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Pannon Management Review

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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.

Contents

GYULA VASTAG

Editorial: Anniversaries

Anniversaries provide reasons to celebrate achievements, to remember some noteworthy occasions, to look back and evaluate what happened and—using past facts—plan for the future. For example, we can learn from the legendary singer and songwriter, Johnny Cash, who died ten years ago on the 9th of September. In positioning *PMR* [Editorial in Vol 1, No 1], I recalled Johnny Cash's famous song, 'Walking the Line' to convey our *ars poetica* about the importance of balancing managerial relevance and academic rigour.

With this September 2013 issue (Vol. 2, No. 3), *Pannon Management Review*, appropriately using a tennis analogy as the US Open just finished in September, completed its first Non-Calendar Year Grand Slam (winning four consecutive majors in two years!); this is the fourth issue [of the first English language management journal in Hungary] published quarterly since December 2012. It was a huge undertaking for all of us involved and this is a good reason to celebrate and review what we have accomplished.

In the first inaugural year, we were honoured to publish papers both from world-class academics, promising young scholars and introduce *PMR* readers to persons and organizations of global significance and local importance. In the first year of *PMR* operation, our contributors had all kinds of professional achievements and recognitions (a random, incomplete and subjective selection is listed below in the sequence of their first appearance in *PMR*):

- Roderick Martin had his new book, *Constructing Capitalism—Transforming Business Systems in Central & Eastern Europe,* published by Oxford University Press.
- Krishna S. Dhir was appointed Dean at the College of Business and Economics (University of Hawaii at Hilo).
- Joseph D. Blackburn became President-Elect of the Production and Operations Management Society (POMS).
- Richard D. Metters was voted Best Associate Editor (*Journal of Operations Management*).
- Andrew Cartwright was made Vice Chair of the PASOS Think Tank representing almost 60 centres from central, eastern, southern Europe and the Caucasus and he has also been given charge of a FAO affiliated Working Group on Settlement Decline and Land Abandonment.

- Alan Clarke received the Best Research Paper Award (with A. Jepson and G. Ragsdell) on the International Conference on Events (ICE2013) & 10th Association of Events Management Education (AEME) Forum.
- Howell John Harris emptied his office and officially retired.
- Wallace J. Hopp (with William S. Lovejoy) published a new book ("Hospital Operations: Principles of High Efficiency Health Care" by Financial Times), and
- I was re-elected as DSI (Decision Sciences Institute) Vice President for the European Division.

We are especially proud of the achievements of our young scholars. Edit Komlósi (her paper, 'The role of trait emotional intelligence in task and conceptual performance: the case of functional managers in the hotel industry', appeared in March 2013 issue of PMR) was the winner of the 2013 PhD Student Research Paper Award of the *Expert Systems with Applications* journal at the MakeLearn 2013 Conference for her paper 'What Traits Make Citizens Really Active?'

From left to right: Dr. Valerij Dermol (MakeLearn 2013 Program Chair); Edit Komlosi; Dr. Binshan Lin (Editor, Asia/Pacific Rim of ESWA); Dr. Srecko Natek (MakeLearn 2013 Conference Chair)

Iris Kassim, who debuts in this issue, received First Prize at the 31st National Scientific Students' Associations Conference at the University of Pannonia in Veszprém in April 2013 and the *Pannon Management Review* Special Award.

A distinguishing feature of PMR has been its colourful, ironic and insightful front covers by Zoltan Debreczeny. The September cover, What's up Mr. Tummler, pays homage both to Zoltan's birthplace and to the engineering ingenuity of Henrik Tummler who, around 1770, solved the problem of supplying water from the river 40 meters below to the magnificent baroque castle of Veszprém, the symbol of the city.

On the back covers of *PMR*, we introduced companies, enterprises that have had positive impact on the university and/or the region: Herend Porcelain Manufactory Ltd., Catherine's Cottages, Nitrogénművek Zrt., and Koczor Winery and Guesthouse.

The current jubilee and more voluminous issue has six papers—instead of the usual five—providing an excellent mix of research papers, company portraits, literature reviews and a new platform of Student Scholars.

The paper by **Wallace J. Hopp**, 'Positive lean: inspiring efficiency from within,' cuts through the fog surrounding the meaning and application of lean concepts originated by the once 'scrappy' car company named Toyota. If there is one thought that, quite subjectively, I can single out from Wallace's context rich and thorough treatise is how Ohno's three key obstacles to ideal performance was reduced to only *muda* (waste or non-value added tasks) while *mura* (variability or inconsistency) and *muri* (overburden or stress) were almost completely forgotten with far reaching consequences.

The next papers by **Roderick Martin** and by **Zoltán Kovács and Zoltán Szegedi** introduce two dominant companies of the Hungarian industry: Roderick interviewed Mr. Zoltán Fasimon (COO of MOL Hungary) and the two Zoltáns got access to Dr. István Blazsek (CEO of Nitrogénművek Zrt.). MOL, a Hungarian acronym, is in the oil and gas business and one of the most important European independents. The interview with Mr. Fasimon focused on MOL's organizational transformations mostly after 2008. Dr. Blazsek spent his entire career with Nitrogénművek supplying two-thirds of the Hungarian fertilizer market and shared some of the lessons he learned as he rose through the ranks.

Ágnes Lublóy and **Kata Váradi**'s paper, 'General practitioner–specialist relationships in shared care systems: insights from a review of the literature,' focuses on the interactions between General Practitioners, the gatekeepers to secondary healthcare, and the Specialists. The article is based on an analysis of the relevant literature and aims to support the ongoing empirical research into patient-sharing networks by addressing ten research questions.

The *Student Scholars Platform* features 'Drivers of employee engagement in European organisations: a human resource practitioner's perspective' by **Iris Kassim** and **Levente Komor**. This review paper discusses and classifies the literature on the various interpretations and drivers of employee engagement and suggests a model of employee engagement that centres on the individual.

József Kelemen, 'The spatial monopolies of supermarket chains in Hungary,' uses Hotelling's 1929 paper as a general theoretical framework for analysing various types of consumers who can choose between two alternatives with data from Hungarian supermarket chains. The paper concluded that the spatial monopoly structure of Hungary is not favourable to customers; many of them have access to only a limited variety of products. The competition authority needs to ensure that supermarket chains neither abuse their market power nor damage the interests of customers.

At PMR, we have many reasons to celebrate the completion of our first Non Calendar Year Grand Slam; we managed to stay true to our mission by publishing research-based papers with managerial relevance and offered publication opportunities—and a supporting, nurturing editorial environment—for young scholars and students as well.

Gyula Vastag is Professor within the Faculty of Business and Economics, University of Pannonia in Veszprém, Hungary. He served as Managing Director of the Corvinus School of Management at his *alma mater*, Corvinus University, and as Professor and Area Coordinator of Operations and Supply Chain Management at the Central European University (CEU) Business School, both in Budapest, Hungary. In the US, Gyula spent almost two decades on the faculties of Kelley School of Business (Indiana University), Eli Broad Graduate School of Management (Michigan State University), and Kenan-Flagler Business School (University of North Carolina at Chapel Hill). In addition, he was Professor and Dean of Supply Chain Management Programmes at the University of Stuttgart (2000–2001), where he has been a visiting professor ever since. He also held a visiting professorship (part-time) with the University of Groningen in the Netherlands.

Gyula earned his PhD and Doctor of Sciences degrees at (the predecessor of) Corvinus University and the Hungarian Academy of Sciences respectively, and finished his habilitation at Corvinus University.

His areas of interest include global operations and supply chain management, service operations management, and environmental management strategies. A successful and popular instructor, Gyula has developed and taught a wide variety of conventional and unconventional courses and educational programmes, both in business schools and for corporations—such as for the Kelley Direct Online MBA Program (Indiana University) and the action-learning programme for the executives of the largest bank in Central and Eastern Europe.

Gyula co-authored two books, wrote eight business cases, and contributed chapters to 15 books. He published over thirty peer-reviewed journal articles, in the US and Europe, and numerous papers in conference proceedings. The h-index of his publications in Harzing's *Publish or Perish* (based on over 1,000 citations) is 15 (as of 14 October 2012). His work on the competitiveness of metropolitan areas has generated interest outside academic circles, and his cases on Sonoco's take-back policy were selected by CaseNet® as two of the six e-link cases for the seventh edition of Meiners, Ringleb, and Edwards' widely used *Legal Environment of Business*.

Gyula has cooperated and consulted with a large number of organisations, including the Aluminium Company of America (Alcoa), the Carlson School of Management at the University of Minnesota, the Global TransPark Authority of North Carolina, the US Federal Aviation Administration, and the North Carolina State University, in the US; the International Institute of Applied Systems Analysis, in Austria; ESSEC-Mannheim Business School, in Germany; Knorr-Bremse Hungary and the OTP Bank, in Hungary; and the International Institute for Management Development (IMD) and the University of St. Gallen, in Switzerland.

Gyula is Member of the Executive Board of the European Decision Sciences Institute (EDSI) and the Vice-President for the European Division (2010–14) of DSI, where he is also Member of the Development Committee for Excellence in the Decision Sciences, the Nominating Committee, and the Strategic Planning for International Affairs Committee as well as Chair of the Member Services Committee (2011–14). He is Founding Member of the Global Manufacturing Research Group, where he also served as Associate Director. In addition, Gyula served on the Executive Committee of the International Society for Inventory Research in 1998 and 2006, and he is currently a Member of its Auditing Committee.

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WALLACE J. HOPP

Positive Lean: Inspiring Efficiency from Within

By many measures, lean production has been a phenomenal success. Since the early 1980's when the West first became widely aware of the practices of a scrappy car company named Toyota, the methods now called 'lean' have swept first through the auto industry, then through the manufacturing sector and are now moving rapidly into the service sector. Today, a visit to a hospital anywhere in the developed world is likely to find a lean initiative under way. A quick Google search will reveal consulting ads for lean office, lean banking, lean food services (lean cuisine?), lean education and lean just-about-anything-you-care-to-name. It is hard to think of any firm in history that has been emulated more than Toyota. Even the moving assembly line of Henry Ford or the multidivisional firm structure of Alfred P. Sloan and Pierre du Pont did not permeate all the way to hospitals and schools the way the Toyota Production System has.

This deluge of lean activity has produced scores of success stories. Most prominently, Toyota leveraged its production system to grow from a struggling niche player in the wake of WWII, with production below 5,000 vehicles per year, to the largest automaker in the world, with annual production of nearly 10 million vehicles. Examples of smaller success stories range from a reduction in floor space for a chair production line from 6,000 sq ft to 3,500 sq ft at Herman Miller (Drickhamer 2010) to a 95% reduction in slide misidentification in a surgical pathology laboratory at Henry Ford Hospital (Zarbo et al. 2009). For the American manufacturing sector as a whole, Chen, Frank and Wu (2005) found that work-in-process inventories declined from 1981-2000 at an average rate of 6% per year, largely due to lean initiatives.

But along with these undeniable accomplishments, there have been persistent problems. The literature is full of claims of high failure rates among lean implementation efforts. For example, Wall Street analyst Cliff Ransom famously estimated that only 1-2% of firms that implement lean do so effectively enough to see the results financially (Hall 2004). A 2006 survey of nearly 300 manufacturing firms found that 90% reported that they were committed to lean, but less than 20% of them could be considered best in class (Aberdeen Group 2006). In a 2007 Industry Week/Manufacturing Performance Institute survey, 70% of manufacturers reported using lean, but only 2% of them reported having fully achieved their objectives and less than 24% reported achieving significant results (Pay 2008). Rajagopalan and Malhotra (2001) studied the American manufacturing sector from 1961 to 1994 at the industry level and, like Chen, Frank and Wu, found that inventories, particularly raw materials and work-in-process, declined. However,

they did not observe acceleration in the rate of decrease from 1981 to 1994, when the lean movement was presumably taking root.

In addition to these concerns about how well or how often lean has achieved its business objectives, there have been claims of negative impacts on the workforce. For example, based on a scholarly study of lean groups in a large vehicle manufacturer, Parker (2001) concluded that, particularly in assembly line settings, lean practices induced negative reactions from employees that included reduced organizational commitment and increased job depression. At a more personal level, Mehri (2006), who worked in a Toyota group company, found lean to create a 'culture of rules' that stifled creativity, neglected safety and created a poor quality of life for workers. Speaking from a decidedly political point of view, Post and Slaughter (2000) described lean as 'management by stress' designed to eliminate waste even when that 'waste includes most things that make life bearable like breaks, or a reasonable pace, or a set work schedule, or a decent pay check, or job security.'

A fair assessment of the evidence is probably that lean can produce spectacular results, but that this is rare. Most lean adopters achieve localized operational improvements without major strategic impact.

Why isn't lean living up to its potential? The response one hears from lean experts is almost always some form of the argument that failures are due to 'not doing it right'. But this begs the question. Of course, by the very definition of 'right', failed implementations or lean programs that harm workers aren't doing it right. A better question is w*hy* aren't they doing it right? The most common reasons cited in the many discussions of failure in the lean literature are:

- Lack of commitment from top leadership
- Resistance to change
- Overreliance on tools, without a deeper understanding of lean thinking

While these may indeed be problems in many lean efforts, they are also excuses. If well-intentioned practitioners are failing to realize the full potential of lean, there must be something missing from the current descriptions and training materials. For some reason, the message is failing to get through. For this, those of us in the lean education and consulting arena must bear part of the blame.

To usher in a new generation of lean, with deeper penetration and broader impact, we need to understand more completely and communicate more clearly the essence and application of lean. The criticisms of lean, particularly those from a worker perspective, offer some clues into how to do this. But to really understand the keys to lean success and articulate these in a transmittable way, we need a bit of history, a bit of science and a bit of vision.

Muda and the History of Efficiency

Most descriptions of lean revolve around the concept of eliminating waste or *muda*.[1] But a concern about waste and methods for avoiding it did not originate at Toyota. These have always been at the heart of an efficiency movement that is as old as human civilization itself. The fundamental focus of this movement was, and still is, to reduce the inputs needed to produce a unit of output (or equivalently, increase the amount of output from a given quantity of inputs).

In antiquity, massive construction projects, such as the Egyptian pyramids, Roman aqueducts, and Mayan temples, simply could not have been built without innovations in technology and organizational methods that increased the efficiency of human labour. In the Middle Ages craft guilds emerged for various production specialties (e.g., smiths, cobblers, weavers, tailors, etc.) and fostered efficiency improvements by promoting training and setting quality standards. In the 17th and 18th centuries, craft guilds in some industries gave way to a new domestic system, in which merchants brought work to artisans working in their homes, typically for lower wages than those of guild members. To enable the lower skilled domestic workers to be at least somewhat competitive in quality with the guilds required efficiency improvements through task simplification. But despite these advances in labour productivity, the pace of efficiency innovation up until the mid-18th century was slow by modern standards.

This changed dramatically in the 1760's with the advent of the First Industrial Revolution, which began in the British textile industry. By leveraging innovations in mechanization (e.g., spinning jenny, water frame and power loom) and power (steam engine) manufacturers achieved vast increases in output per worker relative to traditional manual production. As a consequence, the new factory system progressively replaced the domestic production and craft guild systems, first in textiles and then throughout manufacturing.

The First Industrial Revolution also brought about the first systematic writings on efficiency. Most notably, Adam Smith (1776) captured an essential concept of efficiency in his landmark *Wealth of Nations*, by using a hypothetical pin factory to describe how specialization increases labour efficiency. By viewing production as a sequence of steps (much like an early version of the lean practice of value stream mapping), he argued that the work of making a product could be divided into specialized tasks that could be carried out efficiently by narrowly trained workers.

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[1]Many expositors of lean indulge liberally in Japanese terms, both as an homage to Toyota and to make mundane ideas seem more exciting. For example, 'driving out muda' conjures up images of heroic samurai fighting insidious evil, while 'eliminating waste' sounds like taking out the trash.

Through this lens, the craft guilds represented a step toward specialization as a result of grouping work by function (guild). The domestic system extended this step by dividing work into even smaller units. The factory system, with significant help from technology that mechanized many difficult tasks, led to even further specialization.

The efficiency gains from labour specialization were not without cost, however. The Luddite Movement in early 19th century Britain led to riots and sabotage of industrial equipment in protest of the low prices and wages wrought by the factory system. Later in the century, extremely repetitive work, coupled with long hours, poor working conditions and low wages, spurred the rise of labour unions across the industrialized world. A fundamental tension between efficiency and gratification of work had emerged.

Nevertheless, the efficiency movement took another leap forward during the Second Industrial Revolution, which began in the 1850's in America. Again, technological innovations played a major role. Communication (telegraph) and transportation (railroad) innovations made mass marketing and mass transportation possible, creating the opportunity for mass production. Process innovations, including the Bessemer process for steel making, pulping processes for making paper, vulcanization for making rubber products, and many more, facilitated mass production of basic materials. Possibly more important than any of these technological innovations was the emergence of interchangeable parts. Evolved by Jean-Baptiste Vaquette de Gribeauval, Honoré Blanc, Eli Whitney and many others, this concept made it possible to manufacture highly complex assembled products via a series of simple, standardized tasks.

The writer who best characterized the efficiency improvements in the Second Industrial Revolution was Frederick W. Taylor (2011). Indeed, he embodied the era's almost fanatic focus on efficiency so completely that he was deemed the 'Apostle of the American Gospel of Efficiency' by Daniel Boorstin (1974: 363). Taylor recognized that, in the complex, large scale facilities of the late 19th and early 20th centuries, dividing production into tasks and mechanizing them was no longer enough to stay on the leading edge of the efficiency curve. Instead, he sought to optimize the tasks themselves and made the revolutionary proposal that scientific methods (e.g., time and motion studies) could be used to achieve this. His framework, Scientific Management, is the ancestor of all systematic efficiency systems that followed, including lean.

Henry Ford borrowed heavily from Taylor and applied the same close scrutiny of auto assembly that Taylor gave to simpler tasks such as ore shovelling. However, while Taylor was concerned primarily with productivity (e.g., tons of ore moved per shift), Ford was obsessed with speed. His celebrated moving assembly line was only one part of a vertically integrated system that he claimed could produce a car from raw iron ore in only 81 hours (Ford 1926).

Taylor and Ford both faced the tension between efficient work and gratifying work head on. Taylor (1911) wrote extensively about the problem of 'soldiering', the practice of systematically slowing down the pace of work. He also experienced opposition from workers who felt his methods created intolerable working conditions.[2] At Ford, the mind numbing monotony of working on the new assembly line resulted in high rates of absenteeism and turnover. Both men responded with financial policies. Taylor used piecework to reward productive workers, but was largely unsuccessful in motivating his workforces. Ford adopted a far more successful policy of paying roughly double the market wage – the legendary '$5 a day' rate – to attract, retain and motivate workers.

Taiichi Ohno, a production engineer at Toyota, picked up the efficiency mantle from Ford. Like Ford, Ohno focused on material flows, but he did so in an even more complex environment. Because Toyota did not have the luxury of high volumes they could not restrict their plants to a single product (and a single colour) as Ford was able to do. So matching, and eventually surpassing, the efficiency of its larger rivals required Ohno and his colleagues to evolve practices beyond anything yet seen. That they were able to do this, through relentless experimentation and attention to detail is a matter of public record.

However, while Ohno was extraordinarily diligent about developing the Toyota Production System, he was less diligent about explaining it. Indeed, in an interview in 1990, Ohno said that Toyota deliberately coined misleading terms and words to describe it because 'If in the beginning, the U.S. had understood what Toyota was doing, it would have been no good for us.' (Meyers 1990). So perhaps it is not surprising that English language writers have taken liberties in interpreting Ohno's writings, particularly his book, *Toyota Production System*, published in Japanese in 1978 but not translated into English until 1988, by which time Toyota's methods were so well-known that they were on the cusp of being given the generic term 'lean' (Womack and Jones 1990).

For example, Ohno (1988) described the Toyota Production System as resting on two pillars:

1. *Just-in-time*, or producing only what is needed.
2. *Autonomation*, or automation with a human touch.

[2] The most famous of these was the strike at the Watertown Arsenal in 1911, which led to congressional hearings and ultimately a ban on Taylor's methods in federal facilities (Aitken 1985).

But, although just-in-time (JIT) was lionized by Western scholars and practitioners, autonomation was virtually ignored. JIT was so popular that it was given the more generic name 'pull'.[3]

Ohno (1988) also described the key obstacle to ideal performance as waste, which he described with three words:

1. *Muda*, waste or non-value added tasks
2. *Mura*, variability or inconsistency
3. *Muri*, overburden or stress

But, while 'muda' has become possibly the most recognized Japanese word in the West, and the centre of most people's understanding of lean, 'mura' and 'muri' have been almost entirely lost. As we will discuss below, this loss is a serious one.

Ohno (1988) further elaborated by listing seven types of waste:

1. Overproduction
2. Unnecessary transportation
3. Waiting
4. Extra processing
5. Motion
6. Inventory
7. Defects

The lean literature has treated these with near religious respect. They appear with regularity in almost every lean book, paper, course and presentation. Unfortunately, this list is one of the weaker elements of Ohno's description of lean. For one thing, it is incomplete. In the text, Ohno identified unused people and equipment as waste, but he failed to put 'excess capacity' on his list. Other forms of waste, such as waste of natural resources, were not mentioned at all. Because of omissions like these, some people add to Ohno's list, with 'Non-utilized skills' being the most common addition.

In addition to being incomplete, the list is incongruous. For example, overproduction is a cause, while inventory is a consequence. If we produce more product than is needed, we wind up with inventory. As a result, exercises to classify wastes into these categories often dissolve into confusion. Is walking to get a part unnecessary transportation or motion? Such discussions are themselves a waste. Who cares how a waste is labelled as long as we can identify and eliminate it?

[3] Even JIT was subject to misinterpretation as the term 'pull' wound up being widely interpreted as something entirely different from its original meaning (see Hopp and Spearman (2004) for a discussion).

This cursory overview of the history of efficiency reveals three areas of ongoing challenge:

1. *Complexity:* As production environments become more complex, so do the policies for increasing efficiency. For example, transforming the 18th century textile industry, which used a relatively few steps to convert a single raw material into finished products, was largely a matter of mechanizing two processes, spinning and weaving. Effecting a similar transformation in the automobile industry, which involved thousands of steps to make and assemble hundreds of parts, required mechanization of many processes, a radically new material handling system and decades of detailed process improvements. The reason, clearly, is that systems with more parts, processes and people also have more avenues to explore for improvement.

2. *Dissemination:* Propagating improvements between systems becomes more difficult as the systems become more dissimilar. For instance, the new factory methods of the First Industrial Revolution were rapidly adopted by the British textile industry[4] but were slower to be translated to other industries. Similarly, the methods of Toyota were widely being adopted in the automotive industry by the early 1990's, but widespread efforts in the healthcare industry did not appear until nearly 20 years later. The reason is that transmission within the same industry can be achieved by copying practices. But propagation to other industries requires distilling practices into principles, communicating those principles and then translating them into new practices suited to new environments.

3. *Motivation:* The fundamental tension between work efficiency and work gratification has led to gains in efficiency at the expense of gratification, leading to an erosion of employee motivation. The negative impacts of efficiency have flared periodically throughout history into labour protests and critical writings. But more importantly, failures to manage these impacts effectively have undermined the success of efficiency initiatives ranging from the earliest efforts at industrial organization to the most recent lean programs.

To characterize the keys to lean success and formulate a framework for communicating them, we must address these challenges. For this, it is worthwhile

[4] The new textile manufacturing methods took somewhat longer to migrate to the U.S. because of a British ban on transporting machinery designs abroad. But once Samuel Slater (known as the 'Father of the American Industrial Revolution' in the U.S. and as 'Slater the Traitor' in the U.K.) defied the ban and brought the designs to the U.S., they spread rapidly there as well.

to observe that work is a multifaceted activity that engages humans on many levels. We conceptualize this by appealing to the popular *hands-head-heart* representation of the ways humans engage their world. In this model, the hands symbolize the concrete, physical, action-based orientation. The head symbolizes the conceptual, intellectual, theory-based orientation. The heart symbolizes the emotional, empathic, ethics-based orientation. A human being operates on all three levels, in life and at work.

The hands-head-heart (HHH) model has been invoked in a wide range of contexts. In Religion, hands, heads and hearts appear frequently as symbols in many sects. In the behavioural sciences, which gives the three parts more academic labels—behavioural (hands), cognitive (head), and affective (heart)—the HHH model has been elaborated into the cognitive-affective theory of behaviour. In the American 4H youth organization, a fourth H, for 'health', is added to form the basis for a holistic perspective on personal development.

Hollywood is particularly fond of the HHH model because the interaction of the three elements is a wonderful source of dramatic contrast. For example, in the film *The Wizard of Oz,* the Lion (hands) is unable to act without guidance from the Scarecrow (head) and Tin Man (heart). In the TV show *Star Trek,* Captain Kirk (hands) is prone to rash action (kissing the female aliens and punching the male aliens) when not tempered by Spock (head) and Bones (heart). The moral is always that humans do not function well without all three H's.

When viewed through the HHH lens, it is clear that lean implementation, and lean education, suffer from too much hands and too little head and heart. Some firms are like the Lion, unable to take real action because they lack clear direction. Others are like Kirk, energetically flailing away at actions (e.g., 5S and kanban programs) that have little connection to their ultimate goals.

To rectify this and create a theory of lean that more fully engages humans at all levels, we must better incorporate the missing H's—head and the heart. Interestingly, this is equivalent to bringing back the two M's—mura and muri—that have been lost from Ohno's description of lean.

Mura and the Science of Efficiency

Any system that delivers goods or services is a *production system*. All production systems are comprised of *processes*, in which physical and/or human resources are used to convert a set of inputs (e.g., material, energy, information) into outputs (products or services) that satisfy customer orders. Figure 1 gives a schematic illustration of a process that comprises a single stage of a production system. At the most fundamental level, a process matches supply with demand. Before analyzing the behaviour of this elemental model of a process, we consider

two examples that show how the model applies to both manufacturing and service settings.

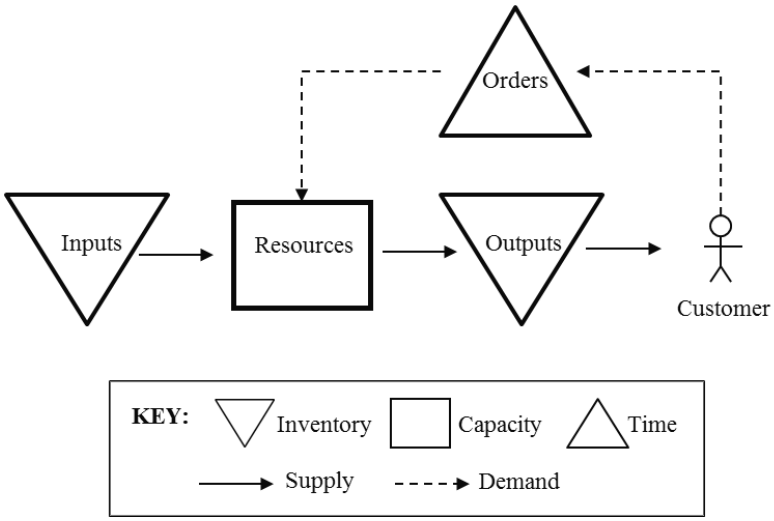

Figure 1: Schematic model of a single process in a production system

As a manufacturing example, consider a system that produces personal computers (PC's). A key component of a PC is the mother board. A step in the production of the mother boards, illustrated in Figure 2, is surface mount assembly, in which electronic components are positioned on the board. The main inputs to the surface mount process are the raw printed circuit boards, components, solder paste and electricity. The resources include one or more pick-and-place machines (chip shooters) and human operators. The outputs are boards with components ('stuffed' boards). The customer is the wave soldering stage, in which a reflow oven is used to solder the components in place. The orders are production triggers, which could be kanban signals in a pull system or order releases in a push (MRP) system. If a demand occurs when there is no inventory of assembled boards available, then the order incurs waiting time.

As a service example, consider a hospital emergency department. An essential step, illustrated in Figure 2, in almost all visits to the ED is an initial examination/consultation with a physician. In this process the inputs vary by patient and can include consumables such as rubber gloves, sanitary wipes, sutures, etc. The resources consist of the physician, the examination room and possibly other equipment and personnel. The patient is the customer in this process and the outputs are the service (e.g., pain relief) and information (e.g., diagnostics) resulting from the examination. If any of the necessary inputs or resources is not

available when the patient arrives in the ED, then the patient must wait. Once the patient has completed the examination stage, he/she generally moves to another production stage, such as a diagnostic test or treatment procedure.

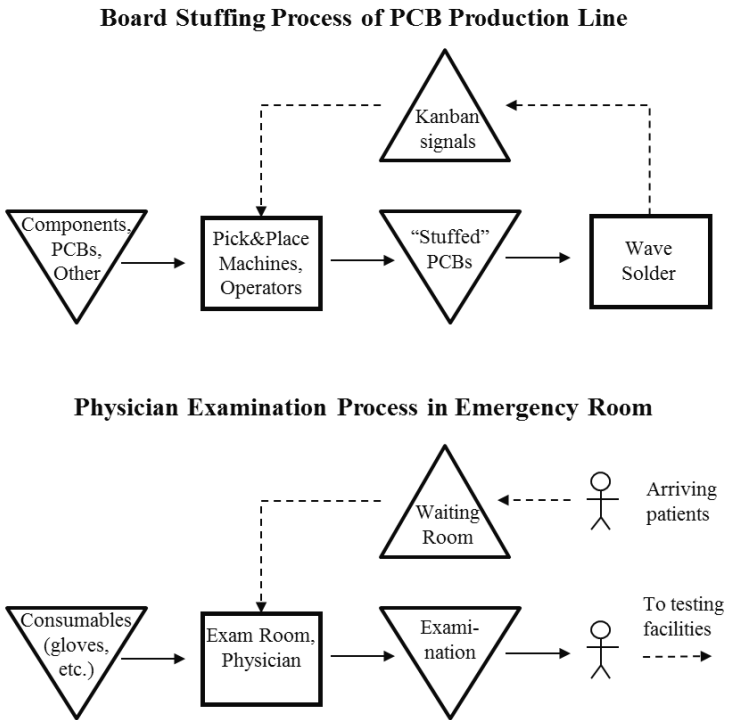

Figure 2: Illustration of processes in a manufacturing (PCB assembly) system and a service (emergency health care) system

A sequence of processes constitutes a *flow*. Note that in a manufacturing system, like the PCB example in Figure 2, the primary flow is of materials through processes. That is, the customer is another process, so that the outputs of one process become inputs of that process. In contrast, the primary flow in a service system, like the emergency room example in Figure 2, is of customers through processes. That is, upon completing service at one process, the customer progresses to another process for service. Real-world production systems often consist of many processes with many different customer and material routings through them. The processes can be geographically distributed and owned by different parties (e.g., as in a supply chain). Coordination of the processes of a production system can be a very complex management challenge. But, ultimately

the efficiency of a production system is determined by the efficiency of its individual processes.

The key insight that arises from the process model of Figure 1 is that there are three, and only three, possible types of waste in a production process:

- *Inventory waste*: consists of inputs that are not immediately used by the process and outputs that are not immediately delivered to the customer. In a manufacturing setting, input inventories are labelled raw materials and work-in-process, while output inventories are called finished goods. In a service system there are no output inventories because the outputs are services which cannot be stored.
- *Capacity waste*: results from under-use of capacity human or physical resources. This can be manifested in the form of idle resources or resources that are busy but not producing value for the customer (e.g., making defective products or services).
- *Time waste*: is any delay in delivering a good or service to a customer. This includes both predicted (e.g., time for a patient to get on the surgery schedule) and unpredicted (e.g., time a patient spends in the waiting room waiting to go into surgery).

Inventory and capacity waste represent resources that cost money but do not provide value to the customer. Time waste represents a loss of value to the customer, and hence a loss in potential revenue to the producer.

Note that the seven wastes identified by Ohno map into these three categories:

- Inventory (Inventory)
- Overproduction (Inventory)
- Waiting (Time)
- Transport (Capacity)
- Extra Processing (Capacity)
- Motion (Capacity)
- Defects (Capacity)

The eighth waste, non-utilization of skills, is also a form of capacity waste.

To go beyond mere labelling toward an understanding of the causes of waste, it is useful to apply the common lean practice of envisioning the ideal to the process in Figure 1. In an ideal production process, the following would be the case: (a) customer orders would arrive simultaneously with their associated inputs, (b) processing would start immediately upon arrival of the orders and inputs, (c) resources would be fully utilized at all times, and (d) outputs would be delivered immediately to customers. Any deviation from these will result in inventory, capacity and/or time waste. We label the waste from such deviations *coordination*

waste because it results from the lack of coordination of orders, inputs, resources and outputs.

But perfect coordination does not by itself guarantee ideal performance. Even if all of the above conditions hold, it is still possible to have capacity waste (e.g., unnecessary processing steps), inventory waste (e.g., work-in-process undergoing non-value-added processing, such as defect creation) and time waste (e.g., delay due to excess processing, such as unnecessary steps or defect creation/correction). We label this *execution waste* because it is a consequence of the individual parts of the process (order processing, input processing, production, output processing), rather than the result of their interaction.

Note, however, that the distinction between coordination waste and execution waste is not sharp. Execution waste can lead to coordination waste. For instance, consider a bank teller who makes a mistake in a customer transaction that takes an extra 5 minutes to correct. The extra time the customer spends in the process is execution waste. But because this delay ties up the teller's capacity, it may result in an inability to provide service when the next customer arrives, causing that person to wait as well. Because the second person's wait is caused by mismatch in timing between capacity and demand, it is coordination waste.

In most production systems, coordination waste comprises the vast majority of waste. This is particularly true for systems in which lean efforts are already under way. Obvious forms of execution waste, such as poorly organized tools that result in excess motion, convoluted layouts that result in excess walking, poor quality control that results in defects and rework, are often amenable to simple remediation (e.g., a 5S system or a rudimentary kaizen event). But once these have been addressed, the remaining coordination waste is much more complex to address.

