Management Dynamics in the Knowledge Economy
Volume 2 (2014) no. 3, pp. 453-461; www.managementdynamics.ro
ISSN: 2286-2668

Development through Knowledge Economy: Cluj-Napoca – a European Smart City

Elena Marilena PORUMB
Faculty of European Studies
Babeş-Bolyai University
1 Em. de Martonne, Cluj-Napoca, Romania
eporumb@euro.ubbcluj.ro

Nadia Valentina IVANOVA
Faculty of Economic Sciences and Business Administration
Babeş-Bolyai University
1 Em. de Martonne, Cluj-Napoca, Romania
nadia.inv@gmail.com

Abstract. *The paper is related to both theoretical concepts and best practice in the field of Knowledge Management Strategy. We have designed a mixture of research methodology that covers literature review, comparative case-study analysis, and best practices in the Smart-City field, in order to propose an adequate model, with a suitable quick guide for implementation that may provide a solution for the development of Cluj-Napoca case study. After an in-depth literature review, we proposed the following as the main research question: Could a smart city comparative case study methodology be used as a knowledge management strategy for development? After a preparatory stage we focused on the upgrading of a smart city development model. To put this model at work we looked for and designed a quick guide that can be used as a tool for implementing the model named Knowledge Broker Intervention Model (KBIM). This KBIM and the quick guide for implementation may be seen as our small contribution to the theory and practice in the field. The Knowledge Broker Intervention Model was designed to improve the networks of components in a new way and a more sustainable development. These outcomes of the comparative analysis may be used as a starting point for the transformation of Cluj Napoca into a Smart City based on the quick guide we developed. Cluj Innovation City is a first step towards transforming Cluj-Napoca into a Smart City, which could be developed around the existing Cluj IT Cluster. The role of a knowledge broker would be to ensure that knowledge of the organizational culture of private firms could be harvested, processed and further transferred to universities. In their turn, universities would adopt the new knowledge and apply it in such a way in which it will influence the nurture of scientists. This would come as a solution in the process of closing the gap between knowledge generation, dissemination and feedback actions. It will link research results with policy and practice, as well as match some research portfolios to the needs of policy and practice, therefore the knowledge broker would act as a catalyst in this scenario.*

Keywords: *knowledge economy, knowledge management strategy, Smart City, intelligent change agents, Knowledge Broker Intervention Models.*

Introduction

Literature reviews show that "Cities are real time systems" (ARUP, 2010, p.3) and this is the best definition out there, but what does it really stand for? The Oxford Dictionary explains *a real time system* as being "any system in which the time at which output is produced is significant". This is usually because the input corresponds to some event in the physical world, and the output has to relate to that same event. The lag from input time to output time must be sufficiently small for acceptable timeliness.

The development of the society has led to the need for sustainability. On this basis, the sustainability concept came into use. One of the solutions that emerged, after many pages of strategies were written, was the SMART city concept.

Looking for a Smart City

A. What meaning is more adequate?

We agree with Forrester who defines the smart city as: a *"city that uses information and communication technologies* to make the critical infrastructure components and services of a city-administration, education, healthcare, public safety, real estate, transportation, and utilities – more aware, interactive, and efficient" (CIO, 2010).

In these types of cities "smart technologies are creating more efficient systems and better informed citizens. Now leading cities have started to push this concept further". They are exploring how smart cities can add value within a strategic framework. This will mean moving from departmental solutions to a city wide approach, creating economies of scale and scope that will result in:
- Economic development and the creation of jobs.
- Promoting resource efficiency and mitigating climate change.
- Providing a greater place to live and work.
- Running cities more efficiently.
- Supporting communities (Arup, 2010, p.3).

Cities are becoming "smarter, as governments, businesses, and communities increasingly rely on technology to overcome the challenges from rapid urbanization". What makes a "smart city smart" is the combined use of software systems, server infrastructure, network infrastructure, and client devices - which Forrester calls Smart Computing technologies - to better connect seven critical city infrastructure components and services: city administration, education, healthcare, public safety, real estate, transportation, and utilities. The concept of smart city is pushing the CIOs in federal, state, and local governments and their technology teams to further evaluate emerging technologies and engage with key stakeholders within and outside of their organizations. To successfully deliver on the smart city vision, CIOs should have a clear understanding of what the smart city is, its key drivers, and their role in it.

