7 Innovations for sustainability

"To raise new questions, new possibilities, to regard old problems from a new angle, require creative imagination and marks real advance in science." (Albert Einstein)

Recommended additional reading:

- Smart City Reference Model: Assisting Planners to Conceptualize the Building of Smart City Innovation Ecosystems (Zygiaris, S.J. 2013, p. 4(2), 217–231).
- Will the real smart city please stand up? Intelligent, progressive or entrepreneurial City? (Hollands 2008, 12(3), 303–320).

7.1 Chapter overview

Understanding the concept of sustainable innovation is an urgent fundament to create development projects for community progress. Financing them is not such a big problem as it seems at first look if we have in mind that cooperation between as many different stakeholders as possible is the key for success. Every community has its own needs. It is not important if the community is organized as a small town or even village or if it is a big urban centre. Truth is that around 50% of population lives in big urban centres but there is a fact that the other half lives in smaller communities. Generally we cannot and may not talk about progress by forgetting the needs of that other half. The sustainable development is only possible if every sphere is developing equally.

Learning outcomes

Your goals for this "Innovations for sustainability" chapter are to learn about:

- the concept of sustainability,
- innovations – what they are and why are they so essential for social and economic development,
- different ways of financing innovations in public services,
- the basic concept of private investments in public infrastructure,
- the need of analogy between big cities and small communities.

7.2 Sustainability – A concept or just a fashion?

Man's attitude towards the environment has through thousands of years presented itself in exploitation of natural resources that have been inferior to the needs a human as the "absolute master with the right to an unlimited use and exploitation." (Pichler 1997, p. 1291)

In the last hundred and fifty years in which the human kind managed to achieve the biggest technologic progress in history it became evident that the uncontrolled desire for an economic expansion, without any respect for the consequences, endangered its own existence. The first recognition, that due to endangering our own kind it is necessary to protect the environment in which humans live was followed by implementation of rules, restrictions and later different regulations which (except a handful of people) not many thought of as significant. The second recognition, that a healthy environment is in fact a foundation for a healthy life resulted in the beginning of the development of the Environmental Law.

In spite of the environment protection with the help of the numerous national and international legal norms the uncontrolled industrialization and urbanization caused an enormous damage to the environment that consequently resulted in emergence of eco-remediations that could be defined, not only as environment protection but also as systems for regeneration of the environment, which take into consideration the meaning, structure and functioning of ecosystems. In the second half of the previous century most of the modern countries added the environmental care in their directives of the " economic and social development" as a responsibility towards the global community.

The fact that the uncontrolled use and exploitation of the natural resources caused not only thinning of the ozone layer, the green house effect, animal and plant species extinction etc., but also a lack of natural resources had in our opinion been the reason for growing tendencies for replacement of non-recyclable natural resources with the recyclable or limited with the unlimited, with which we could ensure a permanent use of natural resources.

Brundland (1987, UN report Our common future)) has in her report popularized the term 'Sustainable development' and made its definition that has since then been, in addition to the World Bank, used in numerous governments and international documents. She believed that a sustainable development means satisfying the needs of today without jeopardizing the future generations in fulfilment of their needs. Surely, sustainable development is by no means only the use of natural resources. In the same report Desai illustrated the sustainable development by using an image of a bridge connecting economy, ecology and ethics and emphasised that is necessary to link different sectors (agriculture, energy, commerce, investments) and integrate the sectors into the development planning. He also points out that it is necessary to expand the concept of the sustainable development onto all sector policies and the most important: onto the key private sphere stake-holders.

The very report meant a turning point in perception of development policies and the term " economic and social development" that had often been used before got replaced by the term "Sustainable Development".

Lukman (2009, p. 82) claims that a "sustainable development emphasises the evolution of society with a responsible economic acting that is in accordance with environmental and natural processes. The political dimension for him represents the key element to it. In the sustainable development the paradigm of the economic, social and environmental resources limitations with intent to contribute to the welfare of the future generations is contained. It can be applied on a local, national or global level; anywhere it always bases on political decisions."

The role of the politics lies within the development guidelines of any field whatsoever may it be the economic, social or environmental and is important indeed. However we believe that without an efficient cooperation (vertical as well as horizontal) of all stakeholders, politics cannot fulfil its basic task which is to achieve those sustainable goals towards which the development of the society has to be oriented towards in order to ensure its present as well as the future welfare.

According to Sharachchandra (1991, p. 607–621) the term Sustainable Development is merely a phrase, that not only does not offer a satisfactory definition but even more, it demonstrates the lack of an actual content in interpretations of the concept and an inability to form a picture of an efficient model of a sustainable institution.

We, his critics can give our consent since it is impossible to trace the unified definition of the sustainable development in theory and it is usually linked with the context in which it is used in EU's documents where we can also find the term "the sustainable growth" and an interpretation that bases on Brundland's report when explaining the term. And if the report on our joint future has in fact set a frame for a definition, it has within that left a vast space for different interpretations. This on its own is, of course, not bad. The problem however is, and we should agree with Sharachchandra on this one as well, that with the popularization of the term came also an uncontrolled phraseology. "Sustainable, sustaining etc." became adjectives that often simply get patched on to numerous different terms only because it is more likeable.

The logical consequence of such examples is that it is difficult indeed to extract the content out of such expressions. In case there was an efficient model of executing a sustainable activity, such and other similar nebulousness could be avoided but now even though a well designed frame of a definition of sustainable development, as a consequence of the stated above, creates a (false) impression that the sustainable development is nothing but a phrase.

A similar opinion was also expressed by Temple (1992, p. 1) when he wrote that the term "Sustainable" is overdosed and that "the word 'sustainable' is these days used in far too many instances and ecologic stability is one of the instances that is confusing for numerous people. You have heard about the sustainable development, the sustainable growth, the sustainable economies, the sustainable societies and the sustainable agriculture. Everything is sustainable."

Not considering the critiques, the problems of sustainable development has been from year to year becoming more enforced.

In the year 1992, within the frame of the Conference of the United Nations RIO+10, on the basis of the Brundald's report a discussion had been opened on development projects and adopted an important document named Agenda 21. As a conclusion document the Agenda has defined the key environmental problems as well as the necessary measures and references for reaching a sustainable development. Important guidelines were given in the Agenda's part where it recommends transferring the executing principles and producing concrete plans for a sustainable development onto the lower political spheres which means from the international onto the national and hence from onto the local level.

Agenda 21 has referenced redefining and encouraging the institutional changes that have according to Write (2004, p. 761–768) an essential role in achieving the sustainable development. The role of the local communities is in this respect particularly important. Developing individual sustainable goals oriented on specific needs or tasks of a specific local community including all the stakeholders (public administration, economies, public sector, civil society, inhabitants) on the basic development areas (economic, social and environmental) brings benefits to the community as well as to the inhabitants. At the same time it represents an "important demonstration of the ways necessary to achieve the wanted values and performance within the whole community." (Cortese 2003, p. 15–22)

The World Forum 2005 has placed the strategy of the sustainable development in three pillars that support each other:

- the economic development
- the social development
- protecting the environment.

According to some United Nations' Forums we should in the lines of the general declaration on cultural diversity also have the fourth pillar, represented by the cultural diversity.

Protection of natural resources is embedded in all the spheres of the sustainable development and represents an efficient use of energy (heating, cooling, lighting), environment protection and eco-remediation (managing the agricultural, forest land, building plots, water systems, litter, air), the use of the green technologies (broad-range connections and internet services, roads, public transport, railways) as well as the care for healthy food and a reasonable planning and executing the plans for the non-economic activities as are health-care and education. In doing so, a concern for the environment and a responsible use of natural resources also have to be a part of the strategy of economic development. In addition to a consistent concern for the environment the economic development has to focus on all members of the community and not just on a few.

According to Schoeman (2013) when social development is concerned there is a distinctive problem within the poor communities that are for the most part overlooked in the big development plans, which needs to be overcome in striving to achieve a real sustainable development. The indicators of the sustainable social development are mainly the length of life-time, education and GDP per person.

From the three pillars of sustainable development it is evident that the development applies on the environment as well as on the economy and social strata of people. In case it is executed on all three levels at the same time, then we can actually talk about a real development. The imbalance of the spheres or simply a "development" that is profit oriented cannot be marked as a sustainable one.

