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MANAGING EUROPEAN SUSTAINABLE CITIES

Abstract:

In this paper sustainable management of European cities in contemporary business environment is analyzed. Recognition of culture diversity and market responsiveness are of substantial importance for new context of urbanization. Economic cooperation among cities is executed in the framework of integrated strategic planning and upgraded sustainability principles. Global climate change and economic restructuring are becoming a wider concern for future cities development. Heterogeneous urban growth is the main constraint for demographic reforms. The focus is on creating management paradigm based on innovative business models, which describes how the ideas should be pursued in European urban settings. The management approach of flexible adjustments that influences the new strategic path development and modification of ongoing structural issues is observed. In order to fulfill the role of privileged location, sustainable city needs to intensify the flow of capital, goods, know-how and value. The paper emphasizes evolutionary concepts of urban transformation management. High prosperity and poverty reduction are highlighted in terms of social justice, geographical and inter-generational equity. The aim of making a “Fair Share” cities includes efficient waste management, energy supply and resource based decision making. The relationship between urban economic viability and patterns of green land investments is considered. Long-term prospects of European regional integration, along with urge for high edge city maintenance, are shown. Land use, access to services and population density present urban issues that indicate strong European commitment to form urban innovation areas. The paper sums up most significant advantages of European capital cities, that make them leaders in the global market.

Keywords:

sustainable cities; European management; urban ecology; economic efficiency; smart growth

JEL Classification: Q56, F63, M21

1. Introduction

Conditions of European environment create need for variety of city economic development paths. Main system structure involves stable management processes that drive urban change (Jenks, Jones, 2010). Complex networks are coordinated via diverse, knowledge-based innovations, that reshape governance structure in order to establish a wide range of adjustable control. Proximity to natural resources and availability of skilled labor force are obviously great comparative advantages of European cities. Third technological revolution generated dual benefit for optimal internal and external factors progress.

Strategies to promote sustainability are mainly location-based, so migration and settlement projections should also be involved in the analysis. The movement of people from rural areas to European megalopolises is forecast to have an decisive impact on future urbanisation. Risk of urban sprawl (also “horizontal spreading” or “dispersed urbanization”), defined as “uncontrolled and disproportionate expansion of an urban area into the surrounding countryside” (UNICEF, 2012), accounts as most significant challenge for sustainable cities to cope with. According to population size projections for the year 2015, European cities are not on the list of top 30 (excluding Paris, at number 26 with population of a 9.7 million citizens), which gives them certain stability against unpredicted deprivation of human needs (UN, 2001). Also by global urban population density European cities have impressive results, given the fact that first European city by population density (Genoa, Italy) is on 365th place in the world (Demographia, 2015).

The *raison d’etre* of urban mobilisation is vertical accommodation growth with respect to the eco-system. The key principles are: redress on spatial discontinuity, multiplicity of uses, multiple circulation system, balanced ecology and land economy (Yeang, 2011). Market relations, information technology, green space planning and global interactions are vital for living standard of so called urban dwellers. A dynamic reactive policy framework is needed for compact city coordination.

Considerable climate changes are expected, as global greenhouse gas (GHG) emissions increased 39% in comparison to pre-industrialization period. Because many European cities are industrial centres, damage from volatile organic compounds (VOCs) is highly realistic. That being said, controls over large environment disasters are in place through large combustion plants and waste incineration, covering emissions from more than 24,000 facilities (European Commission, 2010).

2. Economic and managerial aspects of urban ecology in European cities

Recent empirical studies show that economic development of highly populated areas is not always explicitly good for life quality consistency. Unmanaged services tend to form a negative economic spiral, which could improperly affect the entire city. The central issue that cities must confront is how intensive this development should be, concerning limited natural resources capability. Long-run equilibrium between economic growth and resource availability is a crucial task for sustainable city management. Causal relations of economic and population growth needs to be monitored. Non-European minorities comprise around 6% of residents in European cities, but they could reach 15% of the total population by the year 2025 (European Commission, 2010). Low fertility rates and diverse net migration indicate intensive changes in population origins.

This transnationalism calls for a new management paradigm, as free-movement labor market seeks for dynamic stabilization strategies. The vibrant demographic transition makes institutional engagement more complicated, which adds to the importance of self-sustainability. Although population density is not on a critical level, uneven population distribution is highlighted as a potential threat for further advancements. Namely, United Nations analysis forecasts that in the year 2050 83% of the European population is expected to live in cities, which is approximately 557 million people (European Commission, 2010). This is one of the reasons why it is necessary to implement adequate time-related factors into management. The city networks are seen as an optimal solution for geographical dispersity.

