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BUSINESS NETWORK COMPETENCES AFTER THE DIGITAL TURN

We assume that the digital turn and the mobile-computing environment facilitate the corporate management functions. This is in order to support both offline and online network competences for developments and for innovations. Our goal was to examine the above thesis applied to both online and offline networks mapping them on an interface of two measurable success-indicators. One of these indicators has been defined as a set of achievements gained by a competitor. The indicator of visible success has been generated from the results of marketing, brand awareness and loyalty. We conducted a series of expert-interviews in selected industries. The focus of the interviews was the level and the impact of corporate network competencies concerning the competitiveness. The segments examined show different patterns regarding the intensity of use and efficiency of online networks and digital tools. Also highlighted is risk management according to the size of the network expansion, the type and quality of the network, the kind of industrial and business embeddedness. The highest level of digital competencies was found in large enterprises, companies with a “digital profile” and such small and medium sized enterprises whose clientele include multinational companies and large corporations. The lowest level of digital competencies was experienced in small companies and manufacturing firms.

Introduction

According to our research, companies that have closer connections with their clients, suppliers and research institutes proactively use the latest digital/network tools. Their organizational and inter-organizational relations are technologically oriented. They are more likely to achieve success in research and development (innovation). Existence and development of network competencies have a positive impact on corporate culture and inter-organizational technical co-operation. Also, positive impacts in regards to openness, integration and on further innovations (see among others: Ritter – Gemünden, 2003). We assume that the digital turn and the mobile-computing environment facilitate the corporate management functions. This supports both offline and online network competencies for developments and for innovations.

Our goal is to examine the above thesis applied to both online and offline networks. We plan to map them on an interface of two measurable success-indicators. One of these indicators

has been defined as a set of achievements gained by a competitor. It is related to figures of effectiveness, growth and sales. We have labelled this indicator as the “*competitive advantage*”. We have labelled the other indicator as the “*visible success indicator*”. The indicator of visible success has been generated from the results of marketing, brand awareness, PR and to partners’ – consumers’ loyalty. The analysis of the sample monitored the way companies and organizations allocated supplementary resources. This allocation of resources was on behalf of information management in order to develop competencies and to implement digital innovations. We assumed a close correlation between the results of measurable success-indicators, investments and developments. Furthermore, this research also focused on the size of companies, industrial embeddedness and on the profiles of the analyzed networks for a deeper understanding. A literature review preceded the empirical work in order to clarify the conceptual framework of the hypotheses. Also, in order to set up the framework of the expert interview guide.

Network competence

The basic category of the research is network competence which we analyze with reference to activities both online and offline. Business and organizational networks have been facing the breakthrough of online communication, growing data resources and vulnerability. Also, they are facing the transparency of partners, trust-based networks and security risks. In a digital environment, the continuous development of networks and network competencies as well as the redefinition of offline networking channels and competencies are also important for an effective and successful operation of networks.

A network is conventionally understood as the sum of hubs and that of the hubs’ linkage. Within each framework, we analyze the connections among digital, social, business and sophisticated users’ networks. These are dynamically changing systems. They are built on network competencies or via developing network competencies. Quantity, quality, centralization or decentralization of linkages in close correlation with digital-technological innovations, with the use of online networks will all determine the rationale of these complex networks.

We assume that the function and decision-making processes of offline networks are under the influence of digital platforms and online networks primarily because the Internet is a scale-free network. Besides, scale-free frameworks are extremely resistant to occasional errors. Therefore, a great number of randomly chosen points can be removed without ruining the coherence of the framework. On the other hand, these frameworks are really vulnerable in case of a targeted attack because the removal of relatively few points could ruin the largest network hubs. This may cause disintegration.. It is indispensable for business management

to support network competence. We analyze networks focused on their spots of risk, vulnerability and effectiveness. We map how much companies attend to the logic of scale-free networks in the use of online networks. While focusing on networking society, we have been relying on Castell's model. The core of which is based on informational and communicational technologies where the accumulated knowledge-hubs are definitive (Castells, 2009).

To operate a network or organization, network competencies are needed that manage processes of decision. Network competences can promote effective organizational communication and the competitiveness of the company concerned. As long as progressive, interactive understanding and skills cooperate on various levels of an organization, network competencies can prevail (Edgar – Lockwood, 2008). Effectiveness, as well as competitiveness, will improve. The use of digital tools and the rapidly changing digital environment deconstruct certain network competencies. This sets up and weakens the importance of other network competences..

Digital tools and platforms, online networks and ICT innovations rely exclusively on digital and network competencies. Their continuous improvement is of uttermost importance because accumulating an amount of data, their supply chains within the organization and in inter-organizational relationships are determinative. The online data collection and the interpretation of the results on the organization or that of the partner/concurrent organization imply competencies that can be separately analyzed. Our indirect target is to point to an emerging effect that makes the analysis of network competencies indispensable. This is the so called big data or data boom. The network of data and contents are facing a serious challenge in the digital environment where we produce an average of 2.5 quintillion data per day (source: <http://www-01.ibm.com>). There is a growing amount of data that comes from sensors, social media networks, online knowledge sharing and from lots of other resources. This brings up basic questions of the handling of data resources and induction, network innovations and network education.

Basic questions and hypothesis

Our research questions are the following: How do social and business networks that use the Internet as a scale-free network measure the vulnerability and risk of digital/online networks? Furthermore, how are they getting ready for big data's effects? How can they make an advantage of them? Do communication and education decrease vulnerability and risk? How much does it depend on the size of the company/firm/organization/network? How much does it depend on the industrial or other embeddedness of the company/firm/organ-

zation/network? How determinately do they consider the technical-digital embeddedness? How much do they consider the human/organizational decisions? Which one of these two promotes effectiveness? What is the connection between the size of the network and the level of competence? Can it be determined that 'mezo level' is the most effective? What are the natural and synthetic network regions? What are the condensational fields of the technological-technical-administrative-worksharing-etc. networks?