The United Nation's conference RIO+20 in 2012 has for many been a disappointment. Considering the fact that it has been 25 years since the Brundland's report was published and 20 years since the first world forum (where the Agenda 21 was accepted) happened, there has been, with the exception of numerous polemics, meetings and conferences, done very little. As the main reason, too big expectations from the national and the intergovernmental administrations without cooperation, public rising of awareness, educating the general public and those active in the field of economy was pointed out. (Halle, Najam and Beaton 2013, p. 1–14)

EU has in its contribution for the conference singled out that in spite of efforts from the sides of government and non-government organizations in all the Countries sustainable development still is not a priority on political agendas, also that the goals are still not specifically defined and that there is simply not enough cooperation between ministries in governments. To be able to annulate the gap in practice it is important to stimulate wholesome strategies, public interest, raising awareness and efficient administration. Above all however, it is urgent to start imputing new mechanisms of coordination and establish an active cooperation among all involved: the government and the non-government organizations, local authorities, civil society and the private sector. The cooperation between the public and the private sector in transition to a sustainable development is crucial for EU.

The sustainable consciousness has to be introduced to all organizational structures; it needs to become a part of the research, development and innovativeness, teaching, learning and expert work, as well as, all the activities have to be carried out in graduate baby steps and goals. In addition to this, it is necessary to firstly focus on the local level and spread the new realisations horizontally and only then spread them vertically.

Due to the definitions quoted that are in fact more or less politically prejudiced, the formal specification of sustainable development from the point of view of the Theory of Systems or the Theory of Systems Management is indeed extremely demanding. Both disciplines have been developing since the 1960s. (Hasegawa 2013, p. 1–7)

Let us abstract the sustainable development as a management system (P) that has a multitude of outputs (y) in time (t). Those outputs define the economical, social and environmental indicators. The sensor (F) enables the detection of the selected indicators. According to the soft definition it should detect the economic statistics, public opinion surveys as well as the results of measurements of environmental physical quantities. The measured differences (e) among the desirable values (r) and the measured output values (y) are then brought into the controller (C). The later has to generate such inputs (u) that draw the output values towards the desired values (r).

The controller in such a context has to react on both levels, on the legislation level as well as on the monitoring and undertaking compulsory measures (e.g. financial, tax, environmental control). Unforeseen disturbances (i) from the system surroundings influence the mirroring of the inputs (u) onto the outputs (y). The principle of system management leaning towards graduate reductions of the difference (e) between the wanted condition (r) and the actual condition (y) is in theory of management called the principle of the management system with a negative loopback (Figure 17).

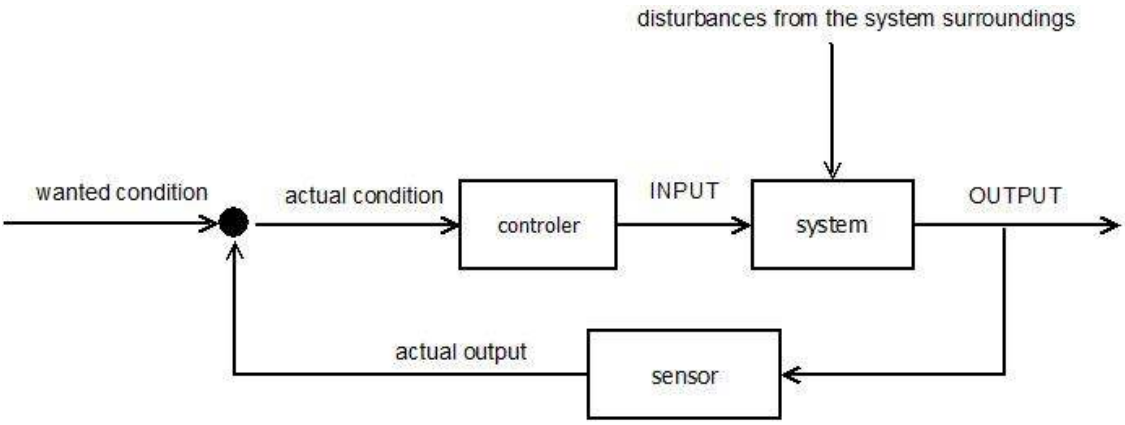

Figure 17: Principle of the management system with a negative loopback
Source: Own, 2014

Such a weakly defined system of sustainable development is practically uncontrollable, unobservable and consequently instable. Some brilliant scientists such as Piere-Simon Laplace (Z-transformations, Theory of Probability), Aleksander Lyapunov (Theory of Stability), Norbert Wiener (Cybernetics), Harry Nykvist (Criteria of stability), Richard Bellman (dynamic programming), Andrej Kolmogorov (Wiener-Kolmogorov's filter), Kalman (Kalman's filter), Lev Pontrjagin (maximum and bang-bang principles) have been working on solving these problems.

The very concept of stability could be used as an analogy for sustainable development. Let us enumerate only the most important obstacles for management system with a negative loopback:

- measuring of the output of variables: a) there is no consensus on recruitment of the output variables and b) different delays in taking the measurements (e.g. from milliseconds in environmental measurements to several months in opinion surveys and economy statistics) and c) a sensor has to measure multiple variables simultaneously since it is the so called MIMO system in question (multiple inputs, multiple outputs),
- a dynamic setting of the desired values: in addition to the emergence of new indicators (and letting go of the old ones) the set point values of the outputs change with time,
- Building a robust and at the same time responsive and in addition to that also a precise controller would demand a lot of cooperation and efforts from different participants (from science to economy, law, organizing via concise legislation and an efficient inter-sector control as well as efficient implication of sanctions.

Evethough, the realisation of the concepts of the Theory of Management into a sustainable development seems in the present to be a distant future, there are however essential conditions such as cooperation and expert knowledge of the participants (civil society, entrepreneurs, different fields' experts, legislators) that have to be met first.

The effect of raising of awareness and educating brings stronger and better results than the passing of a new legislations, declarations and regulations that are sadly going to, without a concrete change of understanding and expertise of the processes on the field of sustainable development that considers social interactions between the subjects involved that are a part of the process, stay merely mechanisms for constraint and by no means a way towards a sustainable development. By that we mean the development of the society as a whole that builds welfare today and the present then becomes a foundation for the welfare of the society of the tomorrow, where when achieving the set goals all cooperate evenly and equally no matter the economic or legal position, the public service as well as the executants and users.

7.3 What are innovations?

The term "innovation" has in the last decades in governmental and international documents been very popular. It has turned over from the educational and research institutions onto the enterprises where it became clear that both the world economy and especially the society depend on knowledge and communication. The efficiency of products, production processes and systems on all levels, all areas is the key for a permanent competitive position as well as for the society as a whole.

Many authors have and are still dealing with the answer to the question What is innovation? When trying to make a definition we cannot overlook the term "invention" for in real life both terms are often used, sometimes wrongly with the same, one explanation for the two. Dictionaries in our opinion do not offer an adequate content line of separation between the two terms since they explain innovation as a new occurrence or a novelty but at the same time they explain that innovativity means something referring to a (significant) improvement. We could deduct that an innovation means "invention" of something new and innovating merely improving something that already exists but both only possible on a technical field. Invention is explained as inventiveness or imagination. Deducting from the later an invention could be a new idea or an idea on how to improve, change or use etc. something that already exists. A separate distinction (excluding the restriction that it has to be technical) is therefore not offered there.

The traditional concept of innovation had at first indeed been focused on the development of technology and closely linked to the internal research of an individual company. Lately however, the concept often also integrates into the remaining business spheres. (Manochehri 2010, p. 4–14)

In theory, many authors deal with trying to define both terms where a special emphasis is given mostly to the meaning and the content of the term innovation. Some think that innovation is an idea that can in time offer an added value (Bessant and Tidd 2011, p. 4–14) but most of their opinions are that we can only talk about innovation when it is in fact implemented in practice and gets its value through commercialization (Hartley 2005, p. 27–34, Verloop 2004, p. 1–142, Freeman 2002, p. 191–211, Achilladelis and Antonakis 2001, p. 535–588). Among the authors there is no dilemma about innovation being something new or improved, the differences are in determining the moment when a "novelty" actually gets defined as an innovation.

Mulej and others (2008, p. 8) define invention as a pre-stage of innovation by defining the invention as "an idea that promises to maybe someday – usually with a lot of effort and investing – become an innovation." Innovation however, (according to the international definition) defines as "any novelty, useful according to experience and evaluation of the customers/clients".

We can conclude that an invention is only an idea (it could be totally new or it can improve something that already exists) that only after a successful transfer into practice turns into an innovation. Given, that it is not necessary for an invention to turn into an innovation, Schumpeter (1939, p. 84) distinctly divides the process of invention and the process of innovation and even believes that the later can emerge even without an invention.

The experience and the evaluation from the users can be equated with commercialization though. In the case of a positive response from the users or a positive commercialization the innovation gains its value.