The essential driver of coordination waste is *variability* or *mura*. In a process like that described in Figure 1, if the rates of order arrival, input arrival or resource processing vary from one another then they will become unsynchronized. Specifically, if an order arrives before the necessary inputs and resources are available, it will wait, causing time waste. If inputs arrive before an order has arrived or resources are ready, it will wait, causing (raw material) inventory waste. If resources finish processing inputs before an order has arrived, the output will wait, causing (finished goods) inventory waste. If the resources are ready before an order and its associated resources are available, then they will be idled, causing capacity waste.

The implication is that if there is variability in the process, there will be waste. But the kind of waste can be managed. To see how, consider the PCB stuffing process of Figure 2. Suppose that pull signals from wave solder (orders) are uneven due to downstream variability in the line (e.g., machine failures, defect correction, operator errors, etc.). Similarly, suppose PCB's and components (inputs) arrive unevenly due to upstream variability. Finally, suppose the

processing rate by the chip shooters is uneven due to product variety (i.e., boards with more components take longer to stuff and switching between board types requires changeovers to load different components into the pick-and-place machines). All of these forms of variability will cause mismatches between inputs, orders and resource capacity.

Initially suppose that the work arrives at nearly the maximum processing rate of the process. This implies that the chip shooters will rarely get ahead of the workload and be idle, and hence that there will be very little capacity waste. But there will be time waste because fluctuations in the order rate will cause it to exceed the processing rate periodically, leading to pile ups of waiting kanban cards. Similarly, there will be inventory waste whenever the input arrival rate exceeds the processing rate and causes backups of PCB's and components.

Suppose that we add processing capacity by installing another chip shooter. Because of the extra capacity, the processing rate will now exceed the order rate more frequently, resulting in more idle capacity, and hence capacity waste. But the order rate and input rate will outstrip the processing rate less frequently, so there will be less time and inventory waste.

Finally, suppose we use the extra capacity to stuff PCB's ahead of demand. That is, we build up a stock of assembled PCB's when capacity and inputs are available. (We can generate 'early' orders to accomplish this by increasing the number of kanbans between PCB Stuffing and Wave Solder.) The finished PCB's will allow instant fulfilment of some orders, and hence will reduce time waste. But the extra finished PCB's will constitute more inventory waste.

This example illustrates that we can decrease one form of waste at the expense of increasing another. But as long as there is variability in the process, there will be waste. Because the three types of waste represent gaps between perfect coordination of orders, inputs and resources, which are caused by variability, we call them *variability buffers*. Because all buffers are costly, an essential challenge of lean is to drive out the variability that causes them. But because buffers have different costs in different environments, achieving the right mix of buffers is another key lean challenge.

We can formalize this variability buffering model of lean by letting B_I, B_C and B_T denote the fraction of variability buffered by inventory, capacity and time, respectively, in a process like that shown in Figure 1.[5] Since, by definition, all variability in a process is buffered, we must have $B_I + B_C + B_T = 1$. The set of values of B_I, B_C and B_T that satisfy this condition is given by the triangle in Figure

[5] Hopp and Spearman (2008) give details on how to quantify variability using coefficients of variability and how to characterize the tradeoffs between inventory, capacity and time, but we omit these because they are not central to our discussion.

3. Each point in this triangle represents a different variability buffering strategy, so we call it the *variability buffering triangle.*

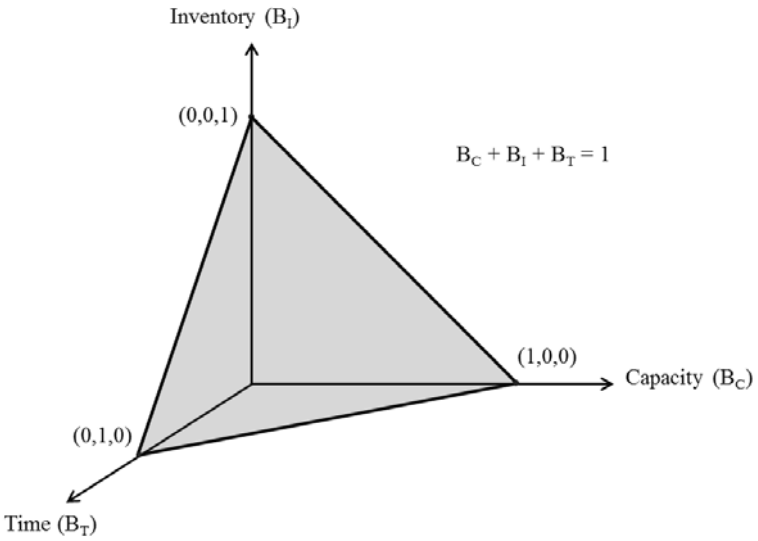

Figure 3: The set of possible variability buffering options

To illustrate how the variability buffering triangle can be used to graphically depict different strategies, we consider three firms in the restaurant industry in Figure 4. (Note that we have dispensed with the three dimensional representation of Figure 3 because we are focusing only on the variability buffering triangle.) McDonald's and Subway are global chains, while Onyx is a high-end, sit down restaurant in Budapest. All three experience variability in customer arrivals (orders), food and supply deliveries (inputs) and rates of preparation and service (resource processing).

Because McDonalds and Subway are fast food restaurants, time buffers (customer waits) must be small. So both restaurants make use of inventory and capacity to buffer the majority of their variability. But they take different approaches to this. McDonalds relies heavily on inventory, particularly during rush periods, by preparing sandwiches and fries ahead of time and holding them on a warming table. Because McDonalds has a higher fraction of its variability buffered by inventory than do the other two restaurants, its strategy is depicted in Figure 4 as lying closest to the inventory vertex of the variability buffering triangle.

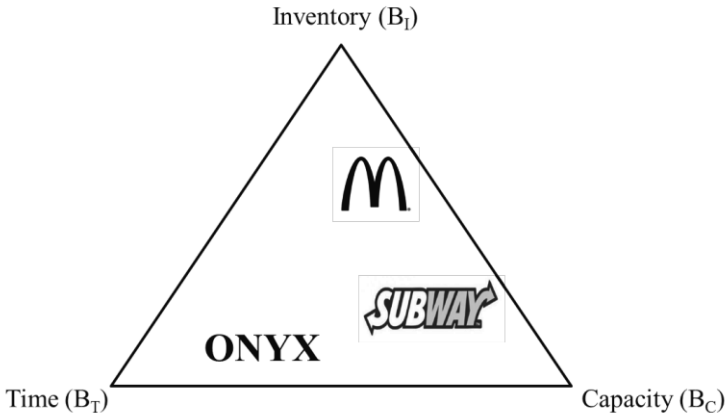

Figure 4: Examples of different variability buffering strategies in the same industry

In contrast, Subway touts customization as a key selling point. To allow customers to choose any combination of ingredients and toppings for their sandwiches, it does not pre-prepare sandwiches. Instead, it holds raw materials and assembles them upon demand. To make this possible without excess waiting time, Subway must have enough capacity (personnel) to respond to spikes in demand. Subway's greater reliance on capacity to buffer its variability is depicted in Figure 4 by its location closer to the capacity vertex than McDonalds.

As a premier (Michelin starred) restaurant, Onyx must offer exceptional quality of food and dining experience to compete in its market segment. Preparing food in advance, as McDonalds does, is inconsistent with the needed quality standard, so an inventory dominated buffering strategy is not appropriate. A capacity dominated strategy, like Subway's, is also not appropriate because highly skilled chefs are too expensive to permit excessive use of them. So Onyx, like all other high-end restaurants, makes use of time as a significant variability buffer, as depicted in Figure 4 by its location closer to the inventory vertex than the fast food restaurants. Customers have to wait, both to get a table and to get served in the restaurant.

Note, however, that in order to be competitive on cost and responsiveness in their respective market segments, restaurants cannot rely on intelligent variability buffering alone. They must also find ways to reduce variability. For example, to facilitate its make-to-stock strategy without excessive inventory, McDonalds reduces variability by limiting its menu and not encouraging customization. To make its assemble-to-order strategy practical without excessive capacity, Subway reduces variability by using an efficient assembly line that standardizes preparation despite customization in the product by allowing customers to specify details of

their orders while their sandwiches are being prepared. To support its high quality, high customization strategy without excessive customer waiting, Onyx reduces variability by encouraging customer reservations.

To summarize, implementing lean requires identifying and eliminating both execution waste and coordination waste. Reducing coordination waste requires identifying and eliminating sources of variability, and then finding ways to buffer the remaining variability as efficiently as possible. These improvement efforts must address the many processes that make up a production system, and take into account the interdependencies between them. Hence, to make effective use of lean, an organization must be proficient at both generating ideas for improvements and following through on them.

A failing in many organizations seeking to implement lean, which limits their ability to generate a full range of improvement options, is an over-emphasis on waste reduction and an under-emphasis on variability management. In Ohno's terms, we are not seeing as much muda as we could be because we are not looking for mara. Texts that explain variability in general terms (Hopp and Spearman 2008, Hopp 2008) have been available for some time, and books that discuss it in specialized contexts, such as health care (Jensen et al. 2006, Hopp and Lovejoy 2013) are appearing. But the concept of variability has yet to penetrate lean training materials fully. Until it does, lean education will continue to under prepare practitioners for success.

However, while better training in and application of variability management methods will certainly increase the effectiveness of lean, it cannot by itself close the gap between potential and reality we described earlier. Generating ideas and implementing them successfully also requires the third H (heart), or the third M (muri).

Muri and the Emotion of Efficiency

As used by Ohno, the word 'muri' has a double meaning.[6] First, it means 'overburden' which is important in the physics of flows because highly utilized resources (i.e., resources with very small capacity buffers) are slow to recover from work backups. As a result, highly utilized (or overburdened) resources are particularly sensitive to variability (see Hopp and Spearman 2008: Chapter 8).[7]

[6] It is not clear whether the dual interpretation of 'muri' as 'overburden' and 'stress' was a deliberate attempt to convey the importance of both to lean, or whether the alliterative appeal of having three 'mu' words—muda, mura, muri—was so strong that it outweighed any potential lack of clarity.

[7] In factory physics terms, we say that 'variability plus utilization causes congestion' to describe the joint impact of variability and utilization on performance. A loose Japanese analog is therefore 'mura plus muri causes muda'.

But muri can also be interpreted as 'stress', which conjures up the emotional aspect of work. Viewing stress broadly as a negative reaction to work, it represents the antithesis of 'heart', which embodies an emotional engagement with work. So the third H (heart) and the third M (muri) both invoke the human element of lean.

The idea that an emotional connection to work is important to performance is hardly new. Indeed, it is almost definitional that motivation is a prerequisite to good work. In lean, good work means achieving continually improving levels of efficiency. Because people are so manifestly essential to this, the lean literature is replete with references to the human side of performance via terms like 'respect for people', 'eliminating underused talent', 'empowerment', and many others. But as Pfeffer and Sutton (2000) have pointed out, knowing is not doing. In their study of why organizations fail to act on things they know, they noted that many firms substitute talking about a practice for actually using it. Motivational talk is not motivational action.[8]

Motivation has long been a topic of serious research in the fields of human resource management, organizational behaviour and industrial and organizational psychology (see Latham 2007 for a historical overview). While the literature on motivation in work systems is vast and varied, its roots are not far from our crude HHH metaphor. In an early formula, which makes up in simple appeal what it lacks in measurability and nuance, Maier (1955) posited that Job Performance = Ability × Motivation. If 'hands' and 'head' constitute ability, while 'heart' embodies emotion, then this is a version of HHH.

To characterize the role of motivation in a lean system, we make use of the simple diagrams in Figure 5, which indicate: (a) whether the influence of worker motivation on process efficiency is positive, negative or neutral, and (b) whether the reverse effect of efficiency on motivation is positive, negative or neutral. Of the 3×3=9 possible scenarios we lump the six cases in which the impact of motivation on efficiency is either neutral or negative under the heading of *Ignorant Lean*. These cases occur only when the workers lack the ability to improve efficiency, even when highly motivated.[9] But if workers have an understanding of

[8] In a comical case of talking in place of doing, a firm for which the author once worked mounted electronic signs flashing motivational messages, such as 'I love my job', in a factory that was making little progress on lean.

[9] While it is probably rare that increased motivation can actually make efficiency worse, it is not impossible. Indeed, the author has observed instances where a well-intentioned and motivated workforce instituted a kanban system without any other process improvements, only to find that throughput dropped dramatically. In factory physics terms, the kanban system substituted a capacity buffer (because reduced throughput decreased resource utilization) for an inventory buffer (by regulating work in process via kanban cards). But because the loss of revenue was not made up by savings in inventory costs, this constituted a degradation in efficiency. In these cases, an unmotivated workforce , which did nothing

the levers of lean described earlier, and the tools to address them, they should be able to improve performance if they are motivated to do so. So we will focus on the remaining three cases in which motivation has a positive influence on efficiency.

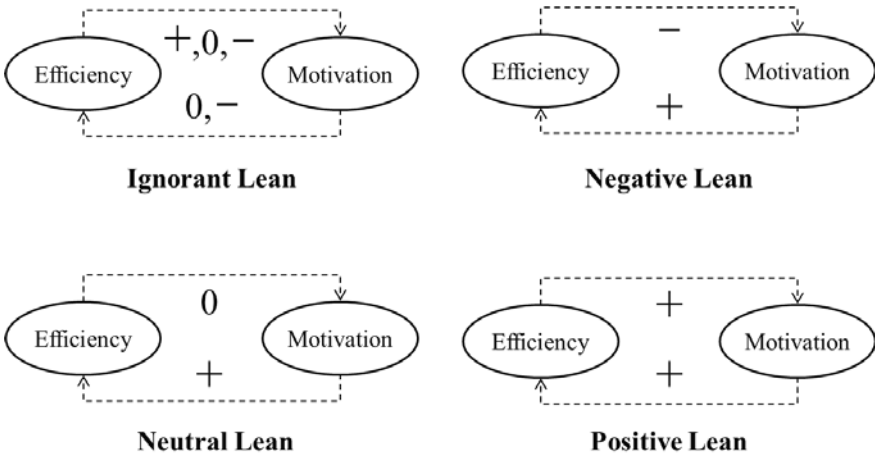

Figure 5: Interaction between efficiency and motivation in lean systems

Negative Lean represents the classic case of Taylorism gone bad — systems in which improvements in efficiency come at the expense of worker satisfaction. *Neutral Lean* protects workers from the negative effects of efficiency gains, but still does not improve conditions for workers. Finally, *Positive Lean* represents the aspirational situation in which efficiency improvements actually increase worker motivation, which in turn drives further efficiency improvements. Because it will cause business performance and worker quality of life to rise in tandem, Positive Lean has strong economic and ethical appeal.

Since all scenarios in Figure 5 other than Positive Lean are not self-sustaining, improvements in them must be driven from the outside, either by forcing efficiency improvements or by exogenously enhancing motivation. The former can be accomplished by technological improvements or managerial changes effected from beyond the workforce (e.g., by management). The latter can be achieved through heroic hygiene or changes in the workforce itself.[10]

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would have been more effective than the motivated workforce that installed an ill-designed kanban system,

[10] Herzberg et al. (1959) distinguished *motivators* (e.g., interesting work, responsibility, recognition and learning) from *hygiene factors* (e.g., pay, fringe benefits, status, and job security) and argued that the former can increase satisfaction while the latter can only

Henry Ford used both of these approaches in his Highland Park plant. The moving assembly line represented a technological and managerial innovation that dramatically increased efficiency, albeit at the expense of demotivatingly dull work (i.e., Negative Lean). His doubling of wages represented a hygiene tool for incentivising existing workers as well as a recruiting tool for reshaping the workforce.

Of course, hygiene factors, like pay and benefits, are only incentives to the extent to that they exceed the market. Once competitors match them, they cease to be distinctive motivators. A more difficult to copy, and hence more sustainable, source of motivational advantage is the work environment itself. This is the target of Positive Lean.

The intrinsic motivating power of work depends on how that work is structured and organized, which is studied in the academic literature under the topic of *job design* (Grant et al. 2011). The classic model of job design is the Job Characteristics Model (JCM) proposed by Hackman and Lawler (1971). In this model, the core dimensions that determine how a worker perceives a job are: *task significance* (ability to have a positive impact on other people), *task identity* (opportunity for individual to complete a distinguishable piece of work in its entirety), *skill variety* (chance to use a range of capabilities), *autonomy* (discretion on how and when to do the work), and *feedback* (clear and direct information on performance).

Although not widely used in the lean literature, the JCM has been invoked by some authors to argue that lean work may be intrinsically motivating. de Treville and Antonaki (2006) and Cullinane et al. (2013) concluded that lean as a general practice can favourably influence some of the JCM dimensions, particularly skill variety and feedback. They conjectured that the net effect of lean on worker motivation can be positive. However, as they concede and as we noted earlier, there is ample evidence that many past and current lean implementations do not have beneficial consequences for workers.

One reason that lean may fail to live up to the motivational possibilities these studies predict is the manner in which it is implemented. For instance, de Treville and Antonaki suggest that a propensity for excessive leanness, achieved through overly aggressive reduction of system slack (buffers), can reduce opportunities for problem-solving activities and thereby erode the skill variety and autonomy benefits. By their reasoning, a system that starts out as Positive Lean may regress to Neutral Lean or even Negative Lean.

Another reason lean may fail to motivate, offered by Vidal (2007), is diversity of individual preferences. Some workers simply do not regard the addition of

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reduce dissatisfaction. Although subsequent research has challenged this distinction (see Grant et al. 2011), the term ‘hygiene’ has stuck.

problem solving to their duties as an improvement in their situation. Hopp and Spearman (2008: 389) described this diversity as a fundamental distinction between people who 'want responsibility, challenge and variety in their jobs' and others who 'prefer stability, predictability and the ability to leave their work home at the end of the day'. They likened this distinction to the difference between officers and enlisted personnel in the military. Officers have more responsibility and variety in their work, but it is most certainly not the case that all enlisted people wish to become officers.

The above arguments suggest that Positive Lean is possible, but that attaining it in a given implementation requires careful choice of policies that are suited to the environment and people in question. Identifying appropriate policies with which to create the self-feeding loop between efficiency and motivation shown in Figure 5, requires an understanding of the drivers of efficiency and motivation. We have characterized the former with the science of efficiency (factory physics) and the latter with the psychology of work (job characteristics model). Since both of these are largely missing from lean training materials, a key first step toward Positive Lean must be for lean educators to do a better job in conveying these known results. But the key to making Positive Lean a reality will be for practitioners to incorporate these concepts into their lean production systems and thereby systematically encourage management and labour to seek and implement steps that increase both efficiency and gratification.

To illustrate how this convergence of factory physics and work psychology might work, we offer examples for each of the JCM dimensions.

Task Significance: Lean methods are usually seen as having little to do with task significance since they do not generally change the final product or service (de Treville and Antonaki 2006). But this does not mean that lean policies cannot incorporate steps to improve workers understanding of their impact on customers or the world. Grant et al. (2011) described a call centre employing agents who solicited donations to a large public university, and was able to substantially increase fundraising rates by putting agents in contact with students who benefited from scholarships made possible by the donations. Similarly, Spreitzer, Porath and Gibson (2012) described a janitor in the Cancer Centre at the University of Michigan who found ways to assist patients in the course of her normal duties. While the actions in these two examples were not directly part of efficiency improvements, neither were they in conflict efficiency. Since they indirectly improve productivity via motivation, initiatives like these should be fair game in a lean program. Moreover, as we will see below, there can be similar opportunities within efficiency initiatives to increase awareness of the impact of one's work on the customer.

Task Identity: The tension between efficiency and motivation in work systems is at least as old as the factory system itself. The specialization principle articulated by Adam Smith and refined by Frederick W. Taylor has long been invoked to narrow tasks in the name of efficiency, but to the detriment of motivation. In search of more rewarding work, Volvo famously bucked the specialization trend in the 1990's with team assembly of complete vehicles in their Uddevalla plant. But, while productivity numbers were competitive, and worker satisfaction was very high, Volvo closed Uddevalla after only four years of operation (Sandberg 2007). Whether the motivational advantages of the Uddevalla system would have offset he efficiency disadvantages enough to enable it to keep pace with traditional assembly plants has been a subject of spirited debate ever since. But subsequent Volvo plants have used Toyota style systems.

Certainly vehicle assembly is a difficult environment in which to fight the legacy of Ford and Toyota. But there are other environments whose conditions make it much easier for task consolidation to facilitate lean. For example, the author once worked for a company that did pre-press production of print catalogues and other high volume printing jobs. The system was originally configured as a typical production line with work divided into steps, such as copyediting, mark-up, proofreading, page layout, colour registration, retouching, page assembly, etc., performed at separate process stations staffed by different operators. But high levels of variability in process times caused very uneven workloads at the stations, resulting in frequent and expensive idling of staff. In addition, communication breakdowns between the customer, the client manager and the people doing the work resulted in errors and rework. To address both problems, the company switched to a system in which a single staff member was responsible for all steps in a job (e.g., section of a catalogue) and also served as the client contact. By 'pooling' the variability in the individual steps, this policy eliminated the inefficient capacity buffers inherent in the underutilized staff, as well as much of the variability due to miscommunication errors. It also had the task identity benefit of giving the staff members a much stronger sense of ownership of their portions of the work.

These examples suggest that task aggregation may pit efficiency against motivation in some systems and enhance both in others. To fairly consider the potential of a Volvo-type system we need be able to account for both the variability reduction and motivation enhancement benefits.

Skill Variety: Rotation of cross-trained workers through multiple tasks represents a happy intersection between reducing variability and increasing skill variety. Of course, this intersection is only happy if workers prefer to rotate. A successful example from the author's experience was that of a firm that manufactured circuit boards. Unable to achieve the needed volumes, the firm was

contracting additional capacity at a high cost. A utilization analysis revealed that one operation, Expose, was the bottleneck, while another, Inspect, had excess capacity. Unfortunately, because of equipment limitations, it was not practical to move an Inspect operator to Expose to shift capacity. In one of many problem solving sessions with the operators, an Inspect operator suggested an alternative that was adopted. Under her plan, the Inspect operators took their daily lunch break first. When they returned, they took over Expose. The Expose operators then took their lunch break and returned to finish their shift in Inspect. The result was double lunch breaks in Inspect, where capacity was ample, and no lunch breaks in Expose, where capacity was needed. Multiplied over three shifts per day, facilitated a significant amount of additional production.

The happy part of the story was that, because it allowed them to divide their shifts between two different (and repetitive) tasks, many operators found this to be an improvement in their working conditions. But, since there were more Inspect operators than Expose operators, not everyone had to rotate. The occasional operator who preferred to stay solely in Inspect was able to do so.

Another common opportunity for increasing skill variety in lean systems is problem solving. As we noted earlier, however, not everyone finds this to be an appealing activity. So the goal should be a lean system that engages and rewards people who seek the challenge of developing new work methods, but accommodates those who prefer and excel in more narrowly defined work. In the above mentioned circuit board plant, the problem-solving sessions were structured so that the enthusiasts had significant influence but the uninterested were not pressured to perform. In addition, an important recognition of those who developed better ways to carry out their own work was to make them trainers of others. The prestige of instructing their peers was a highly prized distinction.

These examples suggest that skill variety is a dimension that can provide many options that serve both efficiency and motivation.

Autonomy: Autonomy in the sense of 'everyone for themselves' is anathema to lean because it implies both execution and coordination waste. Standardized work is a pillar of lean because it ensures that everyone makes use of the same best methods. But the lack of choice implied by adherence to a specified standard would seem to be in direct conflict with autonomy. Indeed this is the case for a job that is so completely understood that an algorithmic best method can be specified for every aspect of the work. But such situations are rare and are candidates for automation. So most human work has some elements that are amenable to standardized best practices and others that are too ill-understood or idiosyncratic to standardize.[11]

[11]In Hopp and Lovejoy (2013: 517) we describe the appropriate limits on standardization with the maxim 'Rationalize the repeatable, but only the repeatable.'

For example, in interviews with 19 physicians in Scotland, Fairhurst and May (2006) found that developing and maintaining patient relationships were a much more significant source of physician satisfaction than were the technical elements of diagnosis and treatment. Since the relationship activities are too individualized to permit standardization, while the technical activities are good candidates for data driven rules, it would seem that the standardization needed for waste and variability reduction can be carried out with little reduction in autonomy over the human interactions. Indeed, this is precisely what has been done at MinuteClinic, where a computer provides a script to be followed by a nurse practitioner in diagnosing and prescribing medication for specific maladies. But, to the undoubted relief of the nurses, the script does not extend to patient conversations.

These examples demonstrate that standardization in lean can sometimes be achieved without undermining motivational autonomy.

Feedback: If asked about feedback in a lean system, most people will say that it is necessary if not automatic. Flows with limited buffers (e.g., limited work in process) require close communication to function. But kanban signals of downstream demand or visibility to a customer's production schedule are not the kind of feedback that impact worker satisfaction. What matters to one's sense of well-being is feedback about one's individual performance. This includes feedback, positive and negative, about both work performance and, where applicable, problem solving contributions.

Losada and Heaphy (2004) studied 60 strategic business unit management teams from a large information processing corporation and divided these into high, medium and low performance based on measures of profitability, customer satisfaction and assessments by superiors, peers and subordinates. They also observed team meetings used to develop annual strategic reports and coded the speech in these meetings into positive and negative statements. They found that positive statements outnumbered negative statements by more than 5 to 1 in high performing teams, but in low performing teams negative statements outnumbered positive statements by nearly 3 to 1. Not surprisingly, people find positive speech more motivating than negative speech.

In lean systems, opportunities where communication can be framed in positive or negative terms are everywhere. Feedback on incoming part quality, coordination of conversations among team members, and commentaries on problem solving suggestions are vital information exchanges, as well as critiques of personal performance. Whether these are motivationally demoralizing or affirming depends on the nature of the communication. By incorporating positive communication techniques (see Cameron 2012) into lean feedback mechanisms,

the information exchanges needed to promote efficiency can also promote motivation.

These examples are only a hint of the promise that exists at the intersection of factory physics and job design. They show that some work environments permit motivational improvements to be made without impeding efficiency. Others are amenable to practices that simultaneously improve efficiency and motivation. In still others, it may be possible to apply efficiency measures to parts of the work and motivational measures to other parts, and obtain the benefits of both. Finally, there are unquestionably situations where tradeoffs between efficiency and motivation exist. In order to properly evaluate these and make the best choices for the long run, it is important to recognize that investments in motivation may take longer to pay off than investments in efficiency.

Integration and the Path to Positive Lean

Our understanding of the physics of lean systems is admittedly incomplete and our understanding of motivation in lean systems is even more incomplete. But in both areas, we already know much more than we apply. If we make better use of known principles of factory physics and job design, we can improve the impact of lean implementations right now. To equip organizations to do this, lean educators and consultants must incorporate into their lean training materials: (a) a deeper understanding of the impact of variability on flow and (b) an explicit recognition of the impact of job characteristics (task significance, task identity, skill variety, autonomy and feedback) on worker satisfaction and motivation. To make effective use of these concepts in the workplace, organizations must build into their production management systems: (c) a shift in perspective from a restrictive, muda-centric focus on eliminating problems to an expansive, muda-mura-muri-based vision of building capabilities, (d) a long-term planning horizon to allow investments in workforce motivation sufficient time to pay off, and (e) a structured process of exploration and experimentation that facilitates discovery by managers and workers of practical new ways to make work both more efficient and more rewarding. With these organizations can begin to realize the immense benefits Positive Lean offers to investors and employees alike.

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RODERICK MARTIN[1]

Being prepared to answer questions that have not yet been asked: an hour with Mr. Sándor Fasimon, Chief Operating Officer, MOL Hungary[2]

Oil and gas are central to international energy supplies, and a focus for political as well economic concern. Since the 1970s, the oil industry has been transformed, with the decline of the 'seven sisters' (BP, ESSO, ExxonMobil, Gulf, Royal Dutch Shell, Standard Oil of California, and Texaco (now Chevron)) that had dominated the industry since World War II—by the 1990s, the four of the seven who survived controlled only 6 per cent of proven world oil and gas reserves, compared with 86 per cent in the 1960s. Instead, a new leading group has emerged, largely composed of state-owned oil corporations (China National Petroleum Company, Gazprom (Russia), National Iranian Oil Company, PDVSA (Venezuela), Petrobas (Brazil), Petronas (Malaysia), and Saudi Aramco (Saudi Arabia)). In addition to large multinationals, the industry also comprises an increasing number of smaller independent oil companies—in Europe alone, over fifty companies are engaged in oil and gas exploration and extraction.

The oil and gas industry is characterised by high levels of volatility in demand, and in prices, resulting in high returns, and high risks. The industry is capital intensive. Hence, in 2012, capital investment in the US onshore sector alone (one of the less risky and capital-intensive sectors) was estimated at USD 186 billion. The risks facing companies in the industry are diverse, including geological, political, and technological, as well as economic uncertainties. The difficulties, and expense, of oil exploration are increasing, with reserves to be found in extreme environments, such as the Arctic. Despite increasingly sophisticated geological survey techniques, the chances of exploration drilling proving negative are high. Political risks are also high, with geologically promising oil production areas

[1] The author and *Pannon Management Review* are very grateful to **Mr. Sándor Fasimon**, Chief Operating Officer, MOL Hungary, for the candid interview on which this article is based—and to **Dr. Miklós Dobák**, Professor at Corvinus University of Budapest and Member of the MOL Group Board of Directors, **Ms. Erzsébet Varga**, Assistant to Mr. Sándor Fasimon, and **Mr. Domokos Szollár**, Director, MOL Hungary Corporate Communications, for enabling it with grace.

[2] Magyar Olaj- és Gázipari Nyilvánosan működő Részvénytársaság (Hungarian Oil and Gas Public Limited Company, in translation).

located in regions of high political tension, in the Middle East, Central Asia, and Sub-Saharan Africa. With oil reserves located in politically highly sensitive areas, success depends upon building long-term relationships with governments—this presents high downside risks, as illustrated by MOL's current difficulties in Syria. Even in areas of political stability, government policies may prove unpredictable, for example on the conditionality of concessions, or on taxation, as in Russia. Despite technological advances, wholly unpredictable events—such as the BP Deepwater blow-out in the Gulf of Mexico—may cause major crises for even the largest oil company. Finally, the level of demand for oil is sensitive to the overall level of economic activity, with contractions in overall global economic activity resulting in declining demand for oil, and declining prices, as globally since 2008—current prices are approximately two-thirds of earlier peak levels. Within Europe, the increasing maturity of the motor vehicle market, as well as increasing environmental concerns regarding hydrocarbon emissions, has led to a softening of the demand for oil.

MOL is one of the most important European independents, whose significance for the industry has grown since the 1990s.[3] It is an 'upstream[4] driven integrated oil company' (MOL Group 2013b), with headquarters in Budapest. The Company is by far the largest company listed on the Budapest Stock Exchange (BSE), and the largest oil company in the Central and Eastern European (CEE) region, with approximately 30,000 employees, including over 600 in its Budapest headquarters. On 31 December 2012, the capital value of the Company was over USD 8.4 billion. The Company undertakes exploration in 11 countries, and production in seven—in addition, downstream[5], it operates five refineries and two petrochemical plants in Croatia, Hungary, Italy, and Slovakia (MOL Group 2013c). The Company is in a relatively secure financial position, with an investment status rating of BBB- according to Fitch and BB+ according to S&P, above the rating for Hungary (MOL Group 2013b). Its major market is Central and South-Eastern Europe, with market dominance in Croatia, Hungary, and Slovakia. Despite the continuing effects of the international financial crisis, especially in Europe, MOL's operating cash flow increased in 2012, after declines in 2010 and 2011. In 2012, the Company generated a clean CCS[6]-based EBITDA[7] of HUF 573 billion—down

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3 See 'Appendix' (pp. 61–62), for 'A history of the company in brief', and MOL Group (2013a) for a more detailed account.

4 Oil exploration, extraction, and transmission.

5 Oil refining, distribution, and marketing.

6 Current cost of supplies (net income after allowing for increases or decreases in expenses).

7 Earnings before interest, taxes, depreciation, and amortisation.

by only 7 per cent compared with previous year, despite the absence of any contribution from Syrian operations, which contributed HUF 75 billion in 2011. The Company is owned by private shareholders, mainly international institutional shareholders, with the Hungarian state as the largest single shareholder.

Since its staged privatisation in the 1990s, the Company has transformed itself from a 'state owned national oil company into an efficient international oil company' (MOL Group 2013c). The company grew from 16,195 employees in 1995 to 29,299 employees in 2012. The scope and scale of its operations has vastly increased, since the mid-1990s, with international expansion both upstream and downstream. Upstream, the Company is exploring or has under development blocks in fields in Russia, the Commonwealth of Independent States (CIS), the Middle East, and Africa, as well as in Central and South-Eastern Europe. In addition to Hungary and Croatia, current production is primarily from Russia and Pakistan (gas and condensate), and, until the declaration of *force majeure* in February 2012, in Syria. For the future, the greatest potential of current assets is in Kazakhstan, the Kurdistan Region of Iraq, and Russia. The Company is the major gas producer for Hungary. Downstream, the Company's operations include both refining and wholesale and retail sales, and are concentrated in Central and South-Eastern Europe (for example, in Croatia, the Czech Republic, Romania, Serbia, Slovakia, as well as Hungary itself), but with further operations in Italy, and with petrochemicals through TVK[8] (in Hungary) and Slovnaft[9] (in Slovakia).

The interview with Mr. Sándor Fasimon focused on specific features of MOL's transformation, especially since 2008, which are detailed below. This introductory note draws attention to three general themes arising from the interview. The first is the importance of adopting a long-time perspective on developments—in oil and gas, there is little scope for short-termism. The second is the strategic importance of a balanced portfolio as a means of managing risk. The third is the need for proactive human resource policy, to develop human resources appropriate for the Company's strategy.

The oil industry operates on a long-time perspective. Upstream, exploration, assessment, development, extraction, transmission, refining, distribution, and sales extend over decades, with large upfront capital investment. Exploration is the basis for long-term growth, but is costly and poses high risks—even in areas of proven reserves, wells drilled may prove dry. Short-termism is out of place, except,

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[8] A subsidiary of the MOL Group, TVK Nyrt. / Tiszai Vegyi Kombinat Nyilvanosan Mukodo Reszvenytarsasag (Tisza Chemical Group Public Limited Company, in translation) is a Hungarian manufacturer of olefins and polyolefins such as polyethylene and polypropylene.

