirby, D.A. and Watson, A. Eds. (2003). *Small Firms and Economic Development in Transition Economies: A Reader.* Aldershot, UK: Ashgate.

Kubr, M, Ed. (1992) *Management Consulting: A Guide to the Profession.* Geneva: International Labour Organisation.

Mack, C. S. (1991). *The Executive's Handbook of Trade and Business Associations.* New York: Quorum Books.

Malhotra, N. (1999). *International Entry Mode Decisions of Professional Service Firms: the Case of Engineering Consulting.* Unpublished PhD dissertation. Edmonton: University of Alberta.

Maister, D. (1993). *Managing the Professional Service Firm.* New York: Free Press.

McDonald, R. (2013). *The Firm: The Story of McKinsey and Its Secret Influence on American Business.* New York: Simon & Schuster.

McIntyre, R. J. and Dallago, B., Eds. (2003). *Small and Medium Enterprises in Transitional Economies.* New York: Palgrave.

McKaig-Berliner, A.L. (2001). *The Global Sourcing of Competitive Advantages: A Study of Professional Business Services.* Unpublished PhD dissertation, Rutgers, SUNJ.

McKenna, C. (2006). *The World's Newest Profession: Management Consulting in the Twentieth Century.* Cambridge: Cambridge University Press.

Micklethwait, J. & Wooldridge, A. (1996). *The Witch Doctors: Making Sense of the Management Gurus.* New York: Random House./Times Business.

Miller, D. (1990). *The Icarus Paradox.* New York: Harper Business.

Mintzberg, H. (2004). *Managers not MBAs.* San Francisco: Berrett-Koehler.

Moore, G. L. (1984). *The Politics of Management Consulting.* New York: Praeger.

Newman, N. ed. (2008). *The Vault Guide to the Top 50 Management Consulting Firms in the U.S.* New York: Vault Reports.

Newman, N. ed. (2008). *The Vault Guide to the Top 25 Management Consulting Firms in Europe.* New York: Vault Reports.

O'Mahoney, J. (2010). *Management Consultancy.* Oxford; Oxford University Press.

O'Shea, J. and Madigan, C. (1997). *Dangerous Company,* New York: Random House.

Peters T. and Waterman, R. (1982). *In Search of Excellence*. New York: Harper & Row.

Pinault, L. (2000). *Consulting Demons.* New York: Harper Business.

Poppi, J. A. (2004). *Management Consulting: A Multidisciplinary Technique.* Unpublished PhD dissertation, Northwestern University.

Rasiel, E. (1999.) *The McKinsey Way,* New York: McGraw-Hill.

Segal, D. (2010). In Pursuit of the Perfect Brainstorm—Can a New Breed of Consultant Teach Companies How to Think?, *New York Times Magazine*, December 19, 24-28.

Shimberg, B. et al., eds. (1972). *Occupational Licensing: Practices and Policies.* Washington: Public Affairs Press.

Schaus, W. (2004). *International Handbook on Association Management.* Washington: ASAE.

Silva, M.K. (2000). *Accreditation, Knowledge, and the Strategies of Professionalizing Occupations.* Unpublished PhD dissertation. University Park, PA: Penn State University.

Stewart, M. (2009). *The Management Myth: Why the Experts Keep Getting it Wrong.* New York: W. W. Norton.

Storey, D. J. (1994). *Understanding the Small Business Sector.* London: Routledge.

Svevo-Cianci, K. (1995) *Associations and the Global Marketplace.* Washington: ASAE.

Technology Business Research Staff. (2007). *PBSQ: Professional Services Business Quarterly: Monographs on Selected Large Management Consultancies.* Hampton, NH: TBRI.

Thommen, P. & Richter, A., Eds. (2004). *Management Consulting Today.* Wiesbaden: Gabler.

Tisdall, P. (1982.) *Agents of Change: The Development and Practice of Management Consulting.* London: Heinemann.

U.S. Bureau of Labor Statistics (2008). *Comparative Labor Force Statistics, 10 Countries, 1960-2007*. Washington: USGPO.

U.S. Census Bureau (2000). *Statistical Abstract of the United States*, 2000, 120th ed. Washington: USGPO..

U.S. Census Bureau (2009). *Statistical Abstract of the United States*, 2000, 128th ed. Washington: USGPO.

U.S. Department of Commerce, International Trade Administration (2000). *U. S. Industry and Trade Outlook, 2000*. Washington: USDC/ITA and McGraw-Hill.

Verocca, D. (1998). *A Comparative Analysis of External Management Consultants in the Public and Private Sector*. Unpublished PhD dissertation. Pittsburgh: University of Pittsburgh.

Wakke, I. A. M. (2004). *Starting Global: An Entrepreneurship-in-Networks Approach*. Unpublished PhD dissertation. Netherlands: Universiteit Twente.

Werr, A. and Stjernberg, T. (2003). Exploring Management Consulting Firms as Knowledge Systems, *Organization Studies*, 24/6, 881-908.

Wood, J. D. (2001). *Patterns of Internationalization of U.S. Management Consultants*. Unpublished PhD dissertation, New Brunswick, NJ: Rutgers University

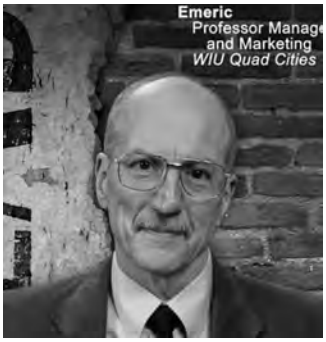
Young, E. M. (1998). *The Coevolution of an Entrepreneurial Climate and a Sectoral Cluster*. Unpublished PhD dissertation. Gainesville, FL: The University of Florida.

http://www.sba.gov/advo/research/data.html
http://www.bls.gov/fls/flscomparelf.htm
www.feaco.org
www.insee.fr
www.destatis.de
www.statistics.gov.uk
http://www.bdu.de
www.icmci.org
http://www.imcusa.org
http://www.vault.com
http://en.wikipedia.org

Andrew Gross is currently a Professor of International Business and Marketing at Cleveland State University where he served on the Faculty for over 40 years. Prior to entering academic life he worked as an engineer, manager, and market research analyst in industry and consulted for many organizations and the Government of Canada. He was born in Hungary, emigrated to Canada in 1950, but has been returning to Hungary since 1971 about every 2 to 3 years. He helped establish a major market research and publishing firm in Cleveland, Ohio which has grown from 3 to 120 employees between 1960 and 1983. Prof. Gross holds a B.Sc. degree in electrical engineering, an M.B.A. (both from what is now Case Western Reserve University) and a PhD in economics/marketing from Ohio State. He served as Fulbright Senior Scholar in Hungary in 1989 and 1992, lecturing in both English and Hungarian at various universities. He was a Visiting Professor at McGill, McMaster and Simon Fraser universities in Canada, at the University of New South Wales in Australia, at ESCP in Angers, France, and the Monterey Institute of International Studies in California. He is the author of 15 monographs, lead author or co-author of 4 books, and has published over 100 journal articles in various refereed and practitioner journals. He serves as Section Editor for Business Economics and is on the board of editors for several international and business marketing journals.

József Poór is a full-time Professor of Management at Szent István University Gödöllő (SZIE-Hungary) since 2011 where he teaches a variety of management courses including International Human Resource Management, Managing Professional Organisation and Human Resource Management. He is Professor of Management at Faculty of Economics Selye János University in Komarno (Slovakia) where he is teaching International Management and International Human Resource Management.
Prof. Poór earned his PhD from Hungarian Academy of Sciences. He served as guest professor at five different US universities (PAMI-Honolulu, Bellermine-Louisville, EKU-Richmond, Saginaw-Michigan and CSU-Cleveland) and taught thirteen short summer semesters. He lectured at Catholic University-Lyon, France three times. He was senior manager (Managing

Director, Country Manager and senior consultant) at different internationally recognized professional service firms (Mercer, HayGroup, Diebold) and at a private business school (International Management Center, Budapest).
His scholarly publications have appeared in more than ten internationally referred journals. He wrote twenty-one books and book-chapters in Hungarian, one book (Walter-Kluwer-Complex) and five book-chapters (Addison-Wisley, Chapman&Hall, Kogan Page, Prentice Hall and Routledge) in English and one book in Romanian alone or as co-author.



Emeric (Imre) Solymossy is an engineer-entrepreneur, experienced manager and executive, who returned for his PhD (at CASE) after his business ventures. He's had seven private-entrepreneurial businesses, and was on the team for ten other firms. His businesses relied on innovation and creative problem solving. He is a two-times Distinguished Fulbright scholar, having served as both a Fulbright Senior-Specialist assignment for technology transfer (Argentina), and as the Fulbright-Hall Distinguished Chair In Entrepreneurship for Central Europe. He draws on his international experiences for cases and examples. He is in his 15th year of teaching at the Quad Cities Campus of Western Illinois University in the Quad Cities (WIU-QC). He is also on the Board for the Illinois Northwest Region Small Business Development Center, and developed the Entrepreneurship program for WIU. All of his teaching is application/competency oriented.
He is passionately engaged in international activities, travels extensively, and remains actively involved in internationally collaborative projects. His current research explores knowledge networks, and how knowledge is valued within organizations as well as in the marketplace. He has published extensively, with his work appearing in five languages. He is on the editorial board for three internationally recognized journals, as well as a frequent reviewer for two other journals as well as four text book publishers. He is active in numerous professional and academic associations, and has received numerous awards for his research and teaching.

Judit Tessenyi – Klara Kazar

THE POTENTIAL EFFECT OF THE "TOBACCONIST LAW" ON ENTREPRENEURS

On 11 September 2012, the Hungarian Parliament adopted a new Act that regulates the conditions of selling tobacco products, according to which only traders operating under a concession agreement may distribute cigarettes from the middle of 2013. According to the original concession tender you could not buy anything else just tobacco products in tobacco stores. Then, a few amendments to the petition slightly loosened the rule, and between October 2012 and March 2013 we tried to assess the acceptance and the expected impact of this. In Hungary 2,100 contractors are currently selling gambling products (Toto, lottery ticket, keno, instant ticket, etc) within the framework of the co-operation with Szerencsejáték Zrt. (The Hungarian National Lottery Company). They were assessed three times on their preliminary expectations and plans. As it turned out, more than half of the retailers distribute cigarettes currently, so the above mentioned law have more or less influences on them. We applied crosstab analysis and chi-square tests to examine how consistently the respondents insist on their prior thoughts differ from those as a result of time and new information. Our aim was to prove dynamic inconsistencies and present those through practical cases, from which we could draw appropriate conclusions after the third step of the research. With the survey made three consecutive times in the same group, we were able to confirm the phenomenon of dynamic inconsistency and partial inconsistency. We cannot say that the respondent's decisions or their original intent was changed just because of the change of the information. As shown in the cases above, retailers who were intended to submit the application when they had less information, finally did not submit their application.

It is a well-known fact that every third person smokes in Hungary. From year to year approximately 30,000 people die due to diseases related to smoking, regarding deaths as the consequence of indirect effect or passive smoking statistical data are not consistent[1].

Within the European Union, Ireland was the first to limit smoking in 2004, which action was followed by almost every member state since. This limitation however, refers to the location of smoking, which means that it is forbidden to smoke in public spaces, public institutions, workplaces. The severity goes much further and limits the locations of distributing tobacco products. The basis of the notion is that if one there is cigarette in less places – and with more effort – and in stricter circumstances, less people will become addicted to smoking, some will

abandon their harmful passion and last but not least the youth will not gain access to this product.

"In Central and Eastern Europe tobacco taxes and cigarette prices are much lower than in Northern and Western Europe. In a European ranking according to tobacco price increase by taxes, smoking restrictions at work and in public places, consumer information, tobacco advertising bans, health warnings and access to smoking cessation therapy, Austria and Greece had the poorest score, followed by Luxembourg, Czech Republic, Hungary and Germany. Recently the tobacco laws of Hungary, Greece, Luxembourg, and parts of Germany were improved and the Czech minister of health announced to ban smoking in restaurants and bars, while Austria seems set to become the ash-tray of Europe." (Neuberger, 2013, p.1.)

Based on the actuality of the smoking habits and the change in tobacconist law in our country we would like to examine the effects of the new law on the behaviour of entrepreneurs. There were continuous changes in the planned tobacconist law; therefore we are curious whether the changed law-plans can cause indifferent selling intentions? Finding an answer to this question in the first unit of our study we take a look at the theories related to the background of the theme, in the second unit we introduce the results of our primary study related to the tobacconist law[2].

[1] „It was attempted to estimate the number of smokers in Hungary in the 1990's several times with national representative sample taking. On the basis of these sample takings with approximate estimations we can say that 34–46 percent of the adult males, and 18–28 percent of the adult females smoke. With this data we belong to the world's and Europe's midrange. In the population older than 15 years almost every third person smokes and among them 1.3 million person die to the consequences of smoking eventually. Half of premature fatalities die in their most productive life years (35–69 years), on the average seven, but even 20–25 years earlier than their non-smoker counterparts. The studies show that while among males the frequency of smoking is decreasing or at least stagnates, among women and the youth it is increasing. According to Global Youth Tobacco Survey's Hungarian result, which was performed in 2003, 33 percent of the 16-33 age class smokes with more or less regularity..." Source: http://color.oefi.hu/adat.htm (accessed 27 May 2013).

[2] Looking forward to the political aspect is not affected. Smoking restrictions – in other countries - rather limited in terms of location: and not for sale, but the places of consumption are limited. A good example could be the limit of sale of the Russian casino industry and the U.S.A:'s alcohol consumption limits in the 1920s. The latter case is too old, and nobody has been prepared impact studies for the Russian situation.

Background

The XLII Act of 1999 regarding the protection of non-smokers and the special rules of tobacco products' consumption and distribution declares that "Tobacco products cannot be distributed in a public educational institution, in a social institution offering personal care, child welfare, child protection institution and health institution. It is forbidden to sell tobacco products or to serve a person who is under aged. In order to validate this restriction, the enterprise or its representative in case of a doubt would call the consumer to credibly certify his or her age. Lack of a proper certification of age means that sales of the product or the service must be denied."

