Local ICT Firms' Perspective on Planning Cooperation with city Government for Innovations

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Abstract: Local ICT firms can play an important role in creation of innovations which could support a smart city concept realization in a city. The topic of the paper is to present details of local ICT firms' perspective on cooperation with city government for production of innovations important in a smart city concept realization. There is a research gap in up-to-date studies concerning such a topic. Motivation of the author in preparing the paper was to make a step forward to fill this research gap through realizing the article's main objective which was to answer the following question: 'What is the perspective of local ICT firms and what are their expectations in the mentioned cooperation to result in production of innovations useful for the city?' An additional question was 'What is the attitude of local ICT firms towards inviting big international leaders in smart city projects for cooperation in the ICT industry?' Critical research of the paper is first of all of empirical and qualitative nature. A review of the current international literature was of preliminary nature. The review was carried out in respect of a smart sustainable city, ICT innovations and public management, ICT innovations and their sustainability. The study concentrated on the case of the Polish city of Częstochowa. Semi-structured interviews were carried out with managers of six ICT local firms or units located in Częstochowa. The findings of the paper include a set of expectations of local ICT firms useful for city governments in planning cooperation with ICT firms for innovations. In analyzing the perspective of local ICT firms an important element was their attitude towards inviting big international leaders in the ICT industry in smart city for cooperation by the city government. The boundaries of the paper of the above nature limited its scope to the perspective of local ICT firms leaving outside e.g. the analysis of the city government perspective. In the future, the studies should be developed on: creating a comprehensive model of strategic planning of the cooperation between city government and ICT firms for Smart City sustainable innovations.

Keywords: Smart city, city management, ICT innovations, ICT firms, cooperation planning, sustainability

1. Introduction

More and more people live in cities which provokes wider discussion on what strategies the cities should develop not only to retain the current standard of living in cities but to improve it. One important way is to use new ICT technologies and work on innovations and especially sustainable innovations. The concept of "Smart City" seems to be a proper answer to these challenges. Some global companies like IBM or Cisco already are the leaders in development of smart city projects. The problem arises if local ICT firms are doomed to be only subcontractors, or they could bring their own input in creation of smart city innovations. Analysis of possible ways and forms of involving local ICT firms by city government into common work on ICT innovations for smart city realization could be useful for public administration and in particular city government when planning cooperation with private ICT firms for sustainable innovations. The objective of the paper is not only to systematize the aspects of planning such cooperation but also to build a set of recommendations for city government reflecting the expectations of ICT local firms. Taking into account these recommendations by city government could help in better and more effective cooperation between city government and local ICT firms.

The specific topic of the paper is to present local ICT firms' perspective on cooperation with city government for production of innovations important in a smart city concept realization. There is a research gap in up-to-date studies concerning such a topic. Motivation of the author in preparing the paper was to make a step forward to fill this research gap through realizing the article's main objective which was to answer the following question: 'What is the perspective of local ICT firms and what are their expectations in the mentioned cooperation to result in production of innovations useful for the city?' An additional question was 'What is the attitude of local ICT firms towards inviting one or more big international leaders in smart city projects for cooperation in the ICT industry?'

2. Smart Sustainable City

There are many definitions of Smart City. Smart City is a blueprint which is being realized in many cities, some of them with a strategic attitude as e.g. Manchester where two documents strictly related to digitization have been developed: The Greater Manchester Digital Strategy 2018–2020 (published in December 2017) and The Greater Manchester Digital Blueprint (published in February 2020). The first document named five priorities: inclusion, infrastructure, skills and talent, marketing and communications and growth and productivity and the

second one is about empowering people, enabling innovative public services, digitally enabling all businesses and developing and scaling digital business (Zhu, Shen, Ren 2022). Taking into account the broader notion "Smart Sustainable Cities" various definitions could be found. Kondepudi, basing on thorough research and analyzing 130 definitions, formulated the following one: "A smart sustainable city is an innovative city that uses ICTs and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects." (Kondepudi, 2016). This is probably the best definition of the term "Smart Sustainable City" because it captures crucial elements of the essence of a smart city which is sustainable.

3. ICT innovations and public management

For real progress in realization of the city ICT strategy a real challenge is an organizational and cultural issue including human resources especially in respect to lack of motivation and bureaucratic enforcement in a decision-making process. The research in the UK showed that the local authorities are good at utilizing new ICT tools from prominent suppliers. However, there is a lack of innovations because local authorities have no research and development departments responsible for the in-depth analysis of the future needs (Khilji, Roberts 2014).