[9] A subsidiary of the MOL Group, Slovnaft a.s. (Slovnaft Public Limited Company, in translation) is an oil refining company.

perhaps, for the special case of the oil futures market. As the following interview shows, MOL's strategic perspective has been long term. The overall upstream internationalisation strategy began in the mid-1990s, with initial investment in Pakistan, and subsequent investments in Russia and the CIS, the Middle East, and Africa. As an integrated oil and gas company with over 75 years' experience in Central-Eastern Europe and two decades of international exposure outside the region, MOL Group's exploration and production strengths derive from field development-driven growth in the short term, the transformation of existing exploration assets into production mode in the mid term (as in Kazakhstan), and the exploitation of long-term opportunities based on an exploration-led strategy (as in the Kurdistan Region of Iraq). In 2013, the Company's strategic aim is to expand upstream output to 170–80 thousand barrels per day by 2017–18—an increase of approximately 50 per cent over the 2012 output of 105–10 thousand barrels per day—and stabilise output at that level, with appropriate reserves developed in support. The long-term production chain, from exploration to eventual sale, is capital intensive—MOL's current capital expenditure (CAPEX) is planned for up to USD 2 billion per annum, with around USD 1.5 billion organic CAPEX planned for 2013. The Company's approach to financing is conservative, with the financing of capital investment primarily from internal rather than external sources, with a relatively low, and in 2013 declining, gearing—a five-year low was reached in the first half of 2013. Organic CAPEX spending is financed from the operating cash flow, as a general rule. The Company's downstream strategy is similarly focused on the long term, with consolidation in core areas, through rationalisation of refinery resources and development of retail facilities. MOL is adapting itself well to the demands of an industry in which a long-term perspective is required.

The second theme is the role of a mixed portfolio in managing risk. Operating as an integrated oil company, both upstream and downstream, provided an overall balance, with upstream performing strongly after 2008, when downstream performed weakly. Operating both upstream and downstream was a long-term strategy, since the privatisation of the Company in the mid-1990s. In the early 2000s, the major source of profit was midstream, gas, and downstream, refining, and wholesale and retail sales. The company exited gas in 2006. From 2008, the downstream market in Europe entered depression, due partly to external market changes associated with economic difficulties especially in MOL's core Central- and South-Eastern European markets, and partly to internal difficulties in refining operations. Upstream became the major generator of EBITDA. The weakness in the European oil market is expected to be long term, and the reliance upon upstream to continue. Within upstream operations, the Company has adopted a lifecycle-based mixed-portfolio model, with fields scheduled for exploitation to achieve and sustain the target 170–80 thousand barrels per day. Central- and South-Eastern Europe (Hungary and Croatia) provide the basis for short-term cash

generation, with Kazakhstan, the Kurdistan Region of Iraq, and Russia providing the basis for mid- and long-term growth. The Company seeks value creation over volume. More specifically, the strategy involves the Company acquiring minority shares in new frontier regions, with growth as operator in core regions where it possessed long experience. Experimentation is practicable in areas where the Company is well secured, as offshore investments off Croatia in the Adriatic. Exploration successes are the basis for long-term growth, but core operations in Hungary sustain revenue flows in the short term, even where the costs of production are rising as fields mature. Downstream, the strategic objective is to reduce costs, both in refining and in distribution. Excess refining capacity in Europe makes profitable operations difficult, except where the Company has a specific edge, as in diesel refining (which partially balances losses in refining polymers). The reduction in refining costs is being achieved through improvements in efficiency, especially in fuel utilisation and maintenance. Improvement in distribution and sales is being achieved through consolidating coverage in markets where the Company is already strong, and small-scale expansion in cognate areas. Hence, the Company seeks to retain its leading position in Hungary and Slovakia, grow further in the Czech Republic, Romania, Serbia, and Slovenia, and consolidate in Bosnia-Herzegovina and Croatia.

In answer to the challenging downstream environment, the MOL Group launched a New Downstream Programme, which aims to achieve a USD 500–50 million improvement in EBITDA by 2014 though improvements in efficiency, increases in operational flexibility, rigorousness in cost management, and integration of revised sales strategies. Almost 30 per cent of the total target—an improvement in EBITDA of USD 150 million—was achieved in 2012 alone.

The third theme is the linkage between long-term Company strategy and human resource policies. The internationalisation strategy involves building an international human resource strategy combining the recruitment of local staff, integrated into the Company's international operations, with the circulation of expatriate staff. The growing importance of upstream also requires expanding the recruitment of engineers, especially petroleum engineers, and reducing the recruitment of chemical engineers, as the importance of the refineries to the Company's performance declines. International recruitment and training are facilitated by a management trainee scheme, established in 2007, which includes on-the-job training at MOL headquarters for internationally as well as nationally recruited staff. The Company has also established alliances with the University of Pannonia, for training engineers in information technology for the oil industry, and the University of Miskolc, for training engineers in chemical engineering for the oil industry.

Mr. Sándor Fasimon was appointed Chief Operating Officer (COO) of MOL Hungary on 1 October 2012. At only 47 years of age, Sándor is a very young executive with a very long—and very impressive—business and managerial experience behind him:

- Executive Vice-President (EVP), Exploration and Production, MOL Group (2011–12);
- Senior Vice-President (SVP), Supply and Trading, MOL Group (2009–11), responsible for crude oil supply, development of energy portfolio, trading platform operation, as well as natural gas and energy trading;
- Chief Executive Officer (CEO), MOL-Russ Ltd (2006–9);
- Managing Director, Natural Gas Division, MOL Group (2003–6), including, between 2005 and 2006, as Head of Upstream Portfolio Development;
- Chief Executive Officer (CEO), MOLTRADE-Mineralimpex (2002–3);
- Director, MOLTRADE-Mineralimpex (1998–2002);

and

- Counsellor, Head of the Tripoli (Libya) Hungarian Commercial Section (1996–7).

Sándor also serves on the MOL Group Executive Board and the Hungarian Hydrocarbon Stockpiling Association, and as Special envoy to the MOL Group Chairman-CEO for CIS and Middle-Eastern relations.

The interview with Mr. Sándor Fasimon took place on 16 July 2013 at 'Agrober'—the Budapest offices of MOL Hungary—and was assisted by Mr. Domokos Szollár, Director, MOL Hungary Corporate Communications, and Ms. Anamaria M. Cristescu-Martin, Assistant Editor, *Pannon Management Review*.

RM: Mr. Fasimon, thank you very much for having us. I was not aware until very recently of the strong bonds between your Company and the University of Pannonia.

SF: *We do indeed have very strong bonds with the University of Pannonia, where we have both a postgraduate MOL Programme Industry Modelling System (PIMS) Academy and an internationally accredited MSc degree in chemical engineering in hydrocarbon and petrochemical processing. The PIMS Academy was launched recently—it was May, when I last visited the University—and the MOL Department at the University of Pannonia even has a small refinery reactor system. (A living, breathing refinery unit, practically working a seven-day continuous shift.) I was astonished by what I saw during my visit there, both from a technological point of view and, as a manager, from a business point of view. In*

any business partnership, no matter how many precautions you take and no matter how much you plan in advance, there is always a small element of gambling involved, but I can say—hand on heart—that I am very proud of what we have achieved in cooperation with the University of Pannonia.

RM: How exactly do this and, possibly, other such partnerships fit in with your Company?

SF: *We have two main business streams—downstream and upstream. Both downstream and upstream require very specific knowledge, very specific expertise of the people who work in one or the other. Our partnership with the University of Pannonia serves our needs in downstream. I would even go as far as to say that—through this particular partnership—our human resource needs for downstream are now covered. Therefore, these days, we are focussing not so much on Veszprém*[10] *as on Miskolc*[11]*. We plan a MOL Faculty in Miskolc, similar to the one in Veszprém, and hope to achieve similar, outstanding results. Our future engineers—geologists and the like—will receive their training and education in Miskolc. In a company like ours, maybe more than in most other companies, we have to think 'long term' and we have to think 'future'. Our human resources are very much an integral part of our long-term future.*

RM: Are these training and education programmes exclusively for (future) MOL employees, then, or are they open for everybody with an interest in the industry, including from overseas?

SF: *A combination of both. The MOL MSC degree in Veszprém is based entirely on a tailor-made curriculum and focuses on the refinery and petrochemical units. Around 70 per cent of the chemical engineers who work in our refinery and petrochemical units come from the University of Pannonia. This is a huge number—as well as a huge human resource management commitment. Moreover, training and education starts not at degree level, but as early as secondary school. Programmes such as Junior Freshhh, Freshhh, and Growww are tailored both for our needs and for those of the young people involved—it works both ways, you see, and it works extremely well. For example, there are more than three hundred people involved in the Growww programme—of these, 124 are fresh graduates from all over the country. We aim to attract the best graduates from all over the country—the selection process is three to four months long, and far from easy. This results not only in working for our Company and*

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[10] The University of Pannonia in Veszprém used to be called the University of Veszprém.

[11] The University of Miskolc. Located in North-eastern Hungary, Miskolc is the capital of the Borsod-Abaúj-Zemplén County and the centre of the Northern Hungary region. Nicknamed Steel City and City of the Open Gates, due to its heavy industrial background, Miskolc is the fourth largest city in Hungary—and the second largest by population density.

getting paid for it, but also in getting business education, practical inasmuch as theoretical. The Growww programme allows you more than just to familiarise yourself with our Company—it allows you to get a good look around, as it were, poke an inquiring nose in all manners of aspects, not just one. Allowing young people to get a comprehensive understanding of our Company at the very beginning of their careers is a way—one of many—of planning for the future. We started this initiative in 2007, if I remember correctly. Today, 12 percent of the total MOL Hungary workforce and 3 per cent of the total MOL Group workforce are former Growww programme participants, with a best-in-class retention rate of 82 per cent—this is an excellent outcome, an excellent return on investment, if you want, particularly important in times of economic crisis.

Planning for the future involves being prepared to answer questions that have not yet been asked—you need answers at hand, in times of economic crisis. At such times, what you certainly do not need is having to start looking for answers—or, worse still, not knowing what the questions actually are. In practice, this means answers in terms of capital expenditure, this means answers in terms of organisational change, this means answers in terms of efficiency, and—from a human resource management perspective—this also means answers in terms of training and education.

RM: With such an emphasis on the future of your Company, to what extent is the past relevant, then?

SF: *We need to know what has happened, we need to know what our heritage as a Company is. Where have we come from? Where are we today? However, we need to focus less on the past, as such, and more on the future receipt of our corporate past. Furthermore, we should not think of our Company in isolation, but very much as part and parcel of a wider, Central-Eastern European picture. Although, theoretically, an 'independent' oil and gas Company, we are dependent completely on our business environment, which is extremely volatile. If we take downstream, for an example, the situation in Europe is extremely difficult nowadays—if we take upstream, for another example, the situation in Europe is equally difficult. This is why I think that the past is relevant only to a certain extent, and that to understand a company like ours you need to understand its environment too—it simply does not work, otherwise. I could tell you that our revenue today is ten times higher than our revenue in 1992, for example, but what is the exact meaning of such a piece of information? Trends, on the other hand, are far better, much more informative, infinitely more strategic pieces of information.*

RM: Let us forget about figures, then, not least because I have already consulted the comprehensive information provided on your Company's website[12], and let us

[12] http://www.mol.hu/en.

talk about trends. As far as the balance between upstream and downstream is concerned, the revenue figures that I have seen suggest a somewhat zigzagging trend, with downstream outdoing upstream, for a time, and upstream outdoing downstream, for another.

SF: *Indeed, so they do, and the integration and synergy between upstream and downstream is a very good example for us to talk about—as well as an essential issue for our Company.*

The time before the global economic crisis of 2008 was practically the golden era of downstream—or of refining marketing, as it were—the crude oil prices were much lower than they are now, the crack spreads[13] *were much higher, and we were harvesting the rewards of prior investments, mainly in our Danube and Slovnaft refineries. It is perhaps worth pointing out that we were not producing fuel oil at all, at these two refineries—petroleum coke and gas oil were the end products, there. Moreover, not only did we have the best five refineries in Europe, from the point of view of technological complexity, but Danube and Slovnaft were also among the best revenue-generation, crack spread-generation, and EBITDA-generation refineries. The investments we made in the early 2000s—and keeping away from producing fuel oil—allowed us to harvest the rewards in 2003–5. In the early 2000s, we focussed very much on strengthening our position on the Central-Eastern European refining marketing market—consolidating our national downstream operations, in the process—by taking over Slovnaft and increasing both capacity and reach. You know enough of our history to remember that we had three refineries in Hungary, at the time, Zala, Tisza, and Danube. Today, our Company has a total of five refineries, but only one in Hungary—the others are two in Croatia, one in Slovakia, and one in Italy. As I said before, this was very much the golden era of downstream—downstream, in those days, was the biggest generator of EBITDA for our Company. Nowadays, the situation is exactly the opposite. However, we contemplated moving out internationally long before the end of this golden era, not least because of our local upstream operations. Some twenty years back, as the first step in our more international operations, we had acquired the relevant experience in Pakistan. The time coincided with our decision to maintain a stronghold position in Central-Eastern European downstream—forever a captive, landlock market for our refineries, due to their locations, and depots and retail networks included. The Upstream Division's contribution has grown significantly, over the last few years—nowadays, our Company is more international and more upstream driven than before. For example, in 2012, in line with previous years' trends, around half of MOL Group's earnings came from outside Hungary. We expect this tendency to continue in the coming years.*

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[13] In the oil industry and futures trading, the differences between the price of the crude oil and the prices of petroleum products manufactured from it.

RM: So, what particular Central-Eastern European countries make up your captive market?

SF: *Look, I would not talk in terms of countries, but in terms of radiuses around refineries—for me, 'captive' is a pure matter of logistics. Most Central-Eastern European countries are now EU members—it is entirely equal to me, whether I sell to Poland or Germany. The question is not where to sell, but who gives me the highest margin—in supply chain management optimisation, this is a very important tool available to us, from crude oil selection up until end product sale, whether via oil or retail networks. In short, 'captive' is a matter of distance, up to a certain point, and a matter of price, beyond that point—at the end of the day, logistics is very much in your own hands.*

RM: It would then follow that the current shape of your Company is pretty much logistics based.

SF: *And indeed it is. It was in cooperation with the PIMS Academy we already talked about at the very beginning of the interview that we arrived at the shape you see today—seven units, of which five refineries and two Petrochemicals units. These allow us a selection of supply materials, whether crude oil or other materials, and a market like a kind of blank book that we ourselves get to write, in time, function of the highest margin we can achieve. This is the real art, if you will.*

That supply chain management optimisation is a real art becomes particularly evident in times of hardship, such as nowadays, in downstream terms, or in the not so distant past, in the natural gas business. I do not particularly like to talk about myself, but the best examples I can give are always examples from my own business experience. The example I want to talk about dates back to 2006, when I moved to Russia as head of our operations there between 2006 and 2009. By 2006, we had already started international upstream operations. To our 75 years of experience in exploration activity in Hungary, we had added the 60 years of experience of our Croatian colleagues at INA[14]*. Our experience as the lowest-cost European onshore operator was much enriched by our Croatian colleagues' experience as shallow water offshore operators. We also benefited reciprocally from each other's already established international positions. However, production and reserves were both decreasing in Central-Eastern Europe—a sign of the natural depreciation of the old, matured fields—not expanding overseas was not an option. One of our two main targets is to reach a 100 per cent reserve replacement ratio, but this can only be reached through international expansion. It will not happen, if we just stay put in Hungary and, respectively, Croatia and wait for it to happen. Our own natural fields are already depleted, and production in both countries is decreasing. However, by adding reserves on an international*

[14] Industrija Nafte dd.

basis, we can reach both our main targets, the second of which is increasing production from 105–10 thousand barrels per day to 170–80 thousand barrels per day by 2017–20.

RM: What strikes me most about your international operations is that the Company holds reserves in politically risky areas—risky at least to some degree, anyway.

SF: *Whether you like it or not, any upstream project struggles with its own set of challenges. The only thing you can do about it is to mitigate these challenges, be they political, geological, of taxation, or of some other nature. They are all different kind of challenges, but they are all challenges that have to be mitigated, as far as we are concerned.*

How do we do that? Well, we manage such challenges in various ways. We have a portfolio of projects, at Group level, with different lifecycles. There are three types of such projects, with three different average lifecycles—exploration projects, appraisal projects, and production projects. The production projects are already in place—mainly in Central-Eastern Europe and Russia—and represent a good, continuous cash generator. The appraisal projects come around once you have found reserves, such as those we have found in fields across Kazakhstan, where we know that we hold around 5 per cent of our total reserves in our Kazakh blocks[15] *and where we carry out the appraisal project as we speak. In the medium term, appraisal projects lead to new cash-generating production projects. As far as exploration is concerned, we currently carry out two such projects, one in Oman, where we hold two blocks, and one in the Kurdistan Region of Iraq. This portfolio of projects is important to us not only in terms of project lifecycles, but also in terms of project geographical spread—from this point of view, we cover Central-Eastern European countries; CIS countries (Kazakhstan and Russia) and other Asian countries (the Kurdistan Region of Iraq, Oman, Pakistan, and Syria, where we have a force majeure situation); and even Africa. For each and every of these countries, we have to consider the exposure we are ready to take and generate a mixed, well-balanced, healthy lifecycle portfolio. So, this is how we manage our challenges, this is how we mitigate our risks.*

I know that you are particularly interested in political risk, but—in many a way—political risk is the least of our worries. Let me try to explain to you why. Political risk is a variable that has to be accepted as given. We cannot interfere with it, and we do not intend to—our business is energy, not politics, and we cannot change an entire country, just because of our ongoing projects. Consequently, the only thing we can do is good, sound stakeholder management. In the CIS countries, for example, we are able to do so because we still have lots of

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[15] Large areas of land awarded to companies by a country's government for oil drilling and exploration.

Russian speakers among our employees, which is very good. The challenges we encounter in Arab countries are different from the challenges we encounter in CIS countries—in turn, of course, these are different from the challenges we encounter in Africa. However, despite such differences, our focus remains unchanged—how to manage challenges, how to mitigate political and other risks.

RM: I am particularly interested in the Pakistani case, because, in 2005, I was a guest of the Pakistan State Oil Corporation (PSO).

SF: *Pakistan is a very interesting story, because it is kind of a heritage from the 1990s for us, when we first went overseas. In accordance with the TAL Block*[16]*, around 8 per cent of the total Pakistani energy supply comes from gas, and we are the operator, with a 10 per cent interest. We have a subsidiary there, with excellent Pakistani colleagues—through the years, MOL Pakistan has gained the respect of the local energy industry. Depending on our intentions, including relative to potential exposure to Pakistan, we are looking for new projects—new ventures such as the Karak block, for example, with Mari Petroleum*[17]*—so, we keep looking, we keep picking up new ideas. As an operator, we are accustomed to Pakistan, and to the country's security situation. We have become acquainted with the local customs, and we have accumulated and learned from our experience there—we feel comfortable working in Pakistan. As an oil and gas company, we have to think not just for the short term, not just for the medium term, but also—particularly—for the long term.*

RM: Well, another aspect I am interested in is Hungary's role as an oil producer—I hadn't realised this was the case, until very recently. Mature production, true, but still quite important.

SF: *Let me add that two-thirds of our current EBITDA is generated by our upstream business—only one-third is generated by downstream, quite the other way around compared with the situation prior to 2008. Incidentally, this gives you a nice, accurate picture of how we integrate upstream and downstream and how we counterbalance the risks of one with the opportunities of the other, in a kind of financial hedge. Regarding revenue, more than 50 per cent comes from our international operations—less than 50 per cent comes from our domestic operations.*

However, Hungary is still important for us—the domestic market is important for us, including from an upstream point of view. Hungary still represents close to 40 per cent of our production, and the slow and continuous decline is natural. Consequently, the only thing we can do to mitigate decreases in production is to ensure that we do not increase the unit cost of production—this is our first main

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[16] Petroleum exploration licence.

[17] Mari Petroleum Company Limited is one of the largest oil and gas exploration and production companies in Pakistan.

target, as far as Hungary is concerned. Our second main target is to ensure that even the natural decline of the production does not exceed 5 per cent. Efficiency is the only solution to this particular problem—both in terms of upstream and in terms of downstream, but particularly in terms of downstream. Although upstream is a different story, to maintain your position as the cheapest onshore operator while your production decreases, you have to increase your efficiency.

Moreover, and more importantly, you have to consider the so-called enhanced oil recovery (EOR)[18]*—or advanced oil recovery—or what unconventional extraction methods you can use in addition to the conventional methods. Unconventional extraction methods may potentially help, but, as I said at the Napi Gazdaság* Forum[19]*, I do not see Europe—Hungary included—playing a pioneering role in unconventional technology. This country's geology is entirely different from that of the US, where these technologies are at their most advanced, and does not lend itself to shale gas and unconventional oil. It is not that we cannot do it—and it is not that we do not keep experimenting—we can do it, we can make the fractioning*[20]*, and we can get the gas. So, the question we have to ask ourselves is not whether we can do it or not, but whether we can do it economically or not. This is the important question—an important question to which we have not yet found a final answer. We shall continue to meet such challenges head on, but I do not foresee dramatic changes in the history of oil and gas extraction in Hungary in the near future. You may have already heard about the Makó unconventional story—we were joined by ExxonMobil, in an attempt to extract gas with unconventional methods. There is gas, no question whatsoever about that, but the pressure and the temperature are very high in Hungary, much higher than in the US, and the geological configuration is completely different—even ExxonMobil failed in front of such challenges. Perhaps, who knows, the technology will gather the necessary momentum, in 20 years' time.*

RM: I looked at today's oil price on the television news this morning—it was, if I remember correctly, around USD 110. At one stage in the past, this price was much much lower, while, at another, it was much much higher. Assuming that the oil price stays roughly in the margins between USD 90 and USD 110, would you say that was a crisis for downstream?

SF: *Look, the oil price affects our business in various ways. Upstream, high oil prices definitely impact on our business directly. There is an important difference between European refining and US refining—European refineries consume oil as*

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[18] A generic term for techniques for increasing the amount of crude oil extracted.

[19] *Napi Gazdaság*—Hungarian Energy Investors Forum, Budapest, 16 May 2013.

[20] The natural gas at the wellhead contains many natural gas liquids (NGLs), thus differing from the natural gas used by consumers. After removal from the natural gas, NGLs are then separated into base components, through a process called fractionation.

well as produce oil. Our own refineries consume around 8 per cent of the oil they produce. In other words, we lose 8 per cent of our production, at a cost of around USD 100 per barrel of crude oil, by burning it for our own consumption—this is a huge cost. In contrast, US refineries work primarily on US shale gas, which comes at a much cheaper price than the crude oil. From a competitive point of view, this is hugely advantageous for the US refineries. In Europe, we have to look at how to best decrease our own consumption and what is the best portfolio of materials for our own energy consumption—beside crude oil, we also use natural gas, steam, and others. What is the best combination of materials—both from a cost point of view and a consumption point of view—is a perennial preoccupation for us. Since there is no easy solution to this problem, the oil price remains a huge burden on our refineries.

Downstream, high oil prices also impact on our business directly, through crack spreads—the differences, the spreads between the prices of diesel oil and gasoline, for example, and the price of crude oil. If not sufficiently high, your business is not really profitable. High oil prices lead to decreases in both consumption and crack spreads and, ultimately, to refineries being closed down—10 per cent in Europe, so far, and a much higher—and much faster—percentage in the US. The situation may deteriorate in Europe at a slower rate than it does in the US, but deteriorate it does.

This is the reason why we have to fight for our lives, the reason why we have introduced our New Downstream Programme, and the reason why it is good to have two main business streams in one integrated company, upstream and downstream—it acts as a kind of financial hedge.

The golden age of the downstream seems over now, at least for the foreseeable future—I do not see it returning in the next few years. Who knows, perhaps it will never return—I myself do not know what the end of the downstream story will be, but I do know that we always have to be prepared to answer questions that have not yet been asked. This is what our New Downstream Programme is all about—efficiency improvement. We aim to increase contributions to EBITDA by USD 500–50 million, between 2012 and 2014, from both cost point of view and revenue point of view.

In practice, the New Downstream Programme affects the entire supply chain management, starting from judicious crude oil selection—through judicious optimisation of logistics, all seven production units, and the wholesale and retail elements of our business—to judicious development of our captive markets. The largest contributions are cost-related and come from increases in efficiency—energy, production, maintenance, logistics, the whole lot. Only 30–40 per cent of contributions come from increases in revenue, as in Romania, for example.

The New Downstream Programme generated 90 criterions and hundreds of different projects, and we are very proud to have reached our first-year target,

which was USD 150 million contributions to EBITDA. With a much higher target of USD 250 million, this year is absolutely crucial, but the quarterly targets so far have been reached successfully. How did we do it? Well, first of all, individual targets were set for all our business units, be they the Croatian Rijeka refinery, the Hungarian Danube refinery, the Slovakian Slovnaft refinery, etc. Second, although the initial planning was done top-down, any subsequent planning was done bottom-up—the decisions we took were collective, but also—at the same time—individual. Third, the New Downstream Programme involves a cultural change, and a new, lean downstream. This requires an enormous effort on our part, but a kind of effort that we are both forced and proud to make—as I said before, the late 2000s were completely different from the early 2000s, not only for our Company, but also for the entire oil and gas industry. Today, around 10 per cent of the European capacity has been shut down, and the European consumption has decreased by more than 10 per cent—in the near future, I expect, other refineries will have to shut down. What is the answer? There is no answer other than to increase your efficiency—moreover, once the downstream 'crisis' is over, you not only come out of it as a winner, you come out as a better winner for that. You have to run for your life—it is as simple as that.

RM: So, was achieving this balance between upstream and downstream a strategic decision that your Company took at a specific moment in time, or a strategy that has developed gradually, by chance rather than intent?

SF: *No, certainly not the latter. Achieving this balance was carefully thought through. If you look back at our history, we were a state-owned company, in the 1990s—a Trust even, not only with factories, but also with hotels and others. Nowadays, following various IPOs*[21]*, we are an independent oil and gas company focusing on our two core businesses, downstream and upstream. While our gas operations are part of our historic heritage, the downstream consolidation of our Central-Eastern European market—by taking over Slovnaft in Slovakia and INA in Croatia, for example—is very much part of our early years as an independent company. We have achieved this consolidation, and we continue to strengthen our captive markets. Building new depots (as we did in Romania) and taking over retail networks (as we did last year with Pap Oil in the Czech Republic) are very much part of our effort to maintain a stronghold position and consolidate our captive markets. The Czech Republic is important to us because of its geographical location. From Slovnaft we can reach Austria, we can reach the Czech Republic, we can reach Germany, and we can reach Poland. Since the Czech Republic is a natural market for us, taking over Pap Oil was a natural thing to do. So, definitely, that's why we have taken over Pap Oil. (As I said before, to feel reasonably comfortable, you need at least 10 per cent of the retail market.)*

[21] Initial public offerings.

It was already during these years[22] *of market consolidation and downstream capital investment—mainly in Slovnaft and Százhalombatta, our Danube refinery—that we understood the necessity of a balanced upstream–downstream portfolio. It was clear that our upstream position was weakening and that, consequently, we needed to expand upstream internationally. We had started off with a historic heritage from the 1990s, but sold off our natural gas operations to focus in 2005–6 on acquiring new international upstream positions. Since we already had 20 years of experience in international upstream, over the last ten years or so, we were able to build up our international upstream portfolio.*

So, you see, while we may have achieved the upstream–downstream balance gradually, the strategy behind this achievement was not at all inevitable, gradual happenstance. This was definitely our answer to the wider economic situation—our vision of where we were going to find ourselves in the future—we had to think 'future', we had to think 'long term'. Moreover, upstream forces you to think that way—exploration can take as long as seven or even ten years, <u>just</u> the exploration side of upstream. So, yes, it was definitely and purposely a very well thought through strategy—we moved away from our gas operations in order to strengthen our international upstream position.

RM: In Central-Eastern Europe, Romania seems to be particularly important to your Company, both downstream and upstream.

SF: *Nowadays, Romania is definitely a core country for us—she belongs to our flagship, and she is important from both an upstream point of view and a downstream point of view. From an upstream point of view, we have won concessions for three blocks in Western Romania —we want to extend our portfolio there. The country is also a natural market for us—this is why Romania is important for us from a downstream point of view too, and a captive market for our refineries. Our retail market share has reached almost 13 per cent there—in our industry, a company is in a strong position if it holds 10 per cent of the market. We have two depots in Romania, one at Tileagd*[23] *and a new depot on the Danube, at Giurgiu—practically, we can reach the Romanian market by barges, as well as roads and railroads, and we are definitely focusing on Romania as one of our core markets.*

RM: One of the changes central to your New Downstream Programme was in connection with the organisation of your Company and with organisational restructuring. In particular, the *Investor Presentation* of June 2013 mentioned GLOCAL. I wonder if you could explain the thinking behind it a bit more.

SF: *Our Company has grown continuously, and is different now than it was even just ten years ago—the number of companies that make up the MOL Group*

[22] 2000–5.

[23] In Bihor County, in Western Romania.

has increased, and our business processes have become more and more complex. At the same time, our business environment has changed greatly, in the last few years, with the economic crisis contributing additional challenge. However, *in many ways, 'where there's a crisis, there's an opportunity too'—a crisis is not just a threat, but also an opportunity. Removing or, at the least, minimising the threat is only half of your answer to that crisis. What is your answer to the opportunity side of that crisis? Our own answer is GLOCAL—creating a new corporate governance structure. This applies to our downstream operations, this applies to our upstream operations, and this applies to the Group as a whole. In very practical terms, we have created a Group-level headquarters, responsible for strategic development from both upstream and downstream perspectives—where does the Company need to go? how can it get there?—and leadership. For the international headquarters of an international oil and gas company to be located in Budapest, Hungary, Central-Eastern Europe is an extraordinary achievement, not just for our Company, but also from national and regional perspectives. The headquarters is located very close to 'Agrober' and employs around six hundred people. Of these, 25 per cent are foreign nationals from countries as varied as Finland, Pakistan, Scotland, and others—all well-experienced colleagues, all colleagues with plenty of international expertise. Therefore, GLOCAL stands for global—as in our international headquarters—as well as for local—as in its location.*

Given the size of our Company, we have created four geographical flagships—Slovnaft, responsible for Slovakia as well as Austria, the Czech Republic, Germany, and Poland; INA, responsible for Croatia as well as Albania, Bosnia, and Macedonia; IES[24]*, currently responsible only for Italy; and MOL Hungary, responsible for Hungary as well as Romania, Serbia, and Slovenia. The latter is my particular area of responsibility—although, of course, I hold many other responsibilities at Group level. We are still in the process of fine-tuning our flagship structure, allowing the four flagships increasing authorities without jeopardising the authorities, responsibilities, and accountabilities of the Group as a whole—bearing in mind the Group optimum is crucial.*

RM: So, would the heads of each of these flagships be local to their particular geographical area of responsibility, would they come from the headquarters, or would they just happen, as it were?

SF: *The heads of these flagships are usually the CEOs of the local companies, be they Slovnaft, INA, or IES—Mr. Zoltán Áldott, for example, is both President of the Management Board of INA and head of the flagship. Regarding Hungary, the situation is slightly complicated by the fact that both Group and flagship belong to the same legal entity. Were they separate legal entities, I would be CEO of MOL*

[24] Italiana Energia e Servizi S.p.A.

Hungary Limited. However, since they are not, the Group Chairman-CEO is Mr. Zsolth Hernádi, the Group Chief Executive Officer (GCEO) is Mr. József Molnár, and I am the COO of the Hungarian flagship. However, in the years I have been with the Company, I have held numerous other positions—including as Managing Director of the Natural Gas Division, for example, and as CEO of our Russian operations—and have acquired a widespread knowledge and understanding of the Company.

RM: Speaking of Russia, Thane Gustafson, an American scholar, has just published an extensive and immensely interesting account of the Russian oil and gas industry—I do not know if you have come across it yet.

SF: *Well, you see, I have a very 'specific' experience of the Russian oil and gas industry. My time as CEO of our Russian operations*[25] *coincided with the time when Surgutneftegas*[26] *attacked MOL—you already know, perhaps, that Surgutneftegas acquired a 21.2 per cent stake in MOL at the time. I have to say, though, that the direction of the Russian oil and gas industry is rather clearer—at least for me—since Yukos*[27]*. Rosneft*[28] *taking over TNK BP is also a good indicator for the Russian oil and gas industry—in what direction it is heading, nationally and internationally. Such knowledge is very important, because, internationally, part of the story of MOL has always been part of the story of Central-Eastern Europe—how to maintain the national and regional economic independence, how to keep Russian economic influence at a comfortable distance. Ukraine is in a different situation, but the Balkan region has always been an economic target for Russia. Russia has expanded in Bulgaria (through Lukoil*[29]*), in Serbia, and in Bosnia.*

RM: Direct competition between MOL, on the one hand, and the Russian oil and gas industry, on the other, would be rather severe.

SF: *Yes, it would—yes, it is. However, I have always thought that you can manage the competition from the Russian oil and gas industry. The only thing is, you have to put the Russian oil and gas industry into a competitive situation—that is all, I think—that is all, but it is rather crucial.*

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[25] In 2006–9.

[26] Open joint-stock Russian oil and gas company.

[27] Yukos Oil Company, an open joint-stock Russian petroleum company that went bankrupt on 1 August 2006.

[28] An integrated oil company with a majority owned by the Russian government. It purchased the Yukos assets in state-run auctions and became Russia's leading extraction and refining company, as well as the largest publicly traded oil company, after acquiring TNK BP in March 2013.

[29] Second largest oil company, and second largest oil producer, in Russia, as well as second largest public company, in terms of proven oil and gas reserves.

From a crude oil supply point of view, we always have the additional potential granted to us by the Adriatic pipeline—we can always rely on the crude oil from the Adriatic Sea. In general, our Slovakian and Hungarian refineries use a different source of crude oil. When you have an alternative, when you do not rely on one single option, that is when your exposure to Russian competition is negligible—and we do have that alternative. The crude oil from the Adriatic Sea. And another thing—the price of the Russian crude oil has to be competitive.