With the help of the above questions, we have set the following hypothesis and sub-hypotheses:

Hypothesis

According to the research's basic/main hypothesis, considered are those business, social-communication and decision chains that operate with the newest digital- online tools and competences. As compared to their competitors, they are measurably (effectiveness, growth, realization) and observably (marketing/ brand awareness, PR, loyalty of partners and consumers) more effective.

Sub-hypotheses

- (1) The analyzed sectors' networks regularly use external and internal modes (consultation with advisors, participation at international conferences, webinars, professional blogs with new information, acting social media managers, involving trainees, etc.) for development and self-training in the field of digital-online innovations and competencies.
- (2) They regularly use competence developing tools and methods in the analyzed sector to introduce them to the market,. Also, to handle the growing amount of data and big data, and to reduce risk. The education is assured by more channels (for example e-learning, conferences, workshops) in many of their connected networks (partners, collaborators, subcontractors, etc.).
- (3) The analyzed sectors consider familiarity with and the development of online network competencies indispensable to achieve competitiveness and effectiveness. In order to build trust and reduce risk, they first manage their offline networks by traditional tools (keep in touch in person, the requirements defined in the contract/in writing, etc.).
- (4) The newest digital tools, digital network services, use of programs, data management elaboration and information management need additional resources. The analyzed sectors consider this as an investment. They develop their material and intellectual sources accordingly.

- (5) The analyzed sectors use both preventive and proactive solutions in their online and offline networks (for example, tracking, management of change and crisis) to decrease vulnerability and increase effectiveness.
- (6) The analyzed sectors show different results regarding the intensity and effectiveness of the use of online networks and that of digital tools. Different results are shown on risk management depending on the size of the network's expansion, the type and quality of the network. Also shown is the business and industrial embeddedness. Finally, the represented generation is highlighted.

We analyzed the hypotheses' framework and validity by highlighting the relevant elements of literature; and also by qualitative research. We are also going to present the research's results in these two steps.

Theoretical background

The Framework of Networks: Relatedness, Tight Bonds and Vibrations

The network, as defined above, is the sum of the hubs and the links connecting them. Due to the infrastructural development of digital environments, various and effective tools are available via online and social networks (Gloore et al., 2012).

Within business and organizational networks, the nodes belong to the same sector's interconnections or to that of different sectors. According to recent studies on business networks and supply chains, relations themselves are a major set of resources for network operators. Practically, these networks can be defined as investments. The greater the investment, the more meaningful and useful connection can emerge between companies and organizations. By this they shape one another and the whole network. The wiredness, or a particular node involvement, makes the organization more sensitive and influential in the network information flow. Theories of competitiveness emphasize how important it is that companies or organizations should not keep the network under control. Otherwise it will be less effective and innovative. The only effort they can make would be seeking profit from others' initiatives and creative solutions. It is important to try to understand that they need to see and know how the network operates in terms of the associated partners. Also, to determine how they see their positions from there (Anderson – Håkansson – Johanson, 1994; Dodgson, 1993; Gelei – Mandják, 2011; Håkansson – Ford, 2001; Mattsson, 1997; Wilkinson – Young, 1994). The competitor's benefit may also be increased by this change of viewpoint.

The relationship of these companies and organizations can be divided into online and offline networks, and can be examined along these dimensions. According to the sub-hypothesis supported above, we have observed it is essential to get familiar with and develop online networking competences for the corporations and organizations. This is in order to achieve competitiveness and effectiveness. Information management, the latest digital network services the use of digital tools and programs require additional resources. The question is how much these resources can be regarded as an investment, how indispensable they are, and how they support the company's or organization's competitiveness. The offline networking competence from this viewpoint is also indispensable. This is because traditional fiduciary and risk mitigation tools have an important role.

There is always something in the flow through networking contacts.. It can be information, process management decisions or co-operation in innovation. As a result, we need to review a particular network nodes' strength and stronger bonds. If these stronger bonds use innovations, digital tools and network education more actively, it may have an effect on the long run including on the rest of the network. There may be situations when confusion arises within the network because of the flow and strong links among members of the business networks. Or, the network faces confusions like jarring or corporate economic crisis.

The so-called network quakes according to their extent and strength have various effects on the operational effectiveness of companies and organizations. It is therefore an important issue for the members of the network to reduce this kind of vulnerability and perceive crisis management solutions. These solutions would be those used online-offline concerning their networks in order to be able to preserve their position and innovative capacity (Csermely, 2009).

On the whole, as participants of a business network, all the companies and organizations need to move beyond their own points of view and they should focus on a networking perspective. Without their networks they would not be able to reach their desired results, innovate successfully nor increase their competitiveness (Christakis – Fowler, 2009).

Offline and Online Networks: After the Digital Turn

As we have mentioned earlier, exploiting the potential of online networks is crucial for corporate and organizational relationships. Presumably, for their business-social communication and decision-making chains that use the most recent digital and online tools and competencies. As they tap this online potential, they can become more competitive as compared to the sector's other companies and the organizations. However, we assume that the online

network extensiveness, its importance for the company, latest digital tool usage, and the importance of the education all depend on the profile of the company. This includes size of the company and on the staff generations represented.

Hurwitz (2013) also draws attention to the fact that this is the age of the so-called post-trust Internet and of digital technology. This means that online networks are becoming more accessible and less evadable. Due to this, it can be turned against the organization or against the company. This could range from the vulnerability to data leakage through hacker attacks or to destructive communication activities that streamline online information management. Internet architecture is a possibility, but the confidence in online networking is being constantly questioned by the opportunity and verification of vulnerability.