In spite of different meanings innovation and invention are indeed correlated. Invention on its own does not have any economic or social value until (and if) it is implemented into practice – until it becomes an innovation. We believe though that innovation could not exist without a previous invention.

Because of this correlation Mulej (2008, p. 10) talks about an inventive – innovative process, demonstrated in the picture below.

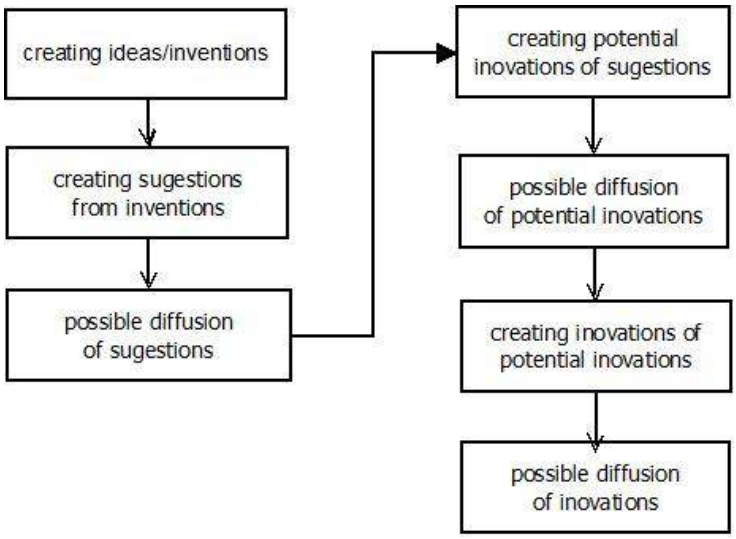

Figure 18: Inventive – innovative process
Source: Adapted after Mulej, 2008

Mulej (2008, p. 10) writes the conditions for a creation of an innovation in the equation:

Innovation = invention × enterprise and entrepreneurship × integrity × management and leadership × staff × culture × suppliers × clients × competitors × social environment × the natural environment × random events / luck

Types of innovations

When classifying innovations in theory, we come across some rather different points of view that depend on individual research focuses.

Damanpour and Goplpkrishanan (2001, p. 18–20) are focusing mainly on product – based and process-based innovations. They divide the first into the new products or services that are presented either within an organization or on an outer market and the process innovations that are divided into organization of production or services.

We can also divide innovations with respect to public or private interests. Innovations of the public interest are innovations that have consequences for a broad public; their stakeholders are usually collective entities such as countries, states, organizations and social movements. They are mostly innovations from the fields of social or political circumstances. (Wejnert 2002, p. 299) Those innovations often have long-term or even historical consequences for they can lead toward reforms also in the field of human rights.

Innovations with private interest on the other hand have mainly influence on stakeholders that are usually either individuals or small organizations. Their purpose is mainly to improve the quality of an individual's life or it is a matter of organizational and social reforms. (ibid.)

North and Smallbone (2000, p. 145–157) divide innovations into five main ranks namely on the product-based and service-oriented, development-marketing, methodology – marketing ones, process and technology based innovations for administrative purposes.

A wide classification however is presented by Mulej (2008, p. 122–123) who distinguishes between no less than 20 different types of innovations and divides them according to:

- the content of innovations (programme based, technically-technological ones, organizational, managerial, methodological),
- the consequences of innovations (distinction between the radical, that wreck the given knowledge and the applicability of equipment and to the tiny ones that strengthen the pre existing knowledge),
- the professional duty to innovate (the differences are in the ownership of an innovation; within the work related duty the owners are the employers, outside of the work related duty they are innovators themselves.).

OECD (2005, p. 18-20) defines innovation activities as all scientific, technological, organizational and commercial steps, which lead to the implementation of innovation. Some of these activities are innovative per se, whereby others or not; but are still crucial for the implementation of innovation. Research and development understatements contain innovation activities, which are not directly linked with the development of a certain innovation. Further it classifies innovation activities into three stages:

- Successfully ended and implemented innovation, by which a successful commercialization isn't a condition;
- Period of innovation activities, which didn't yet result in an innovation implementation;
- Stopping the activity even before the implementation of the innovation.

In most occasions though in the official documents the OECD systematic is quoted distinguishing innovations into four types, be they new to a company, new on a market or new to the world, as follows:

- Product-based innovations, those include a new or improved service. Here we can find also important improvements of technical specifications of components and materials, incorporated software, customer friendly and other functional characteristics;
- Process-based innovations include a new or significantly improved production or a delivery method. That includes important changes in technology, equipment and/or software;
- Marketing innovations include new marketing methods with important changes in a form of a product or packaging, division of products and their promotion or evaluation;
- Organizational innovations, including a new organizational method of a business practice of a company, organization of workplaces or organizing contacts with outer partners.

Innovations types in public services

Most research from the field of innovations and innovating models is tied to companies that can with a successful implementation of innovations into their operation ensure themselves a competitive advantage, an efficient development and also profit. Despite the fact that the value of innovation is indeed measured in inputs and outputs (material, human, with respect to time, financial etc.) we can still not measure everything according to the win/lose principle.

Public services like healthcare, education and social security cannot generate profit but they have an enormous impact on quality of millions of peoples' lives. Implementation of good ideas leads to added value of public services, the already existing ones and the potential future ones. (Bessant and Tidd 2011, p. 6)

Particularly in time of an economic crisis are innovations the key to good development projects also in the field of carrying out of public services or building of public infrastructure, not only on national levels but mainly on the lower levels like local communities. Those can define their advantages and recognize their weaknesses much easier in their development plans.

With respect to issues of public services and the construction or maintenance /management of infrastructural facilities we could, according to the OECD (2005, p. 47–53) classification, briefly define the innovations in local communities as:

- Product-based innovations, those include a good or an improved public service, where we can also add a new or in an important way improved infrastructure facilities, customer friendly services and new or importantly improved information system and such.
- Process-based innovations include a new or significantly improved method of carrying out processes including the process of adopting legislation or issuing provisions, resolutions and the like. They can also include important changes in technology, equipment and/or in software.
- Marketing innovations may include new methods of raising awareness of a population in the sense of sustainable development, a new way of charging for public services, new methods for promotion of the public – private partnership in the sense of co operations between all the stakeholders in creating a development policy and the like.
- Organizational innovations include a new organizational method of a business practice of a municipality or of a carrier of public services, an improved organization of workplaces and tasks or a new way of organizing the workload between the carriers of public services in the population and the like.

Significance of innovations

Without any regard to differences in defining and classifying innovations the theory stays unified in the consciousness that innovations are fundamental tools of public and private sectors for improving competitiveness and productivity, and crucial to achieving a sustainable development of the society as a whole. The need for innovations is a necessity without which it is impossible to even talk about a development.

Innovations are naturally not something simple or could be taken for granted. Numerous big companies lost many projects after a change on a market occurred. (Hamel and Prahalad 1994, p. 79–117) The main reasons had been that they were convinced they were good enough and given the fact that they had not been able to adapt to the changes in their environment quickly enough. (Leonard-Barton 1992, p. 111–126)

Innovations mean big changes in organizations of all sizes and legal forms as a response to the changes in the environment. Bessant and Tidd (2001, p. 5) claim that the logic is very simple: "…if we do not change our offer (products and services) and the way on which we produce then we risk to be taken over by others that are going to do just that." Those who are going to survive are the ones who are going to react to changes in time, focused and regularly. Especially the later is of extreme importance since development means that it is necessary to react to each and every change. That what was yesterday considered an innovation could tomorrow already be obsolete. It is vital to adapt to change regularly, as one goes along.

The companies where the process of innovating is a constant stay competitive and successful in their activity. There is however possible to detect at least two things in all of them and these are that they master the management of changes and are flexible enough and adaptable enough to survive at least one innovation crisis. (Kelley and Gibson 2010, p. 2)

It is essential for the public sector to be aware of the importance of innovations mostly for two fundamental reasons:

- The quality of public services has an influence on people's lives in the whole society. Without an innovative, sustainable, accessible and efficient public service and local autonomy it is impossible to even imagine a development of cities, hamlets and villages and with that of wholesome regions.
- Innovations in public services have positive effects on access to information, a faster execution of services for monetary operations and for citizens/ members of community. In addition to that they contribute to competitiveness and innovativeness of companies.

Numerous governmental and international documents witnessed the importance of innovations. With their guidelines and strategies they are trying to influence the development of innovations and the innovating culture as well as in the public as in the private sector especially:

a) To release the innovations,
b) To encourage people to innovate,
c) Encouraging and using the knowledge,
d) Use of innovations to solve global and social challenges,
e) Improvement of management and evaluating innovation policies.