Year and law number	Item	Comment
16th June 2003	The Framework Convention on Tobacco Control	WHO
CXXVII Act of 2003	law on excise duty and special rules regarding the distribution of excise goods	taxation
XLII Act of 1999	on the protection of non-smokers and the special rules of consumption, distribution of tobacco products	On the rules related to locations designated for smoking
Act LVIII of 1997 on business advertising		legal restrictions on advertising
LXXVII Act of 2005	About the modification of Act LVIII of 1977 on business advertising.	
CXXXIV Act of 2012	on suppressing underage smoking and the retailing of tobacco products	

Table 1. Legislation governing smoking and the marketing of tobacco products
Source: own editing

"If we disregard from the elaboration of the high number of publications in the tobacconist case – which largely contain opinions and conclusions – and we pay attention only to

reports or news, the frequency of short-tempered communication, statements is still striking, ***along with the treatment of beliefs as facts"*** (Laki, 2014, p.15.).

Grucza et al (2012) examined the association between policies governing access to tobacco during adolescence and subsequent adult smoking and they found that the restrictions on youth access to tobacco might lead to reduction in smoking prevalence later in adulthood. The effect might be limited to women.

Dynamic inconsistencies[3]

In the past, several economists and psychologists attempted to model different behavioural anomalies or for example projection biases concerning the prediction of future usefulness (Rabin, 1998),

Our primary study examines entrepreneurial plans and decisions in a dynamic environment and the concrete (later) behaviour as well. Such biases, even including emotional effects and the result of cognitive processes, may occur in our behaviour which would result in differences between the preplanned and the subsequently discernible, actual behaviour. In the scientific literature these phenomena would be called dynamic inconsistencies (Barkan and Busmeyer, 2003, Barkan et al., 2005).

"People underestimate the effect regarding their own behaviour and the future usefulness of external factors and in this way they overestimate the amount of similarity concerning their future and present preferences"– say Loewenstein et al (2003) in their work on Projection distortion regarding the prediction of future utilities which well summarizes the economic essence of differences between planned and factual behaviour.

Impatience modelling has been around for such a long time in economics, that the standard models are usually stuck in the utilities exponential temporal discounting perspective.

However, the standard economic models are consistent with the utility function which can be represented by time preference, that is, the individual's preference at an earlier date to a later one is the same, whenever you ask for it. The introspection and psychological researches both indicate that this assumption is not always true, because in many cases there

[3] The basic article on time consistency's (dynamic inconsistency) problems appeared more than a quarter of a century ago from Finn E. Kydland and Edward C. Prescott's pen (1977). Rules Rather Than Discretion: The Inconsistency of Optimal Plans. The problem of time consistency is attached to economic policy credibility: to take an optimal decision at a particular time, only with the passage of time, the process dynamics may become suboptimal, as the leaders temptations may become too strong and alter the decision (Jankovics, 2003).

are self-control problems: we love to bring forward the prizes and to postpone the losses (Selei, 2012).

Uncertainty is an essential factor of dynamic inconsistencies, with regards to the unpredictability of the environment and to the future consequences of behaviour as well. Among the economic phenomena economists first took note of temporal inconsistencies due to stock market uncertainties (Tessényi, 2011).

Ford et al. (2012) study the impact of informational ambiguity on behalf of informed traders on history-dependent price behaviour in a model of sequential trading in financial markets. Following Chateauneuf et al. (2008), they use neo-additive capacities to model ambiguity. Such ambiguity and attitudes to it can engender herd and contrarian behaviour, and also cause the market to break down.

Primary research related to the tobacconist law

2,100 private entrepreneurs sell gambling products in the country at present within the frameworks of the cooperation with the Szerencsejáték ZRT (football pool, lottery, keno, lottery ticket, etc.), among whom we measured the preliminary expectations and plans in three rounds. Before the tobacconist law these entrepreneurs were allowed to sell tobacco products, but according to the tobacconist law they can sell tobacco products only after a submitted and accepted application. In this section the objective of the study, the questionnaire design and data analysis methods, the sample and the results will be described.

The objective of study

Beyond the survey of intended activity our study's objective is to compare the present situation and future actions to examine consistency. Due to our assumptions, there is a detectable connection between the present situation and the future intent; in the case of the three surveys, the inconsistency of answers can be observed.

Questionnaire design and data analysis methodology

Between September 17th and 26th in 2012, the first questionnaire attached in Appendix 1 was sent to those entrepreneurial sales partners whose e-mail address was in our possession[4]. From the sales regions of Szerencsejáték Zrt., 524 partners returned completed questionnaires.

[4] The number of sales points is 2,140 on a national level, but the number of live (incasso) entrepreneurial partners is 1903.

Following the ministerial invitation and the publication of the concession tender material (December 18th, 2012), some new products (soft drinks, mineral water, newspapers) were added to the law which had been prohibited in the original law. Based on this new information we sent out another questionnaire attached in Appendix 2 to the address of the same 1967 entrepreneurs[5]. During the time of the second survey 488 answers arrived.

At the time of the tenders' submission deadline (February 22nd, 2013), we repeatedly asked our partners if they had really handed in their application. Within the 3rd questionnaire survey, on February 22nd, 2013 we sent out another questionnaire, attached in Appendix 3, to the email addresses[6] of the very same 1503 entrepreneurs. Among them 581 persons answered our questions.

Since our object is to compare the present situation and future plan, and in the questionnaires there are only categorical variables, we applied crosstabs analysis and Chi-square tests, by using the SPSS 20.0 program.

The presentation of the sample

From the first survey we can highlight that more than half of the respondents distribute tobacco products, but this proportion varies from region to region, it is most significant in the region of Pécs. Regarding the application of tobacco marketing opportunity we can draw a distinct picture region by region (Table 2).

[5] 36 were undeliverable, because of inaccurate or non-existent address

[6] 22 of them were undeliverable, the number of interview distinct from the first two survey is added from the expansion of contact list, but the original scope is fully covered.

Region	First survey			Second survey			Third survey	
	Number of valid answers, person	Proportion of persons marking an alternative, %		Number of valid answers, person	Proportion of persons marking an alternative, %		Number of persons applying for a tender, person	Proportion of persons applying for a tender, %
		Yes	I don't know yet		Yes	I don't know yet		
Central	202	34.7	33.2	177	67.2	17.5	234	55.1
Miskolc	114	34.2	36.8	126	61.9	25.4	131	48.1
Pécs	93	38.7	25.8	76	64.5	25.0	93	53.8
Szeged	114	47.4	22.8	95	64.2	24.2	117	62.4
Total	523	38	30.4	474	64.8	22.2	575	54.8

Table 2. The distribution of application intent (application submission) by region
Source: own editing

Our survey demonstrated that 38 percent of the respondents intended to apply the tobacco marketing opportunity, however 30.4 percent had not decided at that time (since the implementing regulation and the application conditions—at the time of interrogation—had been unknown). The survey was too early in the sense that considering the lack of knowledge regarding the application conditions, there are a high number of entrepreneurs responding hesitantly, many people had not decided if they would hand in an application.

From Table 2, by comparing the results of the three surveys it can be stated that with the expansion of information (results after the 2nd survey) about the application intent, we could expect to meet higher proportions, but when compared to the intent proclaimed in the second survey, the proportion of actually submitted tenders was lower in all regions. Among regions with regard to willingness and submitting proportion numbers, the Sales Region of Szeged is outstanding. Given the knowledge of the concession tender: 64.8 percent of the respondents giving a valid answered (474 persons in the case of the question – 14 persons did not answer to this question from the total of 488 responses) desired to apply for the tobacco marketing right. Unfortunately, at that time, 22.22 percent of the respondents still had not decided if they wanted to apply or not. Of the second interrogations results it can be highlighted that regarding the majority of the applicants (60.7 percent) everything goes on in the original business course even if they would not gain a concession right.

Answer	Number of answers, person	Distribution, %
every goes on in the existing course of business	281	60.7
I close the shop	7	1.5
I will not apply	38	8.2
I am thinking about the formation of a new product, service	102	22.0
I don't know	35	7.6

Table 3. What is the applicant's plan if a concession right is not acquired? (n=463)[7]
Source: own editing

The number of persons thinking about ceasing their activity and in this way their contracts is minimal. Many of them rely on their suppliers in this question as well, or think about the introduction of new products and services which would make their enterprise more profitable. Summarizing the January (2nd) survey, the respondents uncertainty deriving from the lack of information was still great. They were trying to get answers primarily informally. They were counting on the cooperation of the SZRT as well, and that their gambling game sales experience would mean an advantage (at least during the evaluation of their business plan).

The respondents of the 3rd survey in the regional distribution are seen in Table 4.

Actually 54.8 percent of the respondents applied for tobacco marketing rights. Since we can argue that the willingness to respond largely depends on involvement (meaning that those who applied are involved regarding the theme), the above shown proportion would not appear to reflect the application proportion referring to the full entrepreneurial sphere. Of the 488 partners answering within the previous round, 64.8 percent planned that will apply and another 22.2 percent did not know if they would hand in an application. Compared to this the number of actual applicants is modest.

[7] 25 persons did not answer this question.

Region	Distribution, %	Number of respondents, person
Szeged	21.2	123
Miskolc	22.5	131
Pécs	16	93
Central	40.3	234
Total	100	581

Table 4. The distribution of respondents according to regions
Source: own editing

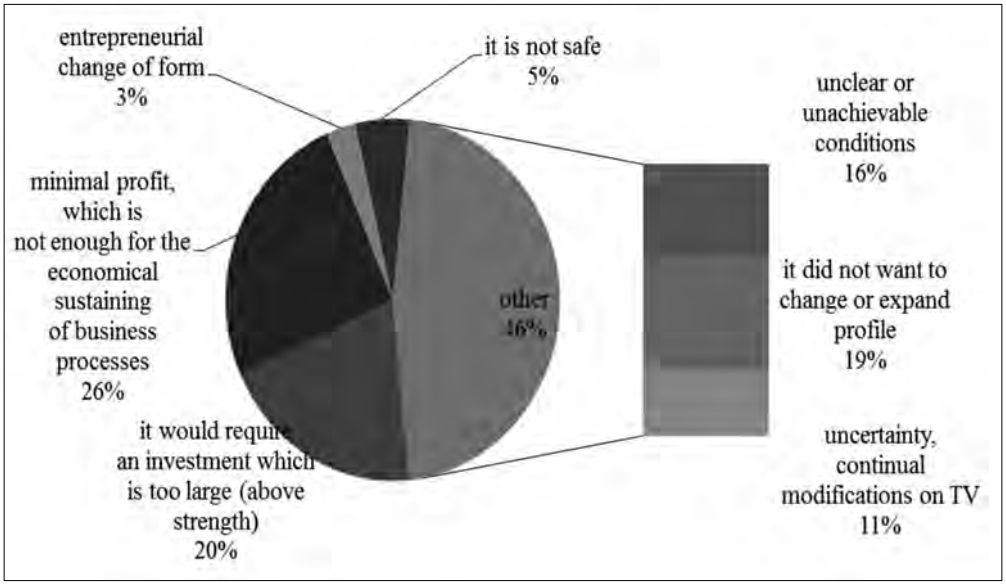


Figure 1. The causes for not submitting the application n=581

After submitting the application we became curious why the non-applying persons did not apply. By categorizing textual answers we distinguished the following groups (Figure 1).

As compared to their original plans, less have applied, the earlier undecided hesitants rather stepped away from this. A part of the respondents want to apply later in a "second round", after they have seen the appearance of the terms and conditions, the concrete

operations of the tobacconists and having received the initial experiences (they are not aware that no second round is to be organized).

Results

In this section the current activities and the future plans will be compared, and then we try to identify respondent groups based on the consistent or inconsistent answers between our questionnaires.

The comparison of current activity and future plans

Regarding the comparison of current activity and future plans, the connection between the variables related to the present distribution of tobacco products and the intent of tobacco marketing was examined with the help of crosstabs analysis and Chi-square test. In the case of the first questionnaire between the two variables, a detectable significant ($p<0.05$, $\chi2=80.284$, df=4, Appendix 4 Table 2) connection can be found.

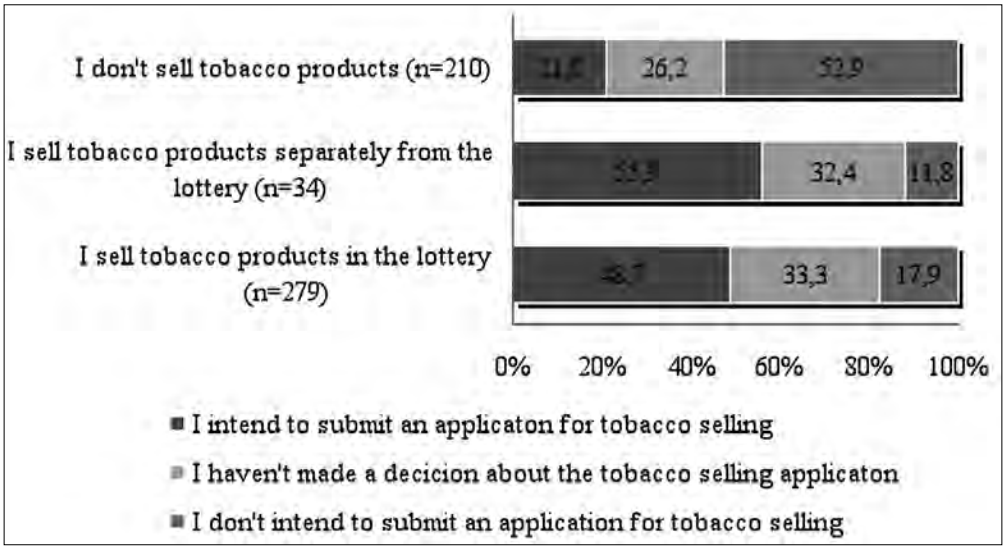


Figure 2. The application intent and the current sale of tobacco products (first survey)
Source: own editing

The proportion of persons intending to apply tobacco marketing opportunity is highest (55.9 percent) among those who sell tobacco products separately from lottery even now. At present, application intent is significant among retails who sell tobacco products in lottery shops as well, 48.7 percent of the group wants to apply a tender. Of those who do not sell tobacco products presently, application intent is only 21, but the completely isolated form 52.9 percent of the group (Figure 2 Appendix 4 Table 1).

In the case of the second questionnaire, a significant connection can be detected between the present sale and the intent ($p<0.05$, $\chi2=10.612$, df=4, Appendix 4 Table 4).