The trust in a network (Krackhardt - Hanson, 1993), the legitimacy and strength of nodes, streamlined network management, issues of safety versus effectiveness are present both in online and offline networks. Yet, they are present in different ways and interconnected with one another. Innovations and effectiveness support the openness. Trust and security supports increasingly exclusive and restricted network solutions. So when we talk about offline and online networks after the digital revolution, it is a fundamental question where the boundaries of the network's development lie, the viewpoint of the network and that of online-offline network competencies..To what extent does competitiveness strengthen the node's place within the network and the trust. When should restrictions be launched for cost cutting, return investments in order to save security functions? How should competitiveness and the proportion of expenditure, the investments of the communicable and demonstrable competitiveness be optimized?

It is important to emphasize that the patterns of online and offline networks are to a certain extent similar. Again though, to an extent they differ. Here "human" and "algorithmic" nodes and their interconnections indicate basic differences between the various sources. Human nature is more analogous, while the nature of the algorithmic one is digital. According to socio-psychological studies, (including Haythornthwaite, 2005; Bargh – McKenna, 2004) there are no significant differences among patterns of human networking. Online relationships usually share the features of offline relationships.

Online communication is also rather frequent and intense in case of close relationships. It works "analogously" and with the same force of offline relationships. Online social networks also operate quite similarly in personal/corporate-organizational relations with shared trust and risk management strategies (Csüllög, 2012).

Operating along algorithms generates common platforms and network management. These would be in management of companies, logistics, organizational development and

project management. Administration, along with other online associate frameworks in corporate-organizational functions, would also be included. They are less flexible between two stages of development, their codification limits usability, and their infrastructural vulnerability could lead to the vulnerability of human network as well.

Information economy, knowledge economy and the network economy model calls attention to the fact that networks are resources in themselves. Within a network technological innovations can spread easier and it is easier for companies and organizations to adapt to each other. They have a greater influence on each other to increase their effectiveness and competitiveness (Bharadwaj, 2000; Moricz, 2009, Seltzer – Bentley, 1999; Vergeer – Pelzer, 2009).

Network Competence, Education and Connectivism

Competence as a sum or as a framework of skills is closely related to the concept of a network. Social capital, the Internet or the digital community, professional platform management- just to name a few- assume complex capabilities. The network management capabilities and skills (Möller - Svahn, 2003; Ritter - Gemünden, 2003) outline a definite competence-portfolio (Vlasyuk, 2010).

The concept of network competence applies to offline and online network management and control. Also, the concept applies to self-learning solutions and to organized education at the same time. Traditional offline forms are moving to some extent to online networks. Online frameworks are newer, platform-oriented stages among competences.

The sustainability of digital networks and the increase of competitiveness altogether assume continuous innovation, competence development and education. Recent developments represent pre-studies, research, the company's/organization's opportunities and expectations to ease the whole network's competence. The development of competence is in this sense system-levelled and includes within the network all those who are involved in the innovation. Developed or adapted solutions are therefore not solely individual components. They also operate as restructuring devices (Henderson - Clark, 1990). Along proper network and digital competences in the digital environment, rapid changes make it possible for companies and organizations to achieve competitive advantage fast and/or on the long run (Grover - Kohli, 2013). Their success can be communicated, marketed, made visible, and in terms of marketing and in partner/customer loyalty – a leverage. As far as the involvement of related resources is concerned it is the process that is in the focus (Partanen - Möller, 2012: 491). It is important to continuously develop competences. In operation management of networking competence, co-operation, collaboration, competition and perceptibility (Vlasyuk, 2013:

970-971) all enhance the visibility and representation of success. Within networks an online community space or a knowledge-sharing portal can have a featured terrain that is being co-developed by an increasing number of organizations. This is based on social media and interactive content services. The activity started earlier in forms of mailing lists and later via forums. This provided some space for communication and by now social network sites have largely shifted to this type of activity (Csüllög, 2012).

Competencies themselves do not change quickly. In Vlasyuk's (2013) approach, they do not come up spontaneously, but along targeted efforts. They cannot be simulated. At best they can be copied. Competence development – within the framework of networking competence development – is defined by the connectivist approach. This is defined as knowledge shared across networks and is in itself an ability to construct this knowledge over networks (Downes, 2007). So networking competence in this sense is a 'meta-competence' This is a competence of accessing and the ability of developing competences.

Competitiveness, Network Trust, Vulnerability

Networking competences are in a dynamic interaction with one another and they promote corporate competitiveness for a strategic vision (Edgar - Lockwood, 2008 and Wang et al, 2012.). It is based on the thesis that a strategic network development approach is needed that is built on the so-called ICT fund (Partanen - Möller, 2012). This also represents value creation (Msanjila - Afsarmanesh, 2009: 4769).

The analyses of networks are not accidentally in the priority areas of strategic management (among others: Gulati, 2007; Jarillo, 1988; Lavie, 2007). Critical success factors map and build strategic networks, establishing strong network linkages and the firmament of protection against quakes. Effective networking is based on application of dynamic competencies (Wang et al., 2012), and the core element is trust.

Trust is a collection of personal beliefs (Berners-Lee et. 2006: 88). Competitiveness and the level of trust are fundamentally interlinked within networks. The results that mark a higher quality and creativity assume networks based on trust (Gloore et al., 2012). Trust and loyalty can be built and feature among companies and organizations in multiple ways. According to our study, the most important question is a sustainable level of online reliability. Can it be as reliable as its offline counterpart? Or, can the online discourse of reliability strengthen offline trust. A further question is how much these factors depend on digital tools and platforms, the human factor and what impact they would have in online/offline networks in the presence and absence of trust. What does risk imply within these networks?

