Innovation in the intelligent municipality: A theoretical model and perspectives for the future

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Abstract: In recent years the development of market economy in Poland has caused that ordinary administration in local communities stopped being effective. Implementation of community management has become very useful. Activities being a part of process of the management of territorial self-government unit can be divided into several kinds. The most important ones are: defining rules of community's policy and coordination of the realization of local policy and monitoring of the usage of sources and means given to community, verification and control of effects of the realization of local policy aims as well as the introduction of territorial marketing which is to be used to create specific unit's image and help in its development in a particular region. Unfortunately, elements of management in the modern economy more and more often are insufficient, that is why specialists are looking for new instruments supporting communities' activities in the region by introducing innovation to create more intelligent municipality. That is why in many TSUs introduction of innovation is a must, not just a need. What is more, innovation inevitably involves a degree of risk because it changes the *status quo* or contributes towards an alternative future. As such, an appetite for risk and risk management is essential; and risk avoidance is an impediment to innovation. In this regard, a number of agencies have given increased priority to building and maintaining the capability, including the human capital, necessary to take a long-term perspective and to better anticipate and respond to the needs of government and stakeholder groups (*Report innovation in the public sector*, 2009). That is why the main goal of this article is to determine the model of intelligent TSU at theoretical level.

Key words: innovation, public sector, intelligent municipality

1. Introduction

In response to intensification of global competition many organizations throughout the world have developed international operation strategies to establish a worldwide production, distribution, and marketing network. In the era of knowledge economy, companies are facing dynamic competitive and rapid changes in global marketplaces. They have to emphasize the creation, accumulation, diffusion, transferring and application of knowledge to accelerate product, service

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and process innovation and value creation to meet the needs of customers. There is an increasing importance of innovation in which knowledge turns into the main source of competitive advantage. Innovation in private and public sector is one of continuous interactive learning that occurs in the context of formal and informal relationships between organizations. Innovation can assume many forms, including incremental improvements to existing products, applications of technology to new markets, and uses of new technology to serve an existing market. This process is not completely linear. Innovation requires considerable communication among firms, laboratories, academic institutions, and consumers—as well as feedback between science, engineering, product development, manufacturing, and marketing.

In the contemporary world innovation it is important to change the standard of running of private as well public organizations. What is more, public services' important roles as demonstrators, as setters of standards, as lead markets and procurers, all make their contributions to innovation, and their role in innovation in other sectors, extremely significant. Hence, public services could even become a comparative advantage for Europe competitiveness, by creating innovation-conducive environments. World challenges such as demographic change, pollution, and security concerns are creating new demands for public services and the public sector may be a strong driver for the EU leadership in these domains, too.

Public services are driven by a specific purpose (a public interest) that justifies particular attention from public authorities. They deal with the delivery of goods and, especially, services (such as health, education, sanitation, and social security services). These may be produced and delivered by state-owned agencies, organizations or enterprises; or they may be produced and delivered through 'public service industries', voluntary bodies or private sector firms that are contracted by governments for this purpose. The organization of public services varies considerably from country to country, and the extent to which similar services (e.g. health or education services) are also provided by private organizations to fee-paying consumers also varies a great deal across services and countries. Innovation in public services, then, is something that may take place in a wide variety of organizational and regulatory contexts (Thenint, 2010, p. 3). Innovation in the public sector, particularly in policy development, programme design and service delivery is a necessary element in public services becoming better targeted, more responsive to community needs and more efficient (Better Practice Guide, 2009).

The purpose of this article is to show the role of innovation in the creation of the image of the territorial self-government unit (TSU) as a functioning of intelligent municipalities in the 21st century—in the era of uncertainty and turbulent environments, at the level of theoretical issue.

2. Innovation—general overview

In the genesis of businesses proactivity and sustainability, the merger between knowledge and innovation has emerged as a source of competitive advantage (Nonaka and Takeuchi, 1995) and intangible resources (e.g. new or significantly improved products, updates in processes, brandings, organizational restructurings) fall in the four areas of innovation that are

outlined by the Oslo Manual (OECD, 2005), namely: 1) Product innovation; 2) Process innovation; 3) Marketing innovation, and 4) Organizational innovation.