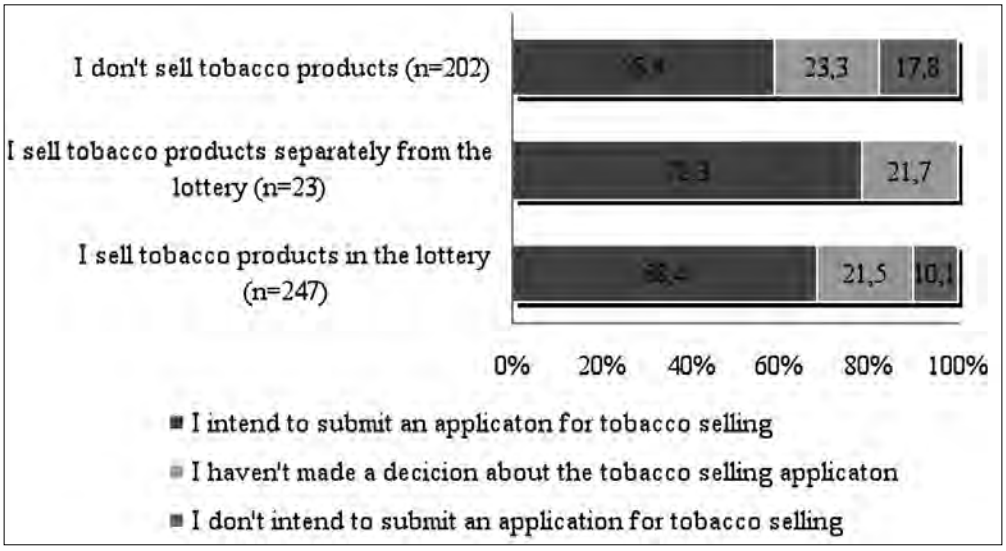


Figure 3. The application intent and the current sale of tobacco products (second survey)
Source: own editing

Given the knowledge of the concession tender's conditions, the application intent can be considered higher compared to the first survey's results. The proportion of persons intending to apply for the tobacco marketing opportunity is repeatedly highest among those (78.3 percent), who already distribute tobacco products separately from lottery. The proportion of persons intending to apply among retailers distributing tobacco products presently is 68.4 percent. The same ratio is significant among retailers who do not distribute tobacco products presently, 58.9 percent of them intend to apply for a tobacco marketing

opportunity (Figure 3 Appendix 4 Table 3). In the case of the third survey, only the tender's submission was questioned, 54.8% percent of the 575 respondents answered that a tender was applied.

The study of consistency

In the first and the second questionnaire we posed the question if the person had the intention of applying for the tobacco marketing opportunity, in the first questionnaire we asked if the respondent applied for a tender. Because of the temporal traceability of some answers, in the analysis only those respondents were taken into account who completed all three questionnaires and were identifiable. The identification was performed on the basis of a consignment code, which is possessed by the partners of Szerencsejáték Zrt., and the respondents had to provide their own codes in all three surveys. Regarding the individual provision, filling mistakes have appeared regarding incorrectly typed or missing codes, so only those respondents were analysed, where a fully equivalent code was submitted, character by character, this meant a final total of 81 respondents.

If the respondent gave a "yes" answer on the basis of the first survey, in our second questionnaire—in the knowledge of the concession tender as well—desires to apply for the tobacco marketing right, we can regard the person as consistent in their decision (meaning that the person decided in favour of the application intent in the case of the first and second questionnaires). By continuing this sequence of logic (in the third questionnaire the question was posed accurately whether the person submitted a tender for the tobacco marketing concession) if the tender was truly submitted a month later. We consider fully consistent those, who would answer with a positive answer for this question as well. From the perspective of categorizing the following outcomes and classification is possible:

Consistency with the consideration of the third questionnaire's results and the occurring answer combinations show a more complex picture, so a further shading of the concept was performed (Table 5).

Intent during the first survey	Intent during the second survey	Application submission	Number of respondents, person	Behaviour
Yes	Yes	Yes	27	Consistent
No	No	No	5	
I don't know yet	Yes	Yes	11	Lack of information consistent
I don't know yet	No	No	2	
Yes	I still don't know	Yes	1	Indeterminate
I don't know yet	Yes	No	6	
I don't know yet	No	Yes	1	
I don't know yet	I still don't know	Yes	2	
I don't know yet	I still don't know	No	4	
No	I still don't know	No	9	
Yes	Yes	No	4	Inconsistent
Yes	No	No	1	
No	Yes	Yes	5	
No	Yes	No	2	
No	No	Yes	1	

Table 5. The categories of consistency
Source: own editing

The consistent category also includes those respondents who gave three unified "no" answers to the questions. Those respondents, who in the first round (when there was lack of information about the tender) marked the "I don't know yet" possibility, but afterwards followed the "apply" or the "does not apply" opinion or behaviour, can be considered as consistent, but in the first round they presumably decided due to lack of information: they form the sphere of consistent with lack of information.

Those respondents, who marked the "I don't know" answer in one of the interrogations and to that different answers were associated in the other two surveys or the "I don't know" answer possibility appeared twice, form the sphere of indeterminate persons. Those respondents who performed opinion change once or twice during this time can be considered factually inconsistent (16 percent).

39.5 percent are consistent regarding the 81 respondents, but the indeterminate and the inconsistent together form 44 percent in the sample, so opinion and behaviour changes can be observed in time regarding the entrepreneurial behaviour related to the tobacconist law.

Summary

This study aimed to find out about the changes of the laws - which are reducing the possibilities of selling tobacco products significantly - and how this would effect the people who have already dealt and sold tobacco products.

The main research question was: what are the perceptions among the respondents, and what are the planned behaviours, by the well-known and described changes in terms of sales.

We have tried to demonstrate the expected impacts of the tobacconist-law, and we tried to exclude political views. We found convincing evidence among the respondents - with information uncertainty and deviations from the original plan - during a half year, a completely different application rate was formed and the number of candidates changed for the tobacco sales.

The dynamic inconsistencies can be traced in the time to express the behavioural inconsistencies and in specific studies this kind of inconsistency was traced mainly in the time/by the temporal. It was hypothesized that those entrepreneurs who had planned in October that they would definitely continue selling tobacco, but by the end of April they had not even tried to obtain the appropriate license.

At three consecutive times, our surveys for the same round succeeded in certifying the existence of dynamic inconsistencies and partial inconsistency. We cannot state that the responding entrepreneurs' decision changed due only to the change of information, since in the above shown case the persons who intended to apply, in the possession of less information, did not submit their applications in the end. Further research and more detailed analysis could be performed along with textual analysis and with the examination of answers given to the textual questions which are to be completed. We could perform a further study and a more detailed investigation with text analysis and with the examination of the answers given to mini essay close questions. Other valuable conclusions could have been drawn from repeatedly asking our respondents who were qualified as "inconsistent", during which we could have already elaborated on the real causes (motivations and attitudes) regarding the decision and the causes of the actually attested actions. Another research direction could be if we would examine the effects of the tobacconist law ***in the long term*** and also extended to other

economic implications. In our thesis, we did not deal with the role of price changes (Table 1) and we willingly omitted political aspects. At the same time ***the limit of our research*** was due to that with our sample, we only addressed lottery entrepreneurs actually possessing a business premise, who were earlier already involved in retail trade, so we could not offer a picture about the new characters, about fresh start-up entrepreneurs and about decision making mechanisms either.

During the study of consistency, we concluded that those responding entrepreneurs are in the highest proportion which answered systematically yes and systematically no, but uncertainty is a strikingly detectable feature of the interviewed circle as well. We found significant points of contact between inconsistency and uncertainty, consistency and information deficiency.

References

Barkan, R. – Busemeyer, J. R. (2003): Modeling Dynamic Inconsistency with a Changing Reference Point. *Journal of Behavioral Decision Making*, Vol. 16, No. 4, pp. 235–255.

Barkan, R. – Danziger, S. – Ben-Bashat, G. – Busemeyer, J. R. (2005): Framing reference points: the effect of integration and segregation on dynamic inconsistency. *Journal of Behavioral Decision Making*, Vol. 18, No. 3, pp. 213–226.

DellaVigna, S. – Malmendier, S. (2006): Paying not to go to the gym. *The American Economic Review*, Vol. 96, No. 3, pp. 694-719.

Jankovics, L. (2003): *Miért nem hisznek a magyar gazdaságpolitikának?(* Why don't they believe in the Hungarian economic policy?) http://ingyenebed.blog.hu/2003/12/08/miert_nem_hisznek_a_magyar_gazdasagpolitikanak (accessed 23 July 2013).

Ford, J.L. – Kelsey, D. – Pang, W. (2013): Information and ambiguity: herd and contrarian behaviour in financial markets. *Theory and Decision*, Vol. 75, No. 1, pp. 1-15.

Grucza, R.A, – Plunk, A.D. – Hipp, P.R. – Cavazos-Rehg, P. – Krauss, M.J. – Brownson, R.C. – Bierut, L.J.(2013): Long-Term Effects of Laws Governing Youth Access to Tobacco. *American Journal of Public Health*, Vol. 103, No. 8, pp. 1493-1499.

Kydland, F. E. – Prescott, E. C. (1977): Rules Rather Than Discretion: The Inconsistency of Optimal Plans. *Journal of Political Economy,* Vol. 85, No. 3, pp. 473-492.

Központi Statisztikai Hivatal: 4.4.12. A kiskereskedelmi eladási forgalom főbb árucsoportonként (The turnover of the main commodity group of retail sales) (letöltés: 2014. szeptember 1.)

http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_okfb002.html

Laki Mihály (2014): A trafikpiac átalakulása és átalakítása (The transformation and restructuring of tobacco market); Esettanulmány MTA Közgazdaság- És Regionális Tudományi Kutatóközpont Közgazdaság-Tudományi Intézet – Budapest http://econ.core.hu/file/download/mtdp/MTDP1410.pdf

Loewenstein, G. – O'Donoghue, T. – Rabin, M. (2003): Projection Bias in Predicting Future Utility. *Quarterly Journal of Economics,* Vol. 118, No. 4, pp. 1209-1248.

Neuberger, M (2013): Failure of Tobacco Control in Central Europe. *Occup Med Health,* Vol. 109, No. 1

Rabin, M. (2008): Pszichológia és közgazdaságtan (Psychology and economics); *Budapest: Alinea Kiadó–Rajk László Szakkollégium.*

Selei. A. (2012): Pszichológiai torzítások a fogyasztói döntésekben és hatásuk a vállalatok viselkedésére (Psychological biases in consumer decisions and their influence on behaviour of the corporates). *Iustum Aequum Salutare,* Vol. 8, No. 3–4, pp. 139–152.

Tessényi J. (2011): Dinamikus következetlenségek és az érzelmek szerepe a szerencsejátékokban (Dynamic inconsistencies and emotions in gambling behaviour). *Vezetéstudomány,* Vol. 42, No. 11, pp. 31-39.

http://tobaccocontrol.bmj.com/content/23/3/189.full.pdf+html
http://www.ksh.hu/docs/hun/xstadat/xstadat_eves/i_qsf003b.html

Appendix No. 1

Responder's data:[8]

Do you distribute at the present tobacco products in your lottery store?

- ❍ Yes
- ❍ No
- ❍ I distribute tobacco products separated from my lottery store

Do you want to apply to tobacco distributing right?

- ❍ Yes
- ❍ No
- ❍ I still don't know

Questions:

1. If you win the concession right, will you cancel your sales contract with Szerencsejáték Zrt?

- ❍ Yes, because I have just one business premise
- ❍ No, I will separate the tobacco store
- ❍ I don't know it yet
- ❍ I will continue distributing lottery games

2. What percentage of your current income comes from distributing tobacco?

- ❍ under 10 %
- ❍ 10–25 %
- ❍ 26–49 %
- ❍ 50–60 %
- ❍ 61–80 %
- ❍ more than 80 %

[8] The questionnaires were in Hungarian.

3. If you won't win concession right (so you won't be allowed to distribute tobacco products) how will you substitute your lost income?

- ❍ I don't sell tobacco products right now, so Traffic Act won't have influence on my business
- ❍ I have to close my shop, because it won't be rentable without distributing tobacco products
- ❍ I have alternative ideas
- ❍ I will go on with the current business, without distributing tobacco products

4. At the present time what kind of other products (services) do you have in your lottery store?

. . . . . .

5. Do you want to get feedback about the integrated results of the survey?

- ❍ Yes
- ❍ No

6. Other comments

. . . . . .

7. Agent code

. . . . . .

Appendix No. 2

Responder's data
Agent code
Sales Region

Questions

In view of the concession tender: do you want to apply to tobacco distributing right?

❍ Yes
❍ No
❍ I still don't know

Do you sell tobacco products now?

❍ Yes
❍ No
❍ Yes, but not in my lottery store.

Do you have a proper business premises as prescribed?

❍ Yes
❍ No
❍ I'm just looking for one
❍ It will be separated from my lottery store
❍ I don't know if my lottery store is suitable

In the case of winning tobacco marketing rights are you planning to hire new employee to the new tobacco store?

❍ Yes
❍ No
❍ I don't know it yet
❍ Only if she is young mother or if he/she is unemployed

Who will write your tender?

. . . . . .

What are your plans if you won't win concession right?

- ❍ everything is going on in the current way
- ❍ I will close my shop
- ❍ I won't apply to the tender
- ❍ I'm thinking about selling new products / services
- ❍ I don't know

7. What is the population of your city?

. . . . . .

8. Do you have other questions concerned with the law on tobacco products?

. . . . . .

9. Other comments, the comments to SzZRT leadership:

. . . . . .
. . . . . .
. . . . . .

Appendix No. 3

Responder's data:
Agent code
2. *Sales* Region

Questions :

1. Did you submit a tender for tobacco distribution concessions?

❍ Yes
❍ No

2. If the answer of the above question is yes, how many tenders did you submit for tobacco distribution concessions?

❍ 1
❍ 2
❍ 3
❍ 4
❍ 5

3. If the answer of the above question is no, what is the reason why you didn't submit for tobacco distribution concessions?

. . . . . .

4. Have you already get feedback from National Tobacco Trading Company?

❍ Yes
❍ Not yet

5. Who did your tender?

❍ I wrote it myself
❍ I wrote it with my accountant
❍ I have had done it with a tender writing company
Other: . . . . . .

6. If you win the right of distributing tobacco products when will you open your tobacco-store?

❍ From 1st May 2013
❍ From 1st June 2013
❍ From 1st July 2013
❍ I don'tknow it yet
Other: . . . . . .

7. Are you planning moving your on-line terminal for this year or are you planning a store makeover?

❍ Yes
❍ No
❍ I don't know

8. Is it necessary to change the type of your company (Ltd., individual entrepreneurship, etc)?

❍ Yes
❍ No
❍ I don't know
Other: . . . . . .