The necessity of innovating and with this, also financing innovations has since long raised awareness in the economy. Progressive companies have their own sectors for research and development within their own organizational structure or they execute that important part of their development policies through other institutions. They spend a good part of their income to finance innovations and are at the same time trying to use numerous opportunities and financial encouragements for development of innovations through invitations for tender applications for governmental and international institutions (banks, development funds and similar). Often the problem of financing innovations appears to be in the small to medium size companies that are not yet established on the market or in development of new products or services that can take years.

Demographic pressures, bigger public expectations and strained fiscal circumstances are the reasons why municipalities and the public sector in general have to direct themselves into searching for innovation development solutions. For the key public services it is necessary to form wholesome innovation strategies. An execution of innovative projects or executing innovation practice or rules is impossible only from the budgetary resources. Therefore it is necessary to find alternative sources of financing just as the innovation design bases on cooperation with the private sector and on a joint search for possibilities of financing in numerous programmes in EU initiatives.

Innovations are a building stone of sustainable development of Smart communities (cities and smaller towns) and we cannot and should not characterize them as merely one of the indicators of development success or of an information and communications industry. They act as an interface on all the areas of sustainable development due to which also local communities can find in the programmes and EU initiatives numerous possibilities for financing strategically important innovation projects.

Hinter (2011) claims that innovation is the life blood of most organizations in the 21st century, but most of them regularly do things to snuff out innovation wherever it rears its head. He says that "Unfortunately, it's easier to mess it up than to get it right, and the result is that employees end up confused, frustrated, and stifled." and lists the following five things that a lot of leaders and companies do to stifle innovation:

- Lack of project leader,
- To many layers of management,
- Ignoring the brainstorming rules,
- Rely too heavily on data and dashboards,
- Under-resource your hidden opportunities.

Avoiding the well known mistakes by promoting innovation sometimes means restructuring the work organization or/and developing o new, fresh and creating space for generating ideas and managing new projects. According to the fact that archival services are public and established by the law, some changes are not easy to achieve. But on the other way such changes could represent an organizational innovation by themselves. (Hinter, 2011)

Brief overview of innovation models

The problematic of innovation models demonstrated in numerous researches in the fields of innovations and that can roughly be divided in the closed models and the open ones presents itself mostly on two levels. The first is that the innovations are mostly oriented only towards the companies' operating or IT development. The second is, as stated Eveleens (2010, p. 1), who theoretically explained that processes simply are not at a point yet where they could be used in specific situations in practical work of problem solving.

The closed innovation models have been and are still used mostly in big and strong corporations. The base paradigm of the closed innovations is namely in the conviction that successful innovations have to be controlled and protected from the public eye and in the (inaccurate) comprehension that they have within a company enough human and material resources for innovation and consequently for a successful performance on the market.

The main reason for the range of dissemination of the closed innovation models has been in the immoderate trials of protecting the intellectual ownership and at the same time within the legally and politically insufficiently specified frame for protection of intellectual ownership. The problem that has occurred as a consequence of the closed innovation models was the lack of connection between the theory and practice. On one side the research centres of the academic institutions did not apply their research and innovative conclusions onto practice, nor did they try to market them. On the other hand, the big companies that needed innovations for the development of their field and for making a place on a market for themselves consequently organized their own research centres within companies where all the innovation activities were carried out in a highly restricted environment inside which no outside subjects were included.

Chesbrough (2003, p. 35–41) is convinced that a close innovation system does not meet the wanted development objectives and that companies should not rely only on their own knowledge but should instead also reach for the knowledge of others, at the same they should also share their own innovations that are not being used in their operations with the outer environment and in this way gain additional benefits.

He defines an open innovation model as a paradigm that anticipates that companies are able to and should use as much of the outer as the inner ideas as well as the inner and outer ways to reach a market if they wish to attain a progress of their own technology.

Marais and Schutte (2009, p. 96–116) distinguish between five types of open innovation models, namely the *Product platforming* (this model bases on a discussion on a half-product or a product development with intent to contribute to its functionalism and the added value), the *idea competition* (the model enables a competition organizer to gain as big a number of good ideas as possible, in an inexpensive way and at the same time get an insight in their customers' needs, the *inclusion of customers* (that model is intended for including the customers into the last stage of product production or the testing of a product in which way the company receives the feedback instantaneously), the *joint designing and developing of a product* (a company hands over the creating and the development of a product to outside partners. Such model is cheaper and usually faster as an independent product development.), the *innovation networks* (the model is intended for a target oriented problem solving in relation to research and product development).

An open innovation model as an "anti-thesis to the traditional vertical integration model" (Chesbrought, Vanhaverbeke and West 2006, p. 1) has in comparison to the closed model numerous advantages. It reduces the cost of organizing one's own research, offers possibilities for productivity improvements, and includes numerous stakeholders in the process of the very beginning of development, increases accuracy of market research and ensures a faster and simpler marketing. Its weaknesses are however mostly in the danger of information leaks, theft of an intellectual ownership, a complex approach to a supervision of innovations and selection of outer innovations as well as in the frequent corrigenda of the development strategies in order to ensure a bigger profit due to including outer innovations. (Chesbrought 2003, p. 21–63)

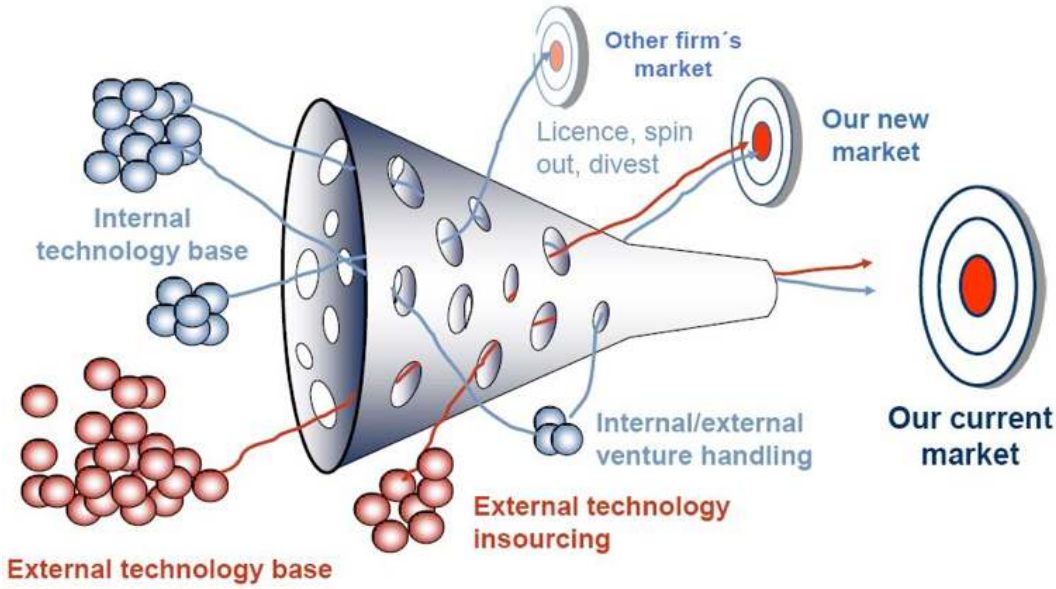

Figure 19: Open innovation model
Source: Chesbrought, 2003

Innovation models are closely linked with business processes in a company and consequently coincide with them according to their structure. In the picture below we show the structure of a traditional innovation process.