I remember the time when I became the Managing Director of the Natural Gas Division[30] *and MOL had complete responsibility over all manner of aspects—storage, wholesale, transmission pipelines, etc. Prior to that, in 2000, we had lost USD 1 billion just because of the negative differences between our internal costs and the prices at which we were importing stuff. Since we had no alternative sources, the situation was simply unmanageable. We decided to make a clear cut, in the wake of this experience, and we partially came out of the natural gas business from the wholesale of our storage. Of the total primary energy consumption, 45 per cent is dependent on Russian gas—this is too high, and the figure is likely to get even higher and, in time, reach 70 per cent. Very many things happened, since then—for instance, just to give you one example of many, we built the interconnectors towards Austria, Bosnia, Croatia, Romania, and Serbia. So, from that point of view, we now have a completely different security level in Hungary. I remember going to Voronezh*[31]*, in the winter of 2006, on temperatures of -35°C. Immediately on my return home, I told my colleague, 'Prepare everything—it's coming!' And it did. The daily consumption reached 90 million cubic metres every day, that week, whilst the normal peak for that time of the year would have been 70–5 million cubic metres—big difference. Also, you may remember, the pipeline was shut down completely, in 2009—yet, unlike Slovakia and Bulgaria, Hungary did not really suffer in that respect. We were able to manage the situation.*

RM: You have mentioned the pipelines, a number of times—my understanding is that it often matters who actually controls the pipelines.

SF: *Yes, we are the sole owners of our high-pressure pipelines in Hungary—there is no foreign interest involved in this aspect of our operations. The commercial storage used to be owned by E.ON*[32]*, but was partially sold to MVM*[33]*,*

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[30] In 2003.

[31] In Russia.

[32] E.ON SE, the German-based holding company of the world's largest investor-owned electric utility service provider.

[33] MVM Group / Magyar Villamos Művek Zrt. / Magyar Villamos Művek Zártkörűen működő Részvénytársaság (Hungarian Electrical Works Public Limited Company, in

the Hungarian state-owned electricity company. Regarding the strategic storage, 74 per cent is owned by MOL and 26 per cent by the Hungarian Hydrocarbon Stockpiling Association, who is the owner of the natural gas.

RM: The crude oil, I assume, comes all the way from Western Siberia.

SF: *Yes, the pipelines stretch from Russia—through Byelorussia and Ukraine—all the way to Hungary and Slovakia. This is the exact route, and we own the crude oil pipelines in Hungary too. As a matter of fact, we buy the crude oil from our Russian suppliers DAF*[34] *at the Ukrainian–Slovakian border and DAF at the Ukrainian–Hungarian border. So, the transportation of the Russian crude oil is made entirely by our Russian partners—up until the Slovakian border metering station and up until the Hungarian border metering station, it is their responsibility entirely. In terms of ownership, Transneft*[35]*, a mainly state-owned company, has absolute control over the crude oil pipelines in Russia—and acts not only as an operator, but also as a tool for the Russian state. The Byelorussian state owns the crude oil pipelines in Byelorussia and the Ukrainian state those in Ukraine, through Ukrtransnafta*[36]*. In Hungary, both crude oil and product pipelines are owned by our Company. However, in Slovakia, the situation is slightly different—the pipelines are not owned by Slovnaft, as you would expect, but by Transpetrol, which in turn is owned by the Slovakian state. So, the tool we hold in <u>our</u> hands is our ability to purchase crude oil—be it at the Ukrainian–Slovakian border, be it at the Ukrainian–Hungarian border—on competitive basis, given that we do have an Adriatic Sea alternative. Consequently, when we sit down with our Russian partners, we can hold normal, serious business negotiations.*

This is why, earlier on, I have advocated in support of trends as opposed to figures—figures provide you with a snapshot, trends tell you an entire story. Listening carefully to this story enabled us to make the right choices—expanding our international upstream and implementing our New Downstream Programme.

RM: We have almost reached the end of this interview—tying the beginning with the end, the recruitment of human resources for 'international' and 'upstream' must be rather different from the recruitment of human resources for 'downstream' and 'Central-Eastern Europe'.

SF: *You are absolutely right, but I want to tell you one more thing. An international workforce is practically inevitable and practically vital for our*

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translation) is the largest Hungarian power company, responsible for production, distribution, and sale of electricity.

[34] Delivered at frontier.

[35] Responsible for the national pipelines, the company owns the largest oil pipeline system in the world (almost 50,000 kilometres) and transports around 93 per cent of the oil produced in Russia.

[36] Joint-stock company.

Company. However, there is absolutely no reason why our local workforce cannot acquire the necessary international expertise. Our Company is being enriched as we speak both by our international workforce and by our local workforce with international expertise. We could not have got where we are today, without both local and international human resources.

RM: Mr. Fasimon, thank you so much for your time, and for a most interesting hour together.

Mr. Sándor Fasimon and **Prof. Roderick Martin**[37]
'Agrober', the Budapest offices of MOL Hungary, 16 July 2013

Appendix:
A history of the company in brief

MOL was established in 1991 as the direct legal successor to the state-owned consolidated oil company OGKT (Hungarian Oil and Gas Trust). The Hungarian oil refining industry was long established, dating from the 1880s, with the

[37] Photograph copyright: Anamaria M. Cristescu-Martin.

formation of the Hungarian Petroleum Company in Budapest in 1884, and the construction of the Budapest Mineral Oil plant in 1891. By World War I, 12 plants were producing 80 per cent of Hungary's oil requirements, using imported feedstock. Following Trianon, and the loss of facilities outside Hungary's new borders, the remaining facilities were merged to form the Fanto Works Company in 1924, renamed the Panto United Hungarian Oil Plants Company in 1933. Between the two World Wars, refinery construction expanded, including the construction of the Shell Company state-of-the-art refinery on Csepel Island in 1929–30, and the Hungarian Oil Works Company (MOIL) plants at Pétfürdő and Szőny, opened in 1937, financed by the Hungarian state.

Oil exploration in Hungary was initially unsuccessful, with the British Anglo-Persian Oil Company failing to find oil before and after World War I, and surrendering its licenses in 1927. Hungarian state exploration in the late 1930s was more successful, finding commercially exploitable reserves in Bükkszék. The Anglo-American company EURGASCO was also successful, finding commercially exploitable reserves at Budafapuszta in 1936. This success led to the formation of the Hungarian-American company MOART, jointly owned by Standard Oil of New Jersey and the Hungarian state, to exploit the reserves. By 1940, Hungary met its own fuel needs.

The oil industry was transformed by World War II. Assets owned by Hungary's enemies, the US and Britain, were expropriated, with the nationalisation of Shell and MOART's assets. Output rapidly grew threefold, at the expense of poor levels of oil recovery. There was heavy German and Italian investment through MANART (Hungarian-German Mineral Oil Works Company), MOLART (Hungarian-Italian Mineral Oil Company), and ONART (Italia-German Mara Region Mineral Oil Company). After World War II, the German-Hungarian company MANART was transferred to the Soviet Union, as part of reparations. The previously American-controlled MOART was returned to its owners in 1945, but, after a controversial legal battle, including the arrest of senior MOART managers, the company was nationalised again in 1949. After further extended organisational restructuring, the industry was consolidated into one company, MAZOIL, a fifty-fifty joint Hungarian and Soviet venture, in 1954. The crude oil industry was reorganised again and consolidated into a single trust, OKGT, in 1957, to which was added the gas industry in 1960. Although there were several organisational revisions between 1960 and 1991, there was little change in the fundamental structure.

MOL thus inherited a complex organisational structure, with dated technology, poor working practices, and low levels of efficiency both in refining and in crude oil production. Although the oil and gas industry had a long history in Hungary, the reconstruction of MOL in the 1990s involved substantially a new start.

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Roderick Martin is Professor of Management, Emeritus, at the University of Southampton, in the UK, and Leverhulme Trust Emeritus Research Fellow.

Roderick was educated at Balliol College and Nuffield College, Oxford, and at the University of Pennsylvania. He wrote over ten books in business management, organisational behaviour, industrial relations, and industrial sociology—including *Investor Engagement: Investors and Management Practice under Shareholder Value*, *Transforming Management in Central and Eastern Europe*, *Bargaining Power*, and *New Technology and Industrial Relations in Fleet Street*—and published over sixty research articles in international journals. His latest book—*Constructing Capitalisms: Transforming Business Systems in Central and Eastern Europe*—was published by Oxford University Press in 2013.

At Oxford, Roderick was Official Fellow (Politics and Sociology) at Trinity College, Senior Proctor, and Official Fellow (Information Management) at Templeton College, and he held the positions of Lecturer (Sociology) and Senior Research Fellow at Jesus College. He was Professor of Industrial Sociology at Imperial College, University of London, and Professor and Director at both, Glasgow Business School, University of Glasgow, and the School of Management, University of Southampton, in the UK. At the Central European University (CEU)

in Budapest, Hungary, he was Professor of Management at the Business School and Research Fellow at the Center for Policy Studies. He held visiting posts with Cornell University, in the US, and with the Australian Graduate School of Management, Griffith University, Monash University, the University of Melbourne, and the University of New South Wales, in Australia.

Roderick is a member of the British Academy of Management (BAM) and of the British Universities' Industrial Relations Association (BUIRA). He served on the BAM Executive Council and on the Economic and Social Research Council (ESRC) Social Affairs Committee and Research Grants Board. In 1989–95, he developed the multi-national and multi-disciplinary ESRC East–West Research Initiative (GBP 5 million). Roderick undertook extensive consultancy work for private and public sector organisations—including, in the UK, the National Health Service (NHS), the Scottish Police College, and the Atomic Energy Authority.

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ZOLTÁN KOVÁCS AND ZOLTÁN SZEGEDI

'Hey, Junior, this is not the way to do it!' Passionate about chemistry, and everything else: Dr. István Blazsek, Chief Executive Officer of Nitrogénművek Zrt.[12]

There are very few centennial companies in Hungary. Two world wars (1914–18 and 1939–45), nationalisation (1945–8), revolution (1956), and political and economic overhaul (1989) marred the country, in the Twentieth Century, with profound consequences for business. Today, the majority of Hungarian companies are 20–25 years old, at most.

However, there are exceptions. While hundreds of businesses have come and gone, Nitrogénművek Zrt. has more than just survived—it has played a prominent role in the Hungarian chemical industry. For over eighty years now, the Company has contributed to increasing productivity in agriculture, and has provided employment not only for generations of inhabitants living at the foot of the Bakony Hills, but also for an entire chain of supply and distribution.

In 1931, when it was first established on the dolomite fields surrounding Pétfürdő and with water from the Creek Pét, Nitrogénművek represented a pioneering venture for the Hungarian heavy industry. In 1932, the modern—by the then standards—chemical plant started to produce chemicals and nitrogenous fertilisers. Since then, the Company has invested in numerous technological innovations, added new plants, and survived the devastations of World War II, the ad hoc policies of Socialist industrial development, and the difficulties of switching to a new economic system in 1989. Although the journey between then and now has been far from smooth, the company known today by the name of Nitrogénművek Zrt. is a major, strategic player in the overall Hungarian economy.

The creation of a heavy chemical industry was the cornerstone of the 1920s industrialisation programme in Hungary. Building the Pét Plant was needed both by the military, to secure a continuous supply of nitric acid for gunpowder production, and in agriculture, to secure yield-improving fertilisers. Of the various technological options, synthesising—and then further processing—ammonia by chemically bonding nitrogen with hydrogen seemed the most economic solution. Producing hydrogen with any of the technologies available in Europe at the time

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1 Nitrogen Works Co. Ltd, in translation.

2 This article was translated from Hungarian by Gyula Vastag.

was not sufficiently viable in Hungary, and a new technology was developed, using lignite from neighbouring Várpalota.

In 1928, when it decided to establish a nitric plant, the Cabinet Council of Hungary changed the life of a sleepy small provincial town for ever. With the construction of the new plant, Pétfürdő began to develop rapidly. In time, the Cabinet Council's choice of location has been confirmed several times over, since all the main production ingredients are local—lignite for synthesis from neighbouring Várpalota; limestone for fertilisers from Bakony, just a couple of kilometres away; and water from the Creek Pét in Sárrét, in sufficient quantities and adequate qualities. In addition, the Székesfehérvár–Veszprém railway line inaugurated in 1872 has facilitated transport from the very start.

The two plants—one for ammonia and the other for fertiliser—were built next to each other and started production in 1932, with Egypt as the Company's main export market. By the end of the 1930s, Pétfürdő had become a flourishing town, with modern residential districts for employees, including casino and swimming pool.

In time, the two plants merged, the production capacity increased, and the range of products extended in new and unexpected directions by modern standards—gases for military use, as part of the Hungarian armament programme of the time. As a potential centre for the Hungarian military industry, the factory was a top target for the Allied bombing campaigns. In the end, despite surviving several bombing raids, both factory and town were all but annihilated—the ammonia and fertiliser plants were completely destroyed, and almost all buildings were left in ruins. Just as the rebuilding efforts were under way, the Germans took over, blew off the remaining buildings, and destroyed the gas production capacity. Although their attempt to ship the remaining machines and equipment to Germany was sabotaged, the birthplace of the Hungarian nitrogen industry was all but destroyed.

A quick, partial reconstruction of the plants in the immediate aftermath of World War II allowed production to restart as early as 1946. For Pétisó, its flagship product (a nitrogen fertiliser lovingly named after its place of birth), the Company imported ammonia nitrate from the Soviet Union until 1948, when full reconstruction was completed. With all the technological processes from raw material supply to final product delivery fully automated, the new fertiliser plant was a world pioneer. In addition, by 1956, the production capacity had reached 100 tonnes of ammonia per day.

The Hungarian fertiliser industry in general and Péti Nitrogén Műtrágyagyár—as it was then called—in particular were among the first to be hit by the crisis of the socialist system, despite the Company's outstanding past achievements. Sales of fertilisers were down, while the energy crisis was driving the price of natural gas—the most important raw material in the industry—higher and higher. In the

end, the Government's policy of pushing sales to non-socialist countries in return for hard currency backfired.

In the turbulent aftermath of the regime change that took place at the end of the 1980s, the new, democratic Government could not resuscitate the Company. After an unsuccessful attempt at reorganisation, the Government ordered its liquidation, without appointing a legal successor. Consequently, a new Nitrogénművek—formed in 1990—focused on crisis management during its first several years of operation. Debts were consolidated gradually and increasing investments were made in technology, energy efficiency, and environmental protection. In addition, in 2002, a group of private individuals acquired the Company shares. This virtual rebirth of the Company was a true turning point in its long and convoluted history, which led to a new wave of optimism about the future. Additional plants and technologies and—more importantly—new and bold strategies fuelled this optimism. The new Nitrogénművek Zrt. invested around EUR 100 million into new developments that propelled it once more to the very top—no comparable investments were made anywhere else in the European fertiliser industry in the last years.

In the 2000s, Nitrogénművek Zrt. founded subsidiaries in Serbia, Romania, Slovakia, Germany, and Italy and focused on marketing and fertiliser expertise. Every year between 2008 and 2011, the Company was awarded the Business Superbrands Award[3]. In 2009, to establish a direct link between production and end users, the Company created GENEZIS, a new selling organisation.

As for the future, the Company plans to increase its production capacity for ammonia (from 1,400 tonnes per day to 1,650 tonnes), nitric acid (up to 1,800 tonnes per day), and nitrate fertilisers.

Dr. István Blazsek has worked for Nitrogénművek Zrt. for over forty years, including—since 2006—as the Company's Chief Executive Officer (CEO). He joined the Company in 1971, on graduation as a chemical engineer from the University of Veszprém (currently, University of Pannonia).

During his distinguished career, István has held numerous other positions with the Company—technologist, shift engineer, deputy shop floor foreman, shop floor manager, deputy plant manager, plant group manager, factory manager, and, between 1992 and 2006, Chief Operating Officer. This exposure to the ins and outs of the Company—and, implicitly, of the industry as a whole—has

[3] http://www.superbrands.com.

allowed István the kind of extensive knowledge and comprehensive understanding that his current position as CEO of Nitrogénművek Zrt. require.

An Honorary Professor with the University of Pannonia since 1993, István is an ardent supporter of education in general and adult education in particular. He serves as a living example himself, having furthered his education through numerous study and training programmes. He was awarded his PhD from the University of Chemical Engineering in Veszprém in 1988 and his MSc in industrial economics from the University of Economic Science in Budapest in 1991.

István's international reputation as an outstanding chemical expert has led to his election as President of the Hungarian Chemical Industry Association in Budapest and of the Technical Committee of Fertilizers in Brussels. Such highly praised national and international accolades have made István more determined than ever before to place his extensive expertise and countless achievements in the immediate service of his local community—to this end, he is currently Vice-president of the Chamber of Commerce and Industry of the Veszprém County.

As an active witness of four decades of Company history, Dr. István Blazsek is best placed to further understanding of Nitrogénművek Zrt.—the illuminating interview below took place in Veszprém on 7 June 2013.

ZK&ZSz: Dr. Blazsek, you have spent your entire professional career with Nitrogénművek Zrt., you have climbed the proverbial corporate ladder, and you have accumulated not just years, but decades of management experience. What has first attracted you to the Company?

IB: *Looking back over the years, my lasting passion for Nitrogénművek seems to have been inevitable—like all great passions in life indeed are. A combination of chance, choice, and coincidence, at the most. I graduated in chemical engineering from the University of Veszprém (currently, University of Pannonia) in 1971, having specialised in process control. There was a high-priority state investment in Pétfürdő, at the time, and the Company was looking for engineers. This is how it all started—yes, it was as simple as that—and for the first 20 years of my career I worked in various production capacities.*

ZK&ZSz: You started out as a junior chemical engineer, but you were soon entrusted with managerial responsibilities. What were the greatest challenges you faced in your new capacity?

IB: *In the 1970s, Nitrogénművek was very different from today. In those days, for example, human resource management in general and succession planning in particular were very different. There were functions, employees for every function, and succession plans for every employee. In very practical terms, this meant that we learned the profession from our more senior—and more experienced—colleagues. In 1974, for example, I was placed in the Ammonia Plant, first as a trainee shift leader, and worked with English and American operators on installing*

a new technology. Most of my colleagues on this project have retired since then, but we recall those days with great fondness, whenever we get together, as if they were a second university education.

ZK&ZSz: What kind of people do you like to work with?

IB: *I love talented and honest people. In a company—and, quite probably, this is also true for universities—you need people who can carry the piano, so to speak, and you need people who can play the piano too. In other words, in a company like ours, you need the right mix of blue-collar workers, skilled technicians, and engineers. If any of these groups is missing, the system is not working properly. Pétfürdő is a small town with tremendous workplace loyalty—our current employees are the third and fourth generations of descendents, the grandchildren and great-grandchildren of the employees who first started with the Company. (Then again, the Company is also employing the third and fourth production technologies since it first started.) We are very fortunate to work with families of employees and very proud of their loyalty. For many of our employees, this is their first and only workplace until retirement, resulting in excellent mastery of the company specifics, at the expense—perhaps—of a wider view of the world.*

ZK&ZSz: How then did you avoid this pitfall in your own career?

IB: *You can learn management the same way you learn finance or any other subject—or anything else in life, for that matter. I started as a shift engineer at the age of 27 and had to manage people—some of whom were my father's age. Of course, I did get the occasional slap in the face in the form of 'Hey, Junior, this is not the way to do it—reset me the old stager!'*

Being appointed to a new position every five or six years was an opportunity not only to apply what I have learned managerially and professionally since my previous appointment, but also an excellent learning opportunity.

ZK&ZSz: Is it possible to be a good manager without being an expert in any particular technical field?

IB: *I think a good manager needs to maintain some kind of balance between technical knowledge and managerial knowledge. If either is missing, the manager either cannot manage at all or cannot manage well. After 1989, for instance, engineering was no longer sufficient by itself—therefore, it was essential to acquire the necessary financial, economic, and legal knowledge. Between 1989 and 1991, I attended Corvinus University of Budapest as a part-time postgraduate student in industrial management. For many years after my graduation as a chemical engineer in 1971, I was reluctant to pursue further studies in economics. Similar courses I took in the past—such as the political economy of capitalism and the political economy of socialism, for example—have put me off. However, at Corvinus, capable instructors were teaching social sciences in a way that was both useful and enjoyable for engineering students. It was there that I learned the basics, including the necessary terminology (such as contribution margin, for*

example, and debit and credit) and—most importantly—an approach to analysing business problems. Nowadays, I know what is behind the numbers, if I look at a balance sheet.

ZK&ZSz: The Faculty of Business and Economics at the University of Pannonia educates managers. What competences do you think our graduates should possess?

IB: *Managers have to know their speciality inside out—be it chemistry, mechanical engineering, automation, or other fields of production. Learning the foundations of engineering first is paramount—the company specifics will be learned later, on the job.*

ZK&ZSz: Your products are well-known, nationally and internationally. How big is the current fertiliser market? How is it segmented?

IB: *We produce nitrogen-based fertilisers, with nitrogen as the active substance—other, so-called complex, fertilisers use phosphor or potassium as agents. In Hungary, the total fertiliser market is around 1.5 million tonnes—of these, 1.2–1.3 tonnes are nitrogen-based and 0.2–0.3 tonnes are complex. At 1 million tonnes, our current production capacity is smaller than the domestic demand. In practice, however, we meet around two-thirds of the domestic demand and export one-third of our production capacity.*

ZK&ZSz: Your Company is a commodity chemical plant with specialised technologies for given products. What is your freedom of decision making?

IB: *We have five high-capacity plants in Hungary, each with a production capacity of 200–300 thousand tonnes—MOL*[4]*, TVK*[5]*, and BorsodChem*[6] *have similar high-capacity facilities. Our products serve basic, general needs. We could manufacture more specialised products, but there is no demand for them in Hungary. We have around 10–15 per cent freedom of decision making, meaning that the combination of raw materials, market demand, and financial options allows us to change our product mix by around 10–15 per cent. We can cut back our production by 20–30 per cent, if we cannot sell our products profitably due to demand constraints. However, in the long run, this level of capacity utilisation is unprofitable—utilisation needs to be above 80 per cent, for our high-capacity plants to be profitable. By the way, this is the explanation behind the recent problems in the oil industry. Usage of petrol and diesel oil declined by 20–25 per cent, and plants are not efficient below 80 per cent utilisation. We were very fortunate, in the last two–three years—demand for our products increased and we*

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[4] Leading Hungarian oil and gas company, listed on the Budapest Stock Exchange, with a capitalisation of USD 10 billion.

[5] Leading Hungarian petrochemical company.

[6] Leading Hungarian chemical company.

sold our full production. Our operations are profitable when the capacity utilisation is higher than 90–95 per cent.

ZK&ZSz: How do you achieve continuous improvement, and what areas do you target?

IB: *Technologies are changing constantly. As I said before, we are practically operating third- and fourth-generation plants—our Company underwent three or four technological changes since it first started. I am very fortunate in that the first- and second-generation technologies were still around, when I was a young apprentice in the late 1960s—nowadays, we have two fourth-generation plants. We achieve technological modernisation in two ways—by upgrading or by revamping. Upgrading a third-generation plant to a fourth-generation plant, for example, involves a major, one-time technological investment—such investments happen very rarely. Revamping—to increase plant capacity and / or reduce energy and material consumption in some evolutionary ways—involves adding new technological units and replacing or eliminating production bottlenecks. We aim to increase our capacity by 20–25 per cent, in the next two years, and revamping is the most cost-efficient solution in terms of return on investment.*

ZK&ZSz: How do you differentiate your Company from other companies with similar profiles? What specific competences allow you competitive advantage?

IB: *If you hold our products in one hand and the products of our competition in the other, you will hardly see any difference, especially if you are a layperson—it would be very much like looking at granulated sugar produced by two different manufacturers. The granules may look slightly different and the colours may look slightly different, but, overall, there is not much of a difference. However, it is an altogether different story for an agronomist.*

Given a certain technology, the chemical composition of fertilisers is more or less constant—it can only change within limits. Nonetheless, while indeed very similar to one another in their chemical composition, fertilisers have important differentiating characteristics. Just to name a few:

- Granule size uniformity allows fertiliser spread uniformity—spreading fertiliser in the fields relies on the centrifugal force of the machines, and some areas would be spread with more fertiliser than others, if the granules varied in size.

- Low moisture content allows long-term fertiliser storage—the granules will not stick together.

- Five or six other differentiating characteristics are manufacturer specific. Pétisó, our key product, is a mixture of ammonium nitrate and ground dolomite and varies not only in name, from country to country, but also in additive—ammonium nitrate can be mixed with dolomite as well as calcium carbonate or other minerals. Additives are important because ammonium nitrate becomes acidic in contact with the ground moisture and can be used only in calcic soils, which are rare in

Hungary. Pétisó is an excellent product for neutral soils and low-level acidity soils, and works well in this country. For Pétisó, the particular type of dolomite we use is the differentiating factor.

I should probably add here that Nitrogénművek's location remains ideal for cost efficiency. In 1931, forward-thinking engineers designed the plant five kilometres from the dolomite fields. (This is one of the reasons why Russian manufacturers of ammonium nitrate and calcium fertilisers cannot compete with us—their dolomite mines are 500–1,000 kilometres away and their transportation costs are high.) Neighbouring Várpalota continues to source our lignite. The Creek Pét used to supply abundant quantities of water for production. By fortunate—and overwhelmingly important—coincidence, our Company is located at the foot of the Bakony Hills, and the pollutants from the production process do not affect the springs of karst water.

ZK&ZSz: Typically, chemistry is associated with laboratories—and, traditionally, the chemical industry with research and development (R&D)-intensive new products and technologies. What is the emphasis of your R&D activity?

IB: *There was a significant R&D activity prior to 1989. Then, due to lack of resources, the research department was closed, only to reopen in 2006. Nowadays, most of our developments are tailored to outside orders. We concentrate on applied research—without pursuing basic research—and seek to expand our product range and improve the application efficiency of our products.*

We cooperate with 12 agronomic institutes, which undertake research on our behalf under our supervision. For product and technology development, we also collaborate with technical universities—such as the University of Pannonia and the Budapest Technical University, for example. For process and environmental protection development, we work with many foreign partners. Since we do not pursue basic research ourselves, we frequently buy know-how and licenses.

Innovation support is insufficient in Hungary—consequently, for example, it is impossible to develop plans and design a new nitrate plant every twenty years or so, as we should. Instead, we buy the basic design from overseas, commission the construction plans from Hungarian partners, and Hungarian companies carry out the construction under supervision from foreign expertise.

ZK&ZSz: One of the most sensitive questions these days is connected with the contrast between chemical solutions and organic solutions. What is your take on this issue? Is it true that the bottom line is the trade-off between efficiency, on the one hand, and environmental and health protection, on the other?

IB: *Organic crops would be ideal, were it not for the fact that they could only feed a tiny proportion of the world's population. Contrary to some beliefs, our fertilisers are neither poisonous nor carcinogen. Our basic materials are the hydrogen extracted from hydrocarbon and the nitrogen extracted from air. We*

synthesise materials that already exist in nature—fertilisers only supplement the nutrients in the soil. Although it has already been proved that the current world population could not be sustained without fertilisers, it is important to develop pollutant- and heavy metal-free fertilisers.

ZK&ZSz: Your Company is part of a supply chain with an enormous material flow. How does one coordinate such a supply chain, and does Nitrogénművek play a major role in its coordination?

IB: *Although fertiliser usage is seasonal, fertiliser production needs to be continuous, due to efficiency considerations. This continuity may be disrupted for two reasons—unexpected repair work and, every two years, planned maintenance work. In Hungary, fertiliser consumption is 'active'—going from producer directly to consumer—from February to May and from September to early November. At all other times, we produce to stock. Pétisó and urea are stored in bulk, in warehouses, while ammonium nitrate is stored outdoors, in bags or large bags of 1,000 kilogrammes or more—in turn, stored in standardised-load packs. Our storing capacity is one-fourth of our production capacity. Due to demand seasonality and prices akin to a sinus curve, the financial liquidity of the Company is secured through export activity, not always profitably. Energy costs have the greatest impact on our entire supply chain costs, which uses 90 per cent natural gas and 10 per cent electricity. We purchase natural gas on the Austrian Exchange and electricity from Hungary.*

ZK&ZSz: What is the secret behind the Company's sustained success?

IB: *Well, 'the secret' is not at all secret, I do not think—we rely on advanced technology, employee commitment, and a strong company culture. Nitrogénművek is a privately owned, family-owned company, since 2002, with owners very much committed to innovation.*

ZK&ZSz: How did you manage to survive the crisis?

IB: *In 2008–9, when the market collapsed, we experienced major difficulties—we just could not sell our products. We had to close down for a whole four months—yes, the situation was as bad as that—and undertake general maintenance, to minimise losses, and sell inventory, to minimise costs. We had run out of inventory, by spring 2009, when we managed to secure financing and restart production. Times have been good, since then, and 2011–12 was a particularly good season. Moreover, we self-financed our operations—including our financial stability and investments—without any major bank loan.*

ZK&ZSz: How far do your plans for the future go?

IB: *We plan our sales 15–20 years ahead of time, and our business and strategic plans extend to 2020. The European Fertilizer Manufacturers Association (EFMA) predicts stagnating sales in Western Europe, for the next decade, and only 2–3 per cent increases in Central and Eastern European sales. We shall of course export any production surplus—to increase capacity and reduce*

energy consumption, the Company owners have already decided on new investments.

ZK&ZSz: The academic literature emphasises the role of strategic alliances—what role do strategic alliances play for your Company?

IB: *Rightly or wrongly, sales networks raise suspicions and the Hungarian Competition Authority (HCA) is very wary of cartels and unfair and restrictive market practices. Since we hold two-thirds of the Hungarian market, HCA have audited us several times.*

Since Nitrogénművek is a family-owned company—and since competition on the fertiliser market is brutal—there are no alliances on the producer side. On the supplier side, we always buy electricity from the cheapest supplier and natural gas from an average of 12 (of around 20) suppliers, on a monthly basis. We have excellent relations with our suppliers—they trust us because they know that natural gas is of vital importance for us and we need it not just this week, as it were, but next week too. As far as engineering developments are concerned, we would welcome more key players on the market, since we are at the mercy of a few companies in an oligopolistic position.

ZK&ZSz: Dr. Blazsek, thank you very much for the interview.

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Zoltán started his career in the meat industry—where he worked as Head of the Quality Control Laboratory and was involved in new product development—and in

the coalmining industry—where he coordinated large-scale projects, including the establishment of computer centres and implementation of information systems.

Zoltán received his MSc in Industrial Engineering from the University of Pannonia, in 1980, and his PhD from the Budapest University of Technology and Economics. He was awarded a PhD degree by the Hungarian Academy of Sciences, in 1991, and a six-month Fulbright Scholarship, in 1993–4, which he took at the University of Wisconsin-Madison in the US.

Zoltán has developed and taught a wide variety of conventional and unconventional courses. His educational innovations include optical character recognition (OCR)-based test evaluations, spreadsheet-based problem generation for compulsory basic training (CBT) test banks, using video case studies, recording classroom work from tablet screens, and virtual classroom-based consultations. In 2001–10, he taught the Business Simulation course at the University of Technology in Darmstadt, Germany. Currently, he teaches Production and Service Management, Logistics, and Business Simulation, (to fulltime and part-time students), as well as Safety and Risk Management (to continuing education students).

In addition to three MBAs, Zoltán has developed a number of other educational programmes—for example, HR Manager, Leadership and Management, Logistics Management, Technical Manager, and the Quality Professional Degree. He directs three programmes, at present, the BSc in Industrial Engineering, the MSc in Logistics Management, and—in continuing education—the Quality Professional Degree.

Zoltán's research interests are production and service management, logistics, and maintenance. He is founding member of the Logistics Committee of the Hungarian Academy of Sciences, founding President of the Logistics Committee of the Hungarian Academy of Sciences Regional Committee, and founding board member of Lean Enterprise Institute Hungary and the Association of Maintenance Professionals. Zoltán wrote two books (*Production and Service Management* and *Logistics*) and co-authored a third (*Reliability and Maintenance*), contributed chapters to ten other books, and co-authored more than ten textbooks. In addition, he published over twenty peer-reviewed journal articles and numerous papers in conference proceedings.

Zoltán's business simulation software is available in 15 European languages, and he uses statistical methods and Monte Carlo simulation to carry out extensive reliability and risk analyses for industrial companies. As a business consultant, his clients have included Continental Teves, General Electric, Herend Porcelain Manufactory, Maxon Motors, and Paks Nuclear Power Plant, as well as the Nagykanizsa local government.

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Zoltán was educated in Dresden, Germany, where he received his MSc as Diplom Ingenieur-Ökonom at the Hochschule für Verkehrswesen Friedrich List, and he earned his PhD in Business Administration at the Hungarian Academy of Sciences. In the early 1990s, Zoltán attended the Advanced Management Program (AMP) at the Harvard Business School in Boston, Massachusetts, and his habilitation at Szent István University followed less than ten years later.

Zoltán's research focuses on supply chain design and strategy and the logistics of small- and medium-sized enterprises (SMEs). He is a dedicated ensign for the case study method, and his case studies and case study collections are used extensively—this is particularly true for his *Case Studies of Logistics Management*, which was translated in English.

Zoltán has authored and co-authored 12 books and over one hundred articles, and he has served on the editorial boards of Hungarian and international journals—such as the *International Journal of Procurement Management*, for example.

Prior to joining the University of Pannonia, Zoltán was on the faculties of Corvinus University of Budapest, International Management Center, and Szent István University, where he developed logistics management subjects and curricula and designed BA, MSc, and PhD programmes with majors in logistics management, supply chain management, inventory control, e-business, and others.

Zoltán was a visiting professor with the Cooperative University in Baden Württemberg, Germany; the Normandy Business School in LeHavre, France; and, in Canada, the Wilfrid Laurier University in Waterloo, Ontario, and the University of British Columbia in Vancouver, British Columbia.

Zoltán has served as Chair and Co-Chair of the Logistics Section of the Hungarian Economic Association, and he has held numerous management

positions in higher education—for example, as founding Director of the joint WeSt (Webster University–Szent István University) MBA Program; as Associate Dean of the Faculty of Business Administration and Director of the Council of European Management Schools (CEMS) Program at Corvinus University of Budapest; and as Director of International Affairs and Marketing at the International Management Center.

