

# The Role of Information Management in the Corporate Development and Controlling of the Smart Cities

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## *Abstract*

"Today the development is so fast that if someone declares that 'this is impossible', the other person interrupts, and says 'we have already solved it'" (Einstein, 1949). The above quote, although it is already several decades old, perfectly fits today as well. Krauth (2008) draws attention to how quickly the use of Internet services extends to the field of human policy works (e.g. recruitment, payroll). The widespread use of the Internet as well as the subsequent, explosive development accelerated the processes, which resulted in a development of incredible speed in the world of information technology. More and more amount of information is generated in our daily lives. But what exactly is the information? How does the information management work at the companies of the smart cities? Do we really properly use the large quantities of generated information? Do the controlling systems of the companies keep pace with the technology as well? Our study seeks the answer to these questions.

*Keywords:* Smart city, corporate development, IT, management, controlling

*JEL Classifications:* O12, O32, O43

## 1 Review of the scientific literature

### 1.1 The past, present and future of corporate information management

The concept of information is defined and interpreted in many ways by many people. Let's look at some of these: Information is uncertainty-reducing knowledge, it is one component of the processes that integrate business operations (Chikán, 2003). János Lakatos gives the concept of information from the aspect of management theory, according to which information is: knowledge, data, news, reference; or that property of the data, which exerts the effects and consequences of the processing; or the content of the data (Lakatos, 2004).

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The news content of the data is what complements our existing knowledge about the investigated event. Consequently, the information content contained in the data is complex, as it may be a novelty and may also confirm the information content of the data. The news content of the data means what its content refers to, what it is directed at, what we learn from it. This news content may be directed at an already existing knowledge, or may be directed at an entirely new world of knowledge. Looking at this aspect of the information concept, it can be said that evaluating, analysing, and comparing the data with each other: all this means the identification of the information content of the data.

In the case of the economic operators, we interpret the material, the energy, and the capital as dead resource. In addition, the manpower appears as a living workforce, whereas nowadays information is now defined as a new resource category. As a special resource - unlike other resources - its volume is increasing over the years. The possibly highest level of knowledge of these information helps managers to make the most successful decisions about the existence of the company, to make feasible plans and to carry out effective control activities.

Today, the information became value, and also power, if used properly. For every organization - from small to multinational corporations - it is of prime importance to quickly and accurately manage information. Large amounts of frequently-changing data sets have to be used economically in the information dumping, which encompasses the world, so that the inherent value can be utilized well from the company's aspect.

The role of information grows in all sectors of society, in education, public administration, research and development, in entertainment, and, last but not least, in the economic life, in production and services as well. Information is generated, communicated, used, maintained, retrieved, re-used, repacked, redistributed and made available as a resource, in the lifecycle of the information (Chikán, 2003).

All economic operators need both external and internal information, as illustrated in Table 1. The importance of external information is unquestionable since the economic situation, the legal background and the up-to-date knowledge of the market environment are indispensable for the company. However, internal information is even more important for controlling and developing processes, regarding both of them, the information of the past, present and future are important as well. These are closely interconnected, and are closely related to the use of external information.

**Table 1. The company's information needs**

Information	
External information	Internal information
<ul style="list-style-type: none"> <li>✓ Economic situation</li> <li>✓ Legal background</li> <li>✓ Market environment, etc.</li> </ul>	<ul style="list-style-type: none"> <li>✓ The company's past performance</li> <li>✓ The company's current position regarding the "whole" and the individual areas as well, such as production and marketing</li> <li>✓ The company's opportunities for future development</li> </ul>

Source: Barancsi, et al. (2001, p. 157)

However, for a company to function effectively, it is not sufficient to obtain information only, its correct or incorrect processing may be a serious competitive advantage or a competitive disadvantage. The essential information required for short and long term operation, their potential sources and the price of neglect are summarized in a rather subjective and relative way, in **Error! Reference source not found.:**