Without trust the majority of online activities would not be viable. In case of online networks there are two formats of trust: 1) trust with reference to systems and 2) with reference to people. For example, in case of trusting systems we speak of web-based architectures (Nagy – Schubert, 2007). According to this, in online relations trust is closely related to a variety of digital tools as mentioned earlier in connection with the so-called post-trust Internet. Therefore, it is important to connect confidence with the use of these tools, and their development. According to all of these, it can also be examined with reference to the company's competitiveness.

Lack of trust can have many reasons. The most significant of which is incorrect communication, lack of information sharing and the unwillingness to share risks (Alawamleh - Popplewell, 2010). This question – among others – is answered by the MESH of companies. MESH is a response to the rapid evolution of technology solutions by results built on networks and sharing. In such networks, proper resources are only available until the company, the organization or consumers need the resources. Thus, these are trust products and services where the credibility of the network members and their reliability are standard (Gansky, 2010).

As far as trust is concerned, networks' informal relationships are important. Their mapping makes the understanding of important and strong linkages possible. In the restructuring of networks and via the network dynamics, these linkages may get damaged. Or, in contrast, they could develop (Sellitto, 2011: 27).

In contemporary economic networks companies', regions' or countries' productivity and competitiveness largely depends on their ability to effectively apply the obtained information. Therefore the networks should try to focus on the trust constituted by their built-up trust networks. This is in order to avoid panic, (Alawamleh - Popplewell, 2010) misunderstandings, errors and to reduce risks and vulnerability.

Trust also implies vulnerabilities – both in case of trust on tools and on human relations. Vulnerability can be reduced on the network level if the network is scale-free. It has sufficiently strong bonds and therefore is more resistant to random errors. If targeted, attacks can be prevented. These formal and informal bonds on corporate and organizational levels need to be carefully treated. Their removal may be critical so that network quakes can be prevented.

Using the latest digital equipment makes it possible for companies and organizations to collect data from their networks. They are enabled to collect from their strong and weak bonds and from the effectiveness of their communication channels, The data is derived both from the network's successful existence or from the network's incompetence. The last step is to analyse the results. Network resources and connections – based on the feedback – can be redesigned more effectively focusing on competitiveness and visibility.

Network Competence, Strategic Co-Operation, Collaboration

The size of a firm defines the strategic position the firm concerned can take within a business framework. The size determines whether it will become a nodal agency or marginal player. The strategic management of trust, networking competences and that of digital frameworks (Grover – Kohli, 2013) is of uttermost importance. This, however, does not only imply a framework, but also a daily routine at companies in online and augmented collaborative environments. Also, implied is a level of transparency and further functions. These determine the corporate strategy and vice versa.

The size of the organization and the organization's position within the business-network concerned provides its functional networking status quo (Wang et al., 2012). Position and linkage might only be qualified after entering into co-operation (Partanen – Möller, 2012: 491). Insight, analysis and the integration of networking competencies for this are indispensable. This is true both in case of nodes with tight linkages and in case of nodes with loose ones investigating separately the speed and methodology of a node's connectedness (Watson et al., 2004 és Vervest et al., 2004). Only an overall system can be error tolerant.

Networking competence is consequently the basic question of strategic co-operation. Its analysis requires the monitoring of the quality of collaboration (Partanen – Möller, 2012: 491) and that of a shared or alternative strategy (Grover - Kohli, 2013). Competitive advantage within this networking complexity is viable via a strategic point of view supported by education.

This is the reason why collaboration has become the organizational and inter-organizational key term for digital networks. Collaboration for common goals in a recursive, inter-embedded operation is the key focus (Martinez-Moyano 2006). In other words, collaboration is not solely co-operation. It is also a shared pursuit that might be complemented by creative devices, by cumulative competences, sharing knowledge, mutual learning activities and by online open frameworks. Members of networks are striving for consensus in their collaboration. Collaboration implies a networking rationale. It provides points of instruction and subsidiary networks within networks. However, this can be decentralized. For example, they could get access to resources in groups and that would make them increasingly effective. At the same time, this will promote further competence development.

Networking Visibility and Reputation

Visibility is a basic requirement for the nodes within networks. The extent of visibility depends on corporate profile, business embeddedness, vulnerability, risk factors. Also, the

visibility depends on communicational strategies and marketing/PR targeting. Competition and visibility together (Vlasyuk, 2013: 970-971) enhance the visibility of success as seen above. The extent of visibility has become even significant within online embeddedness. The organization, people working within these organizations, the ones in collaboration with the organization all produce, share and traffic masses of digital data. It is of strategic importance what/which segments of this data will become available, visible, recognizable and with what implications. Just think of the fact that the good reputation of a corporation can be ruined on account of a piece of information that has gone viral on an online social platform. The impact and the vulnerability of visibility are obvious.

Honour and reputation also have implications for partnership and for third party or parties (Hurwitz 2013, 1611) within a framework. This refers to interconnectedness that might also generate commitment (Mithas et al. 2013: 521). Reputation becomes recognizable and identifiable in interconnectedness. The question is to what extent we should extend or limit networking to achieve trust and reputation. Extension may generate new connections while limiting visibility will also decrease risks (Alawamleh – Popplewell, 2010: 6046).

The more transparent the interconnectedness of the networks, the more visible are networking relations. Tighter bonds will form and random quakes may occur. The increasing visibility of a node will in turn increase the visibility of further nodes. The more open and free a network, the more visible and accessible it becomes. This might imply a smoother access to already existing and prospective B2C, B2B and B2G relations. Also, implies an increasing trust of consumers. Yet it might also implicate vulnerability and could benefit competitors. “It is easier to observe provisions and, then, to copy them.” (Mithas et al. 2013: 519)

The online visibility of networks consequently constitutes issues of reputation and vulnerability. These rely on organizational and inter-organizational collaboration. This implies the availability of marketing, PR, HR and data security functions. Also, implied is the development of competencies that are needed for effectiveness and competitiveness.