This is one definition used by informatics specialists from Arup's IT and Communications Systems team to describe the notion of smart city. There are many definitions, but one of the most comprehensive is the one given by the authors of *Are 'Smart Cities' Smart Enough?* (Roche et al.). When Stéphane Roche, Nashid Nabian, Kristian Kloeck and Carlo Ratti reviewed the literature on this subject, they concluded that in defining smart cities a series of elements should be taken into account, and we agree with them.

B. Smart Cities characteristics

The team of researchers coming from European universities, jointly leading the European Smart Cities project, suggests that smart cities can be defined – and we think they can be built on - by measuring the relative progress in a number of categories, including smart governance (democratic processes and inclusion), smart people (education), smart environment (environmental sustainability/energy consumption), smart mobility (transportation), smart economy (regional/global competitiveness), and smart living (health care, social services). Innovation can be applied to the development of smarter cities in all of the above dimensions, in a variety of ways (Steiner et al., 2011, p.88).

These characteristics "connected with traditional, regional and neoclassical theories of urban growth and development" (Dincer et al., 2014, p.286) are based on theories of regional competitiveness transport and ICT economics, natural resources.

We developed our own definition of a Smart City, which outlines that, above being a high-performance urban zone, a SMART city represents a complex network of connections that are in constant motion and evolution, influenced by the capital mix flow connected to the needs of an innovative community, complemented by an appropriate legislative framework, opened and transparent, supported by public- private partnership, whose development is doubled by its human resource expertise and the creativity factor of its population.

Transforming Cluj-Napoca into a 'smart-city by "investing in human and social capital and traditional transport and modern (ICT) communication infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory governance, is our goal".

Knowledge Broker Intervention Model

Transforming Cluj-Napoca into a Smart-City using the Broker of Knowledge as a key lever and a new model, is the main part of our research paper. The *Knowledge Broker Intervention Model (KBIM)* is what we call the value added of this research paper; KBIM is used to improve the networks of components in a different way and ensure increased sustainable development. The new architecture that Cluj-Napoca may develop in the next strategy which could transform a Roman Castro (old name Napoca) and Medieval City (the town name was Klausenburg) into a XXI Smart city (see Figure 1) is enabled by a few elements. The main role of this strategy is taken by the Knowledge broker – a role which involves an intertwining between the best practices developed in Europe (from which we choose Luxembourg, and Songdo, South Korea) and the concept of Knowledge Management, used to covert knowledge into a powerful tool for transition, development and transformation.

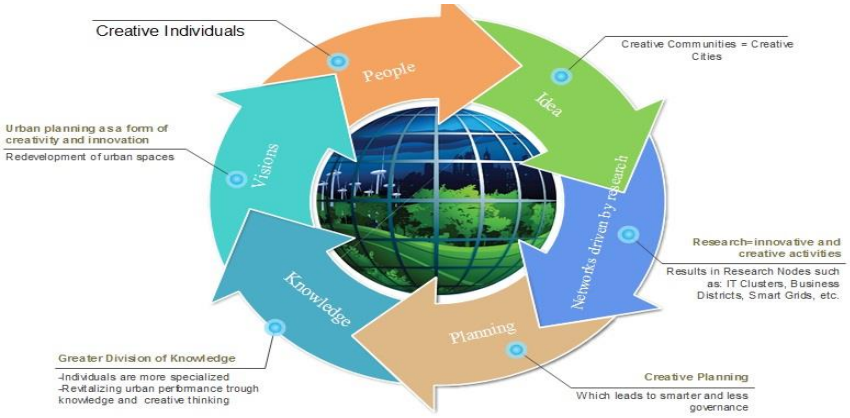

Figure 1. Conceptual Elements of Smart City. Private Sources[1]

These are people, ideas, networks, knowledge, planning and visions. Later in the paper they will be illustrated, showing how they connect and interact in the proposed strategy draft for Cluj-Napoca. A smart city is a connected city. Just like the cases analyzed, which are both situated in strategic locations, Luxemburg and Songdo, are extremely well developed and advanced infrastructures, representing main mobility hubs in their area, we think of what is appropiate for our city. That is also true for Cluj-Napoca, a city which is said to be located in vantage position and will be part of a future development strategy.

[1] Inspired by David Emanuel Andersson, Åke E Andersson, Charlotta Mellander, *Handbook of Creative Cities*, Edwar Elgar Publishing Limited, UK, 2011.