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ÁGNES LUBLÓY[1] AND KATA VÁRADI

General practitioner–specialist relationships in shared care systems: insights from a review of the literature

In general practice, patients stay and diseases come and go. In hospitals, diseases stay and patients come and go.

Heath (1995: 373)

This article analyses interactions between general practitioners and specialists within shared care systems. The professional interactions among doctors who treat patients jointly are crucial in the operation of efficient and effective healthcare systems. Smooth relationships result in higher quality patient care and lower total cost. This article discusses the choice of specialist by general practitioners and elaborates on three aspects of the ensuing professional interaction: collaboration in the interest of the patient, educational interaction, and communication. This article argues that the professional interactions between general practitioners and specialists have smoothed over the last few decades, despite major differences in roles and core values—several new collaborative care projects have been launched, and efforts have been made to improve the outcome of educational interactions and decrease the gap in communication. In recent years, social network analysis has been applied to assess both formal and informal relationships between general practitioners and specialists. This article discusses in detail networks constructed on the basis of shared patients, and presents the number of specialists with whom general practitioners have to interact and elaborates on cost implications. To optimise healthcare in terms of both spending and utilisation, the literature suggests that healthcare managers need to encourage general practitioners to refer patients only to those specialists with whom they can communicate efficiently.

General practitioners (GPs) are the gatekeepers to secondary healthcare. Their interactions with specialists (SPs) have important implications for any healthcare system where GPs are the first point of contact for patients—and of access to relatively scarce and expensive specialist services (Westerman et al. 1990).[2] Based

[1] The author wishes to thank the AXA Research Fund for the post-doctoral research grant that has enabled the research.

[2] The term *general practitioner* (GP) is synonymous with family doctor, family medical practitioner, generalist medical practitioner, and primary care doctor—GPs provide continuing and comprehensive medical care to individuals, families, and communities (WHO 2010). In contrast, the term *specialist* (SP) refers to a medical practitioner who

on semi-structured interviews, Marshall (1998a) argued that many GPs have a respectful and supportive attitude toward SPs, important in shared care schemes—GP respect for SPs generates trust in SP advice among patients and improves the outcome of patient–doctor interaction.

Interactions among patients, GPs, and SPs are central to the efficient and effective operation of shared care systems. Good, smooth relationships entail efficient collaboration and communication, and result in improved outcome from both patient and doctor perspectives. This was shown by Hoskins et al. (1993), McGhee et al. (1994), and Booth et al. (1996), for example, and by Ezekowitz et al. (2005), who found that heart-failure patients received significantly better care when undergoing treatment involving GPs working collaboratively with SPs.

At the same time, good, smooth relationships promote appropriate, effective use of resources and result in lower cost of care. Wagner (2000) reported that smooth collaboration between GPs and SPs improves patient care efficiency and contributes to decreasing costs, particularly in cases of chronic illness. Both Barnett et al. (2012a) and Pollack et al. (2013) found evidence that patients treated by sets of doctors who share high numbers of patients—that is, GPs and SPs who are strongly linked and most probably communicate efficiently among them—tend to have lower cost of care and healthcare utilisation. Thus, a collaborative relationship is not only in the patient's best interest, but also in the interest of the whole society. In addition, if GPs match patient characteristics with the personality of the SP, than the communication between patient and SP is also smooth and most probably improves the outcome of the interaction. However, this would involve GPs interacting professionally with many SPs, leading to lower system efficiency and higher cost of care and likelihood of hospitalisation.

This article is based on an analysis of the relevant literature and aims to support the ongoing empirical research into patient-sharing networks by addressing ten research questions. (1) How many SPs provide care for a GP's patients? (2) Is the patient-sharing network dense or rather fragmented? (3) What determines a GP's patient split among SPs? (4) Does an SP provide care for the majority of a GP's patients? (5) What determines the number of SPs who provide care for a GP's patients? (6) What are the socio-demographic and network topological characteristics of popular SPs? (7) Do doctors with similar doctor and patient-panel characteristics share more patients? (8) Does homophily[3] hold for the GP–SP relationship? (9) Is the number of SPs who provide care for a GP's patients similar across specialities? Equally, is a GP's patient split among SPs similar

focuses on certain disease categories, types of patients, or methods of treatment (WHO 2010). The term *doctor* describes any medical practitioner who holds a professional medical degree.

[3] In social networks, people's tendency to associate with similar people.

across specialities? (10) What are the cost implications of the patient-sharing network structure?

This article is structured into six sections. Following this introduction, the second section analyses shared care systems and the particular case of Hungary. The third section discusses the choice of SPs by GPs. SP characteristics obviously affect the smoothness of GP–SP professional interactions and the outcome of the service provided. The fourth section presents the literature on GP–SP professional interaction. The aim is to understand the relationships between these two main branches of the medical profession through what GPs and SPs think of each other, how they behave towards each other, how they communicate between them, and what the main differences and problems between them are. This is important because of its notable effect on the quality and cost of healthcare. The fifth section reviews studies mapping formal and / or informal relationships between GPs and SPs through social network analysis (SNA)—these studies use survey information for traditional social networks and administrative data for patient-sharing networks. The sixth section brings together the conclusions of this extensive literature review.

Shared care

Governments place increasing emphasis on primary and secondary care integration to achieve better and smoother patient care, better collaboration among healthcare professionals, and an effective balance between community and hospital care. In countries with well-developed social security systems, the ultimate aim of primary and secondary care integration is healthcare budget reduction. Shared care of chronic diseases is viewed as one way of achieving this aim, and GPs are asked to prescribe specialist medication for patients with chronic diseases such as diabetes, emphysema, or asthma. However, shared care is not just about prescribing specialist medication. Hickman, Drummond, and Grimshaw (1994: 118) defined shared care as ‘the joint participation of hospital consultants and general practitioners in the planned delivery of care for patients with a chronic condition, informed by an enhanced information exchange over and above routine discharge and referral letters’.

GPs’ main roles in shared care systems are as first points of contact for patients and as gatekeepers for secondary healthcare services. GPs control patient access to specialist care and refer patients when necessary. When SPs initiate certain therapies, GPs have to prescribe that medication for a time, usually for one year, significantly decreasing SPs’ workload and increasing their own. To obtain prescribed medication, patients have to visit their GPs monthly, allowing GPs to filter out—and refer back to SPs—patients whose health status worsens under treatment. At the same time, SPs hold the exclusive right to start therapies with

specialist medication. Usually of high cost, specialist medication—such as insulin and oral anti-diabetic medication, for example—requires complex prescribing and therapeutic monitoring arrangements not normally undertaken in general practices.

If functioning adequately, shared care systems have many advantages.

1. For patients, these translate in greater accessibility of doctors and better continuity of care (McGhee 1994). By contacting GPs instead of SPs for specialist medication prescriptions, patients save time—not least their own, since general practices are usually accessible, both from location and appointment points of view. Patients appreciate increased contact with GPs, since GPs can provide comprehensive, preventive, and coordinated care (Starfield 1992). As a result, patients find continuity and quality of care better in integrated systems than in conventional systems (Damme et al. 1994)—satisfaction with integrated care leads to patients' wish to continue to experience it (Damme et al. 1994; Diabetes Integrated Care Evaluation Team 1994).
2. For GPs, these translate in fewer misses of follow-ups and regular and more efficient communication with SPs.
3. For SPs, these translate in increased satisfaction, most probably due to decreases in workloads (Horne et al. 2001).

GPs' involvement in shared care was due primarily to pressure on hospital expenditure and resulted in important cost shifting and cost reduction (Jones et al. 1982; McGhee et al. 1994; Horne et al. 2001). For example, shared care for thyroid disease is cost effective because it reduces patient–SP contact while maintaining the review standard (Jones et al. 1982). For another example, shared care for hypertension is cost effective because the total cost is 57.3 per cent of the outpatient clinic cost and 93.6 per cent of the nurse practitioner clinic (McGhee et al. 1994). At the same time, Norris et al. (2002) argued that improvements in care for patients with diabetes result in cost savings for healthcare organisations. However, evaluating shared care effectiveness may be difficult, due to tradeoffs between treatment effectiveness and cost efficiency (Simon et al. 2001; Smith et al. 2007). For example, stepped collaborative care programmes for depressed primary care patients lead to substantial increases in treatment efficiency and moderate increases in cost efficiency (Simon et al. 2001), a result consistent with five other randomised trials of the field.

However, shared care systems have drawbacks as well advantages.

1. For patients, these translate in regular visits to GPs who—in contrast to SPs—are not experts in the fields.
2. For SPs, these translate in decreased control over patients' health status.
3. For GPs, these drawbacks are at their highest. GPs are dissatisfied with specialist medication prescribing (Horne et al. 2001), feeling unable to assume clinical responsibility for areas outside their therapeutic experience and reporting high uncertainty levels. GPs also complain about insufficient involvement in SP

management of patient care, organising shared care in practice being sometimes difficult. Although they have little input in treatment decisions, GPs have to prescribe specialist medication and accept clinical responsibility (Sibbald et al. 1992; Horne et al. 2001). While they are sometimes involved in monitoring, GPs are never involved in altering medication dosage (Horne et al. 2001). Nevertheless, because they think it facilitates patient access to specialist medication, GPs are willing to prescribe it.
Effective medical leadership results in effective shared care systems capable of sorting out such inherent drawbacks (Kvamme, Olesen, and Samuelsson 2001).

In Hungary, GPs refer patients—including those in shared care—to healthcare providers designated by the National Health Insurance Fund (NHIF) as nearest to either patient or GP. However, at patient request, GPs can refer patients to any outpatient services in Hungary—provided that patients make such requests on referral. In turn, requested outpatient services can only refuse such patients if their treatment endangers the treatment of patients within their own area. Moreover, at patient request, GPs can refer patients in integrated care to any SPs in Hungary—free of charge, if the SPs belong to the NHIF-designated healthcare providers, or for an extra fee, if they do not. In practice, this extra fee is rarely charged.

Choosing SPs in shared care systems

SP characteristics evidently influence smoothness in professional relationships, as well as the outcomes of interaction. Several recent studies into choice of healthcare providers at the point of referral have suggested unambiguously that patient choice relies primarily on personal past experience and GP advice (Robertson and Dixon 2009; Victoor et al. 2012). For example, Robertson and Dixon (2009) found on a sample of 2,181 British patients that 41 per cent drew on personal past experience and 36 per cent on GP advice—in 18 per cent of cases, patients followed advice from family and friends. This section summarises the literature on patient choice relative to decision maker. Where GPs make the choice on patients' behalf, it explores the role of GPs in suggesting particular SPs—why and how does a GP advise? on what information does a GP advise? Where patients make the choice on their own behalf, it discusses briefly the factors that determine patient choice.

GPs as decision makers

GPs play an important role in patient choice (Rosen, Curry, and Florin 2005; Robertson and Dixon 2009)—the empirical evidence suggests that either patients rely on GPs for advice or GPs decide on patients' behalf (Magee, Davies, and

Coulter 2003; Kraetschmer et al. 2004; Fotaki et al. 2008, Victoor et al. 2012). Unless patients express a preference, most GPs make choices on patients' behalf (Rosen, Florin, and Hutt 2007), suggesting particular SPs. Alternatively, GPs provide information that may help patients choose from a limited number of SPs.

Patients faced with serious healthcare decisions rely on GP advice and do not value making decisions on their own (Barnett, Odgen, and Daniells 2008)—they appear less likely to exercise choice when they are in a state of uncertainty, vulnerability, or distress (Fotaki et al. 2008). Patients rely on GPs for information and advice for various reasons (Dixon et al. 2010). First, making bad choices has serious consequences for patients. Second, patients often find it difficult to ascertain health service quality. Third, health service information is often too technical for patients—GPs may help patients to interpret it.

Patients tend to involve GPs in decisions about where to receive treatment (Forrest et al. 2002; Schwarz, Woloshin, and Birkmeyer 2005). For example, of 510 patients, over 70 per cent relied on GPs for choosing where to undergo major surgery; of these, 31 per cent let GPs choose on their behalf and 41 opted for joint decision making (Schwartz, Woloshin, and Birkmeyer 2005). For another example, of 34,519 patient visits occurring during 15 consecutive business days in 141 GP offices in 87 general practices, GPs made 2,534 new referrals in 1,771 practice days, recommending specific SPs to patients in 86.2 per cent of the referrals (Forrest et al. 2002). More recently, Beckert, Christensen, and Collyer (2012) also found empirical evidence of GP influence over patient choice—the higher a GP's frequency of past-referral to a particular hospital, the higher the probability that any of that GP's patients will choose the same hospital.

Numerous studies have attempted to determine the factors influencing GPs' choice of SPs on behalf of patients.

SP medical skill is the most important factor according to empirical evidence (Javalgi et al. 1993; Kinchen et al. 2004; Barnett et al. 2012b). At the time, Kinchen et al.'s (2004) cross-sectional survey of GPs was the first national study—their stratified sample consisted of 615 GPs. Of these, 88 per cent considered the SP medical skill of major importance. Several years earlier, Javalgi et al. (1993) found that 90 per cent of 610 GPs considered the SP medical skill of importance. More recently, Barnett et al. (2012b) reported that doctors had uniformly chosen clinical expertise above all other options during the pilot study.

Patient experience of and satisfaction with SP is the second most important factor, according to the literature, and encompasses many aspects of patient care—for example, good patient–SP rapport, quality of patient management, patient results, and healthcare services tailored to the needs of the patient. Of the studied GPs, 84.2 per cent considered this factor important (Kinchen et al. 2004)—GPs cited the reason 'my patients have good experience with this physician' most

(Barnett et al. 2012b). Ludke (1982) and Javalgi et al. (1993) advanced similar arguments.

GP's personal knowledge of SP was found the most important factor in Forrest et al.'s (2002) carefully designed nationwide study—and important by Ludke (1982), Kennedy and McConnell (1993), Mahon et al. (1993), and Piterman and Koritsas (2005). In line with Barnett et al. (2012b), Kennedy and McConnell (1993) argued that GPs are likely to know the local SPs best—GPs cited the reason 'works in my hospital or practice' most.

Quality of SP communication with GP is also a strong factor (Ludke 1982; Forrest et al. 2002; Kinchen et al. 2004; Piterman and Koritsas 2005; Barnett et al. 2012b)—in Barnett et al.'s (2012b) categorisation of reasons for choice of referral, this factor was the most important.

Patient access to SP is also a factor (Javalgi et al. 1993; Mahon et al. 1993; Forrest et al. 2002; Piterman and Koritsas 2005; Barnett et al. 2012b) and encompasses aspects such as patient proximity to and accessibility of the SP's office and SP appointment availability. Although easy patient access to SP reduces the burden for patients, this factor is quite marginal by comparison with others—this may reflect GPs' ability to consider clinical needs and inability to consider other needs important to patients (Barnett et al. 2012b).

Patient request of SP is a factor in some—but by no means all—cases (Ludke 1982; Javalgi et al. 1993; Mahon et al. 1993; Forrest et al. 2002; Piterman and Koritsas 2005). GPs need to exercise caution, when patients rely—as they often do—on their own past experience or on advice from family and friends.

Other—rather marginal—factors include hospital admissions (Piterman and Koritsas 2005), health insurance and health plan requirements (Forrest et al. 2002; Kinchen et al. 2004; Piterman and Koritsas 2005), SP efforts to return patients to GPs for care (Kinchen et al. 2004), and sharing the same medical record system (Barnett et al. 2012b).

Patients as decision makers

Around 20–30 per cent of patients choose SPs without recourse to GP advice (Forrest et al. 2002; Schwartz, Woloshin, and Birkmeyer 2005). The literature on determinants of patient choice is widespread—for example, Victoor et al. (2012) analysed patient choice of healthcare providers based on 118 studies published after 1995—although the literature discusses mainly determinants for selection of GPs, determinants for selection of SPs should be similar.

Humaneness. Wensing et al.'s (1998) systematic review of 57 studies concluded that the aspect most important for patients is humaneness—generally, patients prefer friendly doctors who listen to patients and with whom patients have good relationships. This conclusion was corroborated by Mavis et al. (2005)—who

reported that interpersonal communication is the most important factor when patients select doctors, whether GPs or SPs—and by Bernard, J. C. Sadikman, and C. L. Sadikman (2006). In addition, Robertson, Dixon, and Le Grand (2008) argued that variables relating to patient–doctor relationships have stronger explanatory power than all the other aspects of the patient experience.

Competence and accuracy. Patients prefer qualified and experienced doctors, particularly when doctors' specialisations / interests match patient care needs (Victoor et al. 2012)—Wensing et al. (1998) concluded that competence and accuracy are the second most important aspect for patients. This conclusion was corroborated by Mavis et al. (2005), but contested by Bornstein, Marcus, and Cassidy (2000), who found that professionally relevant factors—such as board certification and specialisation, for example—are of greatest perceived importance.

This controversy in the literature suggests that patients value both doctors' interpersonal skills and doctors' technical capabilities. The importance patients attach to these factors depends on the type of illness, patients' socio-demographic characteristics, and patients' knowledge, attitudes, and beliefs[4] (Victoor et al. 2012). However, studies published after Wensing et al. (1998) suggested that patients value doctors' technical capabilities slightly more than they do doctors' interpersonal skills (R. Arora, Singer, and A. Arora 2004; Fung et al. 2005). R. Arora, Singer, and A. Arora (2004) found that doctors' technical capabilities influence patients' attitude to visits, as well as their intention to recommend doctors, whereas doctors' interpersonal skills and office staff-related variables do not influence patients' attitude to visits. If patients have to choose a doctor based on one single merit, then they choose 'the one with the best outcomes, even if people skills were not that great' (Donald Fisher, Chief Executive Officer of the American Medical Group Association, quoted in Rice 1996: 56). With the help of computerised report cards, Fung et al. (2005) 'forced' survey participants into tradeoffs between doctors' interpersonal skills and their technical capabilities. When faced with complex tradeoffs, nearly two-thirds chose the doctor who excelled in technical capabilities, whereas only 33 per cent chose the doctor who excelled in interpersonal skills.

Several other factors influence patients' choice of doctors, with lesser degrees of importance. *Patient involvement in decision making* is the third most important such factor according to Wensing et al. (1998). Organisational aspects such as *availability* (which translates into waiting time and flexibility) and *accessibility* (both geographical and financial) are also important to patients (Wensing et al.

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[4] Generic terminology that may refer—for example—to patients' (1) medical knowledge; (2) attitudes towards healthcare-acquired infections and doctors' gender and professional juniority; and (3) healthcare beliefs, determined mostly by culture, religion, or personality.

1998; Bornstein, Marcus, and Cassidy 2000; Bernard, J. C. Sadikman, and C. L. Sadikman 2006; Victoor et al. 2012)—R. Arora, Singer, and A. Arora (2004) argued that health is always important, while convenience is only important in low-involvement situations. *Time devoted to care* and *continuity of care* (Wensing et al. 1998; Safran et al. 2001) and doctors' *socio-demographic characteristics* (such as age and gender, for example) also influence patient choice. Finally, a large number of studies reported *recommendations from family and friends* as also important to patients (Bornstein, Marcus, and Cassidy 2000; Schwartz, Woloshin, and Birkmeyer 2005), while others reported *outcome indicators* (such as mortality or pressure sore rates, for example) (Victoor et al. 2012).

Professional interactions between GPs and SPs

In recent years, several factors have contributed to changes in the professional interactions between GPs and SPs. SPs are undoubtedly less autonomous and less powerful within hospital environments than they have been in the past, due to increased management control (Browse 1996). Also, the quality of training has improved, in general practices, as have practice premises and the services and skills available in primary healthcare. The key role of GPs as patient advocates has been enshrined in legislation in many countries (Secretary of State for Health 1989; WHO 2010), and GPs' influence as purchasers of hospital services has resulted in professional power shift (Klein 1995).

The roles of GPs and SPs differ—and so do their perspectives (Kvamme, Olesen, and Samuelsson 2001). The differences in perspectives, cultures, and working conditions in the medical profession reflect the wide range of medical, psychological, and social problems of the patients. While patients need a variety of expertise and technical competence, working within one medical reality may diminish understanding of—and even respect for—the concerns of others. However, little effort has been devoted to bridging professional groups and enabling them to understand their roles in conjunction with those of others within the same healthcare system (Olesen 1998). Some researchers even argued that the two branches of the profession have such different core values that lack of understanding is inevitable (Whitfield 1980; Whitfield and Bradley 1989; Wood 1993).

Professional interactions between GPs and SPs impact significantly the quality and efficiency of patient care and receive notable interest in the literature—this section summarises key findings with respect to collaboration, teaching and learning, and communication.

Collaboration

In shared care, collaboration—working together to accomplish a certain task—results in both effective and efficient healthcare. Efficient collaboration is important—GPs and SPs have to improve patient care efficiency by contributing to reducing costs (Wagner 2000; Ezekowitz et al. 2005; S. L. M. Rubak, Mainz, and J. Rubak 2005; Pollack et al. 2013).

However, there needs to be a clearly defined dividing line between primary and secondary care, in general, and GPs and SPs, in particular. Kvamme, Olesen, and Samuelsson (2001) argued that this distribution of tasks does not imply that SPs have to deal with all the technical problems and GPs with all the other problems. GPs work within an expanded biological, psychological, and social model—while much of their work integrates relevant aspects of patient reactions, coping strategies, empowerment strategies, and social contexts, parts of their work are simply technical.

Knowing what the two main branches of the medical profession think of each other is indispensable to building up a collaborative system. Over forty years back, Horder (1977) summarised the traditional perceptions and found that GPs were jealous of the status, facilities, and income of SPs, as well as resentful of lack of special training, while SPs were dismissive of GPs' preoccupation with 'minor' problems—mostly psychological or social—and with distinguishing minor problems from major ones so that they can refer the latter to SPs. While this description may be exaggerated, detailed studies of the profession in the 1960s and 1970s also highlighted major communication problems between GPs and SPs (Stevens 1966; Honigsbaum 1979).

However, more recent studies tell a rather different story. There is a high level of mutual respect and cooperation between GPs and SPs, as well as a strong desire to build personal professional relationships over long periods of time (Marshall 1999). In general, both GPs and SPs work hard at solving—and even altogether avoiding—potential conflicts. Marshall (1999) argued that professional relationships between GPs and SPs are even better than both literature and anecdotal stories suggest. A significant proportion of SPs understand that GPs are more than just filters for hospital services and regard GPs as colleagues who do not necessarily follow their advice—moreover, SPs are ready to learn from and within general practices (Marshall 1999). However, there are areas of significant disagreement between GPs and SPs—such as over financial parity and direct access to special investigations, for example.

Several collaborative care projects have been launched—however, most of them have failed, for the following reasons (Berendsen et al. 2006):

1. SPs do not regard GPs as equal in professional expertise.

2. SPs seem to satisfy their collaborative needs through informal networks with incidental professional contact, and develop relationships with GPs on a more personal level first.
3. Teaching GPs and regulating patient flow are SPs' main motivation for collaboration.
4. In the majority of cases, lack of time, lack of financial compensation, and lack of collegial support.
5. Restrictive guidelines and time-consuming project complexity.

Similarly to Berendsen et al. (2006), Kasje et al. (2004) found that GPs are more ready to cooperate—and more supportive of developing joint treatment guidelines than SPs, who think them superfluous. In contrast, GPs think that joint guidelines and treatments facilitate smoother relationships between SPs and GPs.

In sum, developing new models for collaboration has to take into account the interests and needs of the professionals. For SPs, improving referral quality and regulating patient flow are primary aims for collaborative care, according to Berendsen et al. (2006)—for GPs, learning from SPs is a primary aim Thus, investing time and money on improving collaboration between GPs and SPs is well founded, and collaboration may improve through teaching and learning.

Teaching and learning

The literature on teaching and learning in shared care systems is widespread and focuses on areas such as reasons for education (Young 1967; Allery, Owen, and Robling 1997; Kvamme, Olesen, and Samuelsson 2001), effectiveness of continuing medical education programmes in changing doctor behaviour (Stein 1981; Haynes et al. 1984; Beaudry 1989; McLaughlin and Donaldson 1991; Davis et al. 1992, 1995), and SPs and GPs teaching and learning from each other (Marshall 1998b; Berendsen et al. 2006). This section of the article focuses exclusively on the latter.

The importance of effective health education and educational interaction was highlighted by Folsom as early as 1963—imposing time lags between disclosure and utilisation of new public health knowledge, he argued, deprives patients of the benefits of medical research. Thus, the new knowledge should be spread as fast as possible among professionals, and education should play an important role in this process. Kvamme, Olesen, and Samuelsson (2001) too argued that bringing GPs and SPs together and developing personal and group relations through education is a powerful instrument of change.

Education narrows the knowledge gap between GPs and SPs and is important in shared care systems. GPs and SPs have different, but complementary, knowledge and skills—and potentially much to learn from each other (Westerman et al. 1990; Marshall 1998b). Marshall (1998b) reported that medical professionals are willing

to learn from one another—so far, the literature has identified three models of educational interaction: traditional didactic lectures given by SPs to GPs, interactive clinically based teaching, and informal interaction based on referrals (Marshall 1998b). However, many GPs are dissatisfied—they dislike didactic lectures (Long and Atkins 1974), want supplementary feedback from SPs on the quality and appropriateness of their referrals, and complain that the content of SP teaching is often irrelevant (Westerman et al. 1990; Newton, Eccles, and Hutchinson 1992; Newton et al. 1994).

In shared care systems, several barriers prevent effective educational interaction between GPs and SPs. Beliefs are one of the most important—most SPs believe that there is not much SPs can learn from GPs (Marshall 1998b), but that GPs can learn something from SPs (Berendsen et al. 2006). Marshall (1998b) attempted to identify the main barriers between GPs and SPs and suggest ways to overcome them. He found that there was a mismatch between what SPs delivered educationally and what GPs wanted—information directly applicable to their clinical work and two-way learning opportunities centring on referrals. However, in fairness to SPs, GPs were not articulating their learning needs clearly (Marshall 1998b). Thus, prior to educational interaction, GPs and SPs have to ascertain their respective needs and wants. SPs preferred to concentrate on new developments in their area—most responded willingly to teaching requests and seemed motivated by a deep sense of professional duty, including the improvement of referral quality. However, GPs were complaining about SPs' teaching skills and communication abilities—criticisms accepted by SPs and explained through lack of educational training. In addition, SPs and GPs seemed locked in a traditional teacher–pupil hierarchy, questioned by few GPs and even fewer SPs, although some GPs thought they could indeed teach SPs—for example, communication methods. The literature has uncovered few examples of successful joint initiatives to encourage two-way education between GPs and SPs (Drury 1976; Pop and Winkens 1989).

Other important barriers include disparity between what GPs want to learn from SPs and what GPs think they are taught by SPs, lack of mutual trust and respect, desire to protect each other from litigation, and low priority attached to education, due to large workloads (Marshall 1998b).

To overcome these barriers, Marshall (1998b) suggested three solutions:

1. Two-way educational needs require to be actively promoted—GPs need to articulate clearly what they want to learn from SPs and SPs need to develop adequate educational expertise.
2. SPs need to acquire work experience in general practices—this is in line with Kvamme, Olesen, and Samuelsson's (2001) recommendation that all postgraduate programmes should include time in both general and specialist practices.
3. Communication and information transfer needs to be enhanced through additional methods—such as television links, electronic communication, and the

Internet, for example, since both GPs and SPs think that time will always be a barrier to effective educational interaction. However, such communication networks dehumanise interaction with colleagues.

Communication

The quality of the communication between GPs and SPs affects both patient care and participant satisfaction with the caring process (Mages and Mendelsohn 1979; Maher 1982; Rosser and Maguire 1982; Nylenna 1985; Cuisinier et al. 1986; Sangster, Gerace, and Hoddinott 1987). Moreover, interactive communication between GPs and SPs improves the effectiveness of GP–SP collaboration (Foy et al. 2010). This section of the article reviews the advantages and disadvantages of various communication channels (such as referral letters and communication by telephone or email, for example); stresses the importance of trust between GPs and SPs; and lists some solutions for the communication gap between GPs and SPs.

The literature on communication between GPs and SPs is widespread, with most studies focusing on *referral letters* and replies to referral letters as important vehicles for conveying patient information and creating and sustaining professional relationships. These studies suggest that the content of this correspondence needs to be improved (Dowie 1983; Wood 1993; Newton et al. 1994).

SPs complain that referral letters contain inadequate information at times (Pullen and Yellowlees 1985). However, GPs are not experts in particular fields, and do not want to presume diagnosis (Dowie 1987). At the same time, GPs criticise SPs often, claiming that SPs do not actually read their referral letters (Doleman 1988; Bremer 1989), fail to understand the problems of the patient (Grace and Armstrong 1986, 1987; Carroll 1988), and disregard important psycho-social patient information (Grace and Armstrong 1987). GPs also criticise SPs for delays in communication (Mageean 1986; Harding 1987; Sandler and Mitchell 1987; Penny 1988) and quality of information (Harding 1987; Muzzin 1992; Wood 1993)—SPs' replies provide clinical and administrative information, thus accomplishing their basic objective, but do not usually address socio-psychological aspects (Newton et al. 1994) and non-clinical matters that affect around one-fifth of referrals. This view was confirmed by Westerman et al. (1990), who found that lack of clear information on patient medical problem, diagnosis, and management renders one-sixth of SP replies unsatisfactory.

Bado and Williams (1984) arrived at similar conclusions by analysing communication between SPs and GPs involved in shared care for patients receiving chemotherapy and affected not only by tumour, but also by emotional and psychological problems (Nerenz, Leventhal, and Love 1982). To support such patients, GPs needed detailed patient information from SPs, as well as detailed patient-related information—what patients and their families make of the treatment

is almost as important as the treatment itself (Long and Atkins 1974; de Aleron, Glanville, and Hodsen 1980). However, the SP replies lacked information in two areas considered essential by most GPs—what the future prognosis is and how much patients know about their diagnosis (Bado and Williams 1984). Other relevant information—such as drug regimens, results of investigations carried out in hospitals, explanations of symptoms, and details of follow-up plans—is also often missing from SPs' replies (Harding 1987).

GPs also complain about SPs cross-referring patients within the hospital—without back-referring them to GPs (Covell 1988)—and about SPs not keeping GPs informed and not returning patients to their care once a specific problem has been identified (Doleman 1987).

Some studies focused on *telephone* communication in everyday practice (Muzzin 1992; Hollins, Veitch, and Hays 2001)—important primarily in organising referrals (Hollins, Veitch, and Hays 2001). GPs call the SPs they know and appear to have fairly well-established networks of such SPs. Empirical evidence shows that networks play an important role in communication, and contribute to effective delivery of healthcare services, efficiency in daily job activities, and overall professional morale, development, and job satisfaction (Hollins, Veitch, and Hays 2001; Joyce, Veitch, and Crossland 2003; Hoelscher, Hoffman, and Dawley 2005; Fields et al. 2008). (The fifth section discusses healthcare network characteristics and consequences in detail.)

In an extensive literature review, Kripalani et al. (2007) advocated for adequate use of *information technology* to improve delivery and quality of discharge summaries—in support, he cited the works of Janik et al. (1978), Llewelyn et al. (1988), Smith and Holzman (1989), Lissauer et al. (1991), Branger et al. (1992), Archbold et al. (1998), and van Walraven et al. (1999). Information technology allows fast and structured retrieval of information on diagnoses, medications, and test results. Such information may also include specific instructions tailored to pending test results, as well as other follow-up needs. Electronic medical records ensure integrity of and speed in the data capture process, and could be configured to deliver information to designated GPs through facsimile or email—alternatively, GPs could be allowed direct access to information (Sujansky 1998; Bates and Gawande 2003; Weiner et al. 2003; Delpierre et al. 2004; Hersch 2004; Weiner et al. 2005; Chaudhry et al. 2006). However, there are numerous practical concerns related to the use of information technology—of security, confidentiality, cost, and complexity, for example. Therefore, in addition to computer-based solutions, other measures proved effective in improving information transfer—for example, giving a copy of the most pertinent data to patients increases the likelihood of information being available to GPs at the first follow-up visit (Dover and Low-Beer 1984; Sandler and Mitchell 1987; Kendrick and Hindmarsh 1989; Curran, Gilmore, and Beringer 1992).

Several researchers found that *trust* is an important element in communication, since it increases the reliability of information—mutual respect is crucial for successful communication (Grant 1982; Grant and Dixon 1987). Muzzin (1992) reported that communication was satisfactory when doctors could establish a relationship of mutual respect over several years—interviewees expressed some nostalgia for the days long past when the satisfaction of long-standing personal communication was routinely based on mutual respect earned through knowledge of one another's medical abilities. Schaffer and Holloman (1985) described referral processes where SPs were selected from close circles of colleagues with whom GPs felt comfortable and were respected peers—GPs and SPs shared similar backgrounds, interests, and, perhaps, education or post-doctoral training.

Table 1: GP-extrinsic and GP-intrinsic barriers to effective communication between GPs and SPs

GP-extrinsic barriers	**GP-intrinsic barriers**
- due to lack of information on SP specialties, GPs do not choose the right SPs	- GPs adopt a passive approach and do not ask for the information they really need
- several SPs may be in charge of the follow-up care of a patient	- GPs have low self-esteem and self-image and lack self-confidence
- although written referrals are common, GPs prefer personal communication	- due to insufficient knowledge of both treatment and prognosis, GPs lack confidence in follow-up care
- by delaying referrals, GPs introduce communication gaps	- GPs do not overwrite SP-suggested follow-up care due to fear of losing SP support
- GPs lack SP information on discharge and follow-up plans	- GPs practice patient-centred rather than disease-centred follow-up care and do not refer patients back to SPs, when they observe new, uncertain symptoms of the disease

Source: Based on Wood (1993).

The most important *communication shortcoming* of shared care systems was identified by Horne et al. (2001), who found that decisions to share care are often not agreed between GPs and SPs. SPs telling patients that GPs will prescribe the

medication—without informing the GPs—is one obvious illustration of this problem. The authors argued in favour of enhancing communication and information exchange between GPs and SPs in shared care systems. In shared care systems functioning adequately, SPs may follow two distinct communication strategies—'tell' or 'sell'. The former involves SPs telling GPs what to do, while the latter involves SPs asking GPs first whether they agree upon the shared care.