The approach of Schumpeter (1952) focuses innovation in a framework that is mainly focused on different economic and social systems. Thus, depending on their relevance, the author argued that innovation can be observed from the waves of creative destruction (Schumpeter, 1952), able to restructure the entire market in favour of those who know how to take the best advantage of those discontinuities (Abernathy and Clark, 1985).

2.1. Innovation in the business world

At a macro level, the concept of innovation covers a range of dynamics, goes through an adjustment, restructuring and systematic learning typical in industrial societies (Nieto, 2003). Innovation should not be limited to the ability that companies have to design and introduce new processes and new products. This assertion leads and supports the concept of innovation that is proposed in the Oslo Manual (OECD, 2005, p. 46) as '… the implementation of a product (goods or services) new or significantly improved, or process, a new marketing method, or a new organizational method in the context of business practices, the organization of the workplace or external relations.' Complimentarily, Morris (2009) refers to innovation as an attribute, a process, and an outcome. Its key attribute is its distinctive and original character, while the process appears associated with the possibility of innovation occuring in any part of the organization. Therefore, the result can be seen from the creation of an idea, a strategy, a product, or even the modelling and implementation of a new business.

As a precursor for social changes, innovation must interconnect with the adoption of a change towards the promotion of something new, and in organization that is relevant to the parallel environment (Knight, 1967; Damanpour and Evan, 1984). This definition underlies the importance of innovation in identifying and recognizing immediately the moment when we firstly use it. The use of the expression 'new organizations and relevant to the environment' (Damanpour and Evan, 1984) implies the existence of a distinction between the generation of an idea where creativity is seen as the product of the human being and as a generator of new ideas, concepts or theories, and its translation, where the transformation of ideas and/ or use of inventions—product of creativity—results in useful and conducive to improvement applications.

According to Xu et al. (2010), the importance of the innovation process in organizations is revealed through the existing fluidity in the relationship between the activities stemming from inventions and culminating with their marketing. The innovation process should cover all the efforts involved in generating new ideas and their consequent exploitation, regardless of its commercial success (Dosi, 1988; Roberts, 2007; Yusuf, 2009). The scanning process includes all stages of business development, application and transfer of inventions, including the concentration of ideas around specific goals. The result of this transfer must be able to materialize into useful applications and must be also capable of leading to improvements in the products and/ or processes. Not being homogeneous, the concept of innovation goes beyond simple technical concept that involves the creation of a product or the advancement of a production process. It is therefore a mistake to define or identify innovation at one point in

time, ignoring that it encompasses a broad range of innovation activities (Kline and Rosenberg, 1986) and is, in essence, a continuous process to create internal and external value.

Based on the Frascati Manual (OECD, 2002), innovation activities include all scientific, technological, organizational, financial and commercial steps (including investments in new knowledge) that actually conduct, or intend to drive, the implementation of new products, new processes (or improvements in these processes), and new organizational methods. Through the classification stated by the OECD (OECD 1997, 2005), innovation activities can be *Successfully Implemented*—resulting in the implementation—or remain *In Progress*—when it has not yet resulted in the implementation of a change or improvement, or be *Abandoned*—prior to the implementation of changes and without creating any tangible or intangible value.

Broadly, innovation and technical progress can be introduced in all phases of the production process, from design into the achievement of a prototype of post-sale services. Using innovation, companies can create and disseminate new knowledge by expanding their economic potential to develop new products, new processes, new marketing methods, and new organizational approaches. Given its multifaceted perspective, innovation induces the existence of a large set of vectors in a broad framework that does not depend only on the technological knowledge.

The convergence of those vectors with knowledge framework flows characterizes the intangible capabilities of companies to associate the dynamics of innovation with the systemic logic. In the case of process innovation during its maturation, not covered by this systemic logic, Hage (1999) argues the identification of three key dimensions: technological, organizational, and sociocultural.