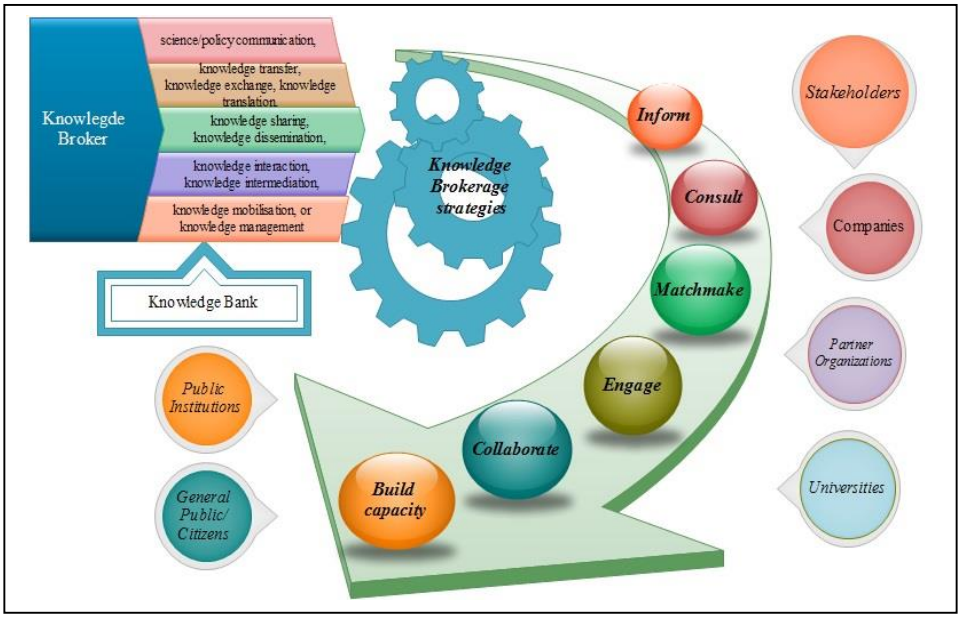

Figure 2. Knowledge Broker Intervention Model

Milton Sousa defines knowledge brokers as "intelligent change agents that stimulate difference and increase the number of external exchanges but in a focused way, simulating innovation while creating momentum for action" (Sousa, 2008). Even if knowledge brokerage is not a well-defined term yet, just as the smart city concept, it can be applied on a variety of fields and situations. Thus, a broader definition would emphasize that knowledge brokerage is "a dynamic activity that goes well beyond the standard notion of transfer as a collection of activities that helps move information from a source to a recipient. Brokering focuses on identifying and bringing together people interested in an issue, people who can help each other develop evidence-based solutions. It helps build relationships and networks for sharing existing research and ideas and stimulating new work" (CHSRF, 2011, p.11).

Here are more functions that a knowledge broker can have, and these functions are being illustrated through the main strategies of a knowledge broker (KB).

A. What are the main functions of a Knowledge Broker ?

There are more functions that a knowledge broker can have, and these functions are being illustrated through the main strategies of a knowledge broker:

Inform: The intent of informing is to disseminate content; it is mostly related to unidirectional knowledge transfer. Information may be delivered in many forms, like a fact sheet, that the recipient will be able to understand its content, evaluate what actions are required as a result of that understanding, and then decide whether or not to take those actions. Other examples may include research synopses, web portals, databases, end-of-project seminars (Karner, 2010, pp.14-15).[2]

Consult and link (Karner, 2010, pp.14-15): This strategy refers to linking expertise to needs in a specific area (e.g. a particular policy area, helping policymakers address a specific policy issue by

2 Adapted after Sandra Karner, *op. cit.*, pp. 14-15, and Louise Shaxson, Elin Gwyn, *Developing a strategy for knowledge translation and brokering in public policymaking*, Knowledge Translation and Brokering workshop, Montreal, Canada, 2010, p. 3. Retrieved from http://r4d.dfid.gov.uk/PDF/Publications/2010-11-16_knowledge-translation-and-brokering.pdf.

seeking out the necessary experts). The broker may be the intermediary, who is able to identify the expertise necessary to help solve the problem, and who establishes a connection. Jacobson et al. identified the following factors as being relevant for the success of such a consultancy process: the consultant should be perceived as accessible, organised, expert and credible, and the client should be open-minded communicative and committed to the consulting process. Above all, the client should be engaged in the knowledge generation, since this will have a positive impact on the utilisation and acceptance of the recommendations. (Nora et al., 2005, pp.229-321). Examples include project or programme advisory committees, focus groups, etc.