Although limited to communication between GPs and cancer SPs, Wood's (1993) analysis of GP-extrinsic and GP-intrinsic barriers seems to hold, over time as well as for other shared care systems (see Table 1, p. 93).

Muzzin (1992) identified a very interesting reason behind the shortcomings in communication between GPs and SPs, a reason automatically embedded in the system—the patients themselves. SPs prefer the information they receive from patients to that they receive from GPs, although it is difficult to include very technical details or rely on confused patients and patients with complex histories.

Among various *solutions for the communication gap* between GPs and SPs, Westerman et al.'s (1990)—for example—advises clear guidelines to control the content of referral and discharge letters and to manage the whole process of communication among doctors. Communication and mutual understanding may be helped by introducing other forms of contact—joint GP–SP domiciliary visits or SP sessions in health centres (Long and Atkins 1974; Harding 1987). Wood's (1993) solutions for the GP-extrinsic barriers to communication between GPs and SPs were to establish a contact person (either a nurse or a social worker) to help the GP or create a hotline for ready access to current knowledge of care and follow-up for the sickness. For patients with a complicated health status, follow-up plans and guidelines need to be developed and discussed with GPs. Also, it may be useful to create a directory of SPs and their areas of expertise. Wood's (1993) solution for the GP-intrinsic barriers was for GPs to adopt a more assertive approach with SPs and seek more personal contact with them. Face-to-face meetings in informal discussion groups and seminars may help GPs become better acquainted with SPs, share concerns, and access practical information on patient care.

Network of GPs and SPs

SNA can be used in a healthcare setting to examine structural relationships and influences and the way information travels and innovative medical ideas, tools, and practices spread. In the recent past, considerable theoretical and empirical work has been carried out on healthcare networks (Chambers et al. 2012; Cunningham et al. 2012). These studies cover professional interactions among a wide range of participants—senior nurses, medical leaders, influential players in health policy, and opinion leaders within particular specialties (West et al. 1999; Kravitz et al.

2003; Lewis 2006; Chambers et al. 2012; Cunningham et al. 2012). However, studies mapping relationships between GPs and SPs by applying SNA methods are scant—this section of the article reviews this literature. First, it reviews studies where networks of GPs and SPs were constructed on the basis of survey information. Second, it reviews studies from a new strand of literature, where networks are constructed on the basis of shared patients.

Relationships between GPs and SPs may be both formal and informal. GPs and SPs enter in informal relationships when they email, call, or curbside each other with specific clinical questions or cases—GPs may seek information or advice on patient care from SPs prior to referring patients (Keating, Zaslavsky, and Ayanian 1998). Such informal relationships have long been an important feature of medical practice. When GPs refer patients to SPs, GPs and SPs enter in formal relationships and subsequent requests for information are formalised (Barnett et al. 2011). In GP–SP networks, the edges can reflect both formal and informal relationships.

Lou et al. (2011) conducted in rheumatology one of the few survey-based studies of GP–SP networks. They found that 62 per cent of a very small sample of 84 GPs equated rheumatology care partnership with having at least one rheumatologist to whom GPs tended to refer patients. In the network of GPs and rheumatology SPs, the majority of GPs tended to have strong links with a small number of SPs and rated aspects such as adequate communication and information exchanges, low waiting times for new patients, clear and appropriate balance of responsibilities, and patient feedback and preferences as important.

In a survey-based study, Wensing et al. (2011) analysed doctors involved in the treatment of patients with Parkinson's disease. They used ParkinsonNet, a database which lists health professionals with relevant expertise, to ask volunteer participants to complete a structured questionnaire and report on their professional contacts with others in the network. The authors found that doctors were most connected within their geographical areas. Individual network aspects—such as density, two degrees of separation, degree, closeness, and betweenness centrality, for example—showed large variations. Nevertheless, the authors found empirical evidence for two associations—both a higher caseload and an affiliation with a hospital were associated with stronger connectedness to other health professionals. More precisely, health professionals who treated more than ten patients with Parkinson's disease had higher centrality and thus larger influence on the network. Also, most probably, health professionals affiliated with a hospital play a central role in the treatment of Parkinson's disease due to cross-referring patients to other professionals.

Recently, the availability of administrative data by health insurance funds has enabled researchers to construct and analyse patient-sharing networks of doctors where links between two doctors exist if they care for at least one patient

together—the weight of the link reflects the number of shared patients. Doctors may share patients for a number of reasons—referral, patient self-selection, administrative rule, or even chance (Barnett et al. 2011). Most probably, doctors who coordinate patient care have to communicate regularly and effectively with many other doctors with whom they share responsibility for at least some of their patients (Pham et al. 2009).

The presence of shared patients in fee-for-service claims data represents an important source of information on doctor relationships and enables large-scale studies using SNA tools. Barnett et al. (2011) listed several advantages of administrative data over survey data in the identification of connections within entire networks of doctors. First, networks of thousands of doctors can be identified and mapped at relatively low cost based on the identification of all pairs of doctors who share patients. Second, researchers can generate networks weighted by strength of relationship in a way that would be almost impossible with survey data. Third, administrative data is less prone to missing data—in patient-sharing networks, all doctors who file claims are in the network, not just those who respond to surveys, and all ties can be captured, not just those that can be extracted from responses to surveys.

Pham et al. (2009) carried out the first ever study on a patient-sharing network extracted from claims data—2,248 GPs who treated almost 577 thousand patients—and found that a typical GP had to coordinate with 229 other doctors working in 117 practices. The median number of peers involved was still substantial (86 doctors in 36 practices) when only patients with four or more chronic conditions (31 per cent) were considered—as well as when only a subset of important services was considered. The authors reported that the number of peers was higher for GPs (1) in solo or two-person practices, (2) in urban areas, (3) in metropolitan areas with higher supply of SPs, (4) who treated patients with more chronic conditions, or (5) with lower percentage of revenue derived from Medicaid.

Two years later, Barnett et al. (2011) published the second-known article on patient sharing. To compare connections among doctors based on shared patients with professional relationships among doctors, the authors administered a web-based survey to the members of a large academic and community doctor organisation. Doctors were presented with individualised rosters of doctors with the majority of whom they shared patients. The probability of two doctors having a recognised professional relationship increased with the number of patients shared—for example, doctors sharing nine or more patients had an 82 per cent probability. The authors argued that the results were clinically intuitive and concluded that patient sharing measured using administrative data was a valid method for predicting the existence of relationships among doctors.

Parchman, Scoglio, and Schumm (2011) used data from the Veteran Health Affairs. Data on distinct individual providers was not available, but the authors constructed a patient-sharing network of 722 nodes representing types of providers in 41 health centres who shared 266,710 patients. With relatively high average node degree, strength, and betweenness compared to other types of provider, GPs were the most central to the network. The average GP node degree—that is, the number of other nodes to which GPs are connected by sharing a patient—was 173, 42 per cent higher than the average node degree for general surgeons. The authors concluded that GPs play an important role in connecting the network and potentially diffusing information via co-caring of patients. (However, in Wensing et al.'s (2011) survey-based subnetwork, GPs were less central than SPs, their lower centrality a straightforward consequence of incomplete network.)

Landon et al.'s (2012) large-scale network was composed of almost 70 thousand doctors practising in 51 hospital referral regions—a link between two doctors signified shared treatment of Medicare beneficiaries. The authors found substantial variation in network characteristics across hospital referral regions. In line with their gatekeeper and coordinating role, GPs were more central to the network than other doctors. Doctors with ties among them were far more likely to be based at the same hospital or, at the least, in closer geographical proximity. Also, doctors tended to share patients with doctors with similar doctor and patient characteristics in terms of race and illness.

In the state-of-the-art literature, two studies explored patient-sharing subnetworks. In breast cancer care at two neighbouring healthcare institutions, Palo Alto Medical Foundation and Stanford Hospital, Bridewell and Das (2011) were interested in organisational boundaries as possible determinants of doctors evident to patients. The authors found strong intra-organisational ties among surgeons, medical oncologists, and radiation therapists and poignantly weak inter-organisational ties—patients were likely to stay in the environment where they were first treated. In prostate cancer care in three US cities, Pollack et al. (2012) examined not the network structure per se, but whether doctors' social networks are associated with variations in treatment for patients with localised prostate cancer. The authors concluded that subgroups of urologists—defined by dense connections with one another via patient sharing—show wide treatment pattern variations.

Finally, two very recent studies analysed the cost of care based on patient-sharing data. Barnett et al. (2012a) assessed the effect of patient-sharing networks of doctors on cost variation and care intensity in US hospitals. The authors considered 61,461 doctors affiliated with 528 US hospitals and reported that a typical doctor was linked to 187 other doctors for every 100 shared Medicare patients. A higher number of connections per doctor was associated with higher spending and healthcare utilisation, even after adjusting for hospital characteristics,

suggesting poorer coordination of care. In a partly similar setting, Pollack et al. (2013) tested 9,596 patients with congestive heart failure and 52,688 patients with diabetes for evidence of frequent shared care resulting in low care cost. The authors found that patients treated by sets of doctors who shared high numbers of patients tended to have significantly lower cost of care. In particular, diabetes patients in the highest tertile of care density had the highest level of overlap among providers and, on average, cost USD 1,502 less than those in the lowest tertile. The annual rate of hospitalisation was also significantly lower for patients with high care density.

Conclusions

If functioning adequately, shared care systems have many advantages (Starfield 1992; Damme et al. 1994; Diabetes Integrated Care Evaluation Team 1994; McGhee et al. 1994). However, the good functioning of shared care systems depends critically on smooth GP–SP collaboration—without it, patients may not receive appropriate treatment. Smooth collaboration results in excellent clinical care and the most positive experience possible, as well as in low healthcare cost (Jones et al. 1982; McGhee et al. 1994; Horne et al. 2001; Norris et al. 2002).

SP characteristics obviously influence the success of professional interactions between GPs and SPs. Empirical evidence suggests that, in the majority of cases, patients rely on GPs for advice—alternatively, GPs decide on their behalf (Forrest et al. 2002; Magee, Davies, and Coulter 2003; Kraetschmer et al. 2004; Schwarz, Woloshin, and Birkmeyer 2005; Fotaki et al. 2008; Victoor et al. 2012). However, in around 20–30 per cent of cases, patients choose SPs without GP involvement (Forrest et al. 2002; Schwarz, Woloshin, and Birkmeyer 2005). In both instances, GPs have to collaborate with SPs efficiently to achieve the best healthcare outcome both for patients and the system.

In most cases, patients shuffling between GPs and SPs do not receive the best possible treatment (Levin 2010). If dysfunctional, the entire referral process needs to be analysed and redesigned in five stages to ensure successful collaboration and maximum treatment efficiency. In shared care systems, as in conventional care systems, these five stages include the profound definition of relationships and roles played during treatment, the development of communication plans, the scheduling of regular communications among doctors, the communication of post-treatment results, and the assessment of post-treatment results (Levin 2010).

With regard to communication channels, some doctors prefer the immediacy of emails or the security of sites designed to handle confidential information—others may prefer the formality of letters. However, telephone calls may be more useful in conveying complex information more clearly or discussing urgent situations.

Although empirical evidence suggests that these communication channels are not without deficiencies (Dowie 1983; Bado and Williams 1984; Harding 1987; Muzzin 1992; Wood 1993; Newton et al. 1994; Hollins, Veitch, and Hays 2001; Kripalani et al. 2007), regular communication via preferred channels facilitates teamwork, enhances decision making, and builds trust among parties. Institutional contexts may both help and hinder efficient communication between GPs and SPs—however, to be efficient, doctors need to seek actively those communication channels that suit them and their patients best. To this end, they may choose any form of communication they wish—be it via telephone, facsimile, electronic surfaces, written referrals, or even the patients themselves.

SPs are strongly advised to give formal dosage instructions both to patients and GPs and secure GP agreement prior to prescribing specialist medications to patients (Horne et al. 2001). In addition, SPs need to make both patients and GPs aware of potential side effects and necessary remedial measures. To ensure patient understanding, secure patient trust and compliance, and facilitate optimal outcomes, treatment plans need to be reviewed with patients by both SPs and GPs (Grant 1982; Muzzin 1992). In cases of re-referral, GPs need to inform SPs of the challenges they have faced and use such situations as learning opportunities.

If doctors work together constructively, patient care is optimal, patient experience is universally positive, and doctors build positive reputations and attract more patients. In addition, recent SNA literature has shown that smooth collaboration between GPs and SPs leads to sharing more patients and collaborating not just more effectively, but also more efficiently (Barnett et al. 2012a; Pollack et al. 2013).

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IRIS KASSIM AND LEVENTE KOMOR[1]

Drivers of employee engagement in European organisations: a human resource practitioner's perspective[2]

This article analyses the literature on the various interpretations and drivers of employee engagement and suggests a model of employee engagement that centres on the individual. While recognising the importance of drivers both internal and external to the individual, this article argues that employee engagement rests not with the external factors, ultimately, but with individual attitudes and behaviours. This article also analyses the results of the *European Employee Engagement Survey* and contrasts them against those of the literature review. While the two sets of results show discrepancies as well as similarities, both human resource (HR) practices and the HR practitioners' perceptions alike indicate an increasing preoccupation with employee engagement as a direct contributor to business performance.

It is widely accepted that engaged employees drive outstanding business results (see, for example, Kular et al. 2008; Gallup Organization 2010; Spreitzer and Porath 2012). Consequently, over the years, employee engagement has turned into a 'hot' topic for both scholars and professionals, and a growing body of research has set out to reveal the drivers of engagement. Whilst the academic literature has focused primarily on revealing individual characteristics that may serve as good predictors to engagement, the main interest of practitioners has pointed towards those environmental attributes that organisations may influence in order to increase

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employee engagement and enhance business results. From among the latter, this article highlights and analyses human resource (HR) practices.

This article is divided into five sections. Following this brief introduction, the second section reviews different interpretations of employee engagement. The third section summarises the relevant literature for factors influencing employee engagement. The fourth section introduces the *European Employee Engagement Survey* conducted by one of the authors on behalf of Stamford Global (SG Magyarország Vezetőképző Kft.)[3] in 2010 and 2012. The study aimed to monitor changes in certain employment aspects during 2008–10 and 2010–12—employee morale, employee engagement, the organisation's ability to attract talent, and the organisation's ability to retain talent. The study focused on employee engagement, but sought to explore wider human resource practices in European organisations. Characteristics such as size, location, and profile of the organisation were also factored in in the analysis of the data. Finally, the fifth section summarises the findings of the *European Employee Engagement Survey*. Although it concludes that particular HR practices constitute significant drivers of employee engagement, further research is required to explicate how these practices come to result in desired outcomes.

Interpretations of employee engagement

In time, employee engagement has been interpreted in various ways, according to various differentiators. Whilst some interpretations focused on the *individual*, others focused on the *organisation*, on the *job*, or on *occupational* aspects (see, for example, Saks 2006). Whilst some focused on *internal* drivers and defined employee engagement as 'something that the individual brings to the workplace' (Kular et al. 2008: 10), others focused on *external* drivers and claimed that employee engagement is shaped by environment. Whilst some focused on *attitudinal* aspects of employee engagement, others focused on *behavioural* aspects.

According to Kahn's (1990: 694) individual-focused interpretation, employee engagement is 'the harnessing of organisation members' selves to their work roles: in engagement, people employ and express themselves physically, cognitively and emotionally during role performances'.

Similarly to Kahn (1990), Rothbard (2001) interpreted employee engagement as psychological—not just physical—presence at work, defined by attention and absorption.

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[3] http://www.stamfordglobal.com.

Csíkszentmihályi's (1975: 36) individual-focused interpretation of employee engagement used the term 'flow' to describe the 'holistic sensation that people feel when they act with total involvement', close off the environment, and focus with all their senses on the task at hand. Flow is an autotelic experience—'the goal is self-fulfilling, the activity is its own reward' (Pink 2010: 113).

Other scholars interpreted employee engagement as a psychological state, but as the (positive) antithesis of burnout. Maslach and Leiter (1997), for example, defined employee engagement as energy, involvement, and efficacy along the three dimensions represented by exhaustion, cynicism, and ineffectiveness.

Schaufeli and Bakker (2004: 295) interpreted employee engagement as a 'positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption'.

Meyer and Allen's (1991) 'affective commitment' construct referred to the congruence between individual and organisational values and corresponded well with similar interpretations of employee engagement—affectively committed employees identify with and want to belong to their organisations.

Macey and Schneider (2008) identified three forms of employee engagement—trait, state, and behavioural. *Trait* is internal to the individuals and refers to individual dispositions—positive views of life and work, for example, or proactive and autotelic personalities. Psychological *state* refers to feelings of absorption, attachment, energy, enthusiasm, and passion, as well as to a sense of identity with one's work. *Behavioural* refers to performance and reflects effort and observable behaviours that have a 'sense of doing more and/or something different' (Macey and Schneider 2008: 24). As such, behavioural employee engagement can be regarded as a manifestation of antecedent trait and state employee engagement.

Whilst the scholarly interpretations tend to focus on psychological aspects and antecedents of employee engagement, the business and practitioner approaches tend to focus on behavioural aspects and organisational succeeders of employee engagement such as willingness 'to go the extra mile', discretionary effort, awareness of business goals, higher productivity, desire to stay with the organisation, etc.

For Robinson, Perryman, and Hayday (2004), engaged employees believe in the organisation, want to improve things, understand the overall business context / the 'bigger picture', respect and help their colleagues, are willing to 'go the extra mile', and keep up-to-date with professional developments.

MacLeod and Clarke (2009) believed that—alongside attitudes and behaviours—outcomes (such as lower accident rates, higher productivity, fewer conflicts, more innovation, lower fluctuation, and reduced sickness rates) are also an integral part of the employee engagement definition.

The Gallup Organization (2010: n. pag.) also believed that 'employee engagement is a force that drives performance outcomes'.

For Towers Perrin (2008: n. pag.), employee engagement was 'employees' willingness and ability to contribute to company success', while for the Chartered Institute of Personnel and Development (CIPD 2012: n. pag.) it was 'a combination of commitment to the organisation and its values and a willingness to help out colleagues (organisational citizenship)'. The Institute for Employment Studies (IES, quoted in Robinson, Perryman, and Hayday 2004: n. pag.) also defined employee engagement as 'a positive attitude held by the employee towards the organisation and its values. An engaged employee is aware of business context, and works with colleagues to improve performance within the job for the benefit of the organisation'.

The *European Employee Engagement Survey* (Kassim 2012; Kassim and Turner 2012) too revealed that European HR professionals focus on the organisational—result-oriented—aspects of employee engagement. The answers to the question 'How would you define employee engagement?' were fed into Wordle—a 'word cloud' generator programme which jumbles up the words in the uploaded text and gives prominence to words function of their frequency in the source text (see Figure 1, p. 117). Interestingly, unlike the scholarly interpretations of employee engagement, the practitioner interpretations rarely used terms such as passion, energy, enthusiasm, and emotional attachment:

- employee	- engagement	- willingness	- 'go the extra mile'
- company	- work	- goals	- discretionary effort
- organisation	- job	- success	- motivate
- commitment	- people	- achievement	- etc.

While Table 1 (p. 118) summarises the various interpretations of employee engagement, Figure 2 (p. 118) suggests a model of employee engagement founded on two main pillars—attitudes and behaviours. Attitudinal engagement has three main components—*intrinsic* motivation, attachment to the *organisation*, and *job* involvement. Employee engagement cannot be purely external to individuals—if employees are motivated only by external factors (such as expected rewards, for example), then they are not really engaged. Employee engagement is also an organisational construct—engaged employees identify with organisational values, mission, and goals. Furthermore, a sense of identity with one's job is also essential in employee engagement—finding meaning in the job itself results in enduring employee engagement. In their interpretations of employee engagement, Kahn (1990), Maslach and Leiter (1997), Rothbard (2001), Schaufeli, Bakker, and Salanova (2006), and many others stopped at attitudes. However, as Macey and Schneider (2008) argued, subsequent behaviours—such as demonstrated discretionary effort, going above and beyond what is expected, and doing something more and / or different, for example—should also be an integral part of the employee engagement definition.

Figure 1: Word frequency across employee engagement definitions in 2012

Source: Kassim (2012: 7)

Table 1: Interpretations of employee engagement

Attitudes	Behaviours	Results / outcomes
- identification with organisational values, mission, and goals - emotional attachment - passion, enthusiasm, and energy - internal drive / intrinsic motivation - pride in the organisation - willingness to 'go the extra mile'	- understanding of the 'big picture' - awareness of the business context - keeping up-to-date with professional developments - demonstrated discretionary effort - going 'above and beyond' what is expected	- higher productivity - outstanding performance - loyalty - lower turnover - lower accident rates - more innovations - fewer conflicts

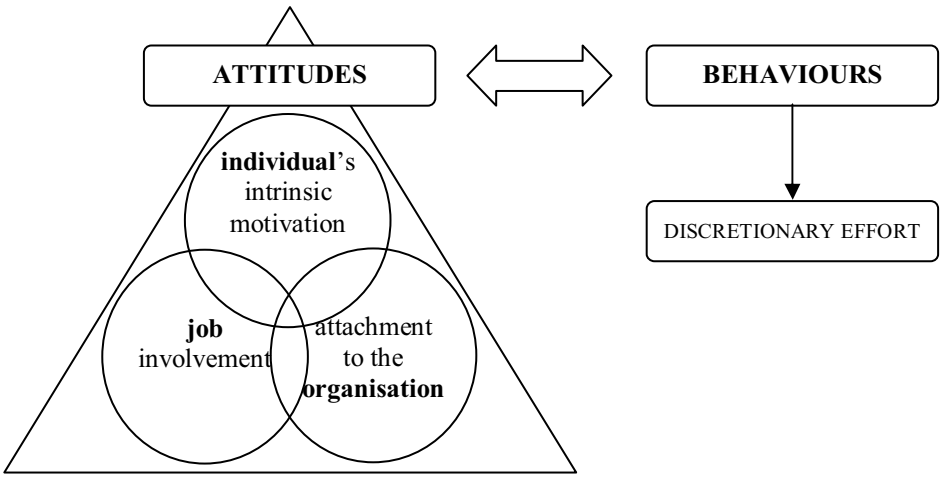

Figure 2: A model of employee engagement

Source: Kassim (2012: 9)

In contrast to this model, Buckingham and Coffman (2005), MacLeod and Clarke (2009), and others included employee performance—measured through results / outcomes—in the employee engagement definition. However, this is not a convincing definition, since employees with the 'right' attitudes—manifested through the 'right' behaviours—would be considered engaged only if their performance were outstanding. Since this is not always the case, and since high-performing employees are not necessarily engaged employees, the model suggested in this article leaves employee performance out.

Drivers of employee engagement

Some interpretations place the source of employee engagement with the individual (see, for example, Kular et al. 2008), whilst others also emphasise the importance of a supportive environment (see, for example, Ryan and Deci 2000; Robbins, Crino, and Fredendall 2002; Towers Watson 2012).

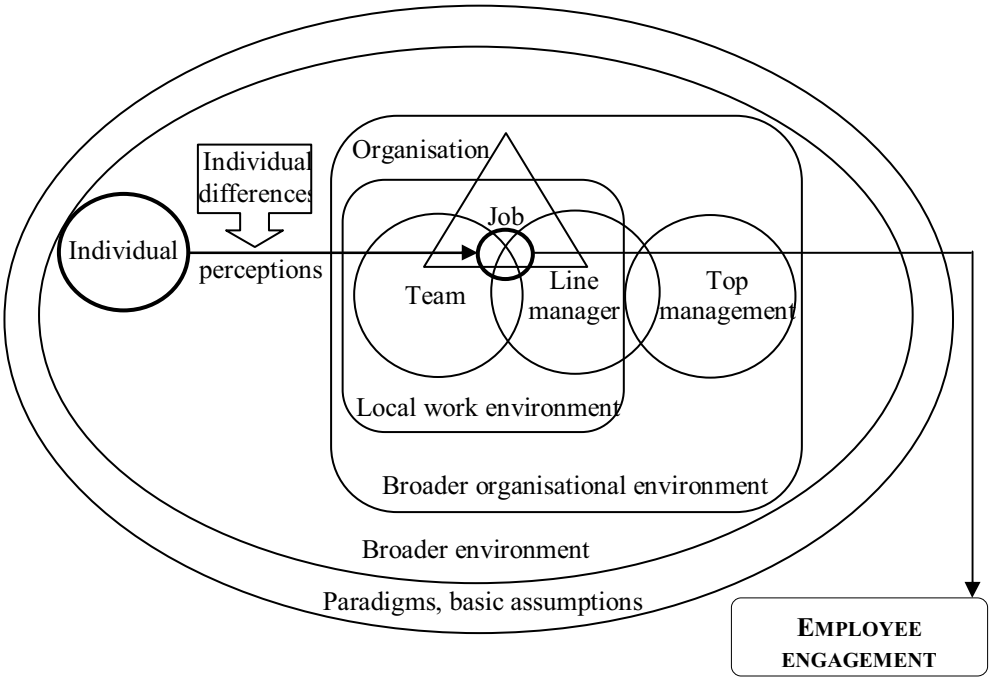

Figure 3: The contextual framework of drivers of employee engagement

Source: Kassim (2012: 14).

Figure 3 (p. 119) illustrates the contextual framework of the internal / individual and external / environmental factors that may play a mediating role in creating and fostering employee engagement. Intervened by the perception process, certain individual attributes contribute to the 'basic' positioning of employee engagement, which is influenced by the immediate work environment, the organisational environment, and the broader environment. The relationships with the line manager and colleagues, the complexion of the team, as well as the nature of the job itself may have important effects on employee engagement. Top management's leadership philosophy and organisational elements—such as mission, goals, values, culture, policies, or HR practices—too may play an important part in facilitating employee engagement. Broader environmental elements—such as political climate, economic and market situation, social trends, or technological aspects—may also have an indirect effect. Finally, basic assumptions and paradigms about the human nature, how people and organisations should be managed, or even what the main objective of an organisation should be (for example, profit maximisation or creating value for the society) may affect all the other components of the employee engagement framework.

Individual factors

According to our model of employee engagement, the individual's *intrinsic motivation* is a key component of the attitudinal pillar (see Figure 2, p. 118). Intrinsic motivation is an 'inside generator' that drives individuals to certain moves and objectives (Herzberg 1987). If purely externally motivated, employees are not really engaged.

The literature suggests that certain individuals are more inclined to engage than others. According to Bakker et al. (2008), positive self-evaluations—such as optimism, self-efficacy, self-esteem, etc.—and feeling able to control destiny and impact on the environment are *personal resources* that predict engagement. Xanthopoulou et al. (2007) found that engaged employees are more *self-efficacious* and *optimistic* and have more organisational *self-esteem*. Robbins, Crino, and Fredendall (2002) as well as others found that employees with high self-esteem are more likely to be open and find meaning in their jobs—an important prerequisite of engagement. Organ and Greene (1974) defined locus of control as the extent to which employees feel able to influence their own lives—an *internal locus of control* involves a strong self-belief in control over the environment, as well as positive perception of opportunities, job involvement, and organisational attachment (Robbins, Crino, and Fredendall 2002). Macey and Schneider (2008) considered *positive affectivity*—an individual's state of active positivism (Larsen and Diener 1992)—a good predictor of employee engagement. Crant (2000)

associated employee engagement with *proactive personality*, manifested as the tendency to influence one's work environment. Open to new experiences, motivated by challenges, and able to arrive at and maintain the state of flow, *autotelic* employees are also likely to engage (Nakamura and Csíkszentmihályi 2002).

Perceptions mediate the evaluation of information individuals receive and play an important role in employee engagement—according to Luthans (1998: 101), 'perception is a very complex cognitive process that yields a unique picture of the world, a picture that may be quite different from reality'. Various individuals' perception of their environments is highly dependent on factors such as personality, previous experiences, expectations, personal competences, values, needs, priorities, etc. Therefore, employees' subjective perceptions bear more weight in engagement than the objective realities of their work environments (Robbins, Crino, and Fredendall 2002).

Job-related factors

Job involvement is also a key component of attitudinal engagement—for sustainable, high levels of employee engagement, finding meaning and identifying with the job are essential. While Maslach, Schaufeli, and Leiter (2001) argued that *finding meaning* at work is positively linked to employee engagement, Thomas and Velthouse (1990) found that employees attached to their organisations are likely to find work meaningful.

Kahn (1990) suggested that *meaningfulness*, *psychological safety*, and *availability* are three psychological conditions related to employee engagement. This hypothesis was later tested empirically by May, Gilson, and Harter (2004), who found that *job enrichment* and *role fit* are good predictors of meaningfulness. Herzberg (1987: 10) suggested that work should be enriched in ways that '[provide] the opportunity for the employee's psychological growth'. For Buckingham and Coffman (2005), *fit* between job features and individual internal motivation, personality, and competences was an essential precondition for employee engagement. Saks (2006) argued that *job characteristics* are positively related to employee engagement, while Hackman and Oldham's (1980) model identified five such characteristics—*skill variety*, *task identity*, *task significance*, *autonomy*, and *feedback*. Humphrey, Nahrgang, and Morgeson (2007) differentiated among motivational, social, and contextual job characteristics. Motivational characteristics include autonomy, task variety, task significance, feedback, and job complexity. Social characteristics refer to assistance and encouragement from managers and colleagues. Contextual characteristics refer to the physical demands of the job on the employee. Christian, Garza, and Slaughter (2011) found positive correlations between employee engagement and *autonomy*,

task variety, *task significance*, *feedback*, *problem solving*, *job complexity*, and *social support*—and negative correlations between employee engagement and physical demands and stressful work conditions. These findings are in line with earlier studies. For example, DeCotiis and Summers (1987) found a relationship between *autonomy* and organisational commitment and Kiss and Szilas (2012) found that higher levels of job control lead to enhanced organisational commitment. Hall, Schneider, and Nygren (1970) as well as others found that *job challenge* and *responsibility* influence employee attachment to employer. Employees who feel *personal importance* and *valued* are also likely to be committed (see, for example, Sheldon 1971; Steers 1977)—feeling *valued* was also emphasised by Maslach, Schaufeli, and Leiter (2001), alongside *sustainable workload*. Pitt-Catsouphes and Matz-Costa (2008) viewed *workplace flexibility* as important.

Organisational factors

While the individual and job-related factors make the subject of much academic literature, the organisational factors receive significantly less attention. In contrast, the practitioner literature emphasises the organisational context of employee engagement—hence, the practitioner 'orientation' of this section. While the data collection, analysis, and interpretation may not always meet scientific requirements, the organisational factors cannot be ignored (see, for example, Miller 1977; Ryan and Deci 2000; Robbins, Crino, and Fredendall 2002; Macey and Schneider 2008).

Quality of leadership and management

Both scholars and practitioners alike agree that the quality of leadership and management is crucial to employee engagement. Numerous management practices provide numerous approaches to effective HR management. However, the academic literature has not yet examined in detail the concrete relationships between leadership and employee engagement.

Unsatisfactory employee *relationships with direct supervisors* lead to disengagement, even in organisations with best reputations, most generous remuneration packages, and / or most sophisticated HR systems (Buckingham and Coffman 2005). In contrast, Towers Perrin (2008) found that *senior leaders* have far more impact on employee engagement than direct supervisors.

May, Gilson, and Harter (2004) was one of only a few academic studies of the relationship between *leadership* and employee engagement. It found that *perceived support* from supervisors and *not controlling relations* contribute to perceptions of safety and, ultimately, to employee engagement. Saks (2006) too

found that perceived supervisor support was in a moderate correlation with job and organisational engagement. Andrew and Sofian (2011) also found that leadership was a significant predictor of organisational engagement.

IES found that an organisation's *concern for its employees' wellbeing and health* is a key driver of employee engagement (Robinson, Perryman, and Hayday 2004). For Towers Perrin (2008), this was the most important in a list of ten drivers—*good relationship with supervisor* was also an important employee engagement factor.

For Groysberg and Slind (2012), leadership was about communication—managers who maintain *genuine and honest conversations* with employees are credible and engage their subordinates at higher levels. Drucker (2002) suggested that leaders spend time with their subordinates, get to know them, mentor them, listen to them, and encourage their development in order to foster engagement and higher performance. Saks and Gruman (2011) too underlined the importance of good manager–employee relationships—including good communication—in employee engagement and, ultimately, performance.

Luthans and Peterson (2002) found that *manager's self-efficacy* contributes to employee engagement and performance. Robertson-Smith and Markwick (2009) added *inspiring and encouraging* and *participative management styles* (for example, sharing information, involvement in decision-making, and allowing job autonomy). The international study of the Corporate Leadership Council (2004) concluded that *management honesty*, *integrity*, and *commitment* to organisational goals are key drivers of employee engagement. It also highlighted the importance of a *clearly articulated vision* as well as that of employee performance expectations realistically linked with organisational objectives. Caldwell, Chatman, and O'Reilly (1990) found that employees who can clearly articulate the organisational mission and objectives are likely to have a high level of commitment.

For Hartog and Belschak (2012: 36), '[e]thical leadership is a value-driven form of leadership that affects the self-concept and beliefs of followers'—the ability to authentically express these values to be internalised by followers affects employee engagement.

Relations with colleagues

Employees may contribute to organisations as individuals or as team members. Either way, they need to interact with colleagues constantly, the quality and dynamics of interaction influencing their engagement levels.

Social support—defined as assistance and encouragement received from colleagues and managers—is positively related to employee engagement (see, for example, Bakker and Demerouti 2007). May, Gilson, and Harter (2004) too found that relationships with colleagues play an important role in job meaningfulness and

contribute to feelings of psychological safety. Both meaningfulness and safety are in a significant relationship with employee engagement. Perceived support from colleagues was found a significant predictor of job and organisational engagement by Andrew and Sofian (2011) too, and Kiss and Szilas (2012) also found a link with emotional attachment to the organisation. In addition, Robertson-Smith and Markwick (2009) concluded that *trust and mutual respect* between subordinates and supervisors are an important enabler of employee engagement.

Following the *norms within a work group* also influences the feeling of psychological safety and impacts on employee engagement (May, Gilson, and Harter 2004).

According to Ryan and Deci (2000), people have three basic human needs—autonomy, relatedness, and competence. Supportive colleagues and an inspiring team atmosphere contribute to the perceived satisfaction of relatedness needs—to engage their employees, companies need to rebuild themselves as *communities* (Mintzberg 2009).