9. Will you have presumably educational needs this year (terminal operator training, because of your new employee)?

❍ Yes
❍ No
❍ I don't know it yet

10. ... for how many person?

. . . . . .

11. Other questions, suggestions, remarks:

. . . . . .

Appendix No. 4

Do you sell tobacco products in the lottery? and Do you intend to submit an application for tobacco selling? Cross tabulation						
			Do you intend to submit an application for tobacco selling?			Total
			Yes	I haven't made a decision yet	No	
Do you sell tobacco products in the lottery ?	Yes	% within Do you sell tobacco products in the lottery?	136	93	50	279
			48,7%	33,3%	17,9%	100,0%
	I sell tobacco products separately from the lottery	% within Do you sell tobacco products in the lottery?	19	11	4	34
			55,9%	32,4%	11,8%	100,0%
	No	% within Do you sell tobacco products in the lottery?	44	55	111	210
			21,0%	26,2%	52,9%	100,0%
Total		% Do you sell tobacco products in the lottery?	199	159	165	523
			38,0%	30,4%	31,5%	100,0%

Table 1.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	80,284a	4	0,000
Likelihood Ratio	81,691	4	0,000
Linear-by-Linear Association	66,314	1	0,000
N of Valid Cases	523		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 10,34.

Table 2. Chi-Square Tests

Do you sell tobacco products in the lottery? and Do you intend to submit an application for tobacco selling? Cross tabulation					
		Do you intend to submit an application for tobacco selling?			Total
		Yes	I haven't made a decision yet	No	
Do you sell tobacco products in the lottery	Yes	169	53	25	247
		68,4%	21,5%	10,1%	100,0%
	I sell tobacco products separately from the lottery	18	5	0	23
		78,3%	21,7%	0,0%	100,0%
	No	119	47	36	202
		58,9%	23,3%	17,8%	100,0%
Total		306	105	61	472
		64,8%	22,2%	12,9%	100,0%

Table 3.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10,612a	4	0,031
Likelihood Ratio	13,292	4	0,010
Linear-by-Linear Association	7,252	1	0,007
N of Valid Cases	472		

a. 1 cells (11,1%) have expected count less than 5. The minimum expected count is 2,97.

Table 4. Chi-Square Tests

Klára Kazár is a lecturer at the Institute of Business Studies of the Faculty of Economics and Business Administration, University of Szeged. Klára graduated in commerce and marketing (BA) in 2010 and in marketing (MA) in 2012, and started her PhD studies at the Faculty of Economics and Business Administration, University of Szeged in 2012. Her research areas are application of statistical models (Structural Equation Modeling, PLS path analysis) in marketing theory, consumer behaviour and brand communities research. Klára has been a member of the Hungarian Statistical Association since 2012 and a member of the International Statistical Institute, International Association for Statistical Education (IASE) since 2013. Klára can be contacted at kazar.klara@eco.u-szeged.hu, at the Institute of Business Studies, Faculty of Economics and Business Administration, University of Szeged.

Judit Tessényi was born in Szeged, Hungary, in 1969. She finished her studies at the University of Economics in Budapest in 1991 as a freight specialist. During these years she spent a summer semester at Wiener Universität as a student with scholarship. In 1995 she got secondary post-graduate degree in law, later in 2002 she finished her studies at Budapest Business School Faculty of International Management and Business Studies (post-graduate course on Public Relations). Between 2005 and 2007 she successfully completed MBA studies at University of Szeged.
Since 1997 she has been working for Szerencsejáték Zrt (National Lottery Co.). In the last 8 years she worked as region director, so her job meets with her interests. In 2008 she started PhD studies at University of Szeged, and in 2014 she defended her theses with summa cum laude. These years she presented 3 international and 9 Hungarian scientific papers in well-known journals, like e.g. Statisztikai Szemle; Vezetéstudomány; Társadalomkutatás; Recreationassociation.eu; Köz-Gazdaság.

„CONSULTANCY IS AN INDUSTRY IN WHICH THE REAL ASSETS GO HOME EVERY NIGHT...” INTERVIEW WITH IMRE HERCEGH, CERTIFIED MANAGEMENT CONSULTANT OF VIALTO CONSULTING

Q: Could you tell me a few words about the development of VIALTO so that we can have an understanding of its changing position.

A: We established our company 7 years ago. There were 12 of us, and we all had 10 to 15 years of experience in consultancy at both Hungarian and international companies. Since the establishment our primary aim has been to provide services in four different areas. These are the financial services including banking services, the telecommunication services and the public services. The fourth area is related to European Union pre-accession funds. We are involved in such projects mainly in South-East Europe. These are internationally announced projects funded by the European Union the World Bank or EBRD. We are participating on these tenders by establishing consortia with the right experts and managing the entire tendering process. If the tender is won we – as a consultancy firm – are responsible for the project management. Many highly skilled and experienced professionals work in these projects with specialised knowledge for example in customs or telecommunication legislation or the application of EU statistical methodology but they don't necessarily know how to manage these projects. That's where we can help.

Q: Does it mean that you give advice on how to lead a project?

A: No, it doesn't. We don't provide project management consultancy advice. We are the project leaders ourselves. As the project starts and the execution phase gets underway our project expert becomes responsible for the successful completion of the project. During the tendering phase we do the assembling work and our role is to help winning the tender...

Q: And who brings business?

A: Business? Well, these are all open tenders and tendering is a long process. Sometimes it may take up to 3 to 4 years to win a tender.

Q: Do you rely on your previous business relationships?

A: Partly yes, of course. Even to find out about a tender call we need considerable network of relationships. EU projects have multiple participants. One of them is the beneficiary or beneficiaries who will have considerable gains from the output of the project. Others are those funding the project (e.g. the EU) and there are also local or regional bodies representing the fund owner. We have had a project in Turkey for example. Our involvement in this project was rewarded with various international consultation awards followed by intense media attention. You could even find it on several webpages. One of them had the following headline: "Hungarian consultants teach Turks how to count olive trees". The project in fact aimed at the introduction of the EU statistical methodology in the Turkish Statistical Institute. But the expression 'counting olive trees' was used in the article because part of the project was to adopt an agricultural forecasting and monitoring system. In this particular project the beneficiary was the Turkish Statistical Institute and the finances were provided by the EU. Our role was to establish the consortium and find and enlist experts and also to implement the project. In order to become part of a project like this we need local contacts just to know what the coming projects are. Besides our local contacts we also have to keep a close eye on the new project opportunities and decide which of these can be feasibly won. We have an extensive network of international experts from Lithuania to Portugal.

Q: How has your career related to the development of the company?

A: I have been working as a management consultant since 1991. Consultancy as a profession started to emerge in Hungary around that time although many elements of it were practiced already in the 1980s, but the naming of it had been different. I started to work at Andersen Consulting in 1991 which has been part of the Arthur Andersen Group. Then I worked at a Hungarian consulting firm called AAM for 8 years. Finally, in 2007 my friends and I set up our own consultancy. Let me add to this that personally I don't work in the previously mentioned international projects. I manage development and reorganisation projects mainly at telecommunication companies and financial institutions.

Q: What is your position in the company?

A: I'm one of the owners of the company and I am also one of the managing directors. The start of our company was quite interesting from a management science aspect, too. We had "revolutionary" ideas at those times. We had disagreements with the management regarding a particular reorganisation, and in the course of the dispute the owners of the company wanted to exert their power claiming that after all they were the "owners", and they were free to make decisions. It was true, of course. We claimed however, that they did not "own" us – who generated and managed businesses. Consultancy is an industry – as a university professor once said – in which the real assets go home every night and the owners can only hope that they would show up for work in the morning. This example shows that no one can actually 'own' a consultancy or rather the consultants working for a consultancy. When we started our company we decided to create a co-operative type of business model. It actually meant that anyone was welcomed to become a partner in our company who had at least 4 or 5 years of experience with their own clientele. First, we thought that all the consultants who work for us would get sooner or later an ownership status. This would have allowed a joint leadership and consequently a joint strategy formulation. It was an attractive idea but it failed because of some "hard rules" of capitalism. The first big decision came when we had to get a bank loan. Nowadays, banks don't lend money unless the owners provide joint and unconditional personal guarantee. It was surprising to see that only a few of us were ready to be guarantors. So, in terms of risk taking our 'co-operative business model' didn't prove to be a success...

I studied mathematical economics in the middle of the 1980s and for about 6 or 7 years I had worked as a research economist. Then in 1991 my colleague, Gábor Kornai encouraged me to become a consultant. As a consultant I'm primarily engaged in reorganisation of business processes, organisational development and implementing major IT systems. Today, in Hungary, majority of the consulting jobs are related to IT system developments. I was involved in many such projects despite the fact that I'm not an IT specialist. I'm a project manager specialised in IT projects so I know how to manage the individual phases of these projects, how to manage risks involved and how to get through these projects successfully. These projects are also packed with tasks related to business processes, organisation and the management of employees. The purpose of my very first project was to figure out how to teach a new IT system to 10,000 railwaymen. It shows that my job is much closer to management science than informatics.

Q: I would like to continue with some more theoretical questions. What would be your quick answers to the following question: what are the core competencies of a management consultant?

A: The most important competence I think is the ability to work with people, especially in highly stressful environment. Also, management consultants must know how to manage conflicts and how to identify real issues in difficult situations. They must be able to tell the difference between crisis and panic. And they must know how to push gently toward a positive outcome. I personally think, that the human factors play the most important role among the many competencies management consultants must have.

Q: What do you think is more important, a broad knowledge of a particular industry or knowing the functional areas of organisations?

A: Both are very important but knowing the industry is a little bit more emphatic because there are as many combinations of functional areas as organisations. I worked a lot in the banking industry in the last 15 years. Every one of these banks has organized its functional areas somewhat differently. But if you get to know a function in one particular industry very well, for example customer service or sales, then the know-how can be easily transferred to the context of other industries. We have focus areas too in which we worked in several different industries but still, if you work in an industry you have to know it.

Q: Do clients expect consultants to have a thorough knowledge of the industry?

A: Absolutely. You must be familiar with the basic facts of the industry. It is not expected from the consultant though to have company-specific information. There are specialists in the field of risk management for example who have been working in that field for 15 years. As expected I'm less of a specialist of that field simply because I have several focus areas besides risk management. Compared to them I have wider insights however into the industry that I've gained form working with many companies. Naturally, I see the world through a different lens.

Q: So, does it mean that if you don't have previous involvement with a particular industry you can't win a business?

A: No, it doesn't. You can always find business from other industries if the project is not too industry-specific. Let me give you an example. Recently, we've started to work at a shared service centre that provides services for a group of companies. I'm not sure whether it's common knowledge but shared service centres are one of the most prosperous businesses today. Several large international companies brought their shared service centres to Hungary. These

provide various services such as customer service, accounting services or collection etc. We started to work on business continuity planning at a shared service centre. It didn't require any specific knowledge on the industry itself but we certainly needed to know a lot about business continuity, customer service and the processes involved.

There are many different strategies consultants can use. There are consultants who can provide services in many different areas within a certain industry and there are consultants who are specialised in a specific area (e.g. IT security). Both strategies involve risks. We opted for a strategy that allows us to have a deep understanding of the industries we work in so that we can provide a wide variety of management consulting services.

Q: Theoretically, there are consultancy firms that offer services as companies and there are also individual consultants. Do you think this division of the consultancy industry reflects reality?

A: Yes, I do. The number of individual consultants has been growing in recent years. In itself it is not harmful for the industry but there are some drawbacks. There are many new entrants to our industry who previously worked at large companies and decided to become consultants. There is nothing wrong with it if that individual has the necessary skills and experience. It only becomes an issue when people who lost their job for some reason think to continue their career as consultants without having the basic skills or knowledge required by the profession. These people certainly have extensive knowledge about the areas they had worked in e.g. as middle managers at banks, telecommunication companies or at automobile manufacturing companies. This is however not enough to become a consultant. Their lack of knowledge about consultancy as a

profession can easily lead to a decrease in the level of quality, and foster bad opinion about the consultancy industry as such. Also, it often happens that the financially vulnerable new entrants drive prices down because their fixed costs are considerably lower than the consultancy firms'. They don't have to pay monthly wages or trainings for employees. Clients may think that an individual consultant costs less, however clients also should know that the quality of such work cannot be guaranteed. I have other concerns as well. As a result of the presence of many small or one-person consultancy firms training of junior consultants becomes almost impossible. I was lucky enough to have the opportunity to work at large companies where I have received proper training. In a company environment junior consultants have the opportunity to get appropriate work to learn on consultancy projects from senior consultants. Consultancy firm can provide consultants with both formal and on the job training. As we can see, our industry is becoming more fragmented and individual consultants outnumber firms which makes training of junior consultants more and more difficult. This is an underlying issue the consultancy market has to deal with sooner or later.

Q: Are there any new technologies in consultancy?

A: It depends on what we mean by technologies in consultancy. I think that consultancy is heading into different directions. Many try to follow the path of "automating consultancy". It means development of artificial intelligence type applications. Those developing such applications hope, that it can replace real life consultants in certain areas. A British consultant for example developed a software 10 years ago that contains over one hundred multiple-choice questions for the top management. Based on the answers provided the software generates a maturity model that shows the areas in which there is work to be done. The ambition of this software is to have a diagnosis of the company without a consultant. This software allows companies to monitor their improvements as well. Although companies liked this software I have to admit that it didn't become a success because companies nevertheless wanted a living consultant to be part of the process. All in all we can say that consultants are still irreplaceable.

Q: Do you mean that they have a unique role?

A: Yes. Not only unique but they also have a supportive role during the implementation phase of the project. Software can give suggestions of what a company should do but it cannot tell a company how to organise the suggestions into tasks or an action plan that actually works in a certain situation.

There are specific 'techniques' though which emphasise the human aspect of consultancy. Workshop techniques for example have improved a lot in recent years. There are well known methods how to develop a joint vision in an organisation with the involvement of hundreds of people.