ICT innovations are needed in cities in many fields: first, in the accounting field (in financial accounting, general accounting of economy-property, analytical accounting in financial or economic version) and second, in a management field (related to: productive resources – modes of purchasing, distributing and engaging various resources, HR in it; performance management with improving processes; needs of beneficiary both external and internal ones). Recent innovations in the ICT sector related to local authorities help in a decision-making process. Among them there are various groups: presentation engines, calculation engines, other engines of analysis (Fontana 2005).

The innovations are being developed in various city life elements which are within the sphere of public management. Up to date research concerns e.g. the factors influencing failures and successes of ICT innovations funded by state in higher education (Wopereis, 2005). Another field of ICT innovations is a city transport comprising tools to be used in e.g.: access to travel information, planning, sharing transport modes, comparing transport modes costs, making payments. In recent years there has been a big growth especially in smartphone applications (Gössling, 2018). In city transportations the catalogue could be even broader as it was indicated in the World Economic Forum Report Expanding Participation and Boosting Growth: The Infrastructure Needs of the Digital Economy e.g.: smart parking, and congestion counteractions. The report classified other fields for ICT innovations in smart city: Energy (smart meter and demand regulation, distributed generation integration, consumption visualization and behavior change), Water and Waste (smart water meters, distribution network control, leak detection, storm and flood management, consumption visualization and behavior change), Social (e-government, remote social infrastructure in health and education, safety and security, social city apps) and Buildings (homes, buildings and energy management systems, smart consumer appliances, peer-to-peer room sharing portals) (Kondepudi, 2016).

Research carried out in different countries brought to light a set of important aspects of the development of the ICT sector, its functioning, and eventually the role of public authorities. Beneath the short review is presented originating from various continents: Europe (the Netherlands, Austria, Poland and Switzerland), Asia (India), Australia/Oceania (New Zealand) and South America (Argentina).

In the Netherlands, part of ICT firms prefer locations outside big cities which are closer to suburban residential locations where their core workers live. However, there is a tendency in the country for spatial specialization in the ICT sector with some specialized activities being still located first of all in big cities (e.g. internet providers or multi-media firms) (Atzema, 2001).

In a sector of economy such as ICT innovation is treated as a key factor deciding the competitiveness of ICT firms. Because the innovation process must be fed with the flow of knowledge, firms rely on internal and external knowledge. In Austria the research showed that in case of a metropolitan region of Vienna ICT firms more often seek to access the external sources of technological knowledge predominantly at a regional level (for the market knowledge they tend to use international sources) in contrast to the case of much less urbanized Salzburg region

where ICT firms relied in both respects (technological and market knowledge) on international sources (Tödtling, Lengauer, Höglinger 2011).

Concentration of ICT firms could lead to clustering being the effect of bottom-up process or city/regional government initiatives. In Poland most clusters initiated by self-government overlap with real bottom-up processes. Public support for already developed ICT clusters (manufacture of computers, electronic and optical products, publishing including software publishing, telecommunications, computer programming, ICT consultancy and information service activities) makes concentration of resources easier in the places with high economic potential (Kowalski, Marcinkowski 2014).

In Switzerland the area of high innovations in the ICT sector is a region of Zürich. One of valuable trends there is existence of many private initiatives of the exchange of knowledge e.g.: Web Monday (Forum for interested in web – new possibilities, new ICT products, new start-ups and new ideas) or Rocket Park (serves typically for the exchange of knowledge between ICT firms) (Collm, Amman 2013).

A smart city concept realization could be started with the establishment of a city company in a form of public-private partnership like in India. In such a company not only representatives of public administration from the central, regional and local level are being represented but ICT consulting firms as well. Further consulting firms together with ICT companies could scrutinize the progress of Smart City concept realization in terms of effectiveness. The central role in the process however is played by Digital Command Center (DCC) as a city unit (Eichenmüller, Münßinger, Glasze 2021).

Not all ICT small firms introduce innovations. Those of firms which do it outperform other small ICT firms in the country in terms of sales growth and profits. Such a thesis had been confirmed in a study in New Zealand (Ng, Hamilton 2015).

In Argentina there are programs of public aid for local ICT firms. The example examined was the case of Cordoba with the program realized in the years 2003-2007. As it was confirmed by the research both direct and indirect effects were positive what has been reflected in terms of sales of the ICT local firms, number of employees' growth, wages and volume of export (Castillo et al. 2014).