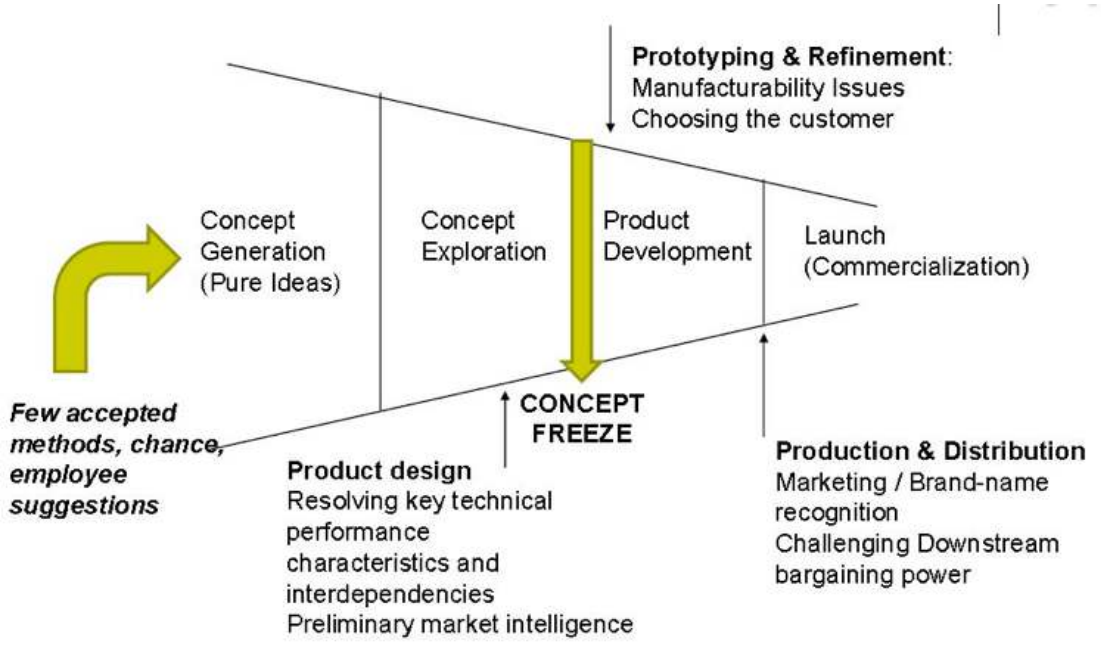

Figure 20: Traditional innovation model
Source: Murray, 2008

Unlike the traditional model the phase model of innovation process (demonstrated in picture below) has a clearer structure and is for a general understanding of project development much more appropriate. It is a formalized process of project management that is able to oversee more development processes at the same time. It enables a possibility of defining, tracking and an oversight of a project in accordance with the decision making criteria and a series of key business decisions. It simplifies reporting on individual phases of a project, since it includes standard terminology, integrates business functions and at the same time anticipates termination of those projects which do not fulfil the expectations. Somewhat problematic is only the inflexibility when introducing the changes within a process (due to the conditions on a market, replacement of the staff or equipment).

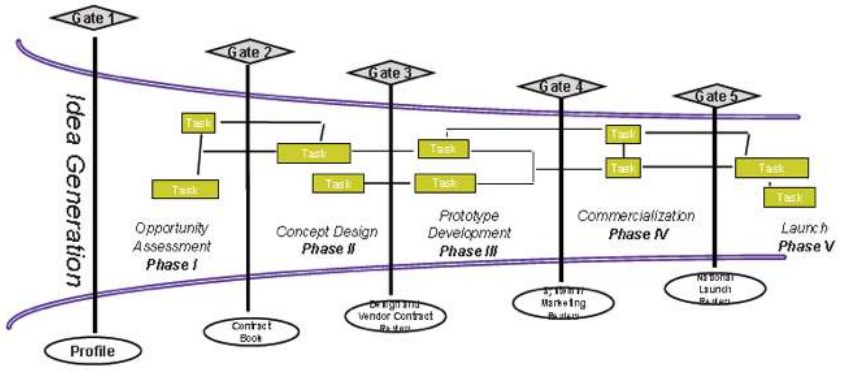

Figure 21: Phase gate model
Source: Murray, 2008

In our opinion the key advantage of the phase innovation process is the structure that is because of the time, content and process transparency the most appropriate one for co-funding.

Notwithstanding the fact that the models of innovation are in theory adapted mainly for business operating, they may also be applied to the innovation activities of the public sector or local communities. Considering the fact that local communities do not have sufficient material and personnel resources for innovating on their disposal, the close innovation model is entirely inappropriate. Its unfitness is further demonstrated also in the exclusion of all outer stakeholders, which is from the point of view of the concepts of sustainable development or smart cities simply unacceptable.

An open innovation model however can meet the needs of local communities because it bases on a wide inclusion of all participants (the public sector, the private sector, users) and in addition to that does not demand huge personnel or material resources. The structure of the phase model of innovation process is also in addition to that simply ideal for the co-funded projects. In the period when local communities are struggling more and more with the financial deficits while they are legally obligated to fulfil their legally based tasks and at the same time reach the sustainable goals of development strategies, the open innovation models can offer a rather good way for carrying out the co-financed projects.

7.4 Financing innovations in public services

In the past the role of local government in the performance of public infrastructure was relatively simple. Local communities, provinces or districts were the primarily investors into the public infrastructure (energy [heating, cooling, lighting], management of agriculture, wood and building land, hospitals, roads, railways, public transport, schools, waterworks, garbage, air, broadband, and internet services for the citizens, healthy food). All this needs were covered predominantly from budget sources or with direct barrowing through local communities. Very common forms of financing were as well self-imposed contributions from citizens. Duo to the public sectors inability of covering the financial burden on one side and new technologies and innovation on the other side, this form of financing does not satisfy any more the growing needs for public standard. This means that local communities and government will be forced to look not just after new sources but as well after new ways of financing. At this point special attention has to be given to new technologies, with which local community and government would have to be acquainted with in order to keep on track with the progress, and innovation, which can be of crucial importance to sustainable development. Some experts from the field of innovation (Cooper 2005, p. 4–6, Kaplan and Norton 1992, p. 70, Albury 2005, p. 51–56) think that innovation are the key to survival of an organization, wherein it isn't important if the organization is market orientated or it works as an operator or manager of public services. Cooper (2005, p. 4–6) even claims: "This is war. Innovate or die."

The transformation of European cities requires considerable investment. Unfortunately, the debt crisis seriously affected a number of municipal budgets. The fundamental problem of financing new development projects is that cities, in addition to the large investments have neither the resources nor good credit ratings for searching cheap sources of financing. Additional austerity governmental measures restrict resources in municipal budgets. Thus leads to congestion in the transformation of cities and decarbonisation, which is a prerequisite for reducing greenhouse gas emissions. These in turn have a negative impact on the industry to develop low-carbon sector, employment and ultimately the key economic sectors such as energy, transport and ICT.

The main problems in financing of innovative solutions for the development of public services can be briefly defined as follows:

- high perception of risk for innovative solutions in the field of energy efficiency,
- uncertain energy prices and political uncertainty about the price of fossil fuels,
- very large investments,
- long term of repayment of the investment,
- limited capacity of public funds (there is no money in the budget, inability of seeking funds in the capital markets).

Given the strategic importance of cities it is an urgent need to find all possible financial tools for the implementation of development projects in smart cities and to develope mechanisms for pooling projects and create them attractive for banks and investors to attract long-term loans from specialized institutions and to develop new systems with off-balance sheet investment mechanisms of private capital and public private partnerships.

The main models for financing innovation projects for development of smart cities are:

- budget funding (state or municipal budget),
- combined budget funding of several municipalities for the joint project,
- budget funding in combination with funds from EU programs (there are several possible combinations:
  - budget of one municipality + EU funds,
  - budgets of several municipalities + EU funds,
  - combined budget funds of State and Municipalities + EU funds),
- funds from EU programs,
- private equity investment – public-private partnership,
- Crowd financing.

7.5 Public private Partnership

Local communities are more and more facing the problem of financing public services, especially in managing and building infrastructure. The resources for financing public services are getting smaller but on the other side the technological development is speeding the needs of higher public standard.

To help financing the city development projects EU developed some programmes and initiatives. In their frame the municipalities can develop innovative projects and candidate for the missing resources. Cohesion policies together with European Fund for Competitiveness and Innovation (Horizon 2020, COSME) also enable development of investments in integrated energies, transport and ICT.

Despite the relatively well-conceived legislation and numerous programs of European Union from which they can draw on the necessary resources, local communities still have problems with ideas, preparation and application-oriented projects sustainable.

Crowd financing is the newest form of financing projects. It is a form of massive investment of private capital individuals in the project, which for various reasons, believe that the project is enough innovative, attractive and important. As the main "channel" for the mobilization of financial resources does the Internet work. Although this funding mechanism is still in its infancy, the data show that gradually gaining ground. Estimated investment in projects in 2010 reached €400 million in 2011 €1.2 billion in 2012 more than 2.2 billion €. With such growth crowdfunding or crowd financing can respectively be classified in the ways of financing large projects for smart urban development.

The classic way of financing the construction of infrastructure from the state budget has become unacceptable; consequently the last three decades have brought radical changes around the world.

As a consequence of these changes two interdependent trends have emerged:

1. The withdrawal of the state from the field of infrastructure construction and operative management and
2. The evolving definition of the state's role as a regulator of infrastructural activities increasingly provided by the private sector.