1. **Technological Dimension:** Comprising the existence of a system of science and technology that could generate and use knowledge in economic activity. This is a fundamental interaction between the holders of knowledge and the knowledge's users, in particular with the focus on companies driven by an innovative approach of doing business.
2. **Organizational Dimension:** More comprehensive than the previous dimension, the scope of its progress depends on the knowledge, and even expertise, from different organizational levels and theoretical domains. In the context of innovation activity, the main argument of this dimension is the creation of working conditions flows, of an integrated understanding, and even the exchange of functional groups that allow companies to build procedural and decision-making mechanisms. These codified or uncodified mechanisms should ensure and support the motivation and required adherence to innovation through continuous learning.
3. **Sociocultural Dimension:** It emerges in a more complex scope than the two previous dimensions. This fits into the adherence of new approaches of values and behaviours that enable the creation of favourable conditions for the intention to innovate and cooperate in knowledge exchange processes.

The plurality and the amplitude of those three dimensions lead us to the importance of certain attributes which we believe are nuclear and inherent to the concept of innovation. However, the concept is embodied in ambiguity, ubiquity, and cumulative processes. The ambiguity drives individuals and groups into a myriad of ways and forms that innovation

can assume. According to Dosi (1988), the responses occur through the innovative way in which these problems are addressed, being susceptible of various solutions that are not always unique and unambiguous. The phenomenon of ubiquity, observed in the continuous creation of new products, processes, methods of marketing, or organizational approaches, allows companies to access new markets (Lundvall, 1988). Furthermore, innovation is also a cumulative process that evolves continuous or discontinuous approaches. Thus, it can generate creative destruction (Schumpeter, 1952), based on existing knowledge mode (Dosi, 1988). The acquisition of intangible capacities can be materialized through the acquisition of knowledge, through learning and expansion of existing technologies, or through the acquisition of new technology (Arnold et al., 2000). Thus, technologies' acquisition is understood by Lall (1992) as the preliminary stage of technological development, a set of interlinked activities that promote the improvement in companies' productive capacity. As mentioned by Arnold (2000), those activities are characterized by the fact that companies are: 1) seeking, selecting, using or applying existing technologies (e.g. through licensing), materialized via the acquisition of machinery and/ or equipment (e.g. hardware) to be used in several workplaces; 2) introduce new materials or components that, by themselves, already incorporate new designs and specifications; 3) invest in new technologies incorporated to enable the expansion or replacement of new infrastructure for the enterprise; and 4) implement existing technologies into entirely new products using the acquisition of licenses or specifications previously developed by other companies.

The acquisition of technology embodied in machinery (or hardware) and the purchase of knowledge mediated by intermediary agents are insufficient for companies to build their own skills. In order to overcome this limitation, Arnold et al. (2000) suggest that companies should proceed with the implementation of incremental and continuous at the level of improvements, such as:

- engineering production that contributes to increase competitiveness, either through increased productivity and capital, both through the efficient use of resources;
- diversification based on different product specifications (in order to maintain market share or establish themselves in new market niches);
- operations using new technologies which create required interconnection of the multiple steps towards the creation of value and innovative environments. It includes hardware, such as transport systems computer-aided, and organizational methods;
- reverse engineering where design and engineering methods allow the diversification of the products' range or, alternatively, the access to opportunities towards the achievement of new components, materials, and equipment.

In the scope of companies' approach, the technological frontier directly fits with the importance of Research and Development activities and investments (R&D). Thus, technological development is a key factor, or even the basis, of a sustainable innovation turnover and outcomes. R&D focuses on the leading approach towards the capture and absorption of the most advanced technological issues, capable of ensuring the release of new products and new processes. Moreover, in the scope of research and technological developments, associated with the design and engineering required by the adoption of technologies that promote access to the launch of new products or processes, the use of R&D is not enough to ensure an immedi-

ate turnover or value creation. Innovation activities should become an internal secret while it is not easily acquired, appropriated, or imitated by competitors (Arnold et al., 2000).

2.2. Innovation in the public sector

Public services are driven by a specific purpose (a public interest) that justifies particular attention from public authorities. They deal with the delivery of goods and, especially, services (such as health, education, sanitation, and social security services). These may be produced and delivered by state-owned agencies, organizations or enterprises; or they may be produced and delivered through 'public service industries', voluntary bodies or private sector firms that are contracted by governments for this purpose. The organization of public services varies considerably from country to country, and the extent to which similar services (e.g. health or education services) are also provided by private organizations to fee-paying consumers also varies a great deal across services and countries. Innovation in public services, then, is something that may take place in a wide variety of organizational and regulatory contexts (Thenint, 2010, p. 3).