4. ICT innovations and their sustainability, big ICT investors

Many ICT innovations related to transport have positive sustainability effects especially when they support growth of interest in sustainable forms of transport. However, ICT innovations could have an adverse effect in terms of sustainability because technological innovations usually enhance the growth of transport demand as a result of competitive travel (Gössling, 2018). Many innovations could diminish air pollution because of limiting a number of operations which will also bring down the costs. A good example is Sharjah, UAE, where Smart Bins and waste containers are fitted with battery powered, wireless sensors to measure the level of filling in real-time. This data is being sent to a cloud server for analysis and display. Collection costs are reduced by 20% as unnecessary clean-up is curbed (Kondepudi, 2016).

In general, sustainable innovations in the globalization era could be developed better if individual employees have developed their cultural intelligence. Employees' cultural intelligence has a significant positive impact on behavior set on creation of sustainable innovation in an organization (Li, Wu, Xiong 2021). In terms of the article's theme, the conclusion is that probably also in local ICT firms the higher cultural intelligence of employees the better the environment for creation of sustainable innovations. The second conclusion is that probably If local ICT firms are to be employed in cooperation with city governments and potentially with a big investor their employees' cultural intelligence is also important for creation of sustainable innovation.

Big ICT international firms (e.g. CISCO, IBM, Accenture) show a tendency to come to the city which would like to be smart when they potentially have a chance of becoming a strategic partner for a city. However at least in European cities that might be quite difficult also because of tendering procedures (Buuse, Kolk 2019). Potential cooperation schemes of local ICT firms-big international ICT firm-city government could be beneficial for local ICT firms. On the other hand, some analysis shows that in the ICT industry local innovativeness of indigenous ICT firms could significantly stimulate and enhance the process of creating innovations in the foreign big international firms as well (Wang, Guo 2017).

5. Methodology

The first review of international literature has been carried out to summarize, synthesize and systematize the arguments which appeared up to date in terms of the topic of the article. Then the case study approach has been used. The case was constituted of six chosen local firms of Częstochowa city. The firms represent various sub sectors of the ICT sector namely: ICT services, programming, ICT applications, software development, ICT equipment sales. Interviewed representatives of firms (Computer Center, Trustnet, Sol-IT, X-Com, Savangard – unit in Częstochowa, Grupa Lew) were owners in four cases and other in two cases: head of Częstochowa unit and member of board. Interviewed firms were SMEs ranging from firms having 20-50 employees, one was micro enterprise with 7 employees, and another was big enterprise with 1300 employees.

On the basis of the literature, a semi-structured interview scheme had been worked out. A semi-structured interview has been carried out in the form of a face-to-face meeting in which there were open-ended questions enhancing discussion with the interviewee. The questions were not sent before the meeting in order to receive more spontaneous answers which best reflect the way of thinking of firms' representatives. The interviews were recorded and then written down. It allowed the researcher not only to ask questions but actively formulate additional questions to develop answers. Thanks to these interviews qualitative data had been collected.

6. Research results

The first question related to the need of preparing a strategy by the city concerning cooperation with ICT firms for innovations. Most of the interviewed firms supported the idea of working out such a strategy. In cases of three firms the enthusiasm was expressed. One was very skeptical pointing out that not disturbing their activity would be enough. The same firm gave an example of public services in supply of Internet which lasted almost a year and finally the firm must have ordered supply of Internet from a private operator (Głębocki K. – Report 2022, p. 1)

The second question was about forms of potential cooperation between the city and ICT local firms. Only one firm which specializes among others in ICT applications allowing payments for public parking places was pro establishment of a common structure. The firm supported the idea of creating a private-public company with the role of an incubator for innovations. For example, if closer cooperation with a city would exist one could work out an application of a map of accessibility of free public parking places based on the connection between park machines and payment applications which would be a much cheaper and easier solution in comparison with installation of sensors or cameras in public parking places. The other ICT firms were skeptical about creating new structure but pointed out various forms of soft cooperation – the firms could realize trainings for officials so that future ordering of services would be easier "talking in the same language", city could be coordinator of closer cooperation between ICT firms and Higher Schools and city could be a coordinator in common sustainable innovations projects management. (Głębocki K. – Report 2022, p. 2)

The next question was on the ICT local firms' perspective when the city would invite a big investor which has a specialized unit in smart city projects. Four of the interviewed firms were against inviting such an investor giving various arguments. The argument most often mentioned was the one of employees – ICT specialists being sucked out of local firms by offering higher levels of wages by such big investors. There was an argument that local ICT firms have wiser employees and better organization but lack bigger capital. Another argument was about global investors not being interested in cooperation with local firms but rather using their own solutions so that local firms could only have potentially the role in implementation of these solutions, not developing new ones. Local firms could develop similar solutions in comparison to the ones offered by big global investors but offering them for much better price. Maybe the medium firm – one of the European leaders could be a good proposal. Two other firms were pro inviting big global investors with the argument of bringing new knowledge. (Głębocki K. – Report 2022, p. 3)