Interestingly, with the exception of the Gallup Organization (2010), supportive colleagues do not figure among the key engagement drivers of research and consulting institutions (see, for example, Corporate Leadership Council 2004; IES in Robinson, Perryman, and Hayday 2004; Towers Perrin 2008; CIPD 2011).

The broader organisational environment

The broader organisational environment serves as a framework for the local work environment (see Figure 3, p. 119), with various—direct or indirect—influences on employee engagement.

Mone et al. (2011) identified five main activities of *performance management* that may enhance employee engagement—(1) setting clear performance and developmental goals, (2) providing constant feedback and recognition, (3) supporting personal and professional development, (4) conducting regular performance reviews, and (5) building a climate of trust and empowerment.

Employees need to know what is expected of them and, crucially, understand what the main organisational objectives are and how they translate into individual objectives. Robertson-Smith and Markwick (2009) supported the importance of *clear goals*, therefore, while Mone et al. (2011) argued for the need to set individual performance and developmental goals in collaboration with the employee. To facilitate personal growth and organisational effectiveness (Kerr and Landouer 2004), goals need to be challenging, but not unachievable (Karoliny and Poór 2010). For Towers Perrin (2008), setting high individual standards was a key driver of employee engagement, provided that the standards are not set so high as to result in burnout and disengagement.

The literature on HR management practices emphasises the importance of *constant feedback*—clear, specific, objective, and constructive—in order to contribute to both personal development and high individual performance (see, for example, Koncz 2004; Karoliny and Poór 2010; Fehér 2011). Szeicz (1996) highlighted the importance of performance management systems, appropriately designed for constant constructive feedback as the basis for trust between employees and organisation. However, Mone et al. (2011: 207) raised fundamental concerns over general constructive feedback—'What remains unclear, however, is the exact relationship between constructive feedback and employee engagement.'

Self-actualisation is a high-order need of the human beings (see, for example, Maslow in Luthans 1998 or Komor 2011; Herzberg 1987), and fostering personal and professional *growth* and *development* contributes to employee engagement. Andrew and Sofian (2011) found that opportunities for employee development were a significant predictor of job engagement, but—interestingly—not of organisational engagement. Towers Perrin (2008) too found that opportunities for skill and capability improvement, as well as career advancement opportunities, are key drivers of employee engagement. Encouraging innovative thinking also contributes to employee engagement (Corporate Leadership Council 2004; Towers Perrin 2008).

Structural and psychological empowerments are often associated with employee engagement (see, for example, Macey et al. 2009; Mone et al. 2011). *Structural empowerment* consists of supportive work conditions that allow employees access to necessary information and resources and learning and development opportunities—it gives employees the power to mobilise resources and enables them to work meaningfully (Kanter 1993). *Psychological empowerment* consists of employees' perception of and reaction to structural empowerment (Kimura 2011)—the more positive the perceptions and reactions, the higher the psychological empowerment and the more likely the employee engagement (Spreitzer 1996; Laschinger et al. 2001).

According to our model (see Figure 2, p. 118), identification with organisational mission and core values are integral to employee engagement. Values guide individual judgments, attitudes, and actions (Rokeach 1973; Chatman 1991). The core values at the heart of organisational cultures (see, for example, Heidrich 2001; Szeicz 2008; Bakacsi 2010) determine the attitudes and behaviours of employees. *Person–Organisation (P–O) fit* reflects the congruence between organisational and individual patterns of values (Bretz and Judge 1994) and the extent to which individually unique personality, competences, needs, and values are in tune with the organisational culture. According to Kimura (2011), the P–O fit has a significant relationship with employee engagement, but moderate effect.

The opportunities for employees to voice their opinions and ideas and the extent to which these are listened to are a key driver of employee engagement (IES in

Robinson, Perryman, and Hayday 2004). Effective *two-way communication* between management and employees contributes to employees feeling valued and involved (Allen 1992; Robbins, Crino, and Fredendall 2002) and promotes a sense of purpose (Conger and Kanungo 1988)—both important prerequisites for employee engagement (Corporate Leadership Council 2004; Towers Perrin 2008). Participation and information sharing as well as a culture of trust and recognition are key elements in developing an engaged and high-performing workforce (Malzenicky 2007a; 2007b). However, Andrew and Sofian (2011) found no significant relationships between communication, on the one hand, and job and organisational engagement, on the other.

Research does not support the common wisdom assumption that *competitive remuneration* plays an important role in employee engagement. For example, Towers Perrin (2008) found that competitive salaries are the most important drivers in attracting employees, but are ineffective at both retaining employees and enhancing employee engagement. International research by the Gallup Organization (in Buckingham and Coffman 2005) also concluded that salary plays no role in employee engagement—Pink (2010) claimed that monetary rewards can even destroy individual intrinsic motivation.

The broader environment

Since the broader environment has an effect on organisations, it may also have an (indirect) effect on employee engagement. For decades now, the '*PEST factors*' (see, for example, Csath 2004)—political-legal climate, economic circumstances, social trends, and technological advancements—have been serving as a framework for strategy development and action planning for organisations of all sizes. Surely, with such a significant effect on the strategic thinking of senior executives, these factors must shape the local work environments of employees.

The *worldwide economic crisis* has had a huge impact on organisations, forcing them into strict cost cutting, downsizing, and significant layoffs—in turn, these measures may have affected employee engagement. Indeed, 2008–10 witnessed the largest decline in global employee engagement in 15 years (Aon Hewitt Consulting 2011). The Kenexa High Performance Institute (2012) studied 28 countries and found a significant drop in overall employee engagement between 2009 and 2011—although the reasons were not examined, we may assume that the economic downturn did play a part in this decline.

Numerous studies have investigated HR practices and have revealed *country*-specific and *region*-specific patterns—see, for example, the Cranfield Network on International Human Resource Management (CRANET) research in Farkas, Karoliny, and Poór (2009); Poór (2009); Karoliny, Farkas, and Poór (2010); and Kohont and Poór (2011). History and culture may also affect a country's HR

practices (see, for example, Poór 2009), leading to the assumption that employee engagement may vary by countries and regions.

Increasingly dynamic information technology (IT) solutions have had major and diverse impacts across the world, including the realignment of the *social behaviour* of new generations, investigated among numerous others by Howe and Strauss (2007). Krajcsák (2012) predicted the conquest of virtual work—for example, remote work, video meetings, web conferencing, hologram presentations, virtual learning, etc.—and suggested that the work arrangements of the future need to be flexible and adapt to the opportunities offered by technological innovations. It can only be assumed that the generational workforces of the future will differ significantly and will impact employee engagement in yet unexpected ways.

Paradigms

Finally, paradigms too are important drivers of employee engagement. Kuhn (1970: 43) defined paradigms as 'universally recognized scientific achievements that, for a time, provide model problems and solutions for a community of researchers', while Schein (1978) gave a great summary of the four main paradigms of human nature. From the rational-economic view of humans (see, for example, McGregor' Theory X), through the concept of humans as social beings (see, for example, Mayo), to the approach of humans as searching for self-actualisation (see, for example, Argyris, Maslow, Herzberg, and McGregor's Theory Y), Schein (1978) suggested that humans need to be viewed as complex beings, variously motivated function of circumstances. In time, various paradigms for human nature have influenced the ways organisations approach and manage their employees.

Recognising and analysing the paradigms that are currently shaping the way organisations manage their employees is fraught with difficulties. The world we live and work in has been changing at a rapid pace—current beliefs about the human nature may be outdated and a significant revolution in approach may be needed to engage the employees of the future. Studies of drivers of employee engagement also need to take into account the paradigms that enable analysis and interpretation, since revealing possible future directions for approaches to human beings may be beneficial.

Drivers of employee engagement—a summary

Table 2 (p. 128) provides a summary of drivers of employee engagement. The analysis in this section has focused on factors that were specifically examined in the literature in relation to employee engagement. However, there may be numerous other factors—emotional intelligence, competences, values, personal

interests, gender, age, generation, tenure at the organisation, role conflicts, perceived fairness, work–life balance, organisational involvement in social responsibility, organisational reputation, and brand name, to name just a few.

Table 2: Summary of drivers of employee engagement

INDIVIDUAL FACTORS		
	- intrinsic motivation - internal locus of control - positive affectivity - proactive personality - autotelic personality	- psychological empowerment - personal resources (for example, optimism, self-efficacy, and self-esteem) - individual perceptions
JOB-RELATED FACTORS		
	- meaningful job - person–job fit, task identity - job challenge - skill variety - task significance, job perceived to be valued	- job complexity - autonomy - responsibility - sustainable workload - workplace flexibility
ORGANISATIONAL FACTORS		
Quality of leadership and management	- sincere management concern and interest in employee wellbeing - genuine and honest communication - management honesty, integrity and engagement	- management ability to articulate clear vision and objectives - managerial self-efficacy - perceived support - not controlling relations - good relationship with manager
Relations with colleagues	- social support (perceived assistance and encouragement)	- trust and mutual respect - work group norms
Broader organisational environment	- quality of performance management system - clear performance and developmental goals - regular performance reviews - personal and professional developmental opportunities	- constant feedback - structural empowerment conditions (access to information and resources, involvement, and autonomy) - person–organisation fit - two-way communication
BROADER ENVIRONMENTAL FACTORS		
	- political-legal climate - economic circumstances - social trends	- technological advancements - region, country - generational differences
PARADIGMS AS INFLUENCING FACTORS		
	- basic assumptions and views about the human nature	

European HR practices

The literature on drivers of employee engagement suggests links between HR practices and employment aspects such as employee engagement. To analyse such possible links, this section of the article presents the results of research based on a European-wide survey.

Table 3: Breakdown of research participants by function for the years 2010 and 2012 (in percentages)

Function	2010	2012
HR vice president	7	7
HR director	40	39
HR manager	40	26
HR business partner	6	17
HR executive	6	12
Total*	100	100

* Percentages may not total 100 due to rounding.

Source: Kassim (2012: 45).

The *European Employee Engagement Survey* was conducted by one of the authors on behalf of Stamford Global in 2010 and 2012. Participation from the European HR professionals on the company's client base was sought by email and participation from the European members of the Stamford Global HCM[4] Excellence Network[5] through the LinkedIn discussion forum. An online survey tool (SurveyMonkey®[6]) was used to allow questionnaires to be completed and submitted online—149 in 2010 and 127 in 2012. The study aimed to analyse:

- changes in 2008–10 and 2010–12 in the European HR professionals' perceptions of the business context;
- changes in 2008–10 and 2010–12 in the European HR professionals' perceptions of four employment aspects—employee morale, employee

[4] Human capital management.

[5] http://www.linkedin.com/groups/HCM-Excellence-HR-Professionals-Network-1850502?trk=myg_ugrp_ovr.

[6] http://www.surveymonkey.com.

engagement, the organisation's ability to attract talent, and the organisation's ability to retain talent;
- the importance of employee engagement in European organisations;
- the management of employee engagement in European organisations;
- HR practices in European organisations;
- the effects of HR practices on the four employment aspects;

and
- the effects of employee engagement practices on the four employment aspects.

The majority of research participants (80 per cent in 2010 and 65 per cent in 2012) were HR directors and HR managers (see Table 3, p. 129).

Table 4: Breakdown of research participants by country / region for the years 2010 and 2012 (in percentages)

Country / region	2010	2012
Austria, Germany, and Switzerland	3	7
Baltics (Estonia, Latvia, and Lithuania)	4	4
Benelux (Belgium, Luxemburg, and the Netherlands)	0	3
Central and Eastern Europe (CEE) (Albania, Bosnia-Herzegovina, Bulgaria, the Czech Republic, Hungary, Kosovo, Macedonia, Montenegro, Poland, Romania, Serbia, Slovakia, and Slovenia)	50	41
Commonwealth of Independent States (CIS) (Belarus, Russia, and Ukraine)	2	9
France	1	1
Mediterranean (Andorra, Croatia, Cyprus, Greece, Italy, Malta, Monaco, Portugal, Spain, and Turkey)	4	13
Scandinavia (Denmark, Finland, Iceland, Norway, and Sweden)	2	11
UK and Ireland	35	11
Total*	100	100

* Percentages may not total 100 due to rounding.

Source: Kassim (2012: 45).

Central and Eastern Europe (CEE) contributed 50 per cent of research participants in 2010 and 41 per cent in 2012 (see Table 4). In 2010, a significant

number of research participants (35 per cent) were from the UK and Ireland—in 2012, there was a more balanced distribution of research participants from European countries outside CEE.

The research participants represented a large variety of industries (see Table 5). Financial services (11 per cent) and fast moving consumer goods (10 per cent) were the most represented in 2010, while professional services (13 per cent), manufacturing (11 per cent), and IT (10 per cent) were the most represented in 2012.

Table 5: Breakdown of research participants by industry for the years 2010 and 2012 (in percentages)

Industry	2010	2012
Agriculture, hunting, and forestry	1	0
Automotives	3	7
Aviation	1	1
Chemicals	2	1
Constructions	1	1
Education	1	1
Fast moving consumer goods	10	8
Financial services	11	6
Government	4	3
Hospitality	2	2
Information technology (IT)	7	10
Manufacturing	9	11
Media	3	2
Mining	0	0
Oil and gas	3	5
Pharmaceuticals and healthcare	5	7
Professional services	5	13
Real estate	3	0
Telecommunications	9	5
Transport and logistics	5	1
Utilities	1	3
Wholesale and retail trade	4	3
Other	7	13
Total*	100	100

* Percentages may not total 100 due to rounding.

Source: Kassim (2012: 46)

In 2010, 70 per cent of the represented organisations had less than 2,500 employees—in 2012, 62 per cent of the represented organisations had more than 5,000 employees, while the ratio of micro-, small- and medium-sized enterprises was 19 per cent (see Table 6).

Almost all responding European HR professionals—98 per cent in 2010 and 100 per cent in 2012—agreed that employee engagement affects business performance (see Table 13, p. 141). Moreover, employee engagement was a 'top priority' or, at the least, 'very important' for 79 per cent of the European HR professionals in 2010 and 81 per cent of the European HR professionals in 2012. In both years, roughly two-thirds of respondents—65 per cent in 2010 and 68 per cent in 2012—reported to have a 'clearly defined employee engagement strategy' or a 'somewhat defined employee engagement strategy'. Moreover, in 2012, 72 per cent of respondents linked employee engagement strategies to business results. It seems widely accepted that investments in HR practices contribute to employee engagement and—possibly—to profitability. Nevertheless, being able to measure any such returns on investments is essential (Ulrich and Smallwood 2005), and these findings seem to suggest a move in this direction.

Table 6: Breakdown of research participants (in percentages) by size of the represented organisation (in number of employees) for the years 2010 and 2012

Size of the represented organisation	2010	2012
0–249	25	19
250–999	30	6
1,000–2,499	15	5
2,500–4,999	9	7
5,000–14,999	7	13
15,000–24,999	3	10
at least 25,000	9	39
Total*	100	100

* Percentages may not total 100 due to rounding.

Source: Kassim (2012: 46).

Measuring employment aspects

There were dramatic changes in the overall business environment, at the time of the research, due to the global economic crisis and the slow recovery period that

followed in its aftermath. To investigate their potential effect on the four employment aspects, the research participants were asked the following questions relative to 2008–10 and 2010–12 respectively:

- How has employee morale changed in your organisation?
- How has the engagement level of your employees changed?
- How has your ability to attract talent changed?
- How has your ability to retain talent changed?

While the original variables were measured on a five-point Likert scale, principal component analyses (PCAs) can be conducted only on variables measured on a ratio scale or alternatively dichotomous variables (Sajtos and Mitev 2007; Székelyi and Barna 2008). Consequently, the answers were recoded as dichotomous variables—'significantly worse' and 'somewhat worse' were coded as '0' and 'remained the same', 'somewhat better', and 'significantly better' were coded as '1'.

Table 7: The Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity for the years 2010 and 2012

The Kaiser-Meyer-Olkin measure and Bartlett's test		**2010**	**2012**
Kaiser-Meyer-Olkin measure		.581	.700
Bartlett's test	Approx. Chi-Square	101.006	172.276
	df	3	6
	Sig.	.000	.000

Source: Kassim (2012: 57).

Since the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was above the required 0.5 limit (Sajtos and Mitev 2007; Székelyi and Barna 2008) for both 2010 and 2012, the new principal components are appropriate representations of the original variables (see Table 7). This was confirmed by Bartlett's test of sphericity—the level of significance was below the required 0.05 limit (Sajtos and Mitev 2007; Székelyi and Barna 2008) for both years. Henceforth, the constructed principal components will be referred to as '*Employment Aspects*'.

Only three employment aspects were included in 2010—the organisation's ability to retain talent, employee morale, and employee engagement (see Table 8, p. 134). The organisation's ability to attract talent was added in 2012 and showed a somewhat different pattern than the other three aspects. A notable proportion of respondents perceived their organisations' ability to retain talent as either 'somewhat better' or 'significantly better' than before—this may have been explained by the economic downturn characterised by high levels of uncertainty and people less willing to leave organisations for uncertain futures elsewhere. At

the same time, the economic downturn forced numerous organisations to lay off large numbers of employees, allowing other organisations to attract more talents than before—hence, the respondents perceived their organisations' ability to attract talent as 'somewhat better' or 'significantly better' than before, while rating their organisations' ability to retain talent as 'somewhat worse' or 'significantly worse'.

Table 8: The component matrices for the years 2010 and 2012 (one component extracted with the principal component analysis extraction method)

Component Matrix 2010		**Component Matrix 2012**	
		Talent attraction	.747
Talent retention	.636	Talent retention	.806
Employee morale	.859	Employee morale	.895
Employee engagement	.901	Employee engagement	.805

Source: Kassim (2012: 58).

Table 9: Total variance explained for the years 2010 and 2012 (principal component analysis extraction method)

Total variance explained 2010						
Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	Percentage of variance	Cumulative percentage	Total	Percentage of variance	Cumulative percentage
1	1.954	65.128	65.128	1.954	65.128	65.128
2	.763	25.427	90.556	n/a	n/a	n/a
3	.283	9.444	100.00	n/a	n/a	n/a
Total variance explained 2012						
Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	Percentage of variance	Cumulative percentage	Total	Percentage of variance	Cumulative percentage
1	2.658	66.438	66.438	2.658	66.438	66.438
2	.757	18.937	85.375	n/a	n/a	n/a
3	.390	9.743	95.118	n/a	n/a	n/a
4	.195	4.882	100.00	n/a	n/a	n/a

Source: Kassim (2012: 58).

The 'Employment Aspects 2010' principal component included 65.1 per cent of information content of the original variables—the 'Employment Aspects 2012' principal component included 66.4 per cent of information content of the original variables (see Table 9, p. 134).

Table 10: HR practices indicated as being used on a regular basis for the years 2010 and 2012 (in percentages)

HR practices	2010	2012
Regular performance reviews	89	89
Training and development programmes	87	85
Leadership development programmes	66	77
Employee engagement surveys	59	62
Behavioural interviews part of the recruitment process	59	62
Succession planning	61	60
Identification of talent pool	55	59
Flexible work arrangements	n/a	58
Coaching	62	58
On-boarding / induction programmes	71	57
360-degree evaluation	49	57
Employer branding	39	53
Talent management programmes	n/a	52
Overall competency model	49	51
Employee satisfaction surveys	63	50
Career planning	50	47
Competitive remuneration	55	45
Mentoring	n/a	43
Social media	n/a	43
Management trainee programmes	47	37
Assessment centres (AC) involved in the recruitment process	37	36
Participation in 'best employer' surveys	29	34
Work–life balance programmes	28	34
Corporate social responsibility (CSR) programmes	36	33
Development centres (DC)	25	23
Individually customised incentives	17	22
Individualised job design	20	17
Interim managers	n/a	11
Participation in 'family-friendly employer' surveys	7	8

Source: Kassim (2012: 49).

An 'Employment Aspects' score was generated and assigned to each respondent, in both years. The higher the score, the higher the increase in employee morale and engagement and the higher the increase in the organisation's ability to retain and (in 2012) attract talent.

Measuring HR practices

The research participants were asked to indicate the HR practices used on a regular basis in their organisations (see Table 10, p. 135).

HR practices were operationalised by standardising them based on frequencies of occurrence—more frequent HR practices were taken into account with lower weights and less frequent HR practices with higher weights. Each organisation was assigned an '*HR Practices Index*', developed by summing up the standardised values of each HR practice indicated as being used on a regular basis within the organisation. Hence, the higher the 'HR Practices Index', the more numerous and varied the HR practices used on a regular basis, and the more progressive the organisation.

The relationship between 'Employment Aspects' and the 'HR Practices Index'

The literature agrees that advanced HR practices influence positively the four employment aspects—employee morale, employee engagement, the organisation's ability to attract talent, and the organisation's ability to retain talent (see, for example, Koncz 2004; Karoliny and Poór 2010; Fehér 2011; Komor 2011).

A correlation analysis conducted between the created variables of the 'Employment Aspects' principal component and the 'HR Practices Index' found correlations significant at the 0.05 level (see Table 11, p. 137). However, with Pearson correlation coefficients of only 0.225 in 2010 and 0.220 in 2012, the strengths of the relationships were weak (Sajtos and Mitev 2007; Székelyi and Barna 2008).

Since 'Employment Aspects' and the 'HR Practices Index' are positively related, in the focus sample of European organisations and based on the research participants' perceptions, the more numerous and varied the HR practices, the higher the positive effects on employee morale and engagement could have been anticipated as well as the higher the positive effects on the organisation's ability to retain and (in 2012) attract talent.

This suggests that investments in developing various HR practices may contribute to positive changes in 'Employment Aspects'. However, since the relationship between 'Employment Aspects' and the 'HR Practices Index' was significant, but the strength of the correlation was weak, the operation of certain

HR practices may not necessarily lead to high 'Employment Aspects'—the ways in which certain HR practices are applied may also have a notable effect on 'Employment Aspects'. For instance, lack of managerial skill in providing clear, objective, and constructive feedback to subordinates may result in employee disengagement, despite cutting-edge performance management systems.

Table 11: Correlations between 'Employment Aspects' and the 'HR Practices Index' for the years 2010 and 2012

Correlations							
2010		PC Employment Aspects 2010	Stand HR Practices Index 2010	**2012**		PC Employment Aspects 2012	Stand HR Practices Index 2012
PC Employment Aspects 2010	Pearson correlation	1	.225*	PC Employment Aspects 2012	Pearson correlation	1	.220*
	Sig. (two-tailed)	n/a	.013		Sig. (two-tailed)	n/a	.032
	N	120	120		N	95	95
Stand HR Practices Index 2010	Pearson correlation	.225*	1	Stand HR Practices Index 2012	Pearson correlation	.220*	1
	Sig. (two-tailed)	.013	n/a		Sig. (two-tailed)	.032	n/a
	N	120	149		N	95	127

* Correlation is significant at the 0.05 level (two-tailed).

Source: Kassim (2012: 59).

Further analyses

Further analyses of variance were conducted in SPSS Statistics (see Table 12, page 139)[7] and revealed the following:

[7] A significance value (Sig.) below 0.05 indicates a significant relationship between two factors, but says nothing of the strength of the relationship. If the relationship is significant, then Eta Squared shows the percentage of variance in the heterogeneity of the dependent factor—'Employment Aspects' or the 'HR Practices Index'—explained by the independent factor (the response to the question, that is) (Sajtos and Mitev 2007; Székelyi and Barna 2008).

1. The size of the organisation did not influence 'Employment Aspects', but had a significant effect on the variety and nature of HR practices used on a regular basis by organisations. However, although the smallest organisations had the lowest 'HR Practices Indexes' and the largest organisations the highest, the relationship was not linear. Higher numbers of employees did not guarantee higher 'HR Practices Indexes'.
2. The region of the organisation was related neither to 'Employment Aspects' nor to the 'HR Practices Index'—although some international studies have identified regional differences in employee engagement (see, for example, Kenexa High Performance Institute 2012), while others have identified HR practices unique to Hungary and CEE (see, for example, the CRANET research in Farkas, Karoliny, and Poór 2009; Poór 2009; Karoliny, Farkas, and Poór 2010; Kohont and Poór 2011).
3. The HR professionals' perceptions of changes in the business context were positively related to 'Employment Aspects', with 'business context' explaining approximately one quarter of the variance in the heterogeneity of 'Employment Aspects' in both years. The mean calculations of each response category indicated that the better the business context was perceived, the more positive the change in employment aspects was perceived.
4. The importance of employee engagement within the organisation was positively related to 'Employment Aspects'.
5. Having a clearly defined employee engagement strategy was positively related to 'Employment Aspects'.
6. Measuring employee engagement was positively related to 'Employment Aspects'.
7. Conducting employee surveys was not related to 'Employment Aspects'.
8. Sharing survey results with the employees was not related to 'Employment Aspects'.
9. Involvement of employees in the development of action plans following employee surveys was not related to 'Employment Aspects'.

Of these, 7, 8, and 9 contradict claims that providing opportunities for employees to voice their opinions or give feedback, maintaining honest communication with them, and involving them in decision-making contribute to employee engagement (see, for example, Koncz 2004; Karoliny and Poór 2010; Fehér 2011). However, these findings were not based only on HR practitioners' perceptions, but also (indirectly) on the quality of their HR practices—the employees may or may not have been asked the right survey questions, they may or may not have perceived the results as sincere and straightforward, or they may or may not have been provided with the opportunity to contribute to action plan development in truly meaningful ways.

Limitations of the *European Employee Engagement Survey*

The *European Employee Engagement Survey* has provided interesting insights into the relationships between certain employment aspects and HR practices—in particular, employee engagement practices.

Table 12: Analyses of variance for the years 2010 and 2012

Features of the organisation	**'Employment Aspects'**				**'HR Practices Index'**			
	2010		**2012**		**2010**		**2012**	
	Sig.	Eta Squared	Sig.	Eta Squared	Sig.	Eta Squared	Sig.	Eta Squared
Size of the organisation	0.966	n/a	0.883	n/a	0.000	0.166	0.000	0.222
Region	0.652	n/a	0.713	n/a	0.122		0.198	
Business context	0.000	0.267	0.000	0.259	n/a	n/a	n/a	n/a
Importance of employee engagement	0.023	0.062	0.001	0.177	n/a	n/a	n/a	n/a
Having a defined engagement strategy	0.000	0.144	0.008	0.144	n/a	n/a	n/a	n/a
Measurement of engagement	0.029	0.059	0.031	0.095	n/a	n/a	n/a	n/a
Conducting employee surveys	0.346	n/a	0.734	n/a	n/a	n/a	n/a	n/a
Sharing results of surveys	0.771	n/a	0.753	n/a	n/a	n/a	n/a	n/a
Employee involvement in follow-ups	0.560	n/a	0.235	n/a	n/a	n/a	n/a	n/a

Source: Kassim (2012: 60).

However, due to the exiguous number of respondents, the sample cannot be considered representative. Moreover, the structure of the sample does not reflect the real regional and industrial distribution of European organisations. Therefore, the conclusions are true for the organisations as represented by the HR professionals who took part in this survey, but cannot be generalised for the whole European region. Further research needs to investigate these findings in more depth.

The data collected by the *European Employee Engagement Survey* were not objective, but subject to HR professionals' perceptions. Perceptions are highly dependent on numerous factors related to the responding individual (Komor and Mihály 2011) that were not examined in this article. (For example, Human Synergistics International (2006) found that top managements and HR managers are likely to perceive organisational cultures more positively than employees.) Therefore, the reliability of the data may be questionable.

Because the questions were constructed to reveal changes over two two-year periods, the data thus collected reflected positions relative to the previous situations of the respondent organisations, without allowing for inter-organisational comparisons from absolute perspectives.

Finally, although it summarises in one single value the numerous variety of HR practices used by an organisation on a regular basis, the 'HR Practices Index' does not provide any information about the quality of the HR practices. The difference between employee engagement and employee disengagement, for example, may lie not so much as with sophisticated HR systems as with basic HR skills.

Summary and conclusions

Table 13 (p. 141) summarises the research findings. Employee engagement was a widely recognised concept among the European HR professionals participating in this survey. Almost all of the respondents viewed employee engagement as a key driver of business results. Employee engagement was a 'top priority' or 'very important' with the majority of represented organisations—therefore, not surprisingly, a notable proportion of respondents reported to have developed a 'clearly defined' or 'somewhat defined' employee engagement strategy. Moreover, in 2012, most of these strategies were linked directly to business results.

A significant, but weak, relationship was found between 'Employment Aspects' and the 'HR Practices Index', suggesting that investments in developing various HR practices contribute to positive, but moderate, changes in certain employment aspects—employee morale, employee engagement, the organisation's ability to attract talent, and the organisation's ability to retain talent.

Research results also revealed that participating HR professionals' perceptions of the business contexts of their organisations were positively related to 'Employment Aspects'.

Table 13: Summary of research findings for the years 2010 and 2012

Survey questions (in percentages)	**2010**	**2012**
Employee engagement has a positive and direct effect on business results	98	100
Employee engagement is a 'top priority' or 'very important'	79	81
There exists a 'clearly' or 'somewhat defined' employee engagement strategy	65	68
The employee engagement strategy is linked to business results	n/a	72
'Employment Aspects' is related to the 'HR Practices Index'	r = 22.5	r = 22
Dependent factors / **Independent factors**	**'Employment Aspects'**	**'HR Practices Index'**
Size of the organisation	not related	related
Region	not related	not related
Business context	positively related	n/a
Importance of employee engagement	positively related	n/a
Existence of a defined employee engagement strategy	positively related	n/a
Employee engagement is measured	positively related	n/a
Employee surveys are conducted	not related	n/a
Survey results are shared with employees	not related	n/a
Employees are involved in follow-ups	not related	n/a

Measuring employee engagement was found positively related to 'Employment Aspects'. However, conducting employee surveys, sharing survey results with the employees, and involving employees in follow-up action plan development were not found to be in a significant relationship with 'Employment Aspects'. Such

contradictions may be explained by the quality of HR practices, and require further research.

Employee engagement is gaining increasing attention both among European HR professionals as well as in the practitioner and academic literatures. The aim of this article was to present a comprehensive summary of various employee engagement interpretations and introduce our own conceptualisation of the employee engagement construct. Furthermore, the article intended to provide a structured framework for summarising those factors that may play an important role in improving employee engagement. Since HR practices were identified as an employee engagement driver, this article rolled out a research investigating the variety of HR practices used across Europe and analysed their relationships with certain employment aspects—employee morale, employee engagement, the organisation's ability to attract talent, and the organisation's ability to retain talent.

Employee engagement was viewed as a key driver of business performance across research participants, who expressed growing efforts in measuring employee engagement, developing clearly defined employee engagement strategies, and directly linking them to business results. The more various and progressive the HR practices, the higher the increases in employee morale, employee engagement, the organisation's ability to attract talent, and the organisation's ability to retain talent that could have been anticipated based on the respondents' perceptions. However, this relationship was found to be weak, suggesting that the quality of HR practices may also have a notable effect on the measured employment aspects—revealing the relationship between the quality of HR practices and employee engagement would benefit highly from further research.

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JÓZSEF KELEMEN

The spatial monopolies of supermarket chains in Hungary[1]

The need to regulate supermarket chain store location to prevent spatial monopoly first came to attention in 2000 in the UK and a few years later in the Netherlands. More often than not, customers live close to one supermarket chain store and far from others—if they have to travel too far at too high a cost to access them, customers will opt for the most convenient. This weakens the market and inter-company competition, damaging customer interests through restricted access to product variety and high costs. To protect customers, governments have to regulate and control the supermarket chains—an issue as valid in Hungary as elsewhere. To inform government action and facilitate further investigation into potential abuse of market power, this article analyses the spatial monopolies of supermarket chains in Hungary.

The survey at the core of this article is based on Hotelling's (1929) representation of space as a line segment made of uniformly distributed points representing inhabitants / consumers. In this imaginary city, under given prices, two different companies located at two different points can reach a range of consumers. If we consider company A in isolation from company B, inhabitants willing to pay the product prices of company A—and bear the eventual travel costs, including the cost of spending time travelling—are potential consumers. As this statement suggests and Figure 1 (p. 154) illustrates, such potential consumers may or may not live in company A's immediate vicinity. Low product prices and low travel costs—or favourable product price–travel cost ratios—attract consumers between A_b and A_j, the points where consumers' reservation prices[2] equal or exceed the sum totals of product price and travel cost.

However, the situation is much more complex if we consider both companies together. If sufficiently far from each other, companies A and B do not affect each other. If sufficiently close to each other, some consumers will be willing to buy from both stores and will opt for the store which affects their reservation price least. Because the sum totals of product prices and travel costs are identical,

[1] This article is based on ongoing PhD research—for his invaluable help and suggestions throughout, the author wishes to thank his supervisor, Dr. Gábor Benedek, Assistant Professor at the Department of Mathematical Economics and Economic Analysis at Corvinus University of Budapest.

[2] In microeconomics, the highest prices buyers are willing to pay for goods or services.

buying from either A or B makes no difference for the neutral consumer M. M divides consumers into two groups—those to the left will buy from A and those to the right from B. This assumption simplifies complex consumer behaviour and facilitates analysis in line with Hotelling (1929).

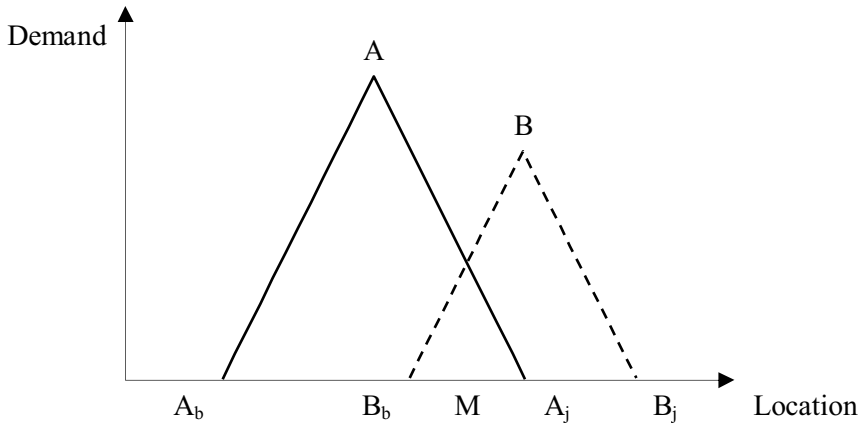

Figure 1: Supermarket chain store location and demand

Social welfare is obviously maximised when a supermarket chain is not narrowly confined to a particular geographical area but uniformly spread in space—not too far from rival supermarket chains, so that they are forced into competition with one another, and the chances of spatial monopoly are minimal.