There are commonalities, differences and synergies between private and public sector innovation. Some aspects of public sector innovation are comparable with, indeed might be almost identical to, aspects of private sector innovation (examples include business process improvements and many aspects of information and communication technologies). However, there are other aspects of public sector innovation, particularly those associated with policy innovation, for which governments must bear responsibilities that greatly outweigh those borne by the private sector (examples are national security, counter-terrorism and pandemic preparedness). This is why, in comparison with the private sector, public sector decision-making processes can appear cumbersome, risk averse and time consuming (Mathews, 2009).

What is more, the majority of studies addressing innovation in the private sector have led to a widely used, standard classification scheme capturing major types of innovation which are product (and service) innovation, process innovation and organizational and marketing innovations (Oslo Manual, Community Innovation Surveys). Historically, the focus has been on technological innovation in both products (and services) and processes. However, the inclusion of non-technological innovation and a specific focus on public sector (and service) reduce the distinction between product and process and emphasize the role of organizational innovation (Thenint, 2010, p. 8).

According to H. Thenint, innovation in the public sector can be divided into several types, for instance:

- a new or improved service (for example health care at home);
- process innovation (a change in the manufacturing of a service or a product);
- administrative innovation (for example the use of a new policy instrument, which may be a result of policy change);
- system innovation (a new system or a fundamental change of an existing system, for instance the establishment of new organizations or new patterns of cooperation and interaction);
- conceptual innovation (a change in the outlook of actors; such changes are accompanied by the use of new concepts, for example integrated water management or mobility leasing);

– radical change of rationality (meaning that the worldview or the mental matrix of the employees of an organization is shifting).

Continuing, the first two types of innovation can be subsumed under product innovation. The innovations can be labeled in the following ways:

– incremental innovations/ radical innovations (denoting the degree of novelty, in industry most innovations can be considered incremental improvements of already existing products, processes or services);
– top-down innovations/ bottom-up innovations (denoting who has initiated the process leading to behavioural changes, 'the top'—meaning management or organizations or institutions higher up in the hierarchy—or 'the bottom'—meaning 'workers on the factory floor', in this case public employees, civil servants and mid-level policy makers);
– needs-led innovations and efficiency-led innovation (denoting whether the innovation process has been initiated to solve a specific problem or in order to make already existing products, services or procedures more efficient) (Halvorsen et al., 2005; Thenint, 2010, p. 8).

3. Intelligent municipality: A theoretical model

When defining a unit as intelligent one we largely mean the persons who manage this municipality and the entire administration which helps implement these decisions. To recognize the specifics of functioning of the so called intelligent municipality it is necessary to determine the traits which should distinguish it from other municipalities, regardless of its location and size. Such a municipality should (Wereda and Raczkowski, 2012, pp. 191–193):

– fulfil its fundamental tasks specified by the statutes;
– manage funds so as to meet these goals, seeking out the most elaborate financial sources (majority of municipalities fund their investment activities from budget resources and bank loans and credits, disregarding instrument on a capital market and the EU funds);
– provide opportunities for boosting competences and learning foreign languages (if a municipality cannot afford to co-finance teaching a few languages, at least it should fund the English language) for personnel of the municipality offices;
– be open and implement changes related with market mega trends,[1] e.g. enabling enterprises and local communities to import skills and knowledge from other regions, and even countries;
– encourage new companies and investors to settle on the territory of the municipality not only through standard action strategies, but chiefly through enhancing the brand and image of the unit, creating virtual municipality office and offering the lowest operation costs for business entity on its territory, e.g. in the form of lower taxes within a grace period, shortened time for acquiring permits for activities on its territory and others;

[1] Megatrends concerned with globalization of markets and enterprises, establishment of supranational power systems (international alliances, establishment of global corporation), shifts in systems of consumers' values (heightened significance of individualism, partnership and business ethics), development of communication methods (development of services based on IT and ICT networks, invasion of new technologies with multiple applications, innovativeness of services and products, growth of inter-organizational relations, networking and coopetition.