Ecological requirements are far more noticeable in metropolitan areas. Municipal solid waste characterizes urban consumption and product material flows. It is usually evaluated by life-cycle assessment, which is a comprehensive analytical tool to calculate environmental impacts of consumer products (Mazmanian, Blanco, 2014). Efficient trade-offs between economic growth and environmental quality are going to internalize costs of those firms causing the problems. Ecological dysfunctions are overcomed by production concentration, technologically advanced distribution activities and strategically oriented infrastructure models. Rapid transportation formation, waste disposal, renewable energy supply and polycentricity will eventually make a strong connection between suburbs and inner-city. Smart, sustainable city could also be described as an organic whole divided into network and linked systems. The new intelligence of the cities is made out of digital telecommunication networks (the nerves), ubiquitously embedded intelligence (the brain), sensors and tags (the sensory organs) and software (the knowledge and cognitive competence) (Chourabi, 2012).

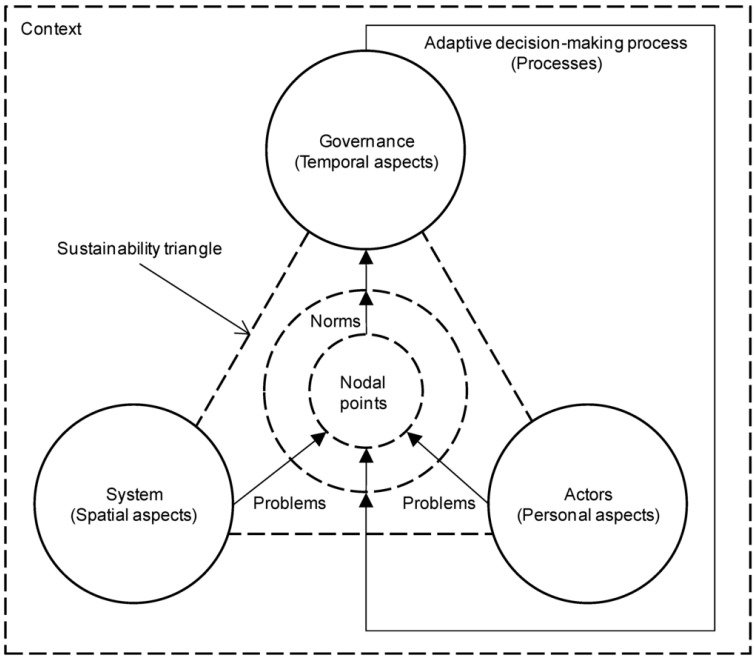
The tendency is not to raise energy consumption, but to make public transportation, buildings and waste streams far more energy efficient. Most of the European capital cities

have already achieved vast improvements in those segments, but more difficult question is if they are going to “spill off” their knowledge and wealth to other parts of the country. Partial answer could be found in the natural resource availability. Redesigning resource usage in European cities is done by nature centred urbanisation. Holistic approach replaces anthropocentrism in order to reduce negative externalities. This proved to be well-charted strategy, as it has considered external impacts (so called undifferentiated impacts) on city development (Haughton, 1997).

Smart city growth activities in Europe include brownfield redevelopment, targeted or cluster economic development, eco-industrial parks, creation of eco villages etc. (Portney, 2003). The desire for growth and local economic vitality keeps cities prepared for discontinuity periods. Reliable tax base and better business climate enforce a high level of financial activity. As a result of improved governance, exportation of ecological degradation to the Third World countries seems to be reduced in the previous few decades.

In Figure 1 five-dimensional sustainability model of governance structure with a wide range of causally linked controls is shown.

Figure 1 Schematic diagram of the idea of governance for sustainability



Source: Iribarnegaray, Seghezzo (2012), p. 2927

An array of options for environmental performance enhancement are at European citiy’s disposal. Some of them are:

- good policy reform governance;
- upfront investments in technology upgrade;

- encouraging local communities to actively participate in ecological initiatives;
- knowledge, culture and creativity building in order to associate them with the city's image;
- preservation of green infrastructure and transportation eco-system.