Consultancy also has an area which is on its borderline and focuses entirely on the human aspect. In the last 10 years we can see a boom in executive coaching. The reason why there is huge demand for executive coaching roots in a well known phenomenon called executive loneliness. Those executives, who are on the very top of an organisation, find it hard to share their problems, dilemmas and doubts. This is where executive coaching helps which is very much in now and at the same time it is very much needed, too. The pitfalls of this specific area of consultancy is that many consultants assume that a few years of experience as a top manager provides enough background to become a coach. I've seen many consultants working as an executive coach who quitted their jobs as top managers and it was simply convenient for them to become a coach. I'm not suggesting that their executive background is unimportant what I'm suggesting is that other trainings are also needed to work as a coach for example some training in psychology. I'm not sure whether coaching can be defined as a 'technology' in consultancy but I'm absolutely sure that this particular area of consultancy is booming...

Q: Is data mining used in consultancy?

A: Data mining is a support tool. Companies develop databases for decades, - and we also help them in this. But it is still quite vague what these databases can be actually used for. There is no doubt that data mining is a booming area as well. And this is the area where consultancy meets science and innovation. Network analysis for example is an area of expertise which is essentially built on data mining. Organisational network analysis is aiming at mapping the informal relationships within an organisation. The findings of the analysis of informal relationships within organisations are used to improve cooperation, knowledge management and sales. Customer network analysis uses databases to study relationships between existing and potential customers. Telecommunication companies for example have databases for this purpose. Of course, when using databases, legal issues are critical. Individual rights are paramount when creating models from databases. Banks are similar to telecommunication companies because they also have open databases that can be used to make customer network models.
The bottom line is that data mining firms rely heavily on research results. They bring information and data whereas business consultants help companies interpret information. For example, business consultants can show companies how to apply the findings of database

analysis to build a successful sales campaign. Moreover, the methodology of how to build a successful sales campaign can also be established. This is our field of competence. I would say that data miners are technical specialists so usually they have very little contacts with companies. They mostly like to deal with data, and we consultants like to deal with people. They deal with data and rely on scientific research results and consultants rely on the work of data miners to provide companies with trustworthy advice.

Q: What are the trends in terms of techniques used in the global consultancy market including emerging markets as new competitors?

A: It is a difficult question. I've mentioned one trend already. In the last 20 years there has been a shift from consultancy firms defining the consultancy market to individual consultants. There are big consultancy firms today of course but there is also a large group of individual consultants. It is becoming more and more evident that we need to find an answer for the question of how these two can cooperate in the future.

Q: Is consultancy still an essentially American technology?

A: Not any more. There are dominant European consultancy firms and there are many international firms with not fully clear national background. I don't know for example what nationality is KPMG or PwC. Even if a consultancy firm has been originally established in the US – and many of the really big ones were – the way they are working in Europe or Hungary is more European or Hungarian than American. When I first started as a consultant 20 years ago my company, Andersen, had strong roots in the US. We had to participate in trainings in the US and basically the know-how and the methodology came from the US. Today, a similar company would give much more freedom to its subsidiaries and in fact locality is stronger than the directions given by the parent company. In Hungary, we can only give advice which is accepted and embraced by Hungarian companies. I suppose it works the same way in Italy or any other countries. There is another significant change that took place. Today, methodology is less important than earlier. 20 years ago a methodology and a few reasonable consultants were enough to win and to get through a major project. It is different now because more specific skills and expertise are needed and the role of new research areas has also increased. In addition, clients are better informed today and many consultants became top managers. There is a Hungarian bank where the majority of the top management had worked earlier as consultants.

Q: It is helpful for consultants if they can communicate effectively with the client.

A: It surely is. First of all, it is good if clients who previously worked as consultants know exactly what they can expect from a consultant. But it also indicates that there will be many challenges because the clients think that they know everything that we consultants know. So, usually these ex-consultant clients have higher expectations.

Q: Then why do they assign a consultant from outside the firm? Is it because they don't have enough time or is it because they have tunnel vision?

A: There are many reasons for that. They know exactly that from inside an organisation everyone develops tunnel vision after a while. This is also one of the reasons why top executives are rotated. Besides, they don't have enough time to push important changes through the organisation. This is a job much more appropriate for a consultant who is not attached to the organisation. It might also happen, that a specific set of skills is needed which is missing from inside. They might have read all the White Papers in the McKinsey Quarterly concerning the issue they are facing in the organisation but they need someone who can implement the contents of what they read. So, today we need to know much more than 15 years ago.

Q: Have consultants from Asia appeared in the consulting industry, yet?

A: Only in certain areas. Indian and Chinese IT development companies are more and more present on the market, and as a side offer they are providing some management consultancy as well. Some of these consultants are really exceptionally intelligent and knowledgeable, but cultural differences often cause problems. I've met some of these brilliant professionals from the best schools armed with the most cutting-edge methodological background who found it really hard to bridge the cultural gap between a Hungarian company and their company. Application development is less problematic from this point of view because data and mega-bytes are understood the same way anywhere. But as soon as we deal with people cultural issues come to the forefront. For now, I don't think Asian consultants are serious competitors. As I said earlier consulting is based on people's competencies and as a result it is culture-specific.
Q: Asian cultures are traditionally good at relationship management.

A: I agree. But they do not necessarily fully understand how a Hungarian counterpart, let's say a manager deals with information, risks, decision making, or crisis situations. In some

cases when the parties are able to develop a good cultural understanding they consultants are able to work very well with local clients, but these are exceptions.

Q: So, they can enter their own markets and become winners in a very short time.

A: On their own markets definitely yes. But as I said consultancy is strongly culture-dependent, so entering other markets is not so easy. This is by the way also valid the other way round. We know from personal experience that working in relatively not so distant countries like the Balkans may become strenuous.

Q: All right. We have already talked about the distinctive features of consultancy in Hungary and the region. Could you recap on that?

A: Our profession is fundamentally very similar in the United States, Western Europe or Asia. I did talk about the most important characteristics of consultancy. Large consultancy

firms have withdrawn from the market which has been flooded with small consultancy firms or individual consultants. In addition to that, it is worth mentioning that the private sector takes up less of our skills and expertise in recent years, basically since the economic crisis began. And it is also rather complex to get business in the public sector since almost all public consultancy projects are funded by the EU nowadays.

A Hungary-specific issue is the presence of 'anti-consultants' sentiments. In western countries this is an almost non-existent phenomenon, while in Hungary it comes up frequently and unfortunately with a political overtone. In such cases responsible-looking officials declare that consultants are corrupt money-makers and naturally it is also picked up by the media. But as I said it earlier the consultancy market is a bit overcrowded which makes it less transparent. There is a colourful palette of consultancy activities and some companies draw up invoices labelling their business activities as consultancy which I don't consider that.

Q: The Taxation Office doesn't like consultants.

A: I don't agree. The Taxation Office does like the huge amount of money consultants pay in taxes. It is rare that companies employ a consultant illegally. What the Taxation Office finds more difficult I think is to figure out what the nature of our work is. The company registry for example is lagging behind with the classification of consultancy. It wasn't long ago when sorghum broom making and sweeping broom making were still grouped separately yet there is still only one NACE number for business consultancy.

Q: Are there consultants who chose their profession out of necessity?

A: Yes, there are. They are those, who lost their job and for the lack of a better opportunity they started to work as consultants. I don't think it is a problem but everyone needs to see it very clearly that they are not management consultants. They are quite effective in various fields of expertise. But they are not consultants.

Q: Finally, I would like to ask you about your thoughts on the medium-term outlook of consultancy in Hungary. Do you think consultancy is a lucrative business opportunity today?

A: I have to give you an optimistic answer for this question mainly because I'm a consultant myself. I think that the consultancy market is receptive to changes resulting from the boom-

bust cycles of the economy. It used to be the idea that companies need consultants in good times and bad times. When the economy is expanding companies need consultants for development projects and when the economy is shrinking companies need consultants to cut costs…As a matter of fact this is simply not true. When recession has hit the economy Hungarian companies instantly reacted with full-scale cost cutting and then hibernate. They didn't need consultants for that. After the recession started to be felt or when the banking sector and the telecommunication sector was hit really hard by unexpected and strict government measures these companies had no choice but to cut back on developmental projects including consultancy services. I tend to think that if one day Hungary steps on the road to recovery consultancy will become a lucrative business. The improving macroeconomic indicators of the last few quarters are not yet felt in everyday business life. But as I said once the economy picks up consultants will be in demand. One of the reasons for this is that there are many industries which neglected organisational development for years. There are companies with 5 or 6- year-old technologies and business processes and they must catch up. As a macroeconomist I know it too well that recession often ends when it becomes impossible to further delay the replacement of depreciated assets and that is the moment when the economy starts to recover. The consultancy market will also pick up when companies cannot further delay developmental projects. Consultancy is needed because there were and there will be certain challenges in management which can only be tackled from outside the organisation. In the long-term I'm truly optimistic.

In the short and medium-run – unless the economy will start real recovery, those consultants working in the private sector will have to wait. At the same time, as long as projects are continued to be funded by the EU, consultants will be needed in the public sector. However this is not an easy area, even if most of these projects are really badly needed. It is not easy to see clearly through the decision making mechanisms and the different interest groups. Although there always will be new consultancies rapidly coming from nowhere and also rapidly disappearing to thin air, but ultimately, the future of management consulting industry rest on those consultancy firms that endure through time. In short, I would be cautiously optimistic in the medium-run but I do believe in a bright future for the consultancy industry in the long-run.

Q: Thank you very much for the interview.

A: It was my pleasure.

Csaba Hegedűs

RISK-BASED CONSIDERATION OF MEASUREMENT UNCERTAINTY IN DECISIONS

The aim of this study is the revision of conformity and process control techniques and the development of a new method for the design of control procedures and charts. The novelty of the proposed method comes from taking measurement uncertainty and decision risk into account in order to fit the appropriate control procedure to the observed process.

Introduction

Investigation, estimation and handling of risks became necessary tasks of business processes. Risk evaluation processes arise as new standards in several branches of industry or become part of existing ones; for instance, the FMEA in the automotive or micro electric area, the HAZOP in the chemical industry, the HACCP for the foods and PSA/PRA in nuclear power plants (Kovács & Pató Gáborné Szűcs, 2006). However, the treatment of risks is not applied in conformity assessment and control, these methods work only on the reliability base. Decisions based only on the confidence interval and probability of errors lag behind methods employing the consideration of consequences into the decision criteria, too. To minimize the risks a new quality/conformity control approach is proposed with the evaluation of the measurement and sampling uncertainty and modification of decision rules.

Most of the conformity or process controlling decisions are based on measurement results. However, these measurement results have uncertainty that can induce decision errors. Conformity assessment and evaluation of measurement uncertainty are separately handled tasks in everyday practice. In most cases the estimation of measurement uncertainty is only used to choose the adequate measuring equipment and method for a particular assessment job. Previous researches (e.g. Carbone et al., 2003; Ellison & Williams, 2007) treat this problem only from metrology aspects. In this study measurement uncertainty is considered as part of a risk based decision problem in the cases of continuous conformity control, sampling for process control, and forecasting.

Measurement uncertainty

The International Organization for Standardization (ISO) issued a guide (BIPM, et al., 1993) 20 years ago that defines measurement uncertainty as a "parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand" (BIPM, et al., 1993, p. 3). Measurement uncertainty is characterized with the σ_m standard deviation of measured values (and called standard uncertainty or combined standard uncertainty) or with an interval that has a $k\sigma_m$ radius (and called expanded uncertainty) according to the Guide to the Expression of Uncertainty in Measurement (GUM). In the last 20 years, since the first issue of GUM expanded uncertainty came into general use in the practice of measuring laboratories, but measurement uncertainty handling methods have not reached a wide audience outside these laboratories.

The guides and industrial standards – (CENELEC, 1997; Ellison & Williams, 2007; IEC CISPR, 1997; ILAC, 2009; ISO, 1998) – specify the coverage factor values on a reliability base and the length of the interval is often calculated with k=2 coverage factor value. The normal probability distribution is also assumed for the dispersion of the measurement results. The expanded uncertainty interval contains more than 95% of the observations if the distribution is Gaussian, however in any other case the confidence level of the decision is under or over-estimated (Vilbaste et al., 2010). Therefore decisions should consider the whole probability distribution of measurement uncertainty instead of standard deviation or its multiplication with the coverage factor k (Rossi & Crenna, 2006). Transition from the reliability centred conceptualization to the risk based approach is also required.

The decision risk arising from the measurement uncertainty can be mitigated in two ways, with the reduction of the uncertainty (Kosztyán et al., 2010) or taking this uncertainty into account and modifying the decision rules.

Following the GUM many studies (Carbone et al., 2003; Pendrill, 2006; Cox et al., 2008) discussed this problem from a metrological aspect, focusing on the measuring instrument and calibration, and some dealt with the conformity decisions based on the measurement results (Forbes, 2006; Pendrill, 2008). Beges et al. (2010) specified the range of target uncertainty that minimize the total cost from inspection and decision errors. The focus of that research is on the selection of an appropriate measurement method and instrumentation. There was no solution to implement the measurement uncertainty handling in statistical control chart applications.

Consideration of measurement uncertainty in conformance assessment

This section deals with three main area of the conformity control. The first subsection introduces the consideration of measurement uncertainty and decision risk in complete conformity control when all the products are inspected. This method is extended in the second subsection to support the statistical process control, when decisions are based on sampling. To further enhance the consideration of uncertainties and risks in the third subsection the inherent relationship of the consecutive samples are taken into account in order to forecast the next values.

Revision of complete conformity control

In conformity control the measured value is compared to one or two acceptance limits. If the measured value is within the acceptance region the product considered conforming, if it is outside the region the product considered non-conforming and will be rejected. The acceptance limits can be some technical specification limits or stricter control limits. Because of the measurement uncertainty the measurement result y and the actual value of the observed characteristic x differ from each other.

The decision on the conformity of a product based on $y=x+m$ measured value as a sum of the real value and measurement error m but the conformity of the product is influenced by the relation of the actual value x to the upper (USL) and lower (LSL) specification limits. This twoness results in (at least) four different outcomes of the decision (Table 1): correct acceptance, correct rejection and two types of decision errors. In case of decision error type I the actually conforming product is considered non-conforming based on the measured values and rejected superfluously. Decision error type II is made when the measurement uncertainty conceals the non-conformity and the process revision or product rejection fails.

To each outcome r_{ij} proportional revenues and c_{ij} proportional costs are assigned and π_{ij} proportional profits of the decision outcomes are calculated as their difference $(r_{ij}-c_{ij})$.