– make available information points to inhabitants which present the updated data with regard to the municipality, region and economic trends across the globe;
– make use of broadly understood promotion elements to create its brand and image;
– strengthen bonds between the municipality and a local community through augmenting the quality of elementary education, searching foundations assisting remarkably talented children from rural areas or giving access and opportunities for using Internet services throughout the whole municipality;
– elect such leaders who possess not only adequate education but also are capable of persuading local community to leverage strong assets of the municipality to the maximum extent, and are able to reduce its weak points and cope with threats;
– ensure the society has access to standard technical and social infrastructure and model fundamentals for development focused on export and import of experiences with other municipalities, cities or regions.

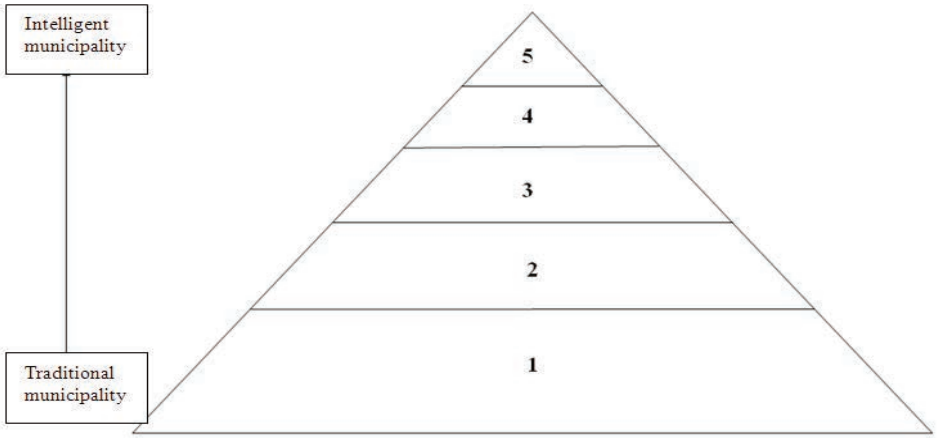
An intelligent municipality should largely be based on relationships built with other entities/ stakeholders (Wereda, 2010, pp. 13–14).

To establish long term relationships with partners and interest groups, and to create a positive image for entities that in future intend to settle down in the municipality, each unit should be concerned with boosting its development opportunities.

Collaboration between self-government bodies and institutions as well as public utilities with internal and external entities, aimed to trigger required changes in attitudes and behaviours and decisions of various target groups, is a reflection of execution of marketing activities (operations, ventures, campaigns). Exchange of values between pairs of units or territorial groups means acquiring specific resources, winning the favour of people and/ or approval of offered environmental assets (social, investment, tourist, economic, etc.) in return for relatively equivalent assets delivered in a returnable way including material, financial, information and emotional assets (Wereda, 2010, pp. 15–16).

Tapping competition as partners and effective allocation of municipality's resources (land, capital, labour) in medium and long term may usher in the phase of sustainable development. As a result this development will lead to gaining competitive advantage over other 'less intelligent' municipalities.

The factors determining an advantage enjoyed by the intelligent municipality in the region, alongside effective management of finances (capital resources), principally include:
– exchangeable relations and value transfers for partners;
– efficient exploitation of the territory of the municipality (land resource) and its workforce (labour resource);
– creation of marketing image of the municipality (also through good brand and image);
– promotion of the municipality;
– use of state-of-the-art techniques and IT technologies in establishing and maintaining relationships with partners and interest groups (Wereda, 2010, pp. 17–18);
– effective governing by individuals adequately selected and professionally groomed and educated in the field of public management;
– treatment of customers as partners of the municipality, not applicants (enhancing the quality of handling customers from each interest group, partners/ stakeholders).



Explanation:
1—meeting the needs of the local community at the primary level and executing tasks specified by the law;
2—developing of the growth strategy and the creation of the municipality management programmes in times of crisis, as well as seeking sophisticated sources of financing;
3—building a good image of the municipality and promotion of the unit (using the latest techniques and information technologies) to establish and maintain relationships with partners and stakeholders;
4—belonging to different organizations and participation in the rankings of local, regional, national and international fairs, exhibitions and other events within a range of at least regional level;
5—creation of own 'intelligent' image of the municipality in the region, as well as the use of knowledge and value innovation in the municipality of relying primarily on stakeholder relationship management.

Figure 1. Transformation from traditional municipality into intelligent one

S o u r c e: Authors' own elaboration.