The treatment and disposal of waste in European cities are highly integrated. It reduces air and land pollution, loss of amenity, water intoxication, industrial $C0_2$ emissions, keeps biodiversity safe and increases general life quality. Recycling as a functional element of waste collection and transportation is without doubt a key competitive advantage of European cities in landfill and land spread waste removal. Highest recycling rates are in Austria (63%), Germany (62%), Belgium (58%), Netherlands (51%) and Switzerland (51%) (EEA, 2013). Great disparity is visible, as some of the eastern European countries still have very low recycling rates, with lowest in Romania of just 1%. The Austrian capital, Vienna, is an excellent example how effective waste management is conducted. On a year basis Vienna produces roughly one million tonnes of waste, from which 600,000 tonnes of residual and bulky waste are collected, along with 350,000 recyclable and biogenic waste in 19 collection centres and 112 stationary collection points (MA 48, 2013). Environmental awareness is managed via separate disposal of hazardous waste, encouraging individual eco-conscious behaviour. Finance are collected from property owners based on the volume of the residual waste (MA 48, 2013). Copenhagen, capital of Denmark, has an even bigger amount of waste per capita. Nevertheless, recycling facilities process around 500,000 tonnes of material each year, including more than 300,000 tonnes of construction waste using the windrow method (Williams, 2005). In Brescia, a city in Italy, a 260,000 tonne incinerator plant generates heat for the entire district system.

Urban transportation system is tightly connected to other spheres of city sustainability improvement. Transport in Europe came a long way from the neoliberalistic ideology of "welfare" economics and became maybe the most important drive for structural changes and efficient governance. Traffic congestion, bottlenecks and other barriers at internal transport markets are going to be regulated on the unified European market, that fully reflects the continents transport needs. High dependence of total European transport on oil products hit the high of 96% in the year 2010 (European Commission, 2011). Even though transport did increase energy efficiency, major fundamental reforms are needed in order to reach goal of limiting climate change below 2^0C.

A reduction of at least 60% of GHG emissions by the year 2050 with respect to the year 1990 is required from the transport sector (European Commission, 2011). Intercity travel will consolidate larger volumes of long distance transfers, which will help cut of negative externalities emission. Road decarbonisation implies the use of buses, rail and air transportation and multimodal solutions. Urban transport participates in a quarter of entire $C0_2$ emission and makes 69% of all road accidents (European Commission, 2011). The

successive substitution of conventional fuels with collective transport based on alternative energy sources, in conjunction with minimum service obligations, can lower traffic volume. Enhancement of cycling and walking should be integrated in urban mobility. A single European transport area includes technical, legal and administrative advantages for city cooperation. A mixed strategy of price formations, efficient public policies and infrastructure for clean vehicles should encourage “Urban Mobility Plans” as a necessity for EU-wide framework (European Commission, 2011). According to “Green City Index” first three cities in transport category are Stockholm (8.81 out of 10), Amsterdam (8.44 out of 10) and Copenhagen (8.29 out of 10) (Economist Intelligence Unit, 2009). Copenhagen is especially interesting representative of how well-managed strategic planning of public transport can lead to long-run sustainability. “Finger Plan” came up as an idea in the year 1939 and began its realization in the year 2007. Green spaces and urban areas are bound in slender fingers, as green wedges of undeveloped land remain between those fingers (Cahasan, Clark, 2006). Large office buildings are located at a distance of max. 600 metres from public transport stations. This outstanding city structure will foster nature and boost the city’s economy on a global scale.

Social justice and economic equity are multi-dimensional indicators that inevitable show successful empowerment of sustainability. Urban poverty in European cities is proportionally minimized in terms of elimination of durable low housing standards. Dynamic definition brought up new multicriteria evaluation, that includes not just the satisfaction of basic needs, but also democracy level, reliable security system, equal opportunities, social innovations etc. Social cohesion at local level is important considering variations of city’s neighbourhood attractiveness. The conventional form of poverty is rearranged with the appearance of unequal wealth distribution. In the year 2007, 17 out of 100 families in Europe were considered at risk of poverty. (European Commission, 2011). Projections suggest that urban poverty data will fall down, as low-income residents are replaced by wealthier inhabitants in a process called *gentrification*. Socio-demographic issue of *gentrification* is significant for European historic city centres. Capital city of the Czech Republic, Prague, is one of the most valuable world’s historical cities. Functional conversion to business and administrative centre in the historical core of Prague, as well as a continually growing number of tourists, threatens to destabilize migration patterns. Paradoxical situation of residentials enforced to leave centre in order to satisfy their needs defines these occurrences as an alarming one. Sustainable transformation management is an essential tool to put an end to social degradation of the city centre. Turbulent and unequal development of Prague after the year 1990 can be administered with disruptive management approach, as more inhabitants become weakly rooted in their territory (Burcin, Kučera, 2000). In the agglomeration of Warsaw, for example, population ageing is marked as a persistent problem. Thus, intensified land use will increase job opportunities and create a morphological character of city urbanisation. Socio-spatial segregation and polarisation will ultimately lead to advanced functioning of Warsaw’s city centre in a free-market economy (Malasek, 2012). Urban regeneration and