The spatial monopolies of supermarket chains were first discussed in the UK, where Tesco's market power seemed too strong for comfort (Competition Commission 2000), and in the Netherlands, where Albert Heijn seemed to acquire spatial monopoly status (Stelder 2012). While various official inquiries cleared UK supermarket chains of outright monopolistic wrongdoing, some chain stores reportedly abused their market power and obstructed market competition (Competition Commission 2000). Hughes, Clarke, and Hallsworth (2009) wrote about Tesco Towns[3] and the potential of regulatory policies.

This article is divided into six sections. Following this introduction, the second section presents a brief historical overview and focuses on Hotelling's (1929) classic model and issues of generalisation, especially in the form of multi-store models. A company with more than just one outlet has to consider the locations of its own outlets as well as those of the competition. The third section presents a

[3] Geographical areas dominated by one retailer with large market share.

brief account of supermarket chains in Hungary. The fourth section introduces the data and methods of data collection, particularly geocoding and calculating distance. The fifth section presents the spatial structure of supermarket chains in Hungary. The final, sixth section summarises the results and suggests further research.

Brief historical overview

The Hotelling (1929) model provides a general theoretical framework for analysing various types of consumers who can choose between two alternatives. It is not just a geographical model—Hotelling himself saw its application as a political voting scheme, for instance, with political parties positioning themselves between leftwing and rightwing to attract as many votes as possible. According to the Hotteling model, two companies have to decide where to position themselves in space to maximise their profits—this is a two-stage game with backward induction. During the first stage, the companies decide their product prices under fixed location. During the second stage, they search for maximal-profit locations, the model assuming linear transport costs. To maximise potential market size, which is the same for both, the two companies will seek to locate as close to each other as possible—in the same point, in fact, in the middle of the city, in a seeming illustration of the principle of minimum differentiation.

Fifty years after it was first suggested, d'Aspremont, Gabszewicz, and Thisse (1979) argued against this model—profit is not a continuous function and the relevant results generated by the model are erroneous, rendering the principal of minimum differentiation invalid. The two companies will not tend towards the middle point. Because it was analytically more tractable, d'Aspremont, Gabszewicz, and Thisse (1979) suggested using quadratic transport costs instead of linear transport costs, in a seeming illustration of the principle of maximum differentiation.

The same year, Salop (1979) suggested a model where space takes the shape of a circle and determines the optimal number of firms.

Anderson and Neven (1991) combined two models—Hotelling and Cournot (1838)[4]—and argued for the new model's applicability to companies that sell products that cannot be reallocated flexibly among different markets. Whether just two or as many as n, the companies will all be located in the middle of the

[4] According to the Cournot model, two companies take each other's decisions into account, when trying to maximise profit—a game where both companies decide simultaneously their respective output quantities.

imaginary city, according to this model, in a seeming illustration of the principle of minimum differentiation.

Gupta, Pal, and Sarkar (1997) built upon Anderson and Neven (1991) and discarded the uniform space assumption—a point can locate more than just one inhabitant. They analysed various space scenarios, with various results—in certain cases, for example, the principle of maximum differentiation could explain equilibrium.

The framework proposed by the Hotteling model contained many new aspects—such as product differentiation, for example, at the expense of the homogeneity assumption. The various model generalisations took different directions.

Gannon (1977) showed that two firms will locate in the middle of the space. Fraja and Norman (1993) arrived at similar results using three different pricing mechanisms.

Tabuchi (1994) extended the analysis—and the quadratic transportation cost hypothesis—from the one-dimensional space to the two-dimensional space to prove the existence of equilibrium. If the space is a rectangle, then the two companies will locate in the middle of two opposite sides.

More recently, the methodology has described space as a graph. Sarkar, Gupta, and Pal (1997) proved the existence of equilibrium in the assumption of a Cournot competition.

Soetevent (2010) examined under-price competition and showed that equilibrium is not guaranteed.

Pálvölgyi (2011) used tree graphs and revealed the existence of equilibrium for relatively low numbers of companies.

Teitz (1968) generalised Hotelling's model and argued its applicability to companies—such as supermarket chains, for example—with more than just one shop. He started by considering two companies—one with one shop, the other with two. Equilibrium should be theoretically impossible, given this situation's divergence from the one-one model. However, if they are to achieve equilibrium in the long run, Teitz (1968) reckoned that companies need to achieve market share proportional with the number of their shops.

Martinez-Giralt and Neven (1988) concluded that—faced with price competition—companies do not open supplementary outlets in either a line segment space or in a circle space. Consequently, multi-store companies do not occur. The Martinez-Giralt and Neven model makes an important assumption—consumers' reservation price for the product is so high that they are willing to buy the product at any shop.

Martinez-Giralt and Neven (1988) were contradicted by Janssen, Karamychev, and Reeve (2005), who proposed a three-stage model where companies seek to

maximise in number first, in location second, and in price third—and achieve equilibrium through shops located separately.

Pal and Sarkar (2002) considered quantity competition instead of price competition and obtained some important results. The subgame perfect Nash equilibrium[5] ensures equilibrium—companies choose their monopoly location, which minimises transportation costs, and the outlets of a given company locate separately in space. Nevertheless, the stores of two different supermarket chains can locate at one point.

Iida and Matsubayashi (2011) used Stackelberg's (1934) model to take into account the market power of the company and determine endogenously the store number of multi-store companies under financial constraints.

The ultimate aim is to ensure equilibrium. However, even a brief historical overview such as this is sufficient to conclude that—although the models have become increasingly complex, with time—their analytical solutions could not always be guaranteed. The relevance of computational models could be strengthened by simulating theoretical micro-level decisions first and observing real macro-level mechanisms second. By enhancing understanding of multi-store companies, this article seeks to support empirically the development of this body of literature.

Supermarket chains in Hungary

The end in 1989 of the communist supremacy in Hungary resulted in an open market and an economy attractive to foreign investors. Hungarian food stores illustrate the ensuing competition most clearly, as well as its dual—national and international—character.

The Hungarian store structure changed, after 1989. Most of the old shops vanished altogether or were amalgamated into new chain stores. At least in part, CBA and Coop—two Hungarian-owned companies—could be originated from such shops. Profi—a foreign-owned chain belonging to the Louis Delhaize Group—opened its first store in Hungary very early on, in 1989. The Dutch Spar entered the Hungarian market shortly afterwards, in 1991. The second half of the 1990s saw the arrival of other foreign supermarket chains—Penny Market, Tesco, and Auchan. In the 2000s, Lidl and Aldi arrived—not only with foreign expertise, but also with cheap, own-brand products—and the domestic market became fiercely competitive.

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[5] Firms decide output quantities first and locations second.

The following paragraphs introduce briefly the supermarket chains operating in Hungary and serve only as background to the subsequent discussion—they are based on the supermarket chain websites and Wikipedia[6] articles.

- Aldi—This supermarket chain originated in Germany with brothers Theo and Karl Albrecht. The enterprise flourished, after World War II, and began to expand across Europe. Nowadays, Aldi's European operations are separated into two networks, Aldi Nord and Aldi Süd, depending on the geographical location of the stores—Hungary joined Aldi Süd in 2008. This supermarket chain aims to high quality through low-price own-brand products.

- Auchan—The first Auchan store was erected in 1961 in the French city of Roubaix. Six years later, in 1967, the first Auchan hypermarket opened in Roncq. Gérard Mulliez, the founder of this enterprise, continues to be its majority shareholder. Auchan's international expansion began in the 1980s, with the supermarket chain entering Hungary in 1998. The company has a large business portfolio, including real estate and banking besides retail. On 27 April 2012, Auchan purchased Cora, but the data used in this article was collected prior to that date—consequently, the two supermarket chains appear as two separate entities.

- CBA—This Hungarian supermarket chain dates back to 1992, when ten entrepreneurs acquired 17 food stores in the so-called Közért Vállalat[7] privatisation. CBA's expansion started in Budapest, but then extended to the whole of Hungary—by 1998, there were more CBA stores in the countryside than there were in the capital city. In 2001, CBA started to expand internationally—nowadays, there are thousands of CBA stores in the neighbouring countries.

- Coop—The history of this Hungarian-owned supermarket chain goes back 50 years. However, the company—as we know it today—was founded in 1995, and currently owns more than 500 stores. In 2000, Coop started to expand in the Czech Republic and Slovakia, but its stores in Hungary continue to outnumber those overseas. A significant section of its customer profile consists of buyers from small village shops.

- Cora, Match, and Profi—Two of the sons of Jean-Jacques Delhaize (a Belgian wine merchant from Charleroi) started their own business in the second half of the Nineteenth Century—the supermarket chain Delhaize Le Lion is now present in both Belgium and the US. Louis Delhaize, the third son, gave his name to the Louis Delhaize group—its more extensive store network covers countries such as Belgium, France, Hungary, Luxemburg, and Romania, for example.

In Hungary, the group owns three supermarket chains. The first, Profi, opened in 1989. The second, Match, started under this new name in 2004, having been

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6 http://www.wikipedia.org.

7 Supermarket Company.

purchased from Julius Meinl—the initial Csemege chain stores were launched in 1952. The third, Cora, started in 1997, but was taken over by Auchan in 2012.

- Lidl—A German family by the name of Schwarz launched this company in 1930—its current image dates back to the 1970s, and the supermarket chain is owned by the Schwarz holding. Lidl started their operations in Hungary in 2004—since then, over one hundred new stores were built. Although Lidl owns Handelshof and Kaufland, these supermarket chains are not present in Hungary. With a profile similar to Aldi, Lidl focuses on low price, quality, and freshness.

- Metro—This wholesale operation built its first store in Mülheim an der Ruhr in 1984, with the stated aim of renewing wholesale services. Metro provides a wide range of goods that can be bought quickly from one single location—the innovative cash-and-carry gave impetus to the company's development, which expanded in many countries in Europe and Asia. The first Metro store opened in 1994, in Hungary—since then, 13 other Metro stores started to operate in the country.

- Penny Market—This supermarket chain is a member of the Rewe Group, which offers retail sales and tourism services. The Rewe Group was founded as a cooperative in Cologne in 1927—since then, it has expanded in many European countries. The first Penny Market store in Hungary was launched in 1996—today, there are 190 such stores in the country. The slogan 'Fresh-Cheap-Good' outlines the supermarket chain's business policy.

- Reál Élelmiszer—Reál Hungária Élelmiszer Kft. began to operate in Hungary in 2001. Entirely under Hungarian ownership, this supermarket chain is owned by six of its member companies. The store network is made of the founders' retail stores as well as other private companies. More than 2,000 stores belong to this supermarket chain. Of these, approximately 500 have a floor area of 100 square metres and are called Reál Food—the remaining stores are known as Reál Points.

- SPAR-csoport—Adriaan van Well founded SPAR in 1932 in the Dutch city of Zoetermeer. The company consists of independent wholesalers and retailers who organise themselves as one supermarket chain and act accordingly on the market. This organisational model proved successful from the very start and—in the 1950s—SPAR extended its store network across Europe, Africa, the Far East, South America, and Australia.

Austria SPAR International AG coordinates the store network in Hungary—the first Spar store here opened in 1991. SPAR took over the supermarket chains Billa (in 2002), Kaiser (in 2003), and Plus (in 2008). There are currently three types of SPAR stores—SPAR supermarkets (with a floor area between 400 and 1,000 square metres), Inter SPAR hypermarkets (with a floor area between 4,000 and 6,000 square metres), and SPAR Cities, which serve inner-city needs.

- Tesco—Sir Jack Cohen founded Tesco in 1919. In time, this once small company expanded across England and—in the 1960s—grew into a significant

supermarket chain. Around that time, the company began its international expansion—today, Tesco is present in Europe, North America, and Asia. The launch of the first Tesco store in Hungary in 1994 was followed by more than 200 other such stores. The various names of the Tesco stores reflect their size—in ascending order, these are Tesco Express, Tesco S-Market, Tesco Supermarket, Tesco Extra, and Tesco (hypermarket).

Data

Stores

The data at the core of this article reflects the supermarket chain structure in Hungary as of the first quarter of 2012, when it was downloaded from the supermarket chains' websites. Where the nearest shop of a particular company is located is sometimes important to customers—as is information on how to reach this nearest shop. Companies adopt different business policies—and use different devices—to inform customers of their geographical location and accessibility. Three groups of companies thus emerge. The companies in the first group provide directly accessible information—the Global Positioning System (GPS) coordinates can be retrieved easily and the data does not require additional analytical work. The chances of companies in this group being found by customers through other information channels—such as navigation devices—are high. The companies in the second group do not make the information public—the data is not downloadable directly, but an own-shop search box is usually incorporated in the company websites. Nevertheless, the GPS coordinates are embedded in the Hyper Text Markup Language (HTML) code and can be retrieved or identified visually. The companies in the third group require the use of geocoding—in other words, determining GPS coordinates from postal addresses. The Internet facilitates access to free geocoding service providers, although access to any such service is usually limited to a given number of queries.

One way or other, for supermarket chains in the first two groups, the GPS coordinates were available and deemed reliable—in one case only, the GPS coordinates were determined manually, with the use of a street map. The relatively low number of observations facilitated comprehensive data collection. The Google geocoding service was used for supermarket chains in the third group. However, the service is limited to postal addresses included in its own database—as well as by a recognisable address format—and, therefore, open to fault. Consequently, each observation was checked and—where necessary—corrected with the use of

external information, such as information made available by WikiMapia[8]. Two methods were used to control for error, if the supermarket chain had more than one store in Hungary. First, the coordinates were checked to ensure that they were inside Hungary. Second, because the Google geocoding service offers several options, if unsure, the options were reviewed one by one.

In terms of data reliability, the supermarket chains were divided into two groups: with reliable company data (Aldi, Auchan, CBA, Cora, Lidl, Match, and Profi)[9] and with poor company data (Coop, Metro, Penny Market (herewith, Penny), Réal Élelmiszer (herewith, Real), SPAR-csoport (herewith, Spar), and Tesco)[10].

Population

A 2010 independent database was the source for population data, structured by Hungarian streets (ordered by name, district, and city), coordinates of the middle of any given street, and number of people who live in any given street. However, gathering the population data was not unproblematic.

First, due to missing coordinates, the 2010 independent database was incomplete—thus, of its 107,879 observations, 4,230 (around 4 per cent) were incomplete. This problem was circumvented by using two imputation methods. The database was structured so that neighbouring values were close. If proximity was deemed plausible (two streets in the same village, for example), the missing values were replaced with the immediately neighbouring values. If proximity was deemed implausible, the missing values were searched manually.

Second, the geodetic systems were different (Varga 2002), with coordinates of Hungarian stores in EOV[11] and coordinates of Hungarian streets in WGS84[12]. The problem was circumvented by converting WGS84 data into EOV data with Quantum Qis software—this allowed easy subsequent calculations of distances.

Third, the coordinates of the middle of any given street represent a simplification of that street's coordinates that had to be taken into account. Through approximation to a point, a spatial object loses information—the error thus introduced has to be minimised. Street population is the only additional

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8 http://www.wikimapia.org.

9 Because of shared ownership at the time, Cora, Profi, and Match appear under the generic name Match later in the study.

10 Because it is not a retail supermarket chain, Metro was not included in this study.

11 Egységes Országos Vetület (Uniform National Projection), the Hungarian geodetic system.

12 World Geodetic System 1984.

information on which correction can be based. Since it is plausible to assume that the more people live in a street, the longer the street is, and the more stores are within easy reach, it may be useful to introduce weighting.

Geometrically, a street would be described through a curve. If few people live in that street, then the street is likely to be short and weighting is likely to have no relevant effect—the middle of the street is a sufficiently good approximation of the street. On the contrary, if many people live in that street, then the street is likely to be long and weighting is likely to have a relevant effect—the middle of the street is not a sufficiently good approximation of the street. The more people live in a street, the more the curve symbolising that street can change, in both length and shape—since the exact length and shape are unknown, errors of approximation are inevitable. Setting a population threshold seems necessary, but what would that threshold be? Where is the border between short streets and long streets? For the sake of the argument, let the population threshold be 1,000 people—there are 658 such streets in Hungary, representing 11.5 per cent of the total population. If the population threshold is set at 5,000 people, then there are only nine such streets in Hungary, representing less than 1 per cent of the population (see Table 1).

Table 1: Hungarian streets with more than 5,000 people in the year 2010 (listed in ascending population order)

Street	City
Fazekas János tér	Nyíregyháza
Barátság útja	Dunakeszi
Gál István lakótelep	Tatabánya
Páskomliget utca	Budapest
István út	Debrecen
Csontváry K. Tivadar utca	Budapest
Pesti út	Budapest
Havanna utca	Budapest
Derék utca	Debrecen

Source: Based on a 2010 independent database.

However, even just a brief look at the satellite map reveals that all these nine streets are located in residential areas and—with the possible exception of Pesti út—are not really long. Considering these streets long would be seriously misleading. Moreover, further investigation reveals that really long streets belong to more than just one administrative district and that the database splits them accordingly—for example, Pesti út is split in two and Hungaria körút in four. Consequently, weighting is unlikely to reduce errors, and this study used the

original coordinates without correction and sought to identify the store closest to the middle point of any given street.

Investigating a supermarket group would have been useful, but unfeasible, due to insufficient information—instead, two groups of shops were investigated, to account for differences in shopping situations generated by characteristics such as the kind of products customers want, the number of products customers need, and others. In the *all shops* group, customers only need some basic foods. Because they want to buy a small number of products fast—and because price is not that important to them—customers in this group shop at the closest shop, whether independent store or supermarket chain store. Because the relevant information was not accessible, the all shops group in this article does not include independent stores. In the *medium-size shops* group, customers need more than just some basic foods and like product variety—also, price is more important to these customers than to customers in the first group, and supermarkets and hypermarkets are more appealing to them than other types of store. The medium-size shops group includes Aldi, Auchan, Cora, Lidl, Match, Penny, Profi, and Spar (see fn. 9, p. 161)—and is a subset of the all shops group.

Results

The method of analysis used in this article is based on Stelder (2012)—the closest shop to any given street and the closest shop belonging to a different supermarket chain were identified, the respective distances between street and shops were calculated, and the difference between the two distances was used to generate four distance thresholds: 300 metres, 500 metres, 1,000 metres, and 3,000 metres. The smaller this difference, the lower the additional travel costs for customers buying products at the closest shop belonging to a different supermarket chain, and the lesser the possibility of customers being locked in a spatial monopoly. This difference distinguishes among (1) customers who shop on foot from more than just one store within a 300-metre radius; (2) customers who ride a bicycle to shop within a 500-metre radius; (3) customers who drive or travel by public transport to shop few products within a 1,000-metre radius; and (4) customers who drive or travel by public transport to shop many products within a 3,000-metre radius. In other words, this difference distinguishes among customers who are not locked in spatial monopolies of type (1), (2), (3), or (4). Calculating the shortest possible route between customer and shop—like navigation devices do—was unfeasible, due to the very high number of necessary calculations, and the crow-fly distance was used instead.

Table 2: The regional distribution of supermarket chain stores in Hungary for the all shops group in the year 2012 (in percentages)

Chain store	Region / Country						
	SGP[a]	ST[b]	NGP[c]	NH[d]	CH[e]	WT[f]	Hungary
Aldi	1	1	1	1	1	3	1
Auchan	0	0	0	0	0	1	0
CBA	18	15	8	11	17	28	14
Coop	45	58	63	69	58	31	58
Lidl	3	4	2	2	3	3	2
Match	3	2	3	3	2	7	4
Penny	4	4	4	3	4	4	2
Real	17	5	11	5	3	4	9
Spar	6	8	4	4	8	13	5
Tesco	3	4	3	2	3	6	5

[a] SGP = Southern Great Plain
[b] ST = Southern Transdanubia
[c] NGP = Northern Great Plain
[d] NH = Northern Hungary
[e] CH = Central Hungary
[f] WT = Western Transdanubia

Before detailing the results, it is worth looking at the distribution of supermarket chain stores by region. Table 2 shows that—with the exception of the Northern Great Plain, where Real comes second and CBA third—Coop is the most dominant supermarket chain in the country, CBA is the second most dominant, and Real or Spar are the third. Regionally, the Aldi, Lidl, Match, and Tesco stores are distributed uniformly, but either Spar or Real always comes third—Spar is more dominant than Real in regions where it has more stores than Real, and vice versa. At the same time, Table 3 (p. 165) shows that—faced with competition from Match, Spar, Tesco, and others—Coop is less dominant in the medium-size shops group.

Table 4 (p. 165) shows that—on average—the closest store is 838 metres far, in the all shops group, and 3,481 metres far, in the medium-size shops group. Unsurprisingly, in both groups, stores are closest to customers in Central Hungary, while the figures for regions in Eastern Hungary[13] are above the average and those for the Southern Transdanubian region are well above the average.

[13] Southern Great Plain, Northern Great Plain, and Northern Hungary.

Table 3: The regional distribution of supermarket chain stores in Hungary for the medium-size shops group in the year 2012 (in percentages)

Chain store	Region / Country						
	SGP[a]	ST[b]	NGP[c]	NH[d]	CH[e]	WT[f]	Hungary
Aldi	5	5	5	2	5	7	5
Auchan	1	0	0	1	1	2	0
CBA	1	1	1	0	3	1	11
Coop	23	12	31	36	11	10	17
Lidl	11	15	8	9	12	9	8
Match	9	6	12	11	9	19	16
Penny	15	15	15	13	15	9	10
Real	3	0	3	4	0	1	3
Spar	21	32	15	17	32	33	23
Tesco	11	13	9	8	13	9	7

[a] SGP = Southern Great Plain
[b] ST = Southern Transdanubia
[c] NGP = Northern Great Plain
[d] NH = Northern Hungary
[e] CH = Central Hungary
[f] WT = Western Transdanubia

Table 4: Population (in percentages) and average distances between Hungarian customers and the store closest to them (in metres) in the year 2012

Region / Country	Population	Average distance	
		All shops	Medium-size shops
Western Transdanubia	10	802	3,664
Central Transdanubia	11	849	3,947
Southern Transdanubia	10	1,301	5,341
Central Hungary	28	535	1,276
Southern Great Plain	13	932	4,312
Northern Great Plain	15	1,001	4,879
Northern Hungary	13	905	4,015
Hungary	100	838	3,481

Source: KSH (2013).

Table 5: Hungarian population locked in spatial monopolies by supermarket chains in the all shops group in the year 2012 (in percentages)

Region / Country	Distance (in metres)			
	< 300	**< 500**	**< 1,000**	**< 3,000**
Western Transdanubia	52.93	41.61	32.92	23.71
Central Transdanubia	56.98	46.57	35.70	24.95
Southern Transdanubia	57.02	47.72	36.10	26.30
Central Hungary	39.18	24.92	11.19	3.96
Southern Great Plain	48.93	35.03	22.83	16.11
Northern Great Plain	56.11	45.84	34.98	27.24
Northern Hungary	63.11	54.90	45.52	33.95
Hungary	51.01	39.34	27.80	19.20

Table 5 shows that the longer the distances customers are prepared to travel, the higher the access to more than just one store—if the entire Hungarian population were to shop on foot, then more than 50 per cent of people would be locked in spatial monopolies. This percentage decreases with the means of travel, reaching 39.34 per cent for bicycle riders, 27.80 per cent for car drivers and people travelling by public transport who buy few products, and 19.20 per cent for car drivers and people travelling by public transport who buy many products.

Given its geographical location, Central Hungary has the highest number of shops. Here, the population locked in spatial monopolies is below 40 per cent in the 300-metre category—relative to the 51.01 per cent category average, 39.18 per cent may be regarded as an outlier. Moreover, since the shops outside major supermarket chains were not included in this analysis, the real percentage is likely to be even lower than this. In the 3,000-metre category, the population locked in spatial monopolies is less than 4 per cent, in Central Hungary, indicating high levels of competition.

The Southern Great Plain has the second lowest percentage of population locked in spatial monopolies in all four categories—48.93 per cent at 300 metres, 35.03 per cent at 500 metres, 22.83 per cent at 1,000 metres, and 16.11 per cent at 3,000 metres—as one would expect from a region in Western Hungary[14], which is more developed than Eastern Hungary. There may be fewer—but more uniformly spaced—shops in the Southern Great Plain than in Central Hungary.

The differences in spatial monopolies between Eastern Hungary and Western Hungary are negligible, while the population locked in spatial monopolies is at its

[14] Western Transdanubia, Central Transdanubia, and Southern Transdanubia.

highest in Northern Hungary, where the figures may be affected by uneven population density.

Table 6: Hungarian population locked in spatial monopolies by supermarket chains in the medium-size shops group in the year 2012 (in percentages)

Region / Country	**Distance** (in metres)			
	< 300	**< 500**	**< 1,000**	**< 3,000**
Western Transdanubia	48.83	33.26	19.87	11.20
Central Transdanubia	46.87	30.68	14.25	5.36
Southern Transdanubia	45.22	28.49	13.55	7.86
Central Hungary	53.14	37.39	18.57	4.26
Southern Great Plain	49.19	35.12	22.36	12.75
Northern Great Plain	47.59	36.97	26.78	14.21
Northern Hungary	49.94	39.75	28.99	19.23
Hungary	49.51	35.32	20.79	9.90

Table 6 shows further interesting aspects of the spatial monopolies of supermarket chains in Hungary. With fewer stores in the medium-size shops group than in the all shops group, the population locked in spatial monopolies should be higher—however, with the exception of Central Hungary, the figures are actually lower, indicating higher levels of competition. This does not mean that customers are in a better position vis-à-vis the medium-size shops group, but that the group has a different location structure, more favourable to customers—brands are located close to one another, for example in shopping centres. In practice, with several brand stores located within a very short radius, reaching one of these stores equates with reaching all the other stores too. However, customers need to travel 3.5 kilometres on average to reach such shopping centres—more likely than not, these customers own their own cars. The last column of Table 6 clearly indicates that—as expected—Western Hungary outperforms all the other regions, on developmental grounds.

Central Hungary comes last in the 300-metre category, last-but-one in the 500-metre category, fourth in the 1,000-metre category, and first only in the 3,000-metre category. However, as expected, even in this latter category, the population locked in spatial monopolies by the medium-size shops group is slightly higher than the population locked in spatial monopolies by the all shops group, presumably on structural grounds. In the particular case of Central Hungary, the number of shops seems to have a greater impact than the existence of shopping centres, due to high population density.

Table 7: Hungarian population locked in spatial monopolies by supermarket chains in the all shops group in the year 2012 relative to the closest store in each brand (in percentages) (continued on facing page)

Chain store	Region / Country						
	SGP[a]	ST[b]	NGP[c]	NH[d]	CH[e]	WT[f]	Hungary
Total							
Aldi	1	1	1	1	1	1	0
Auchan	0	0	0	0	0	0	0
CBA	15	21	15	30	18	8	11
Coop	52	55	56	31	46	63	71
Lidl	2	2	3	2	2	2	2
Match	6	3	3	8	3	3	3
Penny	2	2	4	4	4	4	3
Real	8	3	3	5	19	12	5
Spar	6	11	12	14	5	4	3
Tesco	8	3	3	5	3	2	1
< 300 metres							
Aldi	0	0	1	1	0	1	0
Auchan	0	0	0	0	0	0	0
CBA	11	19	10	33	18	4	9
Coop	74	75	73	41	57	79	85
Lidl	0	0	1	1	1	1	1
Match	2	0	1	4	1	1	1
Penny	0	0	1	2	1	1	0
Real	6	1	2	3	18	11	3
Spar	2	3	10	11	1	1	0
Tesco	4	1	2	4	2	1	1
< 1,000 metres							
Aldi	0	0	0	0	0	1	0
Auchan	0	0	0	0	0	0	0
CBA	9	17	9	33	17	3	8
Coop	84	80	79	48	63	84	89
Lidl	0	0	1	0	0	0	0
Match	0	0	0	2	0	1	0
Penny	0	0	0	1	0	0	0
Real	4	1	3	3	18	9	2
Spar	1	2	7	9	0	0	0
Tesco	2	0	1	3	1	1	0

< 3,000 metres							
Aldi	0	0	0	0	0	0	0
Auchan	0	0	0	0	0	0	0
CBA	7	12	9	31	13	2	6
Coop	90	87	86	60	71	90	92
Lidl	0	0	0	0	0	0	0
Match	0	0	0	0	0	0	0
Penny	0	0	0	0	0	0	0
Real	2	0	2	3	16	8	1
Spar	0	0	2	4	0	0	0
Tesco	1	0	1	1	0	0	0

[a] SGP = Southern Great Plain
[b] ST = Southern Transdanubia
[c] NGP = Northern Great Plain
[d] NH = Northern Hungary
[e] CH = Central Hungary
[f] WT = Western Transdanubia

Tables 7 and 8 (pp. 168–169 and 170–171) show the population locked in spatial monopolies relative to the closest store in each brand. For example, in the 300-metre category, 65 per cent of the population can reach only Coop stores—however, since 51.01 per cent of the population lives in the 300-metre spatial economy of the all shops group (see Table 5, p. 166), the overall figure is approximately 32.5 per cent.

Coop dominates the all shops group, with very high values everywhere, except in Central Hungary. CBA holds the second position in this group.

Spar dominates the medium-size shops group, while Coop stays strong—mainly in the 1,000-metre category and in the 3,000-metre category, where the supermarket chain locks 7 per cent of the population—and Match and Penny hold some remarkable positions. In some of the regions, CBA, Penny, and Spar emerge as possible spatial monopolists.

With its low purchasing power, rural Hungary does not attract the number and variety of stores urban Hungary does, leading to low levels of competition in the countryside and an overall landscape dominated by Coop and Spar.

Table 8: Hungarian population locked in spatial monopolies by supermarket chains in the medium-size shops group in the year 2012 relative to the closest store in each brand (in percentages) (continued on facing page)

Chain store	Region / Country						
	SGP[a]	ST[b]	NGP[c]	NH[d]	CH[e]	WT[f]	Hungary
Total							
Aldi	6	6	3	4	1	4	1
Auchan	0	1	0	1	1	0	0
CBA	18	3	1	0	1	0	0
Coop	24	11	12	11	28	29	44
Lidl	4	10	15	6	8	9	6
Match	12	7	6	23	12	13	11
Penny	10	13	11	9	15	17	12
Real	2	0	0	1	2	6	5
Spar	21	36	39	38	23	12	16
Tesco	3	13	13	6	10	10	5
< 300 metres							
Aldi	7	5	1	3	1	3	0
Auchan	0	2	0	1	1	0	0
CBA	27	3	0	1	1	0	0
Coop	31	17	17	14	37	42	62
Lidl	1	8	13	4	6	8	4
Match	12	3	3	20	11	10	5
Penny	2	11	6	8	11	15	8
Real	1	0	0	1	2	5	7
Spar	18	35	49	41	18	6	10
Tesco	2	15	11	6	12	10	5
< 1,000 metres							
Aldi	3	5	1	3	1	3	0
Auchan	0	3	0	1	0	0	0
CBA	33	4	0	1	1	0	0
Coop	36	20	19	18	47	47	70
Lidl	0	8	14	3	5	9	3
Match	9	2	1	17	8	10	3
Penny	1	11	3	9	10	14	5
Real	2	0	0	0	1	3	8
Spar	16	31	52	43	16	4	9
Tesco	1	15	10	5	11	10	4

< 3,000 metres							
Aldi	1	1	0	3	1	0	0
Auchan	0	6	0	2	0	0	0
CBA	34	7	0	1	0	0	0
Coop	48	33	28	29	62	54	80
Lidl	0	5	1	2	2	9	1
Match	5	1	0	9	2	11	3
Penny	0	16	0	10	12	15	3
Real	0	0	0	0	0	3	9
Spar	12	21	65	39	12	3	0
Tesco	0	9	6	5	9	5	3

[a] SGP = Southern Great Plain
[b] ST = Southern Transdanubia
[c] NGP = Northern Great Plain
[d] NH = Northern Hungary
[e] CH = Central Hungary
[f] WT = Western Transdanubia

Summary

The results presented in this article are similar only in part to those in the Netherlands (Stelder 2012), where 47 per cent of the population is locked in spatial monopolies in the 300-metre category, 32 per cent in the 500-metre category, and approximately 15 per cent in the 1,000-metre category. These figures are lower than their Hungarian equivalents, particularly in the 1,000-metre category—at the same time, the population density in the Netherlands is higher than in Hungary.

More than half a million Hungarians are locked in spatial monopolies in the 3,000-metre category, while 720,000 are locked in spatial monopolies in the medium-size shops group. Since these customers live primarily in the countryside, the figures could be explained by differences between the rural and urban structures and by single shops being scattered across peripheral lands. More likely than not, given the low overall purchasing power, any one village cannot sustain more than just one such shop—as a result, there can be no strong competition in rural areas. The spatial monopoly structure that characterises Hungary is not favourable to customers, many of whom have access to only a limited variety of products. The competition authority needs to ensure that supermarket chains neither abuse their market power nor damage the interests of customers.

Coop dominates the countryside. Does the company abuse its market power? Does the company need to be kept under control? To answer such questions, the competition authority would have to investigate the regional prices and the pricing mechanisms of supermarket chains. Even then, distinguishing fact from fiction would be difficult—supermarket chain stores could always claim in their defence the higher costs (transport, rentability, etc.) rural areas involve compared with urban areas. Thus, public policies that facilitate healthy market competition—by preventing supermarket chains from opening stores in neighbouring villages, for example—are an efficacious alternative to lengthy, expensive, and outcome-uncertain investigations.

In conclusion, what does the future hold for research on the spatial monopolies of supermarket chains in Hungary? Among others, this article has shown that supermarket chains such as Auchan and Tesco have many customers, although their stores are not usually located particularly close to them. Investigating such stores that seem to both attract large numbers of customers and generate high purchasing powers—in spite of distance—is clearly a possible avenue for future research, as well as future articles.

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