Research

Based on the theoretical background, we conducted a series of expert interviews in selected industries. The subject of the interviews was the level and the impact of corporate network competencies (innovative digital technologies, online networks) concerning the competitiveness of companies. The survey methodology consisted of semi-structured interviews for the purpose of studying the junior management staffs of dynamically changing companies.

This is based on or engaged in the development of network competencies. These managers have relevant information concerning the subject of the research. The planned number of interviews has been between 25 and 30 for a sampling. Sampling is to be specified later by saturation analysis. Our basic questions were:

- How do the social and business networks, using the Internet as a scale-free network, measure the vulnerability and risks of the digital/online networks?
- How do they prepare for the impacts of big data? How can they turn it to their advantage?
- What kind of innovations, communication and education help to reduce the vulnerability and the risk?
- How much does it depend on the size of the company/firm/organization/network?
- How much does it depend on the industrial or other embeddedness of the company/firm/organization/network?
- How much do they find the technical and digital embeddedness determining and how much the human/organizational decisions?
- Which of the two primarily affects efficiency?
- How do network size and the level of competence relate? What are the natural and artificial network regions?
- What are the areas where ecological, technical administrative labour-division etc. networks intensify?

Preparing sampling, recruiting respondents

The research plan envisaged making 30 interviews. In the preparation of the sample, we planned to interview in 80% representatives of companies where either digital innovation or the use of digital networks plays a crucial part in their business profile. The remaining 20% were intended to be made up of manufacturing and service companies.

According to the planned sampling procedure, the respondents were contacted through personal channels (in person, by phone, by e-mail) with 10% of the planned sample. Those contacted included a tool manufacturing company, an online agency and a company that develops portals for posting media content. After the first interviews, we asked them to recommend people from their own networks that could be relevant in terms of the research topic (snowball sampling). In this way, we contacted additional respondents.

Snowball sampling worked well in the sense that one participant led us to another. The experts interviewed recommended respondents who worked in the same or a related domain. This method also helped us to include companies of different sizes in the sample since small

companies can relate to bigger ones. The larger ones are also in connection with small ones. Thus, we reached participants from all levels of the networks identified.

The number of interviewees was 26. The scope of respondents was that of junior managers (senior managers in small companies) who had relevant information concerning the competencies of their own company networks and could give useful answers to our questions.

After making an appointment on phone or via e-mail the interviews were conducted at a place designated by the respondents. Mostly, this was in their workplaces in December of 2013 at the time requested by each respondent.

Basic data

The answers of the interviewees to each question depart along certain parameters. More specifically, some characteristics of the company determine what the respondents think of the questions we examined. These parameters are as follows:

- Companies

The usefulness of the interviews largely depended on whether we managed to interview companies of different sizes, activities and clientele. In terms of networks, different problems arise in organizations with different parameters. The individual companies can give answers to such problems based on their own characteristics.

- Scope of activities

With regard to the scope of activities, we divided the 26 companies we had contacted into two groups. The groups were according to whether there were any IT products or services that played a crucial role in their business profile. More than half of the companies had a “digital profile”. Their scope of activities in more detail: The largest group (31% of the respondents, eight experts work for such a company) is made up of companies dealing with IT development and operation. We reached four companies with a marketing profile, and we spoke to the employees of three manufacturing and three financial firms. In addition, the sample included two non-governmental organizations, two trading companies and two companies providing technical services. We also interviewed a firm dealing with education and one providing telecommunications services.

- Clientele

The companies employing our experts have contacts with mostly corporate clients. Seventy-six percent can be regarded as purely B2B suppliers and four companies serve retail/private customers. Their corporate customer base is most important, though. Only two of the experts interviewed reported that their companies focused primarily on retail customers. Their networks included corporate clients as well.

- Company size

In terms of company size, almost one out of four companies employ less than 10 people. More than one third have between 11-50 employees, i.e. almost every second firm is a small enterprise. One company with 51-250 and one with 251-500 employees belonged to medium sized enterprises. There were 5 large companies: one with 501-1,000 employees and four employed more than a 1,000 people.

- Respondents

In addition to the respondents' companies, it is also worth examining the demographic parameters of the interviewees. From this point of view, our sample is rather homogeneous. No significant differences were observed in the responses of the experts according to their age or sex. Here, the homogeneity of the sample was more striking.

- Age

Seven of our experts were under 35 years and more than thirty-eight percent were between the ages of 35 and 40. Thus, almost two-thirds of the sample is made up of young company managers under 40. We had eight respondents between the ages of 41 and 50 and only one above 50. If we examine the companies with a "digital profile" from this point of view, we find that they have much younger experts. In this group, forty-three percent are under 35 and seventy-nine percent are not more than 40 years of age!

It is worthwhile dealing with age statistics from these companies in a little more detail. All of the seven experts pertaining to the youngest age group (up to 35 years) work for a company or in a position with a "digital profile" and six out of ten in the next age group (between 36-40 years). Except for three people all the companies with a "digital profile" in our sample can be linked to these young managers. All of these are IT start-ups dealing specifically with the latest technologies (music streaming services, online advertising, online communication and image, mobile applications, etc.). In older age groups, we spoke to the employees of three firms with a "digital profile". However, they have a wide and deep knowledge of the industry, which provides them with outstanding possibilities. Two of them lead a successful business as owners. One of them provides M2M network services to German customers. Apart from him, only employees of the largest Hungarian provider report in our sample. A third, older expert holds a senior position in this company.