district similarity ranked Rotterdam as number one city by social sustainability index (ARCADIS, 2015).

Energy efficiency and energy intensity are becoming key aspects of managing sustainable European cities. High estimates scenarios of “Business as usual” model, developed by *Intergovernmental Panel on Climate Change*, predict rise of global temperature up to 6 ^{0}C (IPCC, 2014). Information that more than 500 gigatonnes of global negative externalities have been emitted from industrialisation period shows the danger for environmental surroundings. In table 1 CO_2 quantity emission per capita in the European Union is pointed out.

Table 1 Categories of final energy consumption and associated emissions.

Category definition	Energy consumption (GJ/ capita/year)	CO_2 emissions at current global average energy mix (tCO_2/capita/year)
Basic human needs: 100 kWh + 100 kg oil/capita/year	5	0.41
Productive uses: 750 kWh + 150 kg oil/capita/year	10	0.83
Modern society: 2000 kWh + 375 kg oil/capita/year	25	2.1
EU average	75	6.2

Source: (Chakravarty,Tavoni, 2013), p. 70

As seen from table 1, EU average of energy consumption is way above modern society needs. The energy convergence is urging for substitution of traditional sources with nature preservation renewables. Policy reforms had an major impact on energy sector restructuring, where the “Renewable Energy Directive 2009/28/EC” plays a key role. The goal is to reduce even more than 20% of CO_2 emissions in European cities till the year 2020 by accepting unified, EU centralized “Sustainable Energy Action” plans. Realization of green mobility and building sustainability is going to dictate the course of the city’s development. The European Commission supports city governments in eliminating carbon emissions by forming powerful capital funds. The large amount of assets are available through European cohesion funds, particularly European regional development fund (ERDF) and European social fund (ESF). From the year 2007 till the year 2013 ERDF invested in sustainable development of London 182 million EUR, which should use one half of electricity from renewable source till the year 2030. The single European energy market will make a positive effect on many missing infrastructural links and on cross-city electricity trade, which adds to market stability.

The city of Oslo is also called the “green city”. With its global commitment to increase energy efficiency through local proactive strategies, Oslo has become a leading city in

GHG emissions reduction. The target of eliminating all fossil fuels from private and the district heating systems seems very realistic. The project “intelligent street lightning” in Oslo had an major influence on energy consumption reduction of impressive 62% in the last decade. Procurement of cars in Oslo also must fulfill strict environmental requirements, which are going to reduce CO_2 emissions by 690 tonnes in a next 3 year period (ICLEI, 2014). Strong support comes from domestic market of Norway, as it efficiently exploited almost 99% of its hydropower sources. The same case is with Denmark, from which advanced tax support model of fixed subventions can be implemented in most of the European cities energy supplies. Bucharest, the capital city of Romania, is making its way into new sources of electricity by restructuring the entire energy sector. Green certificates usage had an positive effect on energy poverty reduction in Bucharest, as it fell down to 54.2% in 2009 from previous 61% in 2007 (Mîşlea, Leca, 2013).

Building energy efficiency is a vital part of urbanisation and the redistribution of inner city wealth. Residential house stocks in European sustainable cities are rapidly decreasing energy consumption as they turn to renewable energy sources. Berlin has made most positive progress and is ranked first by building sustainability index. Berlin outperforms by far other cities as it has reduced energy usage from 150 kWh (kilowatts per hour) to 80 kWh per year per square metre (Economist Intelligence Unit, 2009).