Matchmaker (Karner, 2010, pp.14-15): Matchmaking brings together individuals who can be a factor to an envisaged action. This concept refers to matching know-how to needs across issues and subject matters, helping policymakers (or other knowledge users) think more generally about a topic, finding experts with relevant knowledge in another field, helping them to come up with a strategic summary to address the details of the issue. Through brokerage the actors are brought together; the broker needs to identify what expertise is needed, and who can provide it in order to connect these people. "The need for matchmaking intermediaries resides in the fact that on the one hand researchers are often not aware about the relevance of research results for decision makers (or other potential knowledge users), and that on the other hand decision makers may not «be oriented toward the scientific environment»" (Magnuszewski et al., 2010, p.31). Examples include Departmental expert advisory committees, general conferences, university internships in government, mapping the evidence base for an issue.

Engaged/ focused cooperation: Engaging as a form of brokering involves the party who is responsible for addressing the problem establishing and implementing a process of involving others with salient expertise. The others contribute their substantive expertise on an equally useful basis throughout the process of addressing the problem. The broker may play the role of a connector and facilitator. The assumption is that the meaning of the circumstances, potential directions of action and their implications require the decision maker(s) involved to interact with individuals who have contradictory and complementary expertise. Examples include contracted research programmes, electronic knowledge networks, working groups (Karner, 2010, pp.14-15).

Cooperation / Strategic cooperation: cooperation requires all participants in mutually developing a process through which they could interact with one another, and to negotiate and reach a common problem (question) to be addressed. Collaboration requires that those engaged think beyond providing their knowledge, and that they reflect on how it can productively and usefully be put together with the expertise of others, on how to lengthen and extend the cooperative process, strengthen relationships and move on to a situation where all sides jointly negotiate the questions to be asked. . While co-operators bring their expertise, they must work as team members to address the complex issue at hand. Examples include joint agreements where the emphasis is on equality in the relationships between actors, joint agreements, communities of practice (CoP) (Karner, 2010, pp.14-15).

Build capacity/ Building sustainable institutions: Capacity building is broadly defined as growing the ability of people and institutions to do what is expected of them to do. In the KB sense, to build capacity presumes that *"parties jointly frame process of interaction and negotiate substance with intent of addressing multiple dimensions of a policy problem while considering what can be learned from doing so that is applicable to implications of the issue, future scenarios and related concerns"* (Michaels, 2011, p.997). While *informing*, *consulting* and *matching* require quite a low level of involvement, *engaging*, *cooperating* and *capacity building* need higher levels of engagement and personal interaction in order to be effective. Therefore, deepening the cooperative relationship to the extent that all parties jointly frame the issue and broadening organizational capacity of institutions to respond to several issues simultaneously are a must. Examples include co-

management arrangements, local enterprise partnerships, and self-sustaining association (Karner, 2010, pp.14-15).

B. How does it work?

Cluj Innovation City is planned as a first step for transforming Cluj-Napoca into a Smart City. It will be developed around the existing Cluj IT Cluster which represents an association of organizations active in the information technology field, comprising software developers and solution providers, academic institutions, public bodies and other catalyst organizations (Cluj IT, 2013). The cluster aims to create "an auspicious ecosystem for the development and commercialization of innovative, value-adding software services and products, through:
- strong cooperation between the cluster members,
- exchange of knowledge and ideas,
- public-private partnership, and
- fostering of research - for the benefit of all cluster entities and with impact on the society at large". (Cluj IT, 2013).

Thanks to its continuous growth, Cluj-Napoca was determined to be an opportune environment for the organic emergence of the cluster. In this context, 31 organizations in Cluj county joined their efforts to effectively address challenges in areas such as human resources, R&D, business infrastructure, financing and marketing & sales, aiming to take the leap to a next level of software development and commercialization capabilities.

The cluster is formally established as a non-governmental organization, with the following composition of the founding members: 23 privately owned companies, 2 universities, 6 public institutions and catalyst organizations (Cluj IT, 2013).

Cluj Innovation City is an urban development project and will center the largest number of IT companies in the region, which through the complementary services it integrates, will create a number of jobs, with a regional as well as an international impact. This mix of functions will ensure sustainable development for the region and will bring a series of economic and social benefits.