- Sex, education

In our total sample, there are only three female respondents, two of whom work in the technical and commercial field. We had only one female respondent from a company with a "digital profile". Here we need to mention a remark by one of our experts who deals with the development of small businesses, in particular, the support of female managers. She attaches

great importance to the development of the IT system of companies and the development of the digital competencies of the managers who are in contact with the organization. In her opinion, the level of competence of female managers is much lower than that of their female counterparts- regardless of their age group. In addition, she finds that aversion to modern technology is more common among women than men. Also, in terms of education, our sample can be regarded homogeneous: all interviewees had higher educational qualifications. (See Annex)

Analysis of the information obtained from the interviews

Our research aimed to describe the system of business relations of companies through network dynamics. The wide-ranging networks of companies – the main components of which include the customer base, the partner base and the employee base – can be described with the characteristics of the networks. This is because the basic definition can be related to these systems. However, these systems or certain parts thereof do not necessarily bear the typical characteristics of networks. For example, a customer base is not necessarily organized in a network. There are not necessarily relationships between the individual customers. Nevertheless, the entire system of relationships of the company can be considered as a network.

Thus the extension of this system of relationships does not always happen with network tools. For the companies, the most important thing is to attract and retain customers. To this end, they employ various marketing methods, but apart from a few exceptions, network dynamics in the extension is less typical. Many companies perform networking-like activities to extend their networks. Here, however, formal networks and their nodes play an increased role. Due to the IT and digital focused profile, sampling the online solutions gets strong feedbacks with cautions. The latest innovations and online tools are only part of the frequented tenders, but the daily practise presents a single or several long versions that had been tested earlier. Corporate managements play safe because of long term agreements, partnerships and potential customer loyalty.

Competitive advantage and visible success

Based on the basic hypothesis of the research, those companies which employ the latest digital and online tools are both measurably (efficiency, growth, sales) and observably (marketing/brand awareness, PR, partnership and consumer loyalty) more successful than their competitors.

The interviews showed that companies that employ digital innovation appropriately can indeed gain an advantage over their competitors by using modern technology. The key question, however, is what technologies they integrate into their operation. Also, how the general principle in this area is “the right tool for the right purpose”. Our respondents find that the applications supporting operational functions, coordination, and project management make work more efficient. Our experts attached the greatest importance to network applications that enable efficient joint work from home or in the form of teleworking. Thus the digital innovation brought the greatest breakthrough in the field of resource management.

However, the introduction and operation of these systems requires an expertise that many companies lack among their resources. Therefore, it is becoming more and more common that IT systems are operated by a third-party or outsourced.

In the “visible success” dimension, the online and network tools have proved to be as useful as offline methods. In this respect, our respondents did not report any difference. Maintaining an online presence in the dimension of “visible success”, maintaining an online presence also consumes resources. Accordingly, such campaign activities are mainly performed by large companies.

Development of competencies

We assumed that the networks of the analyzed segments regularly use external and internal solutions for development and self-education. Specifically used in the areas of digital, online innovation and competencies.

In our sample, companies with a “digital profile” are firms where some kind of network or digital innovation as a provided service plays a major role in their business profile. These companies constantly develop their digital competencies through organized and informal training. Mainly, though, they are developed through self-education using online tools. This has the main purpose of learning about novelties emerging in the market on a user and developer level. Among traditional companies, digital innovation does not play such a crucial role in their course of business for digital training to be important. Instead, training into system management is provided when the company governance, task management or database management system are introduced.

Digital innovation

We assumed that companies use competency development to be able to introduce new tools, make the amount of data increase and the data explosion manageable. Also, to allow risks to be reduced. Education is provided in several channels in several related networks.

Network competencies (for the moment we speak only of natural networks) enable individuals to find their way in the relationship net surrounding them. Also, to identify those groups and individuals who if contacted can help them get closer to their goals. In this sense, the interviews showed that the most important network competence development method can be found within the organizations. They show the job of the individual work groups or divisions to other divisions, or, within a division, the work of colleagues to each other. Network competencies are more in focus in companies where networking activities play a crucial part in their business profile. These include: non-governmental organizations and companies providing financial services.

Training, preparing or accompanying digital developments is not so much about the development of network competencies (unless in a specific IT technical sense). Rather, it is about understanding systems that support work processes and effectively mastering their use. Such training really appears outside the internal networks of companies as well. An essential condition for effective co-operation between companies is to be able to satisfactorily manage each other's IT systems (especially in the case of the suppliers of a multinational company). The main aim of digital networks employed by non-governmental organizations developing small enterprises is to develop the digital competences of its members.

Apart from this, other aims of digital developments are mostly to support work processes, enable joint work-teleworking and database management. Technical solutions play an elementary role in eliminating the increasing data quantity and vulnerability. This is except for the companies where data handling is a particularly sensitive area due to their activity. Those companies reside in the banking sector and nationwide providers with high customer traffic.

To protect the data and to reliably manage the increasing amount of data, special technical solutions are developed. These require a high level of special expertise in mathematics, information technology to introduce and manage such solutions. Thus companies either fully outsource these tasks (a big data commission can be rather costly), or entrust the management of systems to an in-house system administrator. The employees absolutely need the knowledge about the technical part of IT which can be acquired through the company's IT department or through organized corporate training.

Corporate management realises that digital skills and tools are part of employees'/partners' private and professional lives. Two consequences result from these facts. First, employees'/partners' have self-motivation to collect useful information concerning digital devices and new trends in digital networks. Secondly, employees'/partners are digitally linked. Their ignorance and their carelessness implicate some risk for the company. The characteristic man-

agement strategy is the simultaneous use of recommendations and regulation. The management function is based on the eventual confidence in online network context.

Competence development and competitiveness

At the beginning of our research, we thought that companies would find it essential to understand and develop online network competencies. This would be to become more competitive and efficient. However, offline networks are treated with primary importance by using traditional tools to build trust and reduce risks.

Understanding and developing online network competencies is fundamental. This is in the sense that the popularity, usefulness and efficiency of IT systems based on network solutions make day-to-day orientation more efficient and less resource intensive. As a result, the companies that use these solutions can enjoy a “competitive advantage” in this area. These network solutions are basically not aimed at expanding and building the network, but rather support work processes. They enable operative communication in connection with work processes.