3. Smart European cities as hubs of economic and culture activities

Cities have always been important centers of human activities and they defined the progress of humanity since early times. Even the definition of civilization is tied to existence of cities as permanent human dwellings where most of the residing people do not produce food (Kagan, 2007). Today more than half of all the humans live in cities. The density and huge numbers of people living in cities coupled with diversified, sophisticated cultural, economic and social needs present major challenge for sustainable development of cities and hence our Western civilization. Historically major global cities such as London in UK have succeeded in overcoming barriers to growth, famous air pollution of 19th century London being a good example. Challenges that emerge nowadays are more complex and demand new approaches and sophisticated solutions.

Smart city concept has been proposed in many different ways as a solution for growing number of problems urban development worldwide is facing for almost two decades now. The propositions of smart cities have been diverse and change over time too. The term itself was first used in last decade of 20th century and focus was on importance of information and communication technologies – ICT in the context of urban infrastructure (Albino, Berardi and Dangelico, 2015). As new propositions for smart cities emerge over time the soft aspects of the concept gained importance. The ease of use and availability

of city services and their sustainability are some of the focal points of smart city definitions nowadays. Also oftentimes availability of big data collected ubiquitously in the smart city and existence of sophisticated analytical systems are defining smart city concept. Finally, enhanced possibilities for business and human communication are proposed as a major hallmark of a smart city.

In order to function properly a smart city needs resources and infrastructure. Set of needed inputs for a smart city include: natural resources and energy, transport and mobility, buildings, living government, and economy and people (Neirotti, et al., 2014). But even more importantly the strategies for transformation of traditional to smart cities need to be in place (Letaifa, 2015).

Continuing importance of ICT in smart city development is best illustrated by crucial role the Internet of things – IoT that is a prevailing concept in contemporary ICT have for conceptualizing and practical implementation of smart cities worldwide (Jin, et al., 2014). Application of IoT concept can provide in practice the sought for reality of smart cities, making them knowledge-intensive, innovative, and intelligent cities (Komninos, 2015).

Once the basic concept of a smart city is implemented in reality the role and importance of creativity and leadership for enhancing smart city features and especially for building improvements based on smart city concept infrastructure in various economic fields of activities, becomes crucial along with insights in contemporary and future workforce skills and knowledge becomes essential. Second machine age that brings automation in the field of intellectual work releases human work force from some more cumbersome and repetitive intellectual activities and create more time for creative work and innovations (Sofronijević, Milićević & Ilić, 2012). In order to advance all the possibilities created by smart city existence appropriate use of human and machine labor needs to be implemented with humans and machines collaborating and not competing.

With IoT implemented in the core of a smart city new possibilities and challenges emerge. Big data that are collected by ubiquitous technology of such smart city provide possibilities for smart urbanism and enhance entrepreneurship, innovation and creativity. All of this creates the rising need for novel concepts and insights such as: the politics of big urban data, technocratic governance and city development, corporatisation of city governance and technological lock-ins, buggy, brittle and hackable cities, and the panoptic city (Kitchin, 2014).

Implementation of smart city concept allow for further improvements in various fields of economic activities where ICT and technology applications create basis and soft knowledge factors start to rise in importance. Illustrative of this approach is conceptualization of smart tourism destination and proposition that leadership, innovation, and social capital supported by human capital are core resources in building these enhanced tourist hubs (Boes, Bujalis & Inversini, 2015).

4. Conclusion

Empirical analysis shows that there is great intensity of sustainable development in European cities. Major parts of governance structure are disposed in professional and environmentally oriented manner. Diverse cultural, social and economic framework seeks for an optimal management solution that is standardized on European Union level. Various strategies indicate that urban sprawls challenges are going to be reduced by integration management. Dynamics of demographic and regional transitions demand advanced business processes relied on free labour market. Population size and population density forecasts of European cities are marked as comparative advantages in the contemporary global environment. Time speed flexible adjustments proved to be adequate for unequal economic distribution. Glocalization, as an adaptation of service and goods for each market specifically, created European economic aggregation.

Efficiency and competitiveness were already at peak level in western European cities. On the other hand, Eastern Europe countries faced regional integration obstacles and market liberalization difficulties. A crucial task for future sustainable development should be how to link those cities together with the view of making new modern urban agglomerations. Scientific studies presented in this paper signify the holistic integration approach and put the emphasis on the ecological system formation. Based on contemporary sustainability indicators and successfully accomplished management strategies, it is concluded that European cities will remain one of the leading sustainable urban areas of the world.

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