		Decision	
		Accept (j=1)	**Reject (j=0)**
Fact	**Conforming (i=1)**	$\pi_{11}=r_{11}-c_{11}$ Correct acceptance	$\pi_{10}=r_{10}-c_{10}$ Superfluous rejection
	Non-conforming (i=0)	$\pi_{01}=r_{01}-c_{01}$ Incorrect acceptance	$\pi_{00}=r_{00}-c_{00}$ Correct rejection

Table 1. Particular profits of the four decision outcomes
Source: (Hegedűs, 2014a)

To maximize the expected profit the specification limits, which work as acceptance limits in case of total inspection, are modified with K_L and K_U correction components. The measured value y is compared to the new LSL+K_L lower and USL-K_U upper acceptance limits. If the measured value is between the new limits (LSL+$K_L \le y \le$ USL-K_U) the product is accepted otherwise rejected (Figure 1). This approach allows us to define different intervals for each limit to handle asymmetric distributions. Correction component values are determined to minimize the expected profit depending on them.

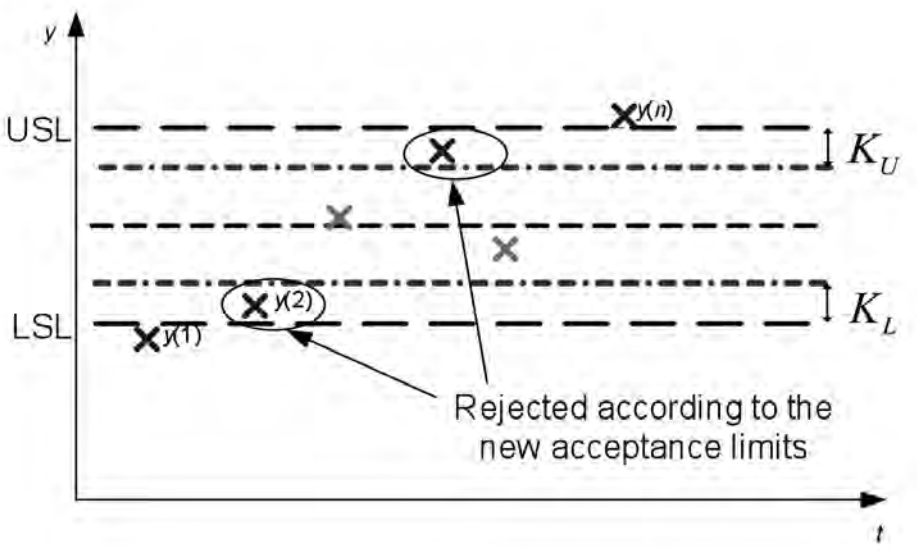


Figure 1. Risk-based modification of acceptance limits
Source: (Hegedűs, 2014b)

Let $\Pi(K_L,K_U)=p_{11}(K_L,K_U)\pi_{11}+p_{10}(K_L,K_U)\pi_{10}+p_{00}(K_L,K_U)\pi_{00}+p_{01}(K_L,K_U)\pi_{01}$ be the expected profit of the decision as a function of K_L and K_U, where $p_{ij}(K_L,K_U)$ is the probability of the outcome *ij* affected by the correction components.

To calculate the probability of outcomes the following Process – Uncertainty of measurement diagram (PU-diagram) have been created (Figure 2). The left side of Figure 2 depicts the four outcomes of Table 1, the black parallelogram in the middle represents the correct acceptance (the values of x and y are within the specified limits). The cases of decision error type II are presented on the left and the right of this parallelogram ($LSL \le y \le USL$ and $x \le LSL$ or $USL \le x$). Above and below the parallelogram the cases of decision error type I are presented. The unmarked fields belong to the fourth case, the case of correct (required and performed) revision or control. The probability of an outcome is calculated as the volume bounded by the corresponding area on the diagram and the two dimensional probability density function above it.

If K_L and K_U correction factors are positive the acceptance zone is tightened, the negative value of the correction factors means the relaxation of the acceptance region. By weighting the profits (or loss) of decision outcomes with the value of occurrence probability, the expected profit maximizing objective function can be formulated as the following equation:

$$\Pi(K_L,K_U)=\Pi(0,0)+\Delta\Pi(K_L,K_U)\rightarrow \max \qquad (1)$$

The $\Pi(0,0)$ is the expected profit without correction ($K_L=K_U=0$), $\Delta\Pi(K_L,K_U)$ is the alteration of the expected profit as a function of K_L and K_U. It is sufficient to maximize $\Delta\Pi(K_L,K_U)$ profit alteration in order to maximize $\Pi(K_L,K_U)$ expected profit.

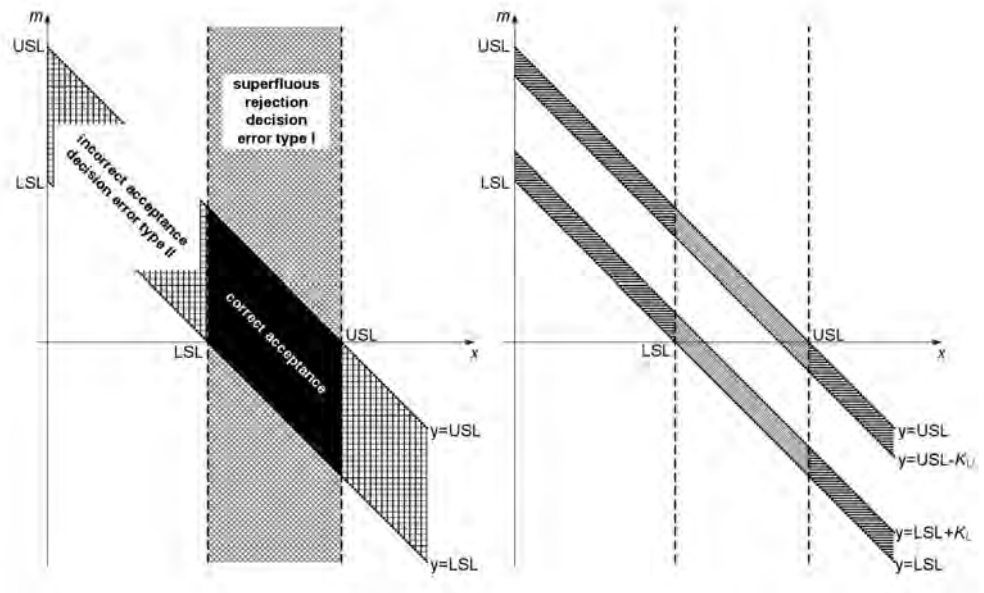


Figure 2. The regions of the four cases of decision outcomes (on the left side) and the regions affected by the alteration of acceptance limits
Source: (Hegedűs, 2014a)

In some simple cases the optimal values of correction components can be determined analytically, in the others numerical methods or simulations are required.

Simulations have been carried out to compare the typical cases (Table 2): when the measurement uncertainty is not taken into account (K=0), the acceptance region is tightened (K=2σ_m) or relaxed (K= –2σ_m) with the interval that the industrial standards suggest. Let the q denote the ratio between the proportional losses of the decision errors calculated with the following formula:

$$q = \frac{\pi_{11} - \pi_{10}}{(\pi_{11} - \pi_{10}) + (\pi_{00} - \pi_{01})} \quad q \in]0,1[\qquad (2)$$

The q=0.5 indicates the equality of proportional losses of the two kinds of decision errors if the cost of decision errors are compared to the cost/profit of correct decision. The higher values of q show that the proportional loss of a decision error type I is higher than the proportional loss of the other kind of decision error. The lower values indicate the dominancy of proportional loss from decision error type II.

In Table 2 the proportional profits (or losses) associated with these cases are compared to the proportional profit gained with the optimal correction (K=K_{opt}). In the first three columns are the profits/losses connected to the typical cases. The highest value from these three is marked with bold and underlined type-face. This shows which typical solution is worth to use for each value of q in this illustrative setting [$x \sim N(\mu_x=105, \sigma_x=4)$, $m \sim N(\mu_m=0, \sigma_m=2)$, LSL=100]. According to these results the "guard band" calculated only from the (combined) standard uncertainty is not the best solution for every cases, its width varies with change of q. The maximal profit is in the fourth column and the corresponding optimal extent of correction is shown in the last column. Consequently the value of K_{opt} is not only dependent on the measurement uncertainty the costs and revenues of the decision outcomes should also be taken into account.

q	Proportional profit/loss				K_{opt}
	K=-2σ_m	K=0	K=2σ_m	K=K_{opt}	
0,05	-10,5472	2,5184	**4,9113**	5,6933	2,4280
0,10	-0,4061	5,4685	**4,9865**	6,3438	1,6156
0,15	2,9743	**6,4519**	5,0115	6,7386	1,0675
0,20	4,6644	**6,9436**	5,0240	7,0247	0,6319
0,25	5,6785	**7,2386**	5,0316	7,2500	0,2582
0,30	6,3546	**7,4353**	5,0366	7,4362	-0,0774
0,35	6,8375	**7,5758**	5,0401	7,5951	-0,3884
0,40	7,1997	**7,6812**	5,0428	7,7339	-0,6835
0,45	7,4814	**7,7631**	5,0449	7,8572	-0,9690
0,50	7,7068	**7,8287**	5,0466	7,9683	-1,2500
0,55	**7,8911**	7,8823	5,0480	8,0695	-1,5310
0,60	**8,0448**	7,9270	5,0491	8,1625	-1,8165
0,65	**8,1748**	7,9648	5,0501	8,2487	-2,1116
0,70	**8,2862**	7,9972	5,0509	8,3291	-2,4226
0,75	**8,3828**	8,0253	5,0516	8,4046	-2,7582
0,80	**8,4673**	8,0499	5,0522	8,4758	-3,1319
0,85	**8,5419**	8,0716	5,0528	8,5435	-3,5675
0,90	**8,6082**	8,0909	5,0533	8,6083	-4,1156
0,95	**8,6675**	8,1081	5,0537	8,6707	-4,9280

Table 2. The proportional profit or loss as a function of K and q
(μ_x=105, σ_x=4, μ_m=0, σ_m=2, LSL=100)
Source: (Hegedűs, 2014a)

To inspect the relationship between the total profit and the relative distance of the process mean from the acceptance limit a new simulation have been done. On Figure 3 the original total profit $\Pi(0)$ is represented by the grey surface and the total profit associated with the acceptance limit modification $\Pi(K)$ is depicted as black surface. The white dashed line belongs to $\Pi(K=-2\sigma_m)$, the total profit from the relaxation of the acceptance region according

to the industrial standards. The solid white line marks the maximal total profit that results from the optimal correction of acceptance limit.

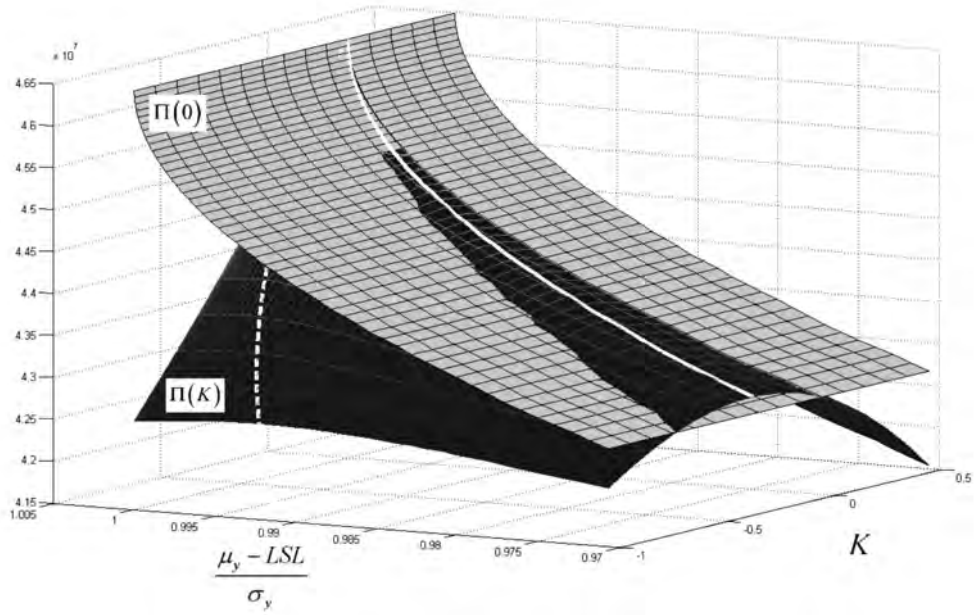


Figure 3. The profit depending on the correction component [$\Pi(K)$] compared to the original profit [$\Pi(0)$] as functions of relative distance of the process mean from the lower bound
Source: (Hegedűs & Kosztyán, 2011)

Consideration of uncertainties in the use of variable control charts

If the conformity of a population is determined in accordance with the results estimated from a sample, e.g. in acceptance sampling and statistical process control (SPC), the uncertainty of estimation also has to be considered beside the measurement uncertainty.

On the control charts of the statistical process control (SPC) the measured values are compared to calculated control limits instead of the specification limits. Falling outside these control limits does not mean the non-conformity of the product (or process) just indicate the necessity of process control or revision. In the SPC the process is said to be in control if

the probability of next values falling into a given interval can be determined on the basis of previous observations (Shewhart, 1931) (Montgomery, 1996). The use and analysis of control charts is practically a hypothesis test (Neyman & Pearson, 1933), the null hypothesis assumes that the current process is the same (has the same probability distribution and parameters) as the previously investigated and considered in control.

The probability distribution of the observed value is assumed to be normal (Gaussian) for the specification of the control chart limits, but this assumption is not true in every case (Schippers, 1998). If the sample size falls below 4 or an individual value chart is applied, the non-normality could increase the decision errors significantly (particularly type I errors) (Schilling & Nelson, 1976).

If there is an asymmetry in the probability density function of the observed variable a greater skewness can cause significant bias from the normality of the sample mean even with sample size of 5-10, according to the Berry–Esseen inequality (Esseen, 1956) and calculation of Shevtsova (2011). Similarly the assumption of normal distribution is incorrect and misleading when the expected value of the observed characteristic is near to zero but the set of negative values is not part of the domain, e.g. measuring weight or concentration.

The deviation from the assumed ratio of decision errors causes great problems if one of the decision errors has significantly more severe consequences than the other. This difference of the decision error consequences is not reflected in the rules that are assuming Gaussian distribution of the observed characteristic and based on a reliability centred approach.