The natural networks are indeed managed and maintained mostly in person. The interviews showed that at the international level and more importantly in a local context, business relationships are determined by the quality of personal relationships and professional values. One note of caution is the risk that personal relationships invade business life and loyalty overrides professional considerations.

Digital innovation as an investment

We assumed that the introduction and operation of digital innovation required additional resources. The examined segments view this as an investment and develop accordingly their material and intellectual resources.

Depending on the segment examined, the experts have a rather varied opinion of digital and network developments. It is the companies with a “digital profile” that realize the importance of developments. In particular, the applications supporting work processes. However, since most of them widely use open source software, the issue of return on investment is less important.

Among the traditional companies, it is the large enterprises active in a special market environment that pay the most attention to this area. Medium sized companies generally follow the big ones after some delay. Whereas the level of digital competency of small enterprises largely lags behind both at international levels and compared to local large companies. Generally speaking, traditional companies spend on digital development if it is required by their

market position. Or, if the development is so efficient that it enables them to save resources thus they can reduce their costs. Some IT professional respondents regard digital developments as value added improvements that yield a return in the long run.

Vulnerability

According to one of our hypotheses, companies simultaneously employ preventive and proactive solutions in their online and offline networks in order to eliminate the vulnerability of networks,

The vulnerability of natural networks is mostly reduced by the management or an appointed company division by keeping personal contact with the customers and preserving good personal relationships.

The vulnerability of digital networks has a totally different meaning. On one hand technical problems and loss of data. On the other, deliberate external attacks can cause destruction. As already mentioned, the protection of digital networks usually involves using specific technical solutions. These are not the kinds of issues that non-technical staff could manage. Therefore, the management of digital networks is either outsourced or dealt with by the company's system administrator.

Summary

The segments examined show different patterns regarding the intensity of use and efficiency of online networks. Digital tools are highlighted as well as risk management according to the size of the network expansion. Also displayed is the type and quality of the network, the type of industrial and business embeddedness, and the generations represented.

According to our research, the digital competences of companies are influenced by several factors:

- company size
- scope of activities
- type of partnership network
- type of customer base

The highest level of digital competences can be found in large enterprises, companies with a “digital profile” and such small and medium sized enterprises whose partners include multinational companies and large corporations. The lowest level of digital competence is experienced in small companies and manufacturing firms.

As suppositions for a future quantitative survey, we can state the following:

Digital network solutions used for the purposes of networking is mostly typical of B2C large enterprises, or firms and organizations where the development of (natural) networks plays a crucial part in their business profile (non-governmental organizations). The staff of companies with a “digital profile” play a leading role in terms of utilizing informal professional communities and networks (both online and offline). This mostly involves professional communities, professional platforms and meetings.

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ANNEX

Company and respondent profiles

| Company profile | Respondent profile |
|---|---|
| 1. | |
| Medium-sized enterprise. Manufacturing and trade in custom-made tools. A Hungarian member of an international group of companies. Staff: 11-50 people; B2B | Senior manager. Male, approximately 40 years old, with higher educational qualifications. He specializes in mechanical cutting and trade. |

| Company profile | Respondent profile |
|--|---|
| 2. | |
| Small enterprise. Online communications agency – creation and operation of websites, social media presence, development of online and mobile games and mobile applications. Staff: 1-10 people; B2B | Senior manager. Female, 35 years, with higher educational qualifications. Account manager, project manager |

| Company profile | Respondent profile |
|--|--|
| 3. | |
| <p>Small enterprise. Portal development to display media content. Website management for online media industries and the press department of organizations. Staff: 11-50 people; B2B</p> | <p>Senior manager. Male, 37 years, with higher educational qualifications. Business development - strategic planning, product development, organizational development</p> |

| Company profile | Respondent profile |
|--|---|
| 4. | |
| <p>Large enterprise. Leading role in the field of insurance and financial services. A Hungarian member of an international group of companies. Staff: over 1,000 people; B2C, B2B</p> | <p>Middle manager. Male, approximately 35 years old, with higher educational qualifications. He specializes in the development of insurance and financial products.</p> |

| Company profile | Respondent profile |
|---|---|
| 5. | |
| <p>Small enterprise. Activity: IT services, operation. Staff: 11-50 people B2B</p> | <p>Senior manager. Male, approximately 40 years old, with higher educational qualifications. He specializes in information technology, operation, and software development.</p> |

| Company profile | Respondent profile |
|--|---|
| 6. | |
| <p>Small business/family business. Wholesale of electronic devices. Staff: 1-10 people B2B</p> | <p>Senior manager. Male, approximately 50 years old, with higher educational qualifications. He specializes in marketing and wholesale.</p> |

| Company profile | Respondent profile |
|---|--|
| 7. | |
| <p>Small business/family business. It deals with the wholesale of bicycles and accessories. Staff: 11–50 people B2B</p> | <p>Senior manager. Male, approximately 35 years old, with higher educational qualifications. He specializes in controlling and corporate governance.</p> |

| Company profile | Respondent profile |
|--|--|
| 8. | |
| <p>Small enterprise. System integration, technical sales on AV and IT markets. Staff: 1–10 people B2B, B2C</p> | <p>Senior manager. Male, 37 years, with higher educational qualifications. Responsible for AV division, account manage- ment, project management, and company management</p> |

| Company profile | Respondent profile |
|--|---|
| 9. | |
| <p>Large enterprise. It produces, develops and sells imaging equipment. A Hungarian member of an international group of companies. Staff: 251 and 500 people B2B</p> | <p>Middle manager. Male, approximately 45 years old, with higher educational qualifications. He specializes in marketing, CRM, market research.</p> |