**Table 2. Grouping of information for business operation**

Corporate function	Information type	Source of information	Alternative opportunity	Price of omission
<b>owner</b>	legal, political, macro-economic	legislation, press, personal	investment agency	Omission of investments-, expansion opportunities
<b>senior management</b>	legal, political, financial, macro-economic	legislation, press, personal	foundation of association of interests	omission of growth opportunities, owner dissatisfaction
<b>finance</b>	internal management, financial,	internal data traffic, legislation, press, personal	no	ineffective operation, formation of crisis
<b>real processes</b>	internal supply information, supplier and customer contact	internal data traffic, personal	no	ineffective operation, degradation of relationships

Corporate function	Information type	Source of information	Alternative opportunity	Price of omission
	information			
<b>marketing</b>	customer relationship information, market information, innovation information	customers, professional meetings, internal data traffic, press	reduction of marketing, outsourcing	omission of enlargement possibilities, loss of market share

*Source: (Csányi, 1997, p. 20)*

## 1.2 Corporate management, smart information systems

The key to the effective use of available - acquired or produced - information is to provide the right person with the right information in the right time and form (Chikán, 2003). In order to ensure this, it is essential to use the information system, since the horizontal and vertical division of labour within the company may result in a various need for information. The information provides business leaders with communication on the internal processes, the relationship between the external environment and the business, and about the effectiveness of the management. Thus, it is a special resource that informs the leaders at different hierarchy levels and functional areas about the existence or lack of resources affecting other organizational operations.

For the rate of companies, who use corporate information systems in developing areas, to reach the EU average, as a first step, the importance of information and that of the related information supply systems should be brought to the attention of the economic operators.

According to Simon (1979), economic value should be given to the management information, because the management has limited time to prepare and take the decisions for the long-term and short-term goals of the economy. In addition, their expertise and motivation are limited. It is also important that, with the development of the corporate and the management approaches, there is an increasing demand for more information, and more specific information. These are all necessary for the internal management, for helping the management in its daily tasks, and for making major long-term strategic decisions. Compliance with ownership demands is of great importance, as well.

The broadest interpretation is that the corporate management information system means a information system that helps the management. An effective information system designed and used to support the achievement of company goals. In this sense, a controlling system can also be considered a corporate management information system (Heteyi, 1999). "The information system - with the help of elements, people, machines, processes, etc. in the system - collects, processes, interprets and stores data in an accessible form, for the purpose of use. The infosystem is that part of the information system, that deals with the various types of data handling (recording, transfer, processing, storage, etc.). The infosystem is also interpreted as the system of information handled in the information system" (Bogdán, 1995). Literature often confuses the two concepts, which is very incorrect, since their separation is important. Simplified, the infosystem is that technical aspect of the information system, which also serves as a basis for the controlling data. The main purpose of the infosystem is to make the data, that reflects real processes and conditions, available at the right place, time, quality, form and cost, i.e. the system should provide messages that reduce the uncertainty as much as possible, in order to perform the organizational tasks.

Initially, the corporate management information system was a simple application, through which managers could share the information about their areas of competence. The modern corporate management information systems use very serious technology, automatically generating reports from the databases on the daily operations, and providing managers with information to help them make the right decisions. Corporate management information systems, in a slightly different approach, are computer-based systems that provide information to business operators with similar needs. The information describes what economic events have taken place at a company or at one of its dedicated areas, what kind of management events are currently taking place and what kind of management events are expected (Dobay, 1997). The primary task of a corporate management information system is to achieve a dedicated yield during the corporate operations. Modern corporate management information systems should have business benefits in the following areas (Drótos, 1991):

- to reduce the quantity of information reaching the manager;
- at the same time, making access available at arbitrary depth;
- to increase the relevance, timeliness, usability and actuality of information reaching the manager;
- to draw the attention of the management on the critical success factors of the company;

- to facilitate the managers' controlling work, the tracing of the processes and the corporate communication;
- to find the earliest indicating factor that is necessary for the change;
- to monitor the changes of the competitive situation, consumer demands etc.