Final conclusions

As it results from the theoretical element outlined above, the knowledge broker's main role it to nurture and built relationships to sustain the flow of information between researchers and decision makers on one hand, and among the organizational layers of the society, on another. The knowledge broker is not only a social means, its reason for being is to ensure that the transferred knowledge is based on solid research and that it is available for decision makers, and its target is to ensure that the end result will consist of a productive change. The knowledge broker must ensure that *the four goals of knowledge exchange* are followed as a quick guide for local officers:
- to facilitate effective research cooperation;
- to guide the strategic direction of the organization - research-related issues change daily and keeping up to date is a must;
- to enhance communication networks;
- to support effective dissemination and uptake of new knowledge.

A knowledge broker has multiple types of power, such as legal authority, expert, referent, network, relational and catalytically, which provide an answer to our expectations regarding the transformation of the community as a unit. Therefore, it can influence the community that uses its

services in different ways. In the Cluj-Napoca case, the knowledge broker can work as a way of bringing together all the actors around the IT cluster and connect them with the society as a whole.

So, the education system (the academic field) lacks the tool kit necessary for development in order to create a Scientist Park, such as a Community of research area or a knowledge cluster.

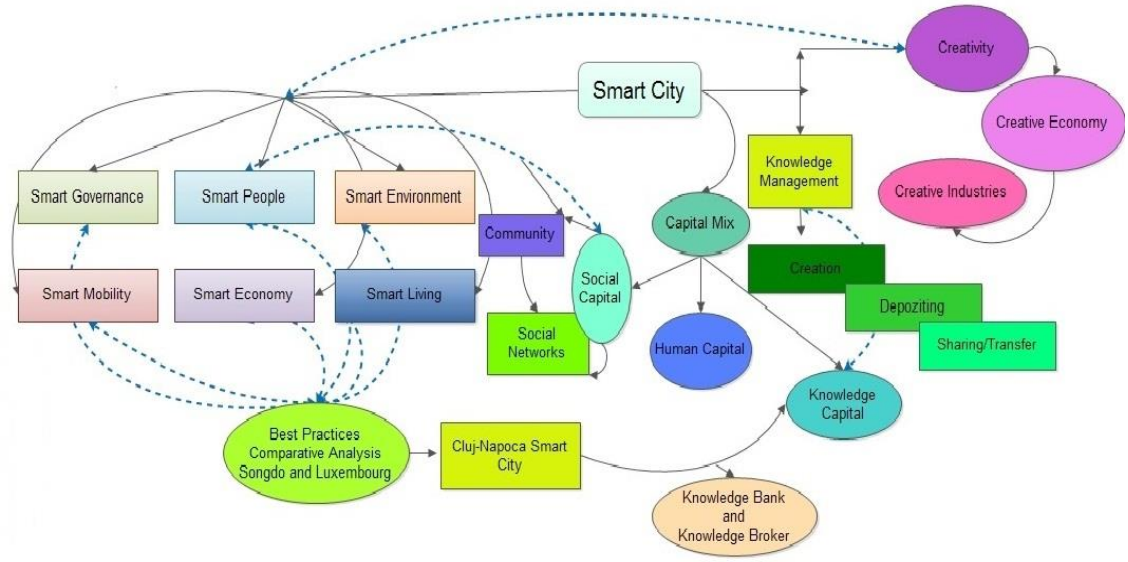

Figure 3. KBIM in Cluj-Napoca Smart City Mind Map

A solution might result from the partnership with the private sector. A knowledge broker would act as the means by which knowledge in the organizational culture of private firms could be harvested, processed and further transferred to universities. In their turn, universities would adopt the new knowledge and apply it in such a way in which it will influence the nurture of scientists.

This would come as a solution in the process of closing the gap between knowledge and action, and will link research results to policy and practice, as well as match some research portfolios to the needs of policy and practice, therefore the knowledge broker would act as a *catalyst* in this scenario (See Figure 3). Why are the knowledge bank and the knowledge broker useful for Cluj-Napoca's development?

- The knowledge broker has access to the knowledge bank where all the information coming from all the economic sectors is stored. Thus, for example, is has the expertise to make the proper correlation between market demand and educational supply. This is possible because both the private environment and academic field store their information into the knowledge bank.

- Having access to universities' data-base, it has information regarding the qualified human resources, it can develop a working force market plan, through which it can make suggestions regarding the human resource demand of the partner companies.

- Developing the human and social capital – human resource data-base can be elaborated, and so the information for all potential knowledge users would be gathered in one place and be available at all times.

- Knowledge provided by research would be easier to access, and in this sense, an interested party that needs expertise for a specific topic can contact the knowledge broker and the knowledge bank.