| Company profile | Respondent profile |
|---|---|
| 10. | |
| <p>Small enterprise. Adult education in IT, one-on-one and corporate IT courses, online training materials. Staff: 11 and 50 people B2B, B2C</p> | <p>Senior manager. Male, 35 years, with higher educational qualifications. Company management as he is the owner, professional management, curriculum development</p> |

| Company profile | Respondent profile |
|--|--|
| 11. | |
| <p>Medium-sized enterprise. Communications agency - already offline as well. Creation and operation of websites, social media presence, development of online and mobile games and mobile applications, ATL, BTL communication. Staff: 51 and 250 people; B2B</p> | <p>Middle manager. Male, 37 years, with higher educational qualifications. He specializes in high-capacity databases and data management systems, big data (for large enterprises)</p> |

| Company profile | Respondent profile |
|--|---|
| 12. | |
| <p>Medium-sized enterprise. She offers technical services, person, product and system certification. A Hungarian member of an international group of companies. Staff: 51 and 250 people B2B</p> | <p>Middle manager, female, approximately 40 years old, with higher educational qualifications. She specializes in marketing and training.</p> |

| Company profile | Respondent profile |
|--|---|
| 13. | |
| <p>Non-governmental organization. Lobbying, protecting the interests of Hungarian advertising, the IAB's digital division. Staff: 1 and 10 people (+members) B2B</p> | <p>Senior manager. Male, 34 years, with higher educational qualifications. Communication, organization, keeping contact, lobbying</p> |

| Company profile | Respondent profile |
|---|---|
| 14. | |
| <p>Non-governmental organization. Development of non-profit organizations of public benefit and small enterprises – competitiveness, creating opportunities and sustainability. Staff: 1 and 10 people B2B, B2C</p> | <p>Senior manager. Male, 46 years, with higher educational qualifications. Company management, strategic planning, internal technological and methodological developments</p> |

| Company profile | Respondent profile |
|---|--|
| 15. | |
| <p>Large enterprise. Investment bank, financial services. A Hungarian member of an international group of companies. Backoffice in Hungary, mainly IT development and controlling. Staff: 501 and 1,000 people B2B</p> | <p>Middle manager. Male, 39 years, with higher educational qualifications. IT development and project management</p> |

| Company profile | Respondent profile |
|---|---|
| 16. | |
| <p>Large enterprise. Activities: banking and financial services. Major player in Hungary. A Hungarian member of an international group of companies. Staff: over 1,000 people B2C, B2B</p> | <p>Middle manager. Male, approximately 45 years old, with higher educational qualifications. He specializes in marketing, CRM, and market research.</p> |

| Company profile | Respondent profile |
|---|---|
| 17. | |
| <p>Small enterprise. It deals with the development of custom software, mobile applications, and web-based solutions. Staff: 11–50 people B2B</p> | <p>Senior manager. Male, approximately 30 years old, with higher educational qualifications. He specializes in information technology and software development.</p> |

| Company profile | Respondent profile |
|---|--|
| 18. | |
| <p>Small enterprise. Development and operation of ad serving systems for media companies. Staff: 11–50 people B2B</p> | <p>Senior manager, male, 35 years, with higher educational qualifications. Company management, commercial and communication tasks.</p> |

| Company profile | Respondent profile |
|---|--|
| 19. | |
| <p>Medium-sized enterprise. It deals with direct marketing and call centre services. Staff: 51–250 people B2B</p> | <p>Senior manager. Male, approximately 45 years old, with higher educational qualifications. He specializes in direct marketing and advertising.</p> |

| Company profile | Respondent profile |
|---|--|
| 20. | |
| <p>Small enterprise. Development and integration of ERP software, CRM systems and document management systems. Staff: 1–50 people B2B</p> | <p>Senior manager. Male, approximately 50 years old, with higher educational qualifications. He specializes in software development and system organization.</p> |

| Company profile | Respondent profile |
|--|--|
| 21. | |
| <p>Small enterprise. Music streaming services, music store services. Staff: 11–50 people B2B</p> | <p>Senior manager. Male, 36 years, with higher educational qualifications. In addition to company management, he is responsible for most of the sales/ commercial and HR tasks.</p> |

| Company profile | Respondent profile |
|--|--|
| 22. | |
| <p>Large enterprise. Three areas of activity: telecommunications, application development, and IT infrastructure. Staff: over 1,000 people B2B</p> | <p>Middle manager. Male, 48 years, with higher educational qualifications. Head of network solutions competency centre.</p> |

| Company profile | Respondent profile |
|---|--|
| 23. | |
| <p>Small enterprise. Software development – engineering company, outsources its own workforce to 2–3 large companies. Staff: 1–10 people B2B</p> | <p>Senior manager. Male, 52 years, with higher educational qualifications. Company management, software development, and project management</p> |

| Company profile | Respondent profile |
|--|--|
| 24. | |
| <p>Medium-sized enterprise. It produces and sells engineering and automotive parts. Staff: 51–250 people</p> | <p>Senior manager. Female, approximately 35 years old, with higher educational qualifications. She specializes in finance and controlling.</p> |

| Company profile | Respondent profile |
|---|--|
| 25. | |
| <p>Large enterprise. Telecommunications, ICT (Information and Communications Technology). Staff: over 1,000 people B2B, B2C</p> | <p>Middle manager. Male, 34 years, with higher educational qualifications. Marketing- service-development, product management, portfolio building.</p> |

| Company profile | Respondent profile |
|--|--|
| 26. | |
| <p>Small enterprise. System certification, an organization accredited by the National Accreditation Board (NAT). Staff: 11–50 people B2B</p> | <p>Senior manager. Male, approximately 50 years old, with higher educational qualifications. He specializes in the development and auditing of management systems.</p> |

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