According to Milutinovič (2000, p. 442–451) in the procurement of the funds for public infrastructure financing, three different methods have become dominant, depending on the available resources:

a) Financing from the current revenue; it foresees that infrastructure investment expenses are covered directly from the current budget revenue of the local authorities or state grants;
b) Loans; comprises the covering of financial sources for infrastructure by issuing securities or raising loans in the capital market;
c) Public-private joint ventures, including privatisation, that involve a partnership and contractual cooperation of the public and private sectors according to one of the possible forms of the cooperation of private subjects.

The interweaving of public and private interests can materialize in several different forms, and most often in the following three combinations:

- Public ownership of objects and public management;
- Public ownership and private management;
- Private ownership and private management.

The involvement of private capital (both human and material) in public infrastructure is not new in the world. The centre of gravity of the problem is the protection of individual interests either in the private or public sector, which does not allow a true partnership and is rarely able to overcome the relationship of client – contractor.

Several variants of infrastructure projects with private funding exist:

BOT – Build – Operate – Transfer

This is the basic variant, where the infrastructure is owned by the state after the project is finished. To that point it is owned and operated by the concessionaire/private partner**.**

BTO – Build – Transfer – Operate

In this variant the infrastructure is owned by the state immediately after construction. The concessionaire is rewarded with the right to operate the object for a limited time.

BROT – Build – Rent – Operate – Transfer or BLOT – Build – Lease – Operate – Transfer

During the contract term the infrastructure object is put up for lease by the concessionaire.

BOOT – Build – Own – Operate – Transfer

In such projects the concessionaire is obliged to construct, finance and operate the object. In return they can levy the taxes and costs from the users. In such projects the concessionaire owns the object until they transfer the ownership to the state or the local community.

BOO – Build – Own – Operate

This abbreviation stands for projects where the concessionaire owns the object they operate and have no obligation to transfer ownership to the state or the local community.

Private investments in the infrastructure can be fully realized in BOT model projects. The short-form BOT characterizes a business relationship form, whereby the government or the local community grant a concession to a group of investors (a project consortium) for development, administrative and commercial marketing of a specific project. The consortium or the legal person who establishes such a concession-project is liable for developing the project and managing the concession in accordance to the contract.

The element of project development is a key element that separates this type of operation from an ordinary public concession. The development of a project in reality translates into the construction of necessary infrastructure. In a classic investment operation the investor takes charge of the entire financial burden. In BOT operations the financing is handled by the building contractor, motivated by the prospect of income from the operation of the concession to pay off any loans.

As the state/local community isn't required to invest in the infrastructure, they could be expected to maintain a passive attitude, expecting just to collect the concession taxes or to gain from the free infrastructure, and use their monopoly to entice the investors to make their best offers. But of course such a perspective would be too simplistic. The state or the local community should be aware of the following:

- In the end they will be the owners of the infrastructure and will need to ensure the continuity of services after the concession ends;
- Due to the heavy burdens and an unequal distribution of risks, the private sector will not be interested in such projects unless the state ensures an environment that will be legally and administratively favourable for the investors;
- The concession operation has to be controlled, as the issuer of the concession is obliged to provide the public services at a fair price.

As a result of these factors the state/local community has to display interest in the technological design of the project and at the same time offer guarantees and initiatives in order to even the distribution of risks and attract private operators and financers.

The BOT model has become a globally established scheme for larger, especially international projects. We could say that the model is suitable for the establishment of infrastructure for public offices that are based on a profit-oriented supply of services and have to be economically justifiable. The question is, whether the BOT model could be used as a fulcrum in order to ensure the progress and realisation of both large and small, difficult and simple, international and national projects, which our societies, both developed and undeveloped, need very badly.

All these forms of BOT model have their advantages and weaknesses. The latter lay mostly in the difficult distribution of risks and interests. The public owner may not want to engage in the providing of services, and at the same time worries about the fate of infrastructure and the respect for public interests if the activities are taken over by the private sector. On the other side the private partner, despite the entrepreneurial spirit, won't be willing to invest in the infrastructure unless there are guarantees concerning the income and duration of the services. (Ilešič 2000, p. 62)

Disadvantages of BOT projects

The transition to partnership between the public and private sectors has found its legality in the roles taken by the public authority and the private subjects. The former is responsible for providing the essential services to the population according to the needs of the society. The latter service providers implement the services according to the cost/benefit criteria. Partnership of the two enables the association of both roles. Still, decisions must be rational, and the public authority needs to review all possible risks of such cooperation and thoroughly study the procedures of partnership formation to create successful partnerships (Jankovič 2006, 151).

What's essential in the entire process is the project itself. It should dictate the distribution of risks in order to stay in line. Taking charge of a risk should be compensated, and the efforts to reduce costs may influence the risks. A typical example is the risk of construction, which can be mainly controlled by the private party and therefore the insurance against that risk is reasonable. For example, the insurance costs can be incorporated in the construction price. In contrast, the commercial risk is often very big and the insurance for the risk can be costly for the private party. That is immediately evident from the higher price and higher subsidies in case the project is not self-sustainable. If the community takes charge of that risk, there is a danger that they may have to pay the compensation for the lack of revenue. Still, that can be acceptable if the project serves an important socio-economic interest.

The main categories of risks are (Aoust et al 2002, p. 28–46):

- Technical risks (design, construction);
- Financial risks;
- Demand risks (exploitation);
- Revenue related risks;
- Higher force risks;
- Macroeconomic risks;
- Legal risks.

Some of these risks are limited to the private sector, e.g. the non-remunerative investments, and some to the public administration (inefficiency of public offices).

It is otherwise true that the risk in itself is not a disadvantage yet. However, when we talk about disadvantages risks are most likely to fall into this category. They transform into disadvantages at the moment when we are least prepared or when we do not know how to or cannot avoid them.

In comparison to the traditional form financing an infrastructure the BOT model brings on the following disadvantages:

- BOT projects are much more demanding than traditional investment programs, in the financial sense as well as in the legal sense;
- A big trap is having insufficient knowledge about the BOT model and not being qualified for using it in the real world;
- The BOT model demands clear and transparent legal regulations and foreseeable conditions for carrying out the activity;
- The costs for preparing and financing BOT projects are usually higher than for traditional forms of financing;
- In most cases, successful realization of a BOT project means a higher price for end-users of the service;
- BOT projects usually create revenues in domestic currency, while creditors can also be foreign partners. This creates a great risk in exchange rates, currency risks and risks in transferring capital (Perrot J.Y. et al 1994);

Simplifying the matter we can say that the state/local community, whereby the concessionary is a foreign partner, does not get much or anything at all from a BOT project. The capital in which a foreign partner has invested into an infrastructure shall be returned them in the form of payment for services and not to the state/local community. However, it is true that the state/local community has fulfilled its obligation in ensuring public services. Besides this, when talking about traditional BOT business, the ownership and administrative rights of the infrastructural building are transferred to public partner after the duration of the contract.

The advantages of BOT projects

It is noticeable that intervening with partnerships between the public and private sectors ensures the operation of public services and infrastructures and offers numerous advantages although; it remains somewhat complicated for its realization and constant monitoring.

A BOT project is based on a partnership between the public/private sector and investors, whose aims are to draw-up, plan, construct and manage infrastructure projects that are usually ensured by using traditional mechanisms such as public tenders.

This partnership does not only mean intervening in the private sector for financing investment projects on the basis of revenues from the infrastructure, but also taking into consideration the competence, knowledge and experience in managing the private sector for the realization and operation of public projects in the most effective way (Namlard 2002, p. 8).

Reducing budgetary requirements

Many times, the BOT model allows for the development of projects with little or even no usage of their own funds (many times, a fixed level of subventions is often needed), as private funds can be used. In many cases, the costs of the services can be transferred to the end-users (utility costs…). A price is calculated, which is close to the real cost, which is done with the aid of an acceptability campaign carried out by the public administration.

Some projects, which are financially profitable even enable for the establishment of new sources by sharing the profits amongst the contractors and the public administration (tolls, taxes…).

It is possible to develop a project without increasing the debt burdens or the affected state/municipal budget. Public sources can therefore be disposed of for other purposes.

The state's image or their ranking is better and enables them to access less expensive capital markets and as a result also attract foreign investors more easily.

Counter value of invested funds

Besides reducing the burden on the budget, the BOT model (under the condition that we use it for suitable projects) allows for the optimization of projects and increasing profits for the allotted investment. These advantages appear in the following elements:

- Linking and synergy during the planning, constructing and operational phases. Of course under the conditions that we have all three phases under one tender;
- Innovation plan, reengineering and effective management;
- Emphasis on the quality of the service for the end-user;
- The way it is dealt with, which tries to reduce the total costs of the project throughout the whole life cycle: investment + maintenance + operations;
- Better usage of capital and creating additional revenues.