According to Albers et al. (2006) if the observed values cannot be considered to follow normal distribution then not the distribution that has the best value on the standard goodness of fit test will necessarily be the best for the calculation or simulation. The standard goodness of fit test concentrates on the middle of the distribution (the surrounding of mode and/or median) not on the tails. Since the majority of the points fall near to the middle of the distribution these points will determine the "goodness of fit". The conformity control deals with the instances that are near the bound or outside of the acceptance region and these instances are typically on the tails of the distributions. Therefore a new test of fit or a new objection function that takes the consequences of the decision is required.

Optimal modification of control limits

Let the probability density function of x real values be $f(x)$, and the probability density function of m measurement error be $g(m)$. These two distributions are assumed to be independent of each other, and the common distribution is calculated as their multiplication.

Simulations have been run to determine the optimal alteration of control limits. The probability distribution of measured values (and its parameters) can be determined from the initial inspections. The measurement uncertainty can be obtained from the calibrations, previous experience and the documentation of measuring system analyses. The x real values are estimated as the difference of y measured values and m measurement error. The probability distribution of x real values (and its parameters) comes from the deconvolution of distribution of y measured values using the knowledge about the probability distribution (and its parameters) of measurement uncertainty.

During the simulation the same structure of proportional profits can be used with a minor change in the interpretation: the non-conformance of the process not means the non-conformance of the product but the necessity of control actions, therefore the costs are associated with these control actions not with the rejection of the product. The $\Sigma\Pi$ total profit in reference to decisions can be calculated in the simulation:

$$\sum \Pi = q_{11} \cdot \pi_{11} + q_{10} \cdot \pi_{10} + q_{01} \cdot \pi_{01} + q_{00} \cdot \pi_{00} \tag{3}$$

The q_{ij} number of elements belongs to certain cases calculated in the simulation. To maximize the expected profit let the decision rules be modified. The value of correction factors are calculated in the simulation. These correction factors are not coefficients; they give directly the extent of the alteration of specification limits. If the risk of decision error type II is low the value of correction factor can be negative. In this case the control limits do not become stricter rather wider. The Monte Carlo simulation searches the value of K_{L} and K_{U} that determine the maximum of total profit in reference to decisions.

$$\begin{aligned}\sum \Pi(K_L, K_U) = {} & q_{11}(K_L, K_U) \cdot \pi_{11} + q_{10}(K_L, K_U) \cdot \pi_{10} + \\ & + q_{01}(K_L, K_U) \cdot \pi_{01} + q_{00}(K_L, K_U) \cdot \pi_{00} \rightarrow \max\end{aligned} \tag{4}$$

Practical example to the modification of SPC charts

At a supplier in the automotive industry the housing of the fuel pump is manufactured by injection moulding. The diameter of the flanged top cover of this housing is a critical parameter because it affects the ability to assemble the fuel delivery system into the tank. To

assure the proper nesting and sealing the diameter must be 121 millimetres and the maximal deviation from this target value should not exceed 0.2 millimetres. The conformity of this parameter is controlled with x-bar (sample mean) chart and sample size of 3.

The observed value follows a Weibull distribution with α= 121.018 scale parameter and β=1,659.907 shape parameter. The measurement uncertainty can be described with normal distribution with μ_m= 0 mean and σ_m= 0.038 standard deviation.

In the following steps of the manufacturing the flanged top is welded to the other part of the housing that contains the fuel pump. If a non-conforming flanged top is accepted and assembled additional costs appear from the destructive disassembling of the housing and re-gaining of the fuel pump. Since the capability of the process is low (c_{pk}= 0.704) these extra costs are calculated in addition to the manufacturing cost (π_{01}= −19.31) if decision error type II is committed and the necessary control fails to be carried out. If the control chart incorrectly shows that the process is out of control we face with the π_{10}= −1.492 loss. The two correct decisions come with π_{00}= −1.864 loss and π_{11}=0.372 profit.

The use of the x-bar chart have been investigated in case of three different sample sizes – 3, 5 and 7 – and compared to the Gaussian distribution with the same mean and standard deviation (Table 3). In all the six cases the initial control limits are defined according to the general chart design rules ($\pm 3\sigma$ from the centre line). The correction components tightened the acceptance interval in every case, and the extent of the modification not exceeds the σ_m standard deviation that describes the measurement uncertainty.

Probability distribution	Sample size	LCL	$K_{L,opt}$	LCL_{opt}	UCL	$K_{U,opt}$	UCL_{opt}
Weibull	**3**	120.8751	0.0125	120.8876	121.0769	0.0225	121.0544
	5	120.9155	0.0175	120.9330	121.9155	0.0175	121.898
	7	120.9328	0.015	120.9478	121.0192	0.015	121.0042
Gaussian	**3**	120.8867	0.02	120.9067	121.0733	0.02	121.0533
	5	120.924	0.0175	120.9415	121.036	0.0175	121.0185
	7	120.94	0.015	120.9550	121.0199	0.15	120.8699

Table 3. Control limits for variables following Weibull and Gaussian distribution
Source: (Hegedűs, 2014a)

If the sample size is small we get different optimal upper ($K_{U,opt}$) and lower ($K_{L,opt}$) correction components for the two distributions (Table 3) because of the differences on the tails of these distributions (Figure 4).

The skewness of the Weibull distribution of the observed parameter is -0.9043 (Figure 5). If the sample mean is investigated the skewness decreases with the increase of the sample size, it equals to -0.5218 for the chart points calculated from three value (n=3), it is -0.4029 for n=5 and -0.3414 for samples with seven elements (see Figure 6).

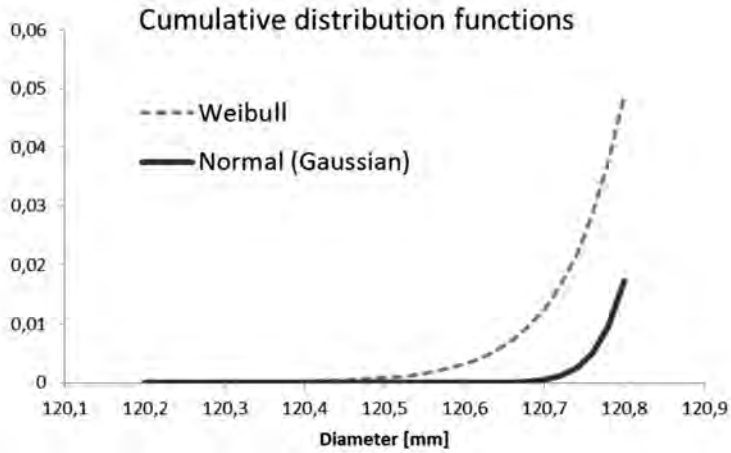


Figure 4. The left tails of the cumulative distribution functions

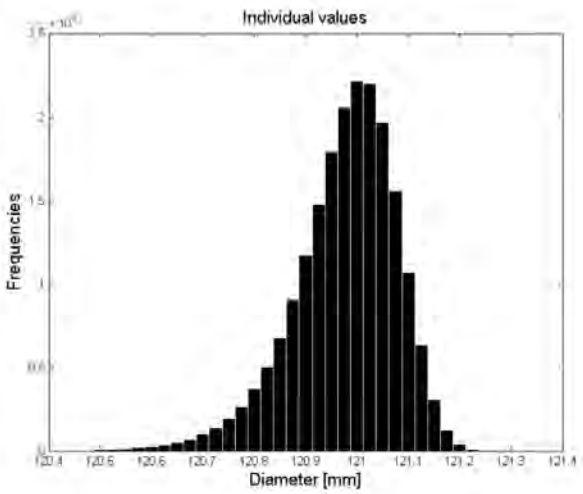


Figure 5. The skewness of the Weibull (α=121.018, β=1659.907) distribution
Source: (Hegedűs, 2014a)

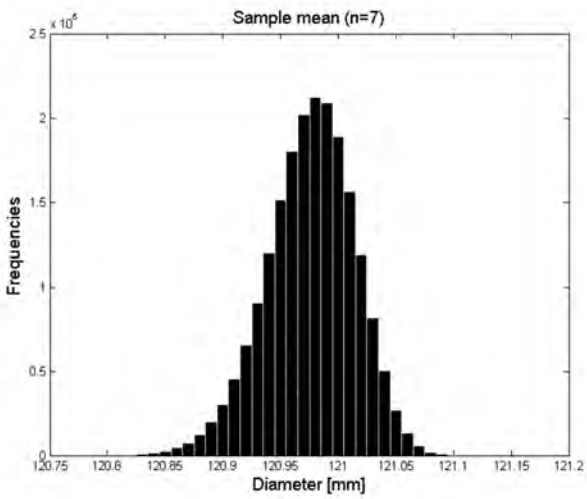


Figure 6. The skewness for samples of seven elements
Source: (Hegedűs, 2014a)

Two million samples in Monte Carlo simulation are not enough to detect significant difference in the sample means outside the control limits. Therefore in this example normal distribution can be used instead of Weibull if just ppm (defective part per million) quality level required and the sample size is at least five.

Since the loss of decision error type II is much higher than the loss of decision error type I the correction of the control limits spares the 36.79 percent of the control cost. This spared control cost is 0.856 percent of the total manufacturing cost of the product and ensue from the change of the modification of decision outcome probabilities.

The investigated process is in the in-control-state in the 83 percent of the time and handled by the x-bar chart (n=5) as statistically controlled in 77.99 percent of the two million cases (Table 4). That means the ratio of decision error type I is five percent and the ratio of decision error type II is also high (4.7 percent).

To find the balance of the four cases that provide the maximal profit or minimal cost the control decisions must be modified by the alteration of the control chart limits. Monte Carlo simulations have been carried out to specify the optimal value of K_{L} and K_{U} correction components.

	Acceptance		Revision		Sum
	cases	percent	cases	percent	
In-control	1,559,895	77.99%	100,028	5.00%	1,659,923 83.00%
Out-of-control	93,937	4.70%	246,140	12.31%	340,077 17.00%
Sum	1,653,832	82.69%	346,168	17.31%	2,000,000 100.00%

Table 4. Initial cases of the conformity control of flanged top
Source: (Hegedűs, 2014a)

The alteration of control chart limits modifies only the decisions thus the sum of each column. Since leaving the process in a state of out-of-control results the higher cost the optimisation going to decrease the ratio of these instances.

	Acceptance		Revision		Sum
	cases	percent	cases	percent	
In-control	1,295,340	64.77%	364,583	18.23%	1,659,923 83,00%
Out-of-control	23,160	1.16%	316,917	15.85%	340,077 17,00%
Sum	1,653,832	65.93%	346,168	34.08%	2,000,000 100.00%

Table 5. Ratio of the cases after the modification of control chart
Source: (Hegedűs, 2014a)

Due to the optimisation the number and ratio of process revisions will grow from 17.31 percent to 34.08 percent. The consequence of the more frequent revision is the increase in the ratio of type I errors but it also decrease the ratio of decision error type II with more than 75 percent. Thus the control is overdone because of the low process capability.

Considering uncertainties and risks in forecasting

To improve the conformity control we can take advantage of the inherent relationship of the consecutive measurement results. If this relationship can be described by a stochastic process the next values can be predicted. With the previously introduced correction of acceptance limits and the confidence intervals of the prediction the next time when measurement needs to be performed can be determined at a given level of risk (Figure 7).

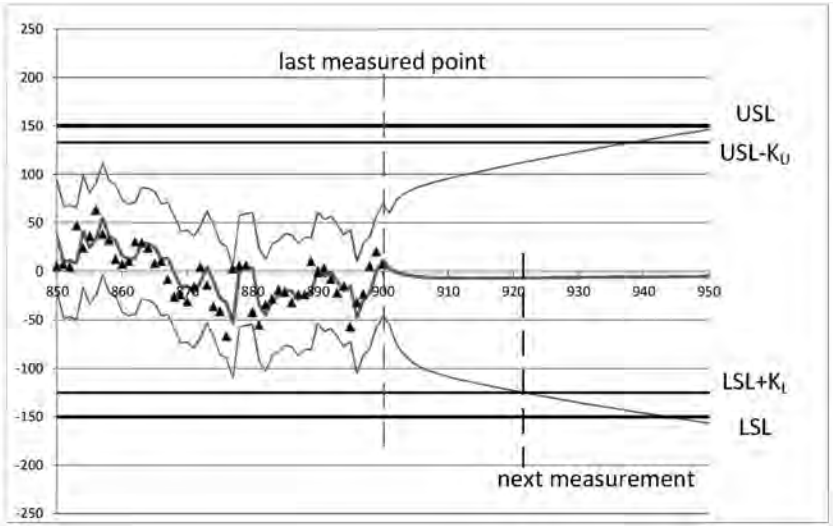


Figure 7. Forecasting between the modified acceptance limits with stochastic processes
Source: (Hegedűs, 2014a)

More suitable to handle the process as a time series particularly in maintenance decisions if deterioration occurs and the process of the observed characteristic of the device has a trend. In order to treat the time series of the observed characteristic with linear stochastic models the time series must be decomposed. The trend shows the expected value of the characteristic. The uncertainty of this forecast derived from the random variation of real value, the frequency of sampling, the sample size and the time interval of the forecast. If the intervals between the samplings are equal the width of the confidence interval of the trend is constant. The lower and upper bound of confidence interval parallel to the trend (Figure 8).

At a given confidence level the width of confidence interval can be decreased if the sampling frequency is increased when the trend comes closer to the LSL (Figure 9). Increasing the frequency of sampling, the length of the confidence interval of forecasting will decrease. The length of the confidence interval (for a given significance level α) can be calculated as follows:

$$INT_{1-\alpha} = \bar{y} \pm t_{1-\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} \cdot \sqrt{1 - \frac{n}{N}} \tag{4}$$

where n is the size of the sample, N is the number of the elements of the whole population, σ is the uncertainty expressed as a standard deviation and t is the value of Student-t distribution that belongs to the confidence level of 1-α/2.