The fields of the biggest possible potential for cooperation with city for creation of innovations mentioned by the firms were the following:

- Health care, waste management, water management, heating of buildings;
- Security of ICT of public services;
- City Smart grid of electricity;
- Development of e-government with extension of cases which a citizen could realize in electronic form, creation of taxpayer portal where a city citizen could pay all payments (taxes and others), development

> of apps for best routes including public transport, park and go zones and the use of public bikes and paid electric scooters. (Głębocki K. – Report 2022, p. 4)

The next question was on the attitude towards exchange of knowledge between ICT local firms for creation of sustainable innovations. All interviewed firms were supportive for such an exchange adding various information and arguments. One firm underlined the possibility of such cooperation but not with their competitors. Local ICT firms exchange to some extent their knowledge already between themselves especially on the owners' level. If such an exchange was organized by the city this would have to be done on the basis of well-constructed rules not to provoke conflicts between local ICT firms. Such a cooperation coordinated by the city should be based on openness and transparency. Sometimes the platform for integration of local firms are sport clubs rather than the city itself. (Głębocki K. – Report 2022, p. 5)

There was also a question about intercultural intelligence of employees – if this helps or not in creation of sustainable innovations. Almost all firms claimed cultural intelligence to be important in the development of sustainable innovations. All firms claimed that they already have experience with employees from other cultures. The ICT sector is the one in which intercultural intelligence is important on a daily basis. (Głębocki K. – Report 2022, p. 5)

The last question was about barriers in cooperation with the city for sustainable innovations. One of the barriers is the lack of interest on the side of the city. Higher schools are the ones which are more interested. Another barrier is ICT systems in cities which are not up to date. City officials are not prepared for such cooperation, having often only vague orientation in what innovations could be developed in terms of sustainability. Often, they decide to continue doing things as they were in the past, being afraid that in case of a failure of a new solution they would be fired and in case of success they will get a relatively small financial bonus. If there are some passionate officials interested in sustainable innovations, they are usually on the lower level of city administration – managers of a medium level and city authorities are not interested very much in these innovations. The Danger is that sometimes cities purchase an innovative system which then is poorly used. Sometimes cities make barriers deciding that only one firm in a big city (Warsaw example was given) will be responsible for parking payments electronic collection, whereas there are in the Polish market 5-7 firms offering such service. Another barrier could be the lack of proper documentation on the side of the city. (Głębocki K. – Report 2022, p. 6).

7. Conclusions

The questions which were formulated in the paper had been answered. The first question was 'What is the perspective of local ICT firms and what are their expectations in the mentioned cooperation to result in production of innovations useful for the city?' and the additional second question was 'What is the attitude of local ICT firms towards inviting one or more big international leaders in smart city projects for cooperation in the ICT industry?' The main conclusions from the research carried out by the author are as follows: according to the firms surveyed a strategy of cooperation between city government and local ICT firms would be useful. Almost all the firms surveyed suggested soft cooperation with a city without any formal new structure but one firm which already is making many projects for cities supported the idea of creating a public-private company. Generally the firms are afraid of the leading global ICT companies being brought to the city. The firms interviewed are prone to exchange their knowledge with other local ICT firms. According to the local ICT firms, the barriers to cooperate with city aiming at innovations, include low engagement of the authorities and poor level of knowledge of city administration employees.

The above results could be set in the form of following recommendations for city government for planning the cooperation with ICT local firms for innovations (comprising also sustainable innovations):

- The strategy of cooperation between city government and ICT local firms for innovations should be worked out;
- The future cooperation could have at least two variants: first variant is soft cooperation without creating any formal structure and second variant (especially for firms already experienced in smart city projects) is a private-public company;
- Not inviting a big global ICT firm or inviting such a firm after wider discussion with local ICT firms and with their acceptance;

- In the strategy of cooperation, especially the following fields should be taken into account: health care, waste management, water management, heating of buildings, security of ICT of public services, city smart grid of electricity, development of e-government with extension of cases which a citizen could realize in electronic form, creation of taxpayer portal, development of apps for transport;
- The strategy should comprise organizing a forum of knowledge exchange for ICT local firms which would be helpful for ICT innovations development;
- In strategic planning of cooperation the engagement of city top management should be secured and promoted as well as improving the level of ICT knowledge of officials should be well planned.
- The above set of recommendations could be useful for public administration and in particular city

government when planning cooperation with private ICT firms for sustainable innovations. The above set does not only systematize the aspects of planning such cooperation but also reflects the expectations of ICT local firms so from practical point of view it could help in better and more effective cooperation between city government and local ICT firms.

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