Many companies do not or cannot introduce an integrated system because of the significant level of costs. However, it is no longer a question that if a company, among competing companies in the same sector, is not introducing the system, cannot gain competitive advantage but also short-term competitive disadvantage. However, the advantages of the introduction are also difficult to quantify. The goal of the value chain as per Porter is to identify and separate value-creating resources within the company, thus to determine the points where the process can be improved or where cost savings can be achieved. Thus, among other things, using the value chain, the benefits of integrated systems can also be explored and evaluated (Szalay, 2009). Returning to the infosystems, it is important to mention that at the management level of organising the infosystem, the most difficult question of needs assessment: what kind of information does the manager need? It is not certain that the more we go upwards in the hierarchy, the more the concerned manager should 'see' (Dobay, 1997). The question then arises: why do the information systems spout the unwanted information? Two answers are given to this question (Baracskaï, 1997):

- on the one hand, it is because of the poorly structured problems occurring at senior management, and so the manager replies that he cannot predict what information he will need;
- on the other hand, he specifies everything that comes to his mind, which is built into the system. As a result, he will provide data, some of which are not necessary and therefore will interfere.

We believe that the manager does not sufficiently know the information system of his company, besides the above. As a result, he will not be able to produce those statements or reports that would help him make his decisions, or cannot check the correctness and possible results of these. However, it is quite certain that different levels of decisions need information of varied nature and with different degree of concentration. The intermediate managers execute the policy that has been defined by the senior management, and based on that do the intermediate managers plan and perform the tactical tasks. This level is the world of plans dismantled into the tactical levels of detailed budgets, and human procedures. Located at the centre of the corporate information system, they receive the

planned or ad hoc decisions from above, and the information mass from the bottom. The task of the lower level leaders is to control the real processes based on the strategy and tactics defined by the higher levels. At this level, information of the control, explanatory, tracing operations are required for the operational control. This is where the ad hoc information has the greatest role. 60-80% of the inputs are generated here (Dobay, 1997). Knowing the revealed problems, it became clear that it has an emphasized importance regarding the compliance of the methodology of accurate forecasting analyzes as well, since a forecast made with an inadequate methodology can make the decisions go in the wrong direction.

In the light of these, in the design of Enterprise Resource Planning (ERP), the primary objective is to eliminate the use of the previously used "insular" computer programs (materials register software, order register software, accounting software, etc.) that have been independently developed and adapted to the user demands.

However, it is clear that if we take a look into the future, we can see that a decade ago, only large corporations could afford to use ERP systems. A few years ago, vendors of the systems - due to the narrowing market outlet of big enterprises - began to open up to small and medium-sized companies by building corporate management systems that were affordable for them, and last but not least, acquirable and operable by them. Based on this, it is possible to imagine that simple ERP systems will be created for households, which will help manage the family's financial-, purchasing-, maintenance processes, as well as bills, official correspondence and accounts.

Thinking about business processes and information management (possibly introducing an integrated system) can have advantages such as:

- inventory reduction;
- decreasing need of experts;
- flexibility;
- more efficient and more productive processes;
- more competitive performance;
- operational efficiency;
- customer satisfaction;
- utilizing new opportunities;
- utilizing the intellectual capital.

Despite all these benefits, the rate of companies using the system is still very low. Information technology has been integrated into all sectors, so it can be beneficial for businesses in agriculture, industry and service, and above these, mainly the decision-supporting workflows, as they are those who can use and utilize the results of the designed information systems to the greatest extent. The system provides a framework for collecting, processing and transmitting information, serving a specific task that may include the combined use of the above-mentioned technologies. If we analyse the developments published in different countries so far, it can be deduced that all modern (e.g. computer-based) information systems rely on some well-established and proven conventional information systems concepts. This is proven by the information systems that have made with significant time input to support decisions and management, and are largely accepted by the producers (Herdon and Rózsa, 2011). Parr and Shanks (2000), based on a slightly different approach, consider these to be among the most frequent reasons for introducing a corporate management system:

- creating common IT platform;
- demand for developing processes;
- data availability;
- reducing operational costs;
- advanced customer service;
- improvement of strategic decision-making;
- support of business processes;
- increasing organisational efficiency.