When creating an intelligent municipality, local authorities should harness in its functioning seven core 'habits' which distinguish it from traditional municipalities:

- an intelligent municipality has leaders (frontmen) who persuade a local community that more is to win than to lose by 'hooking up' to a so called local broadband economy;[2]
- intelligent municipality is open to shifts;
- an intelligent municipality fosters visions inspiring to activities and sets ambitious viable objectives;
- intelligent municipalities create 'heroes'—leaders;
- intelligent municipalities 'do not rave' about technology, but as far as reasonably possible put in place technological solutions (Bell et al., pp. 22–32);
- an intelligent municipality creates its image in the region and across the country;

[2] Local broadband economy characterizes by establishment of new companies and industries on the local area; boosting local firms to convert them into global exporters; enabling export and import of knowledge and skills; giving local school access to latest information; combining local health centres with leading medical centres to exchange experiences; combining enforcement of local law with national data templates; allowing local business and units to seek out global trade partners offering products with low costs and high quality; augmenting involvement among local community in the use of Internet tools and new technologies; implementing service and product innovations on the local market.

– an intelligent municipality nurtures relationships with its partners and interest groups through improving customer service;
– an intelligent municipality develops e-administration and continuously improves the functioning of the office in the direction of pro-client orientation.

4. Conclusions

Managing innovation is to develop the necessary and appropriate skills that enable organizations to capture the signals of change, and simultaneously to be prepared to move forward in other fields—or abandoning in an earlier stage, or acquiring and developing new skills. This assertion allows the linkage with knowledge management in which the concept of innovation and learning really fits, leading to the creation, codification and transfer of knowledge (Davenport and Prusak, 1998). This dynamic process can promote the ability of organizations from private and public sector to manage incremental changes, towards sustainable performance, and anticipate different skills in particular fields through the use of disruptive changes. That is why another important factor can be collaboration between TSU because it is a valid source of knowledge; consequently, the degree to which units learn and increase their stock of knowledge is a function of the extent of their participation in network activities.

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Innowacje w gminie inteligentnej – model teoretyczny i perspektywy na przyszłość

Abstrakt: W ostatnich latach rozwój gospodarki rynkowej w Polsce spowodował, że zwykła administracja w społecznościach lokalnych przestała być skuteczna. Wdrożenie procesu zarządzania gminami stało się bardzo przydatne. Działania będące częścią procesu zarządzania jednostką samorządu terytorialnego można podzielić na kilka rodzajów. Najważniejsze z nich to: określenie zasad polityki gminy, koordynacja realizacji polityki lokalnej i monitorowania wykorzystywanych źródeł i środków przekazanych do gminy, weryfikacja i kontrola efektów realizacji polityki lokalnej, jak również wdrożenie marketingu terytorialnego, który ma za zadanie po pierwsze – kreowanie wizerunku danej jednostki, a po drugie – pomoc w jej rozwoju w określonym regionie. Niestety elementy zarządzania w nowoczesnej gospodarce coraz częściej są niewystarczające, dlatego specjaliści szukają nowych instrumentów wspierających działalność gmin w regionie poprzez

wprowadzanie innowacji, aby stworzyć jednostki bardziej inteligentne. W wielu zatem jednostkach samorządu terytorialnego wdrażanie innowacji jest przymusem, a nie tylko koniecznością. Co więcej, innowacje nieuchronnie wiążą się z pewnym ryzykiem, ponieważ zmieniają status quo lub przyczyniają się do alternatywnej przyszłości. W takim wypadku „apetyt" na ryzyko i zarządzanie ryzykiem są niezbędne, a unikanie ryzyka jest przeszkodą dla innowacji. W związku z tym wiele urzędów i agencji rządowych przykłada coraz większą wagę do budowania i utrzymywania pewnych umiejętności, w tym rozwoju kapitału ludzkiego, koniecznych do podjęcia długoterminowej perspektywy i lepszego przewidywania i reagowania na potrzeby rządu i zainteresowanych grup / interesariuszy (*Report innovation in the public sector*, 2009). Dlatego głównym celem artykułu jest określenie modelu inteligentnej jednostki samorządu terytorialnego w ujęciu teoretycznym.

Słowa kluczowe: innowacje, sektor publiczny, inteligentna gmina