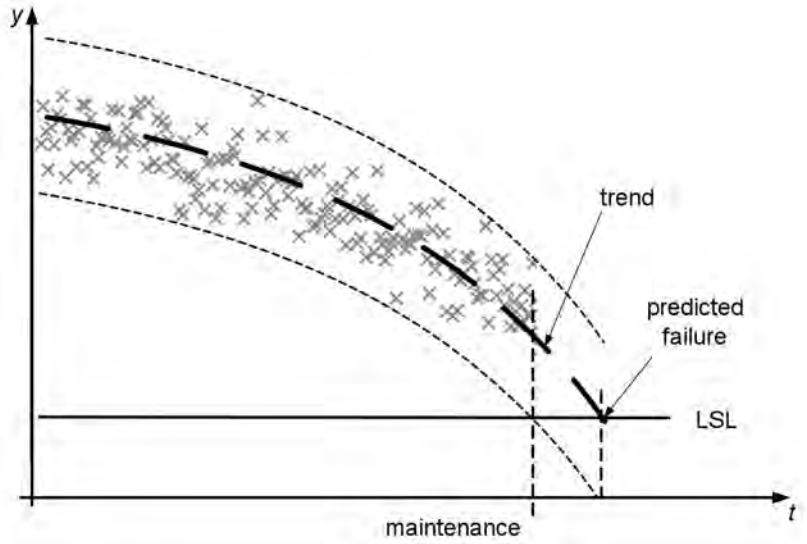


Figure 8. Confidence interval around the measured process
Source: (Hegedűs & Kosztyán, 2011)

After the decomposition we identify the stochastic process best fitting to the real process. Once we have identified a particular model we need to estimate the parameters and assess how well the model fits. After the validation of the stochastic model it can be used for

forecasting. This model predicts the next value on the basis of actual and previous values of real process and prediction error. The further we try to forecast the higher the uncertainty will be (see Figure 10).

The optimal control limit can be determined by simulation or estimation with the methods shown in previous sections. This limit is not a constant as it changes with the time. At the time of the initial measurements the risk of decision error type II is low, because the observed characteristic is far from the LSL (see Figure 10). This risk is increasing because of the deterioration. The risk of decision error type I is also increasing but at a slower rate than the risk of decision error type II. So the curve of minimal total risk will increase.

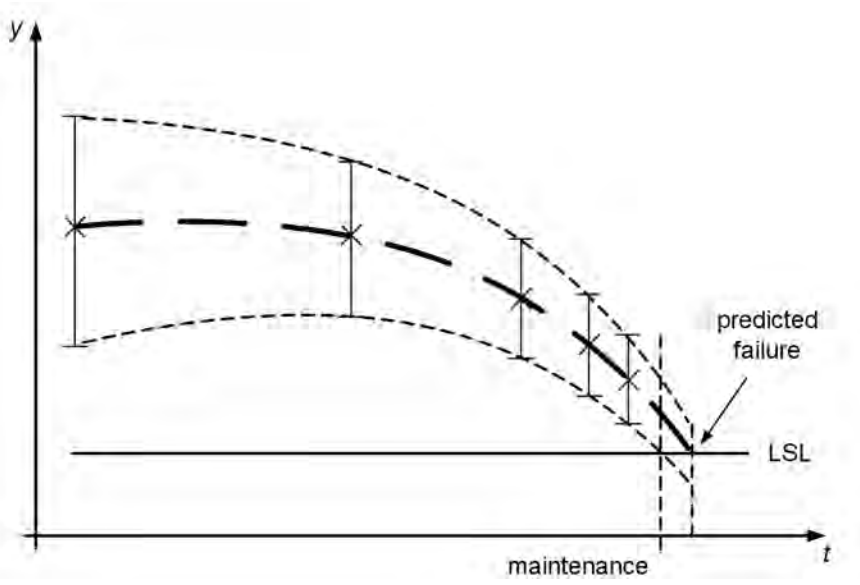


Figure 9. Approximating the level of device failure measurements are taken more frequently to reduce the confidence interval of prediction

Source: (Hegedűs & Kosztyán, 2011)

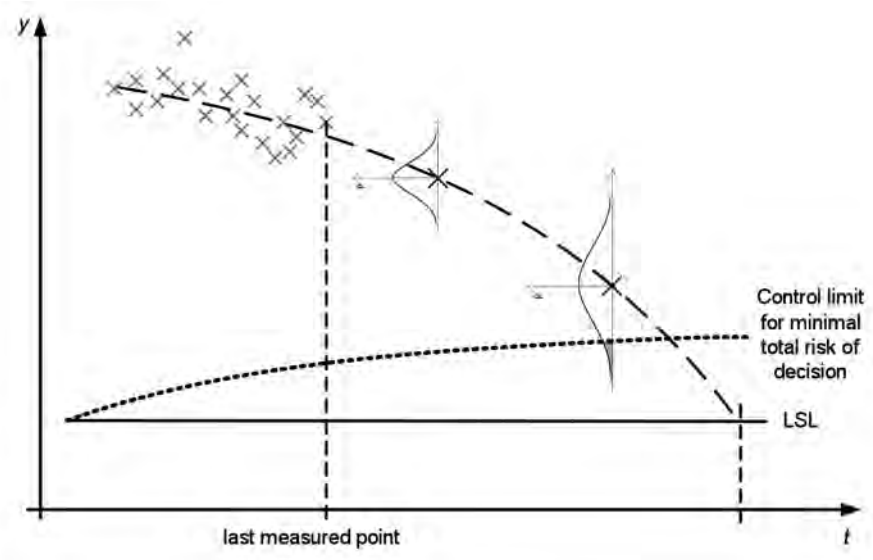


Figure 10. Also the control limits and the confidence interval of the prediction change with the time
Source: (Hegedűs & Kosztyán, 2011)

If the trend of the deterioration and the stochastic model that describes the stationary process are combined the time of the measurements can be determined.

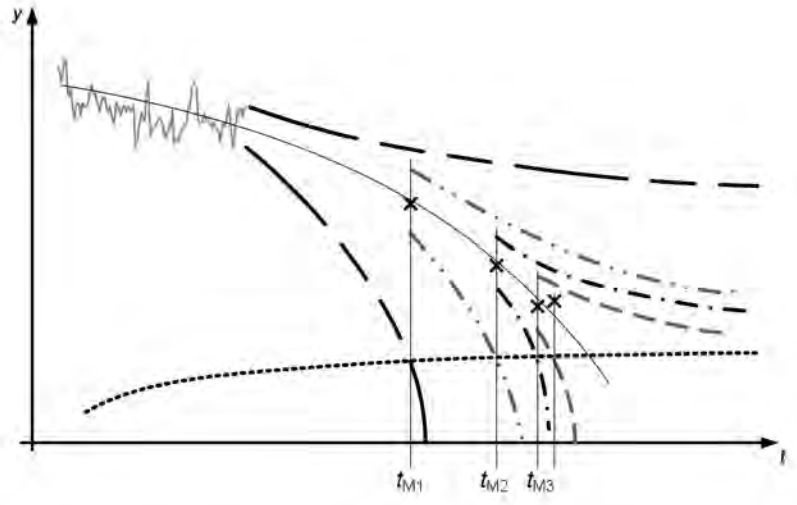


Figure 11. The intersection of prediction confidence intervals and the control limit determine the next time of measurement or maintenance
Source: (Hegedűs & Kosztyán, 2011)

The following measurement must be performed there, where the confidence interval of prediction intersects the curve of minimal total risk (t_{M1}) (see Figure 11). Until this point failure will not occur in the process with the confidence level of forecast. With the new measurement result the decomposition, identification, estimation of parameters and forecast will be executed again. These steps are performed iteratively (t_{M2}, t_{M3}) until the interval between intersection of the confidence interval and the curve of minimal total cost and the intersection of the confidence interval of the trend and the curve of minimal total risk is inessential. At this point maintenance is required as opposed to measurement.

Summary

The industrial conformity assessment or process controlling decisions are simplified to ease the understanding and the everyday work. However, the assumptions and requirements of the used methods are not true for all the case. Due to the computer aided decisions support these simplifications and presuppositions are no longer required and new, more precise methods are available to the managers and operators.

In this paper simulation methods are introduced to reduce the risk from uncertainty of measurement and estimation. These methods no longer require the normality of a process, the deviation from the Gaussian distribution can be handled with the modification of the acceptance limit. The focus of the optimisation is on the decision consequences, the decision rules are modified to decrease the risk of the conformity control. The possible outcomes of a decision are taken into account and costs and revenues are associated with them.

The preventive maintenance decisions are based on measurement results, but these results have an uncertainty and cause incorrect decisions. It is necessary to take into account this uncertainty on a risk base. In this paper a uniform model was presented that treats the customer's risk along with the producer's risk through the consideration of the measurement uncertainty and costs or losses in reference to maintenance decisions. This model gives the optimal control limit of the process that minimizes the total risk associated with the decisions and maximizes the related profits. It can treat both kinds of the processes that have either only one or two specification limits. The optimal control limit influenced by the risks can be determined by Monte Carlo simulation.

The methods introduced here require the user to describe the uncertainty of measurement and the process of the observed characteristics with a probability function, and the cost and revenues should be determined correctly. This means that the managers need to know profoundly the technical and economic attributes of these processes.

References

Albers, W., Kallenberg, W. C., & Nurdiati, S. (2006). Data driven choice of control charts. *Journal of Statistical Planning and Inference, 136*, 909–941.

Beges, G., Drnovsek, J., & Pendrill, L. R. (2010). Optimising calibration and measurement capabilities in terms of economics in conformity assessment. *Accreditation and Quality Assurance, 15*, 147-154. doi:10.1007/s00769-009-0599-3

BIPM, IEC, IFCC, ISO, IUPAP, & OIML. (1993). Guide to the Expression of Uncertainty in Measurement. Geneva, Switzerland: International Organisation for Standardisation.

Carbone, P., Macii, D., & Petri, D. (2003). Measurement uncertainty and metrological confirmation in quality-oriented organizations. *Measurement, 34*, 263–271.

CENELEC. (1997). *Standard for the evaluation of measurement results taking measurement uncertainty into account.* Brussels: CENELEC.

Cox, M. G., Rossi, G. B., Harris, P. M., & Forbes, A. (2008). A probabilistic approach to the analysis of measurement processes. *Metrologia, 45*, 493–502.

Ellison, S. L., & Williams, A. (2007). *Use of uncertainty information in compliance assessment (Eurachem/CITAC Guide).* Eurachem.

Esseen, C.-G. (1956). A moment inequality with an application to the central limit theorem. *Skandinavisk Aktuarietidskrift (Scandinavian Actuarial Journal), 39*, 160–170.

Forbes, A. B. (2006). Measurement uncertainty and optimized conformance assessment. *Measurement, 39*, 808–814.

Hegedűs, C. (2014a). *Kockázatalapú döntések támogatása a megfelelőség értékelésében a mérési bizonytalanság figyelembevételével. Doktori (PhD) értekezés (Support of risk-based decisions in conformity control considering measurement uncertainty – PhD dissertation)* . Veszprém: University of Pannonia.

Hegedűs, C. (2014b). Risk-based decision support for conformity control under uncertainty. *Global Journal on Technology, 5*, 78–84.

Hegedűs, C., & Kosztyán, Z. T. (2011). The Consideration of Measurement Uncertainty in Forecast and Maintenance Related Decisions. *Problems of Management in the 21st Century, 1*(1), 46–59.

IEC CISPR. (1997). *Accounting for measurement uncertainty when determining compliance with a limit. (IEC CISPR/A/204/CD).* Geneva: IEC.

ILAC. (2009). *Guidelines on reporting of compliance with specification (ILAC-G8:03/2009).* Silverwater: ILAC.

ISO. (1998). *Geometrical Product Specification (GPS)—Inspection by measurement of workpieces and measuring instruments—Part I: Decision rules for proving conformance or non-conformance with specifications.* Geneva: International Organisation for Standarsitation. ISO 14253-1:1998.

Kosztyán, Z. T., Eppeldauer, G. P., & Schanda, J. D. (2010). Matrix-based color measurement corrections of tristimulus colorimeters. *Applied Optics, 49*(12), 2288–2301.

Kovács, Z., & Pató Gáborné Szűcs, B. (2006). Kockázatmenedzsment a karbantartásban. (old.: 1-6). Veszprém: "Megbízhatóság és kultúra" XVIII. Nemzetközi Karbantartási Konferencia (2006. június 12-14.).

Montgomery, D. C. (1996). *Introduction to Statistical Quality Control* (3rd ed.). John Wiley & Sons.

Neyman, J., & Pearson, E. S. (1933). On the Problem of the Most Efficient Tests of Statistical Hypotheses. *Philosophical Transaction of the Royal Society London A, 231*(694–706), 289-337.

Pendrill, L. R. (2006). Optimised measurement uncertainty and decision-making when sampling by variables or by attribute. *Measurement, 39*, 829–840.

Pendrill, L. R. (2008). Operating 'cost' characteristics in sampling by variable. *Accreditation and Quality Assurance, 13*, 619–631. doi: 10.1007/s00769-008-0438-y

Rossi, G. B., & Crenna, F. (2006). A probalistic approach to measurement-based decision. *Measurement, 39*, 101–119.

Schilling, E. G., & Nelson, P. R. (1976). The Effect of Non-Normality on the Control Limits of X-charts. *Journal of Quality Technology, 8*(4), 183–188.

Schippers, W. A. (1998, September 20). Applicability of statistical process control techniques. *International Journal of Production Economics, 56–57*, 525–535.

Shevtsova, I. (2011). On the absolute constants in the Berry-Esseen type inequalities for identically distributed summands. arXiv:1111.6554.

Shewhart, W. A. (1931). *Economic control of quality of manufactured product.* New York: D Van Nostrand Company.

Vilbaste, M., Slavin, G., Saks, O., Pihl, V., & Leito, I. (2010). Can coverage factor 2 be interpreted as an equivalent to 95% coverage level in uncertainty estimation? Two case studies. *Measurement, 43*, 392–399.

Csaba Hegedűs is a Lecturer at the Department of Quantitative Methods, University of Pannonia. He graduated in Engineering Management with Production Management Specialization in 2008 and received PhD degree in Business Administration and Management Sciences in 2014. His research interests are operation management, quantitative methods of quality control, reliability and risk management. He is member of the Decision Sciences Institute.
Csaba teaches Reliability and Risk Management, Quantitative Methods, Advanced Statistics at graduate level and Management at undergraduate level.
Csaba Hegedűs can be contacted at *hegeduscs@gtk.uni-pannon.hu* and at the Management Institute, Faculty of Business and Economics, University of Pannonia, Veszprém.

Editor: Zoltán Veres

Printed in B5 on 6 and 1/4 sheets
at the Tradeorg Press Ltd.

Executive director: Zoltán Tóth
Technical expert: Zsuzsanna Demeter

SZÉCHENYI 2020

HUNGARIAN GOVERNMENT

European Union
European Social Fund

INVESTING IN YOUR FUTURE

TÁMOP-4.2.3-12/1/KONV-2012-0026
ACKNOWLEDGEMENT AND DISSEMINATION OF SCIENTIFIC RESULTS AT THE UNIVERSITY OF PANNONIA