These also mean that introducing a system and managing information, that is, facilitating the flow of information between the various management levels, give solution to these problems. Solving and managing these problems means a significant advantage for companies. This is confirmed by Kapronczai (2007), in his wording, information is a goal-oriented functional knowledge that serves the preparation and execution of decisions. Ficzeréné, et al. (2009), stated that information should refer to opportunities and should protect the company from risks, i.e. should serve the planning and control as well. Hágen and Kondorosi (2009), as a result of their research, draw the attention to the fact that in order to maintain the efficient operation of businesses, it is necessary to adapt new processes and methods and to be open to new innovative systems, and these should be integrated into the decision-making mechanism. Integrated corporate management systems can be of great help for this, as Herdon and Rózsa (2011) also point out. They emphasize that systems provide a framework for collecting,



processing and transmitting information, serving the production, service, and management tasks. The effectiveness of this process is facilitated, if the users are prepared with proper training prior to commencing the use of the system. (Katonáné és Csomós, 2010) In contrast, the reasons for introducing a corporate information system are:

- facilitating management activities through the creation of a secure, well-structured database;
- accelerating the flow of information by simplifying data recording;
- faster preparation of analyzes, statistics;
- time and energy are spared when recording the data (onfold data recording);
- information on the company's situation and internal processes can be found in different databases and in different structures;
- the processes within the company and their relationships are more traceable, their coordination can become more efficient.

With regard to corporate information systems, today we must also mention the concept of information and communication technology (ICT), under which we are talking about a universal technology system that is increasingly getting intertwined and permeable with all the previous technology systems, and at the same time it creates new, large technology systems. ICT is used for the acquisition, storage, processing, transmission, distribution, management, control, transformation, retrieval and use of information. Its form is more and more - or nowadays, almost exclusively - digital. ICT systems are characterized by both physical products (such as communication devices and networks) and non-physical formations (such as databases, communication channels, content distribution systems). ICT refers to the phenomenon of convergence (which is still ongoing) between the information technology (IT) and telecommunication systems, the result of which is the merging of the two technology systems into a higher level, uniform system (Sasvári, 2008). According to Herdon and Rózsa (2011), the new information and communication technologies:

- promise greater speed in the communication processes of the economy;
- higher quality in the processing and in the transmission of information;
- a higher degree of individualization of information with task orientation, enterprise orientation and user orientation.

Based on the literature on the whole, in principle it can be said that the opportunities offered by information technologies should mostly have a positive impact (faster and shorter processes, better quality, usually cheaper processes due

to the shortening of processes, etc.), but yet, we do not utilize these possibilities sufficiently, because, despite the promising results, the introduction of technologies fails, it is slow or inadequate. Rethinking the business processes and information management may have the following advantages, as seen in **Error! Reference source not found.:**



Figure 1. The benefits of proper information management

Source: *webMethods (2005)*

### 1.3 The economic and management approach of smart cities

Since the 1990s, several types of urban renewal projects have come into view in several Western European countries, which, in addition to the functional and building-structural renewal of blocks in the traditional sense, are increasingly handling energy efficiency interventions and the social and long-term economical sustainability, as a requirement, taking into account the threefold unity of sustainability (society, environment, economy), (IBM, 2010). Nowadays, we can find the Smart Cities all around the world, among which it is worth highlighting the major cities in Scandinavian countries, including Malmö, Copenhagen, Oslo and Rotterdam.

IBM has made a study, in which it has concluded the thesis that the most important aspect for making the cities of the world liveable and operable is that the city administration should support its own tasks with IT solutions proven in modern and industrial sector, and should closely co-operate with the population, thus making their urban environment better, smarter and safer.

In their wording, *"the smart city or liveable city is a settlement that uses the available technology possibilities (primarily information and communication technology) in an innovative way that facilitates creating a better, more diversified and more sustainable urban environment"*.

A city is called "smart" if investment in human capital, in traditional (e.g. transport) and in modern information and communication infrastructure stimulates and drives the sustainable economic development and further increases living standards - while wisely manages the natural resources." (Smarter Cities for Smarter Growth, IBM Institute for Business Value, 2010)

"The complex concept of smart city requires an integrated approach in order to make cities' management truly more efficient and to provide a more liveable and sustainable living environment. Different interpretations of smart city give emphasize to different areas. Summing up the various theories, 5 topics emerge: technology, economy, governance and politics, human and society, and the environment, and above these, another important thing is the matter of management and organizational structure, that cover these areas. These topics will emerge in relation to all the interpretations." (Szendrei, 2014, p. 7.)

The key objective of smart city is to improve the success and efficiency of city operations. In addition, it is important to improve the quality of life of citizens and raise living standards along with respecting and consciously managing natural resources.

The important purpose of the theories is to improve the quality of urban services and to make them widely accessible, and it is also important to harmonize the city-forming factors. The socially highlighted segment of smart cities is the strengthening of a knowledge-based society that can contribute through innovations and productivity to improving the efficiency of urban areas and improving the benefits, gained in contrast to other settlements.

The Smart Cities are primarily concerned with improving the social situation, with a large investment that promotes the innovative modernization of the residential area. Its main goals are to strengthen the community and to incorporate an environmentally conscious approach into the everyday life of the population. This brings ecological solutions, which, among other things, results in the reduction of refurbished residences, with a directly proportional decreasing number of residents. Among other things, it causes a reduction in public utility costs as well, in the electricity, and water costs, which results in a minimum of 40% savings for the population in the households. Accordingly, a 12-point development strategy was developed, which applies to the residential blocks. Surveys show that Smart Cities can produce more growth than that of in the areas of awareness, flexibility, consistency and being singular. The purpose of these Smart Cities is to link the infrastructure network with the services, including education, healthcare, property management and public security. After the purchase of residential blocks, the

newly renovated apartments are rented not only as residential properties but also for the operation of public facilities. The newly designed interior courtyard, which was designed to have the largest possible green area, influences the community as well.

All Smart City researchers study and consider different areas important. Giffinger's 2007 study focuses on technology and smart mobility. According to Ladós (2012), the connection between transport and communication is important, and calls attention to the importance of energy management as well. For Correia et al. (2011), intelligent transport systems are a key factor, with the emphasised importance on the economic factors: Smart economy is nothing but productivity, the goal is adopting new and developing industries, which requires skilled workforce, thus generating replenishment and, as a result, the economy is being transformed. Its main aim is to reduce bureaucracy in the respective countries and at the same time to increase the role of responsibility. Nam et al. (2011) calls this area as the institutional sector. The basic task of smart governance is to link and make connection between city population, the communities and the business operators. Thus, stimulating the city for innovation, progress, growth. The basic concept of smart living is to focus on people living in the city, and at the same time it requires that the utility system is effective and sustainable, it includes infrastructure elements, such as making the transport system more secure and environmentally friendly. In addition, it provides adequate public security, coupled with the operation of a cost effective social and service system. Its aim is to provide high quality education that attracts students from abroad who wish to study in the city. (Lados, 2011)

Cook et al. (2005) in their work, call smart environment "*a small world where various intelligent tools are constantly working to make the residents more comfortable*". The aim of smart environment is to meet the individual's experience originating from every environment by replacing dangerous work, physical work, and agents automated for repetitive tasks. Poslad (2009) distinguishes between three different types of intelligent environment in relation to systems, services, and tools: virtual (or distributed) computing environments, physical environments, and human environments and their hybrid combinations:

- Virtual computing environments allow intelligent devices to access the relevant services from anywhere, anytime.
- Physical environments can be embedded with a variety of types of intelligent tools, including labels, sensors, and controllers, and include a variety of factors ranging from nano to micro-macro size.

- Human environment: people, individually or collectively, are basically intelligent environments for the devices. People can be accompanied by intelligent devices, such as mobile phones, can use surface-mounted devices (portable IT) and embedded devices (such as cardiac rhythm controllers to maintain healthy heart function or AR contact lenses).

Smart Mobility is a traffic system based on real-time data, that combines human knowledge, intelligence and decision-making processes. Its goal is to reduce (replace) human activity through collaborative advanced information technologies. The challenges, goals regarding smart mobility:

- increase of safety (safety, security)
- increase efficiency of energy consumption
- reduction of environmental load
- reduction of time needs and cost
- improving capacity utilisation
- forecasting demands
- enhancing comfort, subsystems, functions, data, e-mobility, innovative modes of transport.

The Smart People primarily show the characteristics of the population, but some indicators also deal with the characteristics of the civil sector as well as the economic sphere.

### *Examination hypotheses*

**H1:** We assume that information management is not working properly, if the information security is inadequate. According to our hypothesis, the correlation between costs of information security and capacity utilization can be demonstrated today.

**H2:** We assume that by means of factor analysis, the examined indicators can be properly classified into distinct groups and thus provide valuable information on information management factors that give the basis of the smart city concept.

## **2 Research methodology**

The basic database for our examination was the Enterprise Survey, which was made by the commissioned market research firms at the initiative of the World

Bank. The data of the research carried out using standard questionnaires in each examined country were used as secondary sources for our analyzes. In the original examination, there were country-specific questions as well, but for comparability, the database we use did not contain any of these values. Only registered companies with at least five employees and without 100 percent state ownership may be included in the sample.

Among the service companies, mostly companies involved in construction, retail, wholesale, hotels, restaurants, transport, warehousing, telecommunications and IT are included among the elements of the sample. In each country, the leaders of those companies and producer companies were interviewed, which, in the given cities or regions, have the most decisive economic activity.

In the questionnaire research, more than 125,000 businesses in 139 countries around the world have participated. The interviewers filled out the questionnaires with the owners and senior executives, but occasionally addressed the company's financial or human resource managers regarding certain questions of specific areas. More than 90 percent of the questions asked about objective facts about the country's business environment. The additional questions targeted the opinions of the respondents. The purpose of these questions was to identify obstacles preventing the company's growth and performance. Therefore, this database is very well adapted for implementing the goal of the research objectives.

The countries included in the survey, according to the regions of their locations, can be grouped as follows:

- EAP: East Asia & Pacific;
- ECA: Eastern Europe & Central Asia;
- LCR: Latin America & Caribbean;
- MNA: Middle East & North Africa;
- OECD: Organization for Economic Co-operation and Development;
- SAR: South Asia Region;
- AFR: African Region. (World Bank Group, 2016)

When grouping the questions of the questionnaire, the following groups of topics have been developed:

- obstacles preventing the company's growth and performance;
- bribing;
- crimes, black economy;
- access to the financial services;

- the company features;
- sex ratio;
- the lack of formalities, informalities;
- status of the infrastructure;
- the introduction of the technological and innovation acquis;
- the companies' performance;
- the effect of the state regulations (e.g.: in the form of provisions and taxes);
- commerce;
- qualifications of the workforce. (World Bank Group, 2016)

Statistical analyzes were carried out using MS Excel and SPSS software package (Statistical Package for Social Science).

Among the selected variables, firstly the strength and tightness of the correlation were determined between the investigated factors, and the intensity was determined by means of correlation calculations. In the correlation calculation we calculated the value of linear correlation (Pearson's correlation) between the two variables using the SPSS software package. The correlation value may be between -1 and +1. The absolute value of the correlation coefficient shows the strength or tightness of the relationship, while its sign indicates the direction of the relationship.

In the further analysis, we used factor analysis, which is particularly suitable for revealing the relationship between variables in the case of homogeneous populations, to identify the "most important" variables and to facilitate the interpretation of data by data reduction (Sajtos and Mitev, 2007).

### 3 Results and discussions

To justify the hypotheses I formulated, we used the selected indexes of the database introduced in Material and method section, which were the following:

- The age of facilities (years)
- The rate of those companies, who pay insurance costs
- Costs of the insurances (annual sales %)
- Annual costs of insurances, if paid, its (annual sales %)
- Number of power outages in an average month
- The duration of an average power outage (hours)
- If there were blackouts, the duration of a typical power outage (hours)
- Losses caused by electric issues (annual sales %)

- The rate of those companies, who nominated the information sector as the biggest problem
- The rate of companies, who nominated electricity as the biggest obstacle
- Capacity utilization (%)

The database already includes data for later years, but the values of the indicators we examined were most processed in 2013, so we used this year's data for our analyzes.

To confirm the H1 hypothesis, correlation analysis was performed, which showed the following results:

**Table 3. The result of correlation analysis for the H1 hypothesis examination**

Correlation		
		Capacity utilization (%)
The rate of those companies, who pay insurance costs	Pearson's correlation	,294*
	Significance	,040
	N (no. of element)	49

*Source: Personal edit*

As a result of this analysis, it can be said that, although it is weak, but a detectable relationship can be shown between capacity utilization and the rate of companies who invest money in security. This means that in countries where companies are able and willing to pay for this, with time, it is reflected in capacity utilization as well, for example, reliable information will be available for decision-makers on time, to help the decision-makers to make decisions.

As a result of this analysis, our H1 hypothesis proved to be true, so the correlation between the costs of information security and the utilization of capacity can be statistically demonstrated based on the values of the examined database.

To verify the H2 hypothesis, we performed a factor analysis with the previously selected indicators, which showed the following result.

**Table 4. The result of the factor analysis for the H2 hypothesis Rotated Component Matrix<sup>a</sup>**

	Components
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	1	2	3
Losses caused by electric issues (annual sales %)	,881	,141	-,217
Number of power outages in an average month	,863	-,156	,088
The duration of an average power outage (hours)	,851	,302	-,018
If there were blackouts, the duration of a typical power outage (hours)	,654	,237	,128
The rate of companies, who nominated electricity as the biggest obstacle	,653	,406	-,146
The rate of those companies, who nominated the information sector as the biggest problem	-,497	,278	,051
Annual costs of insurances, if paid, its (annual sales %)	,277	,880	-,007
Costs of the insurances (annual sales %)	,142	,873	,288
The age of facilities (years)	,513	-,570	-,014
Capacity utilization (%)	-,014	-,072	,839

Source: personal edit

Method of deriving the data: Main component analysis

Rotation method: Varimax Kaiser Normalization

From this it can be seen that with the help of factor analysis three well distinguishable factors can be formed which I have named as follows:

1. Indicator group providing the electronic background;
2. Indicators assessing the security of information;
3. Indicators illustrating the capacity.

From these results, it can be clearly seen that the indicators can be categorized into statistically well-distinguished groups, which properly justify the main factors that are important for information management, so that such cities can exist in the countries, that are capable of adopting technological innovations and thus they can also play an important role in spreading the smart city concept. Thus, our H2 hypothesis is considered to be justified. It is also important that smart companies should be present in the smart cities, thus not only the population, but also companies could become committed for this philosophy.


### Conclusions

Consequently, as the result of the examined analyzes and research work, it can be stated that in regards of the implementation and spreading of the information management system operating in the Smart City concept - which could be an important basis for a well-functioning controlling system -, the following factors are indispensable:

4. Due to non-standardized processes, it is necessary to minimize the number of redundant data movements and to standardize processes.
5. Due to the lack of adequate IT interfaces and/or inadequate IT skills, continuous training is needed to ensure the right basis.
6. The excessive workload by constant manual data verification due to the frequent errors of electronically entered data needs to be minimized, and as an important factor in the smart concept, it should be emphasized that the data should preferably be included in databases at the place of their creation.
7. Ensuring data security of insular systems is unfortunate and their creation should be minimized.
8. Due to the frequent lack of expertise, there are unclear, inaccurate data and definitions in systems, which cause culminated incorrect results during data analysis, so training is needed here as well.
9. The set of available information is fragmented, unordered, has no structure, does not focus on goals, so their usability is often questionable. It is necessary to structure them.

The difficulty of sharing edifications leads to the need to solve the task that has already been solved once, and it will waste a lot of money and time, so it is definitely expedient to practically use the research results listed here, and to minimize the losses.

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