The optimal distribution and transferring part of the risks to the private sector

Projects regarding public and private partnerships almost always bring on a really high level of risks. Especially, because of the great financial amounts that are at stake, because of the uncertainty related to the costs of construction including operations and the uncertainty of revenues. The financial construction within the framework of the BOT model is based on the adjustment of distributing the risks after these have already been identified and enables that a certain part are transferred to the private partner if they are easier to control than the public administration.

The public administration can greatly reduce their exposure to risks, whereby in spite of everything it ensures the optimization of the project in this area.

Realistic development and being in command of the costs

The financial construction of the BOT model in the public administration enables for a better evaluation of the real costs of the project. A precise and real evaluation of costs is also necessary for the sheer promotion of the project as it aids attracting financing in the form of capital and loans. With its aid, we can avoid the cost deviations of the project, which are frequent in public infrastructure tenders. With the transfer of responsibility to the private partner in a BOT model, we can also avoid the undervaluation of real costs ex ante. Real costs enable for a comparison with the standard, which can serve as a basis for improving the quality and effectiveness of other public services in the future.

Economic and social benefits

If the worries of the participants are merely of a financial character, then the BOT project will most certainly suffer as a whole. We must not forget that the economic and social benefits must stay at the forefront of the partners' interests in the BOT project especially, because the project will be financed to a great extent from the revenues that will originate from it. It must be planned in a way that the best service for the best price will be ensured, which will satisfy as many end-users as possible.

The principle, which is hidden behind the term partnership between the public and private sectors, is based on the fact that the public administration remains responsible for the services it provides for its citizens and is not necessarily responsible for the investments themselves. This is how the public administration with the help of a financial construction in the form of a BOT model can relieve the burden of investments by devoting itself, above all, to the quality control of the service. On the other hand, the private partner possibilities in optimizing its investments (which is their job) so they can ensure the quality that is being demanded.

Fast realization and the reliability in executing the project, which stimulates economic development

If the project was evaluated as being beneficial to society, its installation in the form of a partnership between the public and private sectors can allow for the acceleration of its final realizations. At this level, the decision to a great extent depends on the disposability of budgetary funds, which can also be the reason for its postponement to a later date.

In this case, the projects get a more political dimension. On the other hand, its quick realization will also ensure a quick benefit for society as well as for politicians who connect a certain name with a certain project. This holds true regardless of the level of development in a country, which realizes its projects on the basis of partnerships between public and private sectors.

The modernisation of the economy and the indirect benefits

By accelerating the realization of projects, we also enable the acceleration in modernising the economy. Developing infrastructures and implementing new technologies is faster and because the realization of projects is directed towards the quality of the service it is more possible to take into consideration the needs regarding demand and adapt them to development more quickly resulting in enabling fast modernisation of the economy. The result is numerous indirect benefits for the country's economic development (i.e. higher standard of services, the use of environmental protection and modern technologies and the implementation of technical knowledge, etc.)

Access to financial markets and development of the local financial market

The use of private forms of financing for environmental protection projects has a completely positive macroeconomic financial effect for countries in development. Their access to financial markets is improving. By obtaining international capital, they strengthen the country's image in markets and they base themselves on huge operators, who have privileged access to international markets.

The private form of financing enables for a timely development of the local financial market. These complex constructions actually limit the number of financial sources and are often effective as a catalyst for the local market, which has to modernise and adapt itself.

Social advantages: improving public services

If we enable for a better identification of costs and a reduction in budgetary expenses for public administrations, the big project constructions under the BOT model allow for a better concentration of funds for financing that part of the project, which they have to ensure themselves, but is not profitable. Freeing up financial sources for other public services where a partnership between the public and private sectors is not possible or is possible just in a smaller form (healthcare, education, social protection, etc.) can allow the public administration to direct its funds and energy towards other social tasks.

Enabling lasting development

Contrary to widespread belief, intervention via the private sector with the BOT method can enable better consideration of all dimensions in development. The construction of infrastructures, which are necessary for the proper operation of public services, demands a great amount of investment and flexibility for operations. BOT models enable for faster realization of public services and lower costs for public finances.

On the other hand, entire public service cooperation with huge international groups means accessibility to the most modern technologies, which take into consideration the needs in the development sense, adapt themselves to the regulations around the world and are capable of innovating and adapting their offers in developing needs in the area of public services.

The implementation of the BOT model also enables for solutions that are better adapted to the demands according to the quality of the service, economic capacity and the public administration.

The role of the state in concentrating on their initial tasks

As the BOT model frees up the public administration from its administrative tasks, it simultaneously allows for it to concentrate on its initial tasks. As a result of this method, it can identify the needs and costs for public services more easily. It can also, in a very effective way optimally evaluate the level of public services, which the society wants and the costs involved. As a result, it can decide on economic and social effectiveness more easily.

Technological benefits

BOT projects enable for the arrival of important professionals with international experience such as constructors, operators, engineers, legal advisers, systems analysts and financial analysts, etc. We can find these professionals alongside private partners as well as in public administrations. This has resulted in an important transfer of technologies, know-how and experience, which can be seen in many areas such as:

- Construction and systems for optimizing economic consumption (it is possible to offer the most modern technology and it is possible to adapt to local attributes);
- Managing the project and economic consumption;
- Financing engineering;
- Institutional engineering;
- The quality of software (The operations of the majority of industries in the economy has significantly changed with the forceful penetration of internet technology and as professor Leskovar states, the paradox of is that individuals and organisations are forcing themselves in the intense usage of program equipment, which frequently changes, is not user friendly for the entire population and is expensive (Leskovar 2000, p. 491–496);
- And many others.

The transfer of technologies, know-how and experience first occurs in local companies that directly cooperate in projects as well as the rest of the companies at the local level. It also has an influence on the administration, which monitors the project, the local financial organisation, etc. An important factor is certainly the training and qualification of the local labour force. Foreign international companies that are part of the project will especially try to focus on the local labour force who they will adequately train. On their part, they will only send the most necessary group of staff, who are necessary for completing the transitional phase.

The new role of public administration

The political advantages that originate from this are certainly not negligible. By directing public administration operations towards their initial tasks and intervening with the partnership between the public and private sectors, once again it is possible to define their role as a subject that directs and supervises and no longer as a subject in the role of owner and manager of property. Besides the benefits, which these projects bring to society, they also enable for stimulating the development of effective services, which have been better adapted to meet the demand. As a result, public administrations come out on top because they ensure a better quality of services, by directing its funds in way that takes into consideration the social points of view more strongly. Furthermore, implementing BOT projects allows for the rethinking of the distribution of roles between the public and private sectors.

The assignment and "non-resignation" functions

BOT projects allow for alluring private investors, whereby connecting public projects with personal profit does not occur. In essence, we can define BOT projects as delegating the implementation of public services for a defined period of time. Just as well it does not alienate public property within infrastructures. Infrastructures, that had already existed before the contract and new ones as well that have originated on the basis of concessions in fine, become owned by the administration that gives the concession.

The public authority preserves its function in appointing public service projects and assures their legal regulation.

A partnership between the public and private sectors allows for the preservation of the essential "public" part of these services and avoids the accusation of saying that it is "giving" the property to foreigners or third parties.

Stability

The above described social and economic advantages evidently positively influence economic and politically stability, as well. Besides this, the contracts are signed for a period of time that is longer than the political mandates. In general, public services are, directly as well as indirectly less touchy for the outcomes of "elections". The maintenance and the quality of services are also less subject to this type of risk and the projects must show a true social-economic character in order to be chosen. On the other hand, with the improvement of public services without any excessive pressure in the area of taxation, BOT models conjure up economic and social stability.

In spite of this fact, it is worth emphasising once again that it is necessary to avoid rashness.

It is essential that we take enough time to prepare society and administrations really well, foresee the time period of transition so people can come to terms with the fact that it is necessary to pay for the service (or at least a part of the service) and that we ensure good regulations, which will help us prevent immoderations.