- Having knowledge, and therefore expertise, gathered in one place makes it easier and, at the same time, possible for experts in the academic field to offer suggestions and be more involved in the local administration activities (by offering consultancy).

Knowledge brokers can enable innovation because they have access to knowledge gathered from various territories. Beside this, they should increase the amount of knowledge by making connection with a wide range of industries by accepting to work on various problems and finding alternative answers for their previous solutions.

Knowledge distribution can be the most sensitive aspect of the knowledge management practice, and a very important one. Data is turned into information and in its turn it is turned into knowledge. Both individuals and institutions or organizations possess knowledge. And it is their "duty to further disseminate the knowledge they posses". But, in order to distribute it, we need to have an appropriate infrastructure; we need connections and therefore social networks. And here is where the knowledge broker steps in.

Knowledge brokering is a concept that regards people and makes possible the creation of productive and dynamic relationships. Knowledge brokering involves the nurture of relationships that would facilitate the movement of ideas. This process requires experts who can link the academic world with the world of decision-makers, policy setters and researchers. Knowledge brokering offers a path to improvement for every field. It provides the possibility of capitalizing on research and development with a vision in order to achieve redevelopment supported mainly by the available knowledge.

References

Andersson, D.E., Andersson, A.E., and Mellander, C. (2011). *Handbook of Creative Cities*. London: Edwar Elgar Publishing Limited.

ARUP (2010). *Smart Cities. Transforming the 21st century city via the creative use of technology*, 3.

CHSRF (2011). The Third Community: Knowledge Brokers, Research, and Policy. In S. Karner, H. Rohracher, B. Bock, F. Hoekstra, and H. Moschitz. *Knowledge Brokerage in Communities of Practice* (pp.14-15). Seventh Framework Programme, 5. Retrieved from http://www.foodlinkscommunity.net/fileadmin/documents/Common-contents/publications/D2.1_Synthesis_report_DRAFT_uploadHP_March2012.pdf.

Cluj IT. Retrieved from http://www.clujit.ro/en/about/.

Dincer, I., Midilli, A., and Kucuk, H. (2014). *Progress in Sustainable Energy Technologies* II. Berlin: Springer.

Jacobson, N., Butterille, D., and Goering, P. (2005). Consulting as a Strategy for Knowledge Transfer. In *The Milbank Quarterly,* 83(2), 299-321.

Magnuszewski, P., Sodomkova, K., Slob, A., Muro, M., Sendzimir, J., and Pahl-Wostl, C. (2010). Report on conceptual framework for science-policy barriers and bridges. Policy Science Interactions: connecting science and policy, 31.

Michaels, S. (2011). Matching knowledge brokering strategies to environmental policy problems and setting. *Environmental Science and Policy*, 12(7), 997-1011.

Roche, R., Nabian, N., Kloeckl, K., and Ratti, C. (2012). Are 'Smart Cities' Smart Enough?. Québec City, Canada. *GSDI,* 13, 14-17. Retrived from http://www.gsdi.org/gsdiconf/gsdi13/papers/182.pdf.

Shaxson, L., and Gwyn, E. (2010). Developing a strategy for knowledge translation and brokering in public policymaking. Montreal, Knowledge Translation and Brokering Workshop, 3. Retrieved from http://r4d.dfid.gov.uk/PDF/Publications/2010-11-16_knowledge-translation-and-brokering.pdf.

Sousa, M. (2008). Open Innovation Models and the Role of Knowledge Brokers in *Inside Knowledge Magazine*. Retrieved from

http://www.ikmagazine.com/xq/asp/txtSearch.business+intelligence/exactphrase.1/sid.0/articleid.EC1DF606-1E43-468C-AA32-314238647C07/qx/display.htm.

Steinert, K, Marom, R., Richard, P., Veiga, G., and Witters, L. (2011). Making Cities Smart and Sustainable. *The Global Innivation Index 2011,* 88.

Washburn, D., Sindhu, U., Balaouras, S., Dines, R. A., Hayes, N. M., & Nelson, L. E. (2010). Helping CIOs Understand "Smart City" Initiatives: Defining the Smart City, Its Drivers, and the Role of the CIO. Cambridge, MA: Forrester Research, Inc. Retrieved from http://public.dhe.ibm.com/partnerworld/pub/smb/smarterplanet/forr_help_cios_und_smart_city_initiatives.pdf.