Conclusion on Public private partnerships

BOT projects are a specific combination between traditional projects and ones with concessions. However, in spite of the many advantages it is especially necessary to take into consideration the basic methodologies of BOT projects, which are:

- Well structured financing of the project in the framework of a partnership between the public and private carriers enables for the improvement of this project. Moreover, the incorporation of the financers is a guarantee for their quality and optimization. However, it cannot ensure the life cycle of the project, which in itself does not have sufficient economic and social good;
- Financers closely monitor the quality of the participants and the quality of the project and the project's environment: the institutional and economic framework, the quality and incorporation of builders, the legal and technical abilities of the concession giver, and the economic parameters of the contract…;
- The ad hoc structure of the company for the project is also important, which is the project carrier and connects the active items of the project and links up the partners in the project;
- The intervention of the public administration in the area of financing the project, which is in the form of a partnership between public and private carriers is often times necessary and founded because of their social-economic interest. Intervention is only possible with the input of assets, funds or guarantees;
- The traditional forms are no longer adapted to levels of risk (few assets, revenues are founded only on the flow of funds, which are evaluated with a specific level of uncertainty), the value nor the duration of the partnership between public and private carriers.

BOT projects are also effective for the state and local communities and are the best possible method (with the lowest costs) for building a public infrastructure and realizing its usage in the economy by ensuring the best possible services. The reason is in the lack of funds as well as in the lack of adequate human resources. In the case of a BOT project, where the concessionary is a foreign party both the state as well as a local community will have to come to terms with the fact that the profits are going to go abroad. Evidently, this problem will have to be solved somewhat pragmatically, especially when legitimate interest for implementing a public service project exists.

Last but not least, we cannot and must not forget the end-users (thus the citizens). For them, BOT projects are going to represent two different sides of a coin. Legislation will represent quality and an undisturbed service, which by all means will satisfy it. The other side of the coin represents the payment aspect for its implementation. Regardless of the fact if the concessionary is a foreigner or a domestic legal person, the service will have to be paid for. The price will be higher than in the case if the state/ local community would carry out the activity in another form (for which it will probably not have the human resources or the funds). Not only will the profit have to be paid for but also the interest on the capital, which the concessionary will take.

The end-users will simply have to radically change their standpoint on service consumption in which public administrations have assured in one form or another and it will be necessary to come to terms with the fact that services simply cost more.

The latter is of course necessary to add an awareness of the importance of sustainable and balanced regional development, but without the support of adequate resources (both material and human) it remains just a wish.

7.6 Smart municipalities

Forming different strategies in order to reach urban growth in metropolises of different regions had at first been based on information – communications technologies (IT) and has consequently caused a vast range of research in the field of urban development, urban innovations and IT sector innovations. An undue prominence (merely) in the field of IT as the main (and the only) foundation for the assessment of urban development has avalanched critiques out of which we can read out that such a strategy of development neglects numerous other possibilities of development of cities and at the same time it underestimates the negative influences from the new technologies (Hollands 2008, p. 306–319). Paskaleva (2009, p. 405–422) and Odendal (2003, p. 585–607) claim that the advantages and the possibilities offered by IT in fact do need to be used however; the urban development has to be built on perspectives that enable integration of more participants, more sectors and more levels.

The definition of a "smart city" that has for long been tightly linked to IT development has started to change and supplement. Komnitos (2002, p. 337–355) believes though that is mostly due to distinguishing between the terms "smart city" and " digital city" where he defines the later as an intelligent city that is oriented in a strong integration of three main dimensions of intelligences existing in a city, namely the human, joint and artificial intelligence.(Komnitor 2006, p. 17–18, 2008, p. 122–123) A special characteristic of an intelligent city that is to say a highly developed area of innovations that are in addition to the ability to solve new problems, the main characteristics of intelligence. (Komnitos 2006, p. 53–61)

We are convinced that merely setting a line of division between the smart and the intelligent cities was not in fact the only reason for redefining the definition of smart cities. The more likely reasons could be in establishing that the innovations only in the field of IT and a revolutionary development of the sector were simply not enough to achieve the wanted effects as well as in the deficit of an active cooperation of multiple sectors which would contribute to a more even development of cities.

The concept of a smart city differs from the concept of digital or intelligent cities by focusing rather on the human capital and education as a driving force of an urban development than simply on the role of the IT infrastructure. (Jung, Phaal and Sang-ho 2013, p. 286–306)

Nor the definition nor the concepts in theory on their own are unified which is no surprise considering that the goal is to achieve a sustainable development for which again there is no unified definition. Some authors have been, when setting the priorities of the concept, leaning towards a more efficient, sustainable and a live model of urban development that has a fundamental vision of environmental and social durability. A smart city is therefore simply called a sustainable city. (Cozens 2008, p. 429–444, Marshall and Toeffel 2005, p. 673–682)

Having stated that, the fact that the concepts of development and consequently the definitions are indeed changing due to the additionally acquired knowledge, innovations, possibilities and last but not least the new, different needs of people as well as of the environment, should not be overlooked.

Zygiaris (2013, p. 218–224) claims that a smart city is a "generic term describing an innovative urban ecosystem based on information technology". As a help to the designers of innovation ecosystems he conceptualizes a model constructed of seven areas within which the cities should find their priorities, put them into action and in such a way accomplish a sustainable development. The areas he defines are the following:

- A city (a tradition of their own, an identity of a city, smart priority tasks, people as the driving force of cities and the behavioural impact on the city's historical and cultural heritage.)
- A green city (new urban theories with an emphasis on environment and natural resources protection)
- Networking (spreading of the green economies and the broadband economy)
- Responsiveness (a new generation of the interactive technologies)
- Free integration (open source internet services)
- Applicability (infrastructure, smart networks, gaining energy from recyclable sources and the like)
- Innovations (creating a fertile innovation environment for new business opportunities).

A smart city should by content mean a modern, urban centre in which the development would with intent to increase the competitiveness run equally in the IT area as well as in the social and environmental areas, claims Caragliu (2009, p. 2–14). It is necessary however to take into the consideration the six important factors in order to be able to call a city smart. If we summoned up the results of the final report on the smart cities prepared by the Centre for regional sciences at the Vienna Technology University (2007, p. 10–12) we can establish that they are in some way consistent with the traditional and the neo-classicistic theories of urban growth and development. Especially, since they are based on the theories of regional competitiveness, transport, IT, economy, the natural resources, the human and social capital, the quality of living and cooperation of citizens in city management. We can therefore say a city is a smart city only when the investments in the human and private capital as well as in the traditional and modern communication infrastructure enable a sustainable economic development, a high quality of life and a wise managing of natural resources with a cooperation of the inhabitants.

In the direction of smart cities there are a lot of efforts at European level in research and financial programs and supporting initiatives. Definition "smart city" by itself and its content in form relate primarily to large or medium-sized cities. With regard to the high concentration of people in big cities these efforts are understandable.

However, we believe that even small local communities are an important part of society and they should be treated just as seriously as the big cities, especially in regions where there are no metropolitan areas and the population is inhabited in many smaller local communities.

In ensuring sustainable development, both big cities and small local community has substantially the same functions in terms of development of regional competitiveness, transport, ICT, economy (in small rural municipalities Agriculture is also an important factor), natural resources, human and social capital, quality of life and citizen participation in the management of the community in which they live.

Thus, large cities and small municipalities are obliged to provide public services, both economic and non-economic. Commonly to a lesser extent but still the well-being of the population in small municipalities is also measured by the quality and accessibility of public services.

A quick comparison of non-economic areas shows that large cities usually have universities, opera houses, clinical centers, etc. Small municipalities that do not have (what actually no one really expected), but there must be guaranteed at least basic health care and basic (sometimes even secondary) education. Usually the smaller places traditionally have their local theater or performance spaces.

If, as the main problems of big cities air pollution and the environment due to industrialization and transport and uncontrolled release of greenhouse gases can be considered, the main problems of rural areas and small towns definitely are pollution of groundwater by herbidici, poor accessibility (road networks, broadband) and the impact of climate change on agriculture.

It is certain that both big cities and smaller municipalities have the same needs. The difference is only in the setting of priorities and due to small size (both territorial and demographic) the size of the investments. In doing so, we should not ignore the following facts:

- large cities have several options for implementation of high technology and promoting innovation because they have more resources within reach (both financial and human),
- most of the research in the field of urban development relates primarily to the metropolis and big cities. Medium-sized and small cities, where the development rules are different (in the struggle for competitiveness they have less critical mass of resources and organizational options) remain insufficiently explored.

Promoting sustainable and smart development of major cities, disregarding the different needs of the population of small towns or medium-sized and smaller cities could eventually lead to excessive migration to large cities and the abandonment of activities which are typical for the smaller villages (disappearance of traditional crafts, etc.) and culture. That could also mean supersaturation of the population in large cities and regression instead of the development of small towns.

This problem is well known in the abandonment of agricultural activities and migration of population in larger cities. Analogy smart cities and smart municipalities (smart communities) is consequently a logical